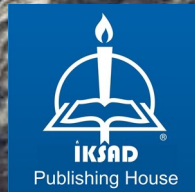


# EXPERT SYSTEMS APPLICATION TO THE TOURISM SECTOR IN TÜRKİYE

Mehmet Nuri ÖDÜK



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USA: +1 631 685 0 853  
E mail: iksadyayinevi@gmail.com  
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## **PREFACE**

Throughout history, humanity has attempted to understand the universe and nature. However, people continue to find new clever and controllable ways to make their lives easier. Artificial intelligence has begun to develop in the world and in our country.

The subunit of artificial intelligence is the expert system. An expert system requires the help of experienced people in the field to solve problems. In expert systems, it aims to imitate the knowledge of experts in solving special problems in their own fields.

The tourism sector, where businesses that can see and implement change in changing world conditions and have a vision of managing the future are at the forefront, is a sector that has to keep up with competition that is becoming increasingly aggressive and sharp.

It is very difficult to make a system analysis in the tourism sector, which is quite complex and affected by different factors. It seems appropriate to use expert systems in modeling these multifunctional systems. In this study, modeling of expert systems in the tourism sector is shown theoretically and in practice.

Hoping readers benefit from it,

Mehmet Nuri Ödük  
Konya -2024

**I present this book to my beloved father, Yaşar ÖDÜK, who died in 1992.**

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## **1. INTRODUCTION**

In our book, the aim is to determine the demands of local and foreign tourists with the help of technology. Thanks to this, the problem of increasing tourism revenues in Turkey will be eliminated. In our book, firstly, the definition of tourism, its importance and the definitions of the types will be determined. Then, the historical development of tourism in Turkey will be examined. The increase in local and foreignization will increase through expert systems. Thanks to this system, the incomes of diversity will increase.

For this purpose, the importance of the study will be explained in the first chapter. In the second part, concepts related to tourism, their importance and types will be explained. In the third part, the historical development of tourism in Turkey will be explained. In the fourth chapter, the application of expert systems will be explained. In the fifth chapter, the design of the tourism and expert system will be included.

Serious research has been carried out in the field of artificial intelligence since the 1950s. All of these technological developments have begun to be used in our lives. Artificial intelligence has developed as a sub-science of Computer Engineering. Artificial intelligence is used at every stage of life. One of the largest and most advanced subsections of artificial intelligence is the Expert system, which is a plan developed like programs that try to do the job of an expert. The expert system differs from the traditional model in terms of design. In this respect, it is easier to learn how the Expert system is designed. There are many publications in foreign languages on expert systems. It includes research books and articles. Fuzzy logic is a good method used in real estate valuation. Our aim here is to prove that the expert system is applicable in the field of tourism, as in every field. We expect our book to be useful to people working in the fields of computers and tourism.



### **1.1. The Aim of the Study**

Scientists are trying to develop intelligent algorithms and hardware that imitate human mental functions in order to give computers intelligence and thinking ability. These studies are called "artificial intelligence" studies (Penrose R, 1998).

Especially, our country's biggest income is tourism. To offer the best options to tourists coming from abroad. It will advertise for free to tourists leaving our country. Thanks to this, our country's income will in One of the most important priorities of companies is to ensure accurate measurement of their financial performance. For an accurate and reliable financial performance measurement, the information obtained from financial statements must be objective. In addition, it should be determined in advance which analysis will be applied to the information obtained (Kınalı, 2022). The suitability of using expert systems in making these analyzes in the tourism sector was investigated in this study. crease.

### **1.2. Importance of the Study**

Nowadays, computer technology has developed rapidly. Some operations that people can perform in their dreams can now be performed by computers much faster and more accurately than humans.

Computer is divided into two parts: software and hardware. Software are programs used in the operation of the physical structure called hardware. While software developed until recently was used to carry out well-defined routine operations, today it can replace humans in some decision-making and automation tasks (Babalık A, 2000).

Artificial intelligence; It can be defined as directing computers to perform human mental functions. When artificial intelligence techniques are examined, it is seen that not only the human thought

and biological system are imitated, but also the techniques that are tried to be imitated in other living creatures (Akyol, et.al., 2009).

The most widely used artificial intelligence techniques in today's technology are artificial neural networks, fuzzy logic, genetic algorithms, artificial immune system, ant colony algorithms and expert systems (Ödük and Büyükkaracıgan, 2013).

### **1.3. Source Research**

The concept of artificial intelligence has a deep-rooted history. Humanity's thoughts and research on artificial intelligence date back thousands of years. However, the modern development of artificial intelligence emerged in the 20th century. The modern era of artificial intelligence began in the 1950s with Alan Turing's question "can computers think?" It started with the question (Say, 2021).

The Dartmouth Conference, held at Dartmouth College in 1956, was accepted as the groundbreaking ground for artificial intelligence. At the conference, studies on mathematical and symbolic methods of artificial intelligence were discussed (Haugeland, 1985).

Logic Theorist, one of the first programs of artificial intelligence, was developed. By laying the foundations of expert systems, studies have been carried out in the fields of language processing, problem solving and learning (Newell & Simon, 1956).

The development of expert systems accelerated in 1970, and an expert system called MYCIN achieved great success in making medical diagnoses. Advances have also been made in the areas of pattern recognition and image processing. In the 1980s, research on methods such as artificial neural networks and deep learning gained momentum, and artificial intelligence attracted attention with its ability to beat opponents in computer games (Winston, 1992).

Database research and commercial applications of expert systems, further advanced by artificial intelligence, statistical methods

and machine learning, also increased during this period. With the developments in fields such as big data analysis, deep learning and object recognition in the 2000s, artificial intelligence has become even more popular and with the spread of the internet, big data sources and data analytics have increased the power of artificial intelligence (Metsker et al., 2019).

Artificial intelligence studies gained great momentum in the 2010s, and techniques such as deep learning and artificial neural networks enabled artificial intelligence to break new ground in many fields. Larger data sets and more powerful computational resources have allowed deep learning models to produce more complex and impressive results (Ödük and Büyükkaracıgan, 2022). IBM's Watson computer achieved great success by competing with human competitors in the television competition Jeopardy, and this success was an important milestone that demonstrated the natural language processing and information acquisition capabilities of artificial intelligence (Kelly, 2017).

Subsequently, an important step was taken in the development of facial recognition technologies, and the DeepFace model developed by Microsoft demonstrated the ability to recognize faces in photographs with human-like accuracy (Wang & Deng, 2021).

Then, the artificial intelligence program called AlphaGo, developed by Google, made a big surprise by defeating the world Go champion in the game Go, an extremely complex strategy game (Curran et al., 2020).

With the rapid development of artificial intelligence in recent years, artificial intelligence applications have become widespread in autonomous vehicles, virtual assistants, recommendation systems, smart home technologies and many other areas (Büyükkaracıgan, 2021). Today, artificial intelligence continues to develop at a rapid pace. Machine learning, deep learning, natural language processing,

image processing and similar techniques are constantly expanding the capabilities of artificial intelligence (Zhou, 2021).

Machine learning is an important subfield of artificial intelligence that includes techniques that enable computer systems to gain the ability to learn based on data. Machine learning identifies patterns in data through the use of statistical models and uses these patterns to predict future data or make decisions (Alpaydın, 2014).

Deep learning is an important subfield of artificial intelligence and is a learning method based on artificial neural networks. These neural networks are designed inspired by biological nervous systems. Each layer receives input data, processes this data through the neurons within it, and transmits the results to the next layer. In this way, the network gains depth. Unlike traditional machine learning methods, deep learning automatically extracts features during the data-based learning process. Instead of manually defining the features used to perform a specific task, the deep learning algorithm itself learns the features from the data (LeCun et al., 2015).

Another important area of artificial intelligence is natural language processing. This field includes techniques that enable computer systems to understand, interpret, and produce human language. Natural language processing extracts meaning by analyzing text-based data, applies grammatical and semantic rules, and performs text-based tasks. In this field, there are applications such as automatic text translation, text classification, extracting meaning from text and speech recognition (Liddy, 2001).

Artificial intelligence is used in healthcare, automotive, finance, manufacturing, retail, service sector and many other areas. The potential of artificial intelligence is vast and developing rapidly (Akyol et.al, 2011). There are constant innovations in areas such as image and sound recognition, natural language understanding and

production, emotional analysis, robotics and virtual reality. Artificial intelligence also works in an integrated manner with many technologies and sectors such as big data analysis, internet of things (IoT), gaming industry, and security systems (European Commission, 2018).

## **2. CONCEPTS USED IN THE TOURISM SECTOR**

### **2.1. Definition of Tourism**

Tourism activities, which are considered as old as human history, have reached huge dimensions today. Tourism is defined as the science, art and trade of attracting tourists and providing services. It is a field that develops investments and business volume, creates income and provides foreign exchange with its large dimensions at national and international levels. It has gained a quality that opens employment areas and performs important social and human functions affecting social and cultural life (Küçükaslan, 2006).

The origin of the concept of tourism is the Latin word *tornus*, which expresses the rotation movement. The English words *touring* and *tour* are also derived from this word (Ünlüönen et al., 2007: 16).

There were many definitions about tourism towards the end of the 19th century. The first definition of tourism was made by Guyer-Feuler in 1905. In this definition, tourism is the desire to know the increasing weather change and rest needs, the dazzling beauties nourished by nature and art. It is the happiness of people, trade, developments in industry and the perfection of transportation vehicles. It is a phenomenon specific to the modern age, based on the belief that it provides the inclusive rapprochement of nations and societies (Kozak et al., 2001).

Tourism gained importance especially after the Second World War and began to attract increasing attention as a developing social and economic event (Bayer, 1992).

Tourism is the whole of economic and social events and relationships that arise from temporary travels and accommodations that exceed twenty-four hours or consist of at least one overnight stay, outside the place of permanent residence, for reasons that are not based on commercial gain (Usta, 2002).

In today's dynamic industrial environment, where competition is at its highest level, businesses must constantly renew themselves and focus on performance-enhancing key success factors in order to catch the difference and stand out at least one step ahead of other businesses (Kurşunmaden, 2007). Businesses in the tourism sector also have to cope with these competitions.

## **2.2. Definition of Tourist**

Tourists are directing by participating in tourism activities. They are those who temporarily leave their permanent residence, travel and stay for the changing parts of commercial income; they are those who seek economic satisfaction. They can also change as people who consume with limited spending power and time (Usta, 2002: 10).

Ünlüönen et al., (2007: 20) listed the characteristics of tourists as follows;

- A tourist is a person whose main purpose is to provide psychological satisfaction, who does not intend to make a profit through the production or sale of goods and services during his travel, who is an economic consumer and has a normal level of financial power but has limited time.
- A tourist is a person who wants to return extremely satisfied from the place he went to.
- Most tourists are not looking for adventure. They expect everything to go well. Disruptions bother him a lot.
- Tourist's time is very valuable. He wants to see the most places in the least amount of time, get the most benefit, and have enough fun and rest.

## **2.3. Tourism Importance**

The importance of tourism is increasing in the world. It has also reached very large dimensions. It can directly and indirectly respond

to the physical, social and psychological processes of people for a certain period of time (Usta, 2002: 2).

Tourism is a sector that contributes to the national economy by increasing foreign exchange income and providing employment (Çımat and Bahar, 2003:2).

Tourism increases the amount of demand for various sectors. The increase in demand enables the establishment of new business lines and the capacity of existing ones to be increased. It increases the income level of the people, increases the amount of production and consumption, creates new job fields and ensures a balanced distribution of income. It contributes to the development of regions outside industrial centers, increases the amount of foreign currency entering the country, and contributes positively to the balance of payments. Tourism has a great place in terms of economic development, production and use of resources (Sezgin, 1995: 35-36).

## **2.4. Tourism Types**

Tourism is divided into two types according to the desires of the customers. These are traditional and alternative tourism.

Vacationing only by benefiting from the trio of sea, sand and sun is called traditional tourism, while tourism types that are done for purposes other than swimming and sunbathing are called alternative tourism (İnce and Duman, 2007: 79).

### **2.4.1. Traditional Tourism**

Traditional tourism is also called 3S (sea-sand-sun) in English. These consist of the sea, sand and sun trio. It is one of the most important elements of tourism activities and has led people to participate in tourism activities for many years (İnce and Duman, 2007: 82).



Tourism in Turkey has focused on coastal tourism for many years. The fact that local and foreign tourists generally spend their holidays on the Aegean and Mediterranean coasts has led to traditional (sea-sand-sun) tourism coming to the fore (Kozak and Kayar, 2007: 65).

Traditional tourism has served as the locomotive of tourism resources in Turkey and has been fulfilling this duty for years. It has been the first emphasized source in creating tourism policies and marketing the country's tourism. It is expected that traditional tourism will continue its existence in the developing tourism market for a longer time (Eraslan et al., 2010: 72).

However, there are many destinations around the world with touristic products based on the sea-sand-sun triangle, and this type of tourism can be easily substituted. This situation leaves countries that cannot differentiate their products in tourism weak in terms of competition. The tendency towards extensive holiday tourism in Turkey and the world causes the inability to benefit sufficiently from natural, cultural and archaeological values other than sea, sun and sand.

In the international tourism market, where needs and expectations change rapidly, Turkey's ability to turn its potential into an advantage depends on its ability to diversify its tourism activities (Hacıoğlu and Avcıkurt, 2008: 3).

#### **2.4.2. Alternative Tourism**

All types of tourism performed other than traditional tourism activities are called alternative tourism (İnce and Duman, 2007: 82).

Developing countries can only increase their share of the tourism market by diversifying the tourism services and products they offer. Diversification of tourism services and products means ensuring the development of alternative tourism activities. Countries that

develop alternative tourism activities can be strong against their competitors (Öztürk and Yazıcıoğlu, 2002: 184).

The reasons for the emergence of the concept of alternative tourism can be listed as follows (Kiper, 2006: 1).

- Changes in tourist demand,
- To reduce the concentration in countries and tourism enterprises at certain times of the year and in certain regions of the countries, and to spread tourism throughout the year and throughout the country,
- To make positive contributions to the balance of payments of countries with the tourism revenues they obtain by accepting more tourists,
- Trying to eliminate the development differences between regions by creating demand for the region with alternative tourism types to be developed according to the existing touristic supply potential in the regional area throughout the country,
- The desire to create new tourism areas in the country, to protect some areas and to use the existing tourism supply in an efficient and balanced way,
- Not to interrupt the workforce in tourism businesses that will operate throughout the year due to the labor-intensive nature of the tourism sector, but to create additional workforce opportunities,
- To encourage new tourism investments in different regions of the country with alternative tourism types.

#### **2.4.2.1.Sports Tourism**

Today, sports are accepted as an element of healthy life. Sports tourism is gaining importance day by day, the Olympics and

international sports events cause thousands of people to travel (Usta, 2002: 19).

Sport and tourism are often inseparable and give the impression that they are identical. However, sports do not arise directly with tourism, that is, when there is no change of venue in sports, it does not constitute tourism. When sports and tourism meet in time and space, they become identical. Both activities take place in free time (Batman and Eraslan, 2007: 199).

Sports tourism aims to participate in travel directly for sports purposes. Especially in some destinations, people who participate in similar sports activities, especially water and mountain sports, are interested in sports and are associated with sports; It is defined as the type of tourism created by people who act to participate in or be spectators of sporting events and Olympics (İçöz, 2005: 27).

Sports tourism includes nature sports, winter sports, water sports and passive-based tourism.

Under the name of nature sports tourism, there are nature sports consisting of sports activities such as mountaineering, nature walking, horseback riding, hiking, cycling, golf, jumping, orienteering, grass skiing, paragliding, paintball, hunting and caving. Among the winter sports, we can count skiing, snowboarding, ice skating and ice hockey. Water sports; It is defined as sports tourism types mostly for recreational purposes carried out on rivers, lakes and seas. This type of tourism includes river sports tourism, rowing, water skiing, underwater diving, surfing, sailing and swimming (Batman and Eraslan, 2007: 211).

Passive participation sports tourism, on the other hand, is a sports tourism activity that includes events such as international organizations, especially the Olympics, football, tournaments and indoor sports (Batman and Eraslan, 2007: 214).

Football can be classified as Olympic sports, tournament sports and nostalgia sports.

#### **2.4.2.2. Marine Tourism**

Marine tourism is basically cruise tourism and yacht and boat tourism.

Cruise tourism is the type of tourism that visits the ports on the tour route for entertainment and familiarization purposes during a tour in which the ship itself is among the main targets of the trip, thanks to the sports, fitness, entertainment and cultural activities offered to the passengers on the ship.

Travel starting from a certain destination is made between certain ports and activities such as Sea Tourism, Cruise Tourism, Yacht and Boat Tourism, transportation and accommodation of the participants before and after the trip, daily tours in some of the ports, and nature sports can also be included (Yücel, 2007: 96).

Yacht tourism is; It is all the touristic activities that take place between the tourist reaching the yacht and leaving the boat at the end of a certain excursion.

Yacht tourism, which started with the marketing of Datça, Gökova and Hisarönü bays by Greek yacht operators towards the end of the 1970s, started to develop rapidly after the Tourism Incentive Law, which came into force in 1983, led to the change in the Cabotage Law No. 815 (Kozak et al., 2001). :21).

#### **2.4.2.3. Gastronomy Tourism**

Gastronomy is better known as the art of cooking and eating well (Kivala and Crotts, 2006: 354).

Gastronomy tourism can be defined as visiting special destinations, food exhibitions, food festivals, restaurants and wineries for the main purpose of tasting food and beverages and gaining experience in this regard (Yurtseven, 2007: 258).

One of the important factors for tourists to visit a country is the culinary culture of that country. In each country's cuisine, the preparation and cooking of food and the tools and equipment used vary (Pekyaman, 2008: 19).

Food is one of the most important elements that positively affects the image of the destination. Additionally, kitchens are branded with the names of nations. For example, cuisines such as French Cuisine, Italian Cuisine, Mexican Cuisine, Turkish Cuisine, Greek Cuisine play an important role in the tourism image of countries and provide a synergistic effect (Yurtseven, 2007: 258).

#### **2.4.2.4. Faith tourism**

The type of tourism that people create by traveling outside the place where they live, in order to realize their religious beliefs or to see faith attractions, by taking advantage of tourism enterprises, is called religious tourism ([www.kultur.gov.tr](http://www.kultur.gov.tr), 2010).

In Islam, Mecca and Medina are important cities. In Christianity, Jerusalem, Rome and Ephesus. In Judaism, Jerusalem is the most visited center as a holy place.

Especially in Islam, the religious observances performed in the city of Mecca during Eid al-Adha and the obligation to visit the Kaaba cause Saudi Arabia to make great profits from pilgrimage revenues. Jews visiting the Wailing Wall in Jerusalem on Christmas and Christians' Christmas worship in the Vatican, which lasts a week starting from December 24, cause these places to receive a heavy influx of visitors, especially during these periods (Sargın, 2006: 3).

#### **2.4.2.5. Nature Tourism**

Tourism movements to destinations whose nature is intact or whose protection is taken care of (Saydan and Küçükaslan, 2007: 112) are grouped under the name of nature tourism. It is possible to classify nature-based tourism activities, which are seen as an important branch

of alternative tourism, as tent and caravan tourism, plateau tourism, ecotourism and leisure tourism.

Tent and caravan tourism is a type of tourism that pays attention to the controlled use of a completely natural structure with unique vehicles and equipment and highlights individual preferences. It is possible to divide camping-caravan tourism into camping and caravanning. Tent tourism is mostly done in camping, and caravan tourism is mostly done in caravanning (Saydan and Küçükaslan, 2007: 118).

Another type of tourism is plateau tourism. As a natural result of the fact that people living in big cities today prefer to escape from the noise of the city and prefer quiet places with natural beauties, the plateaus have a wide variety of vegetation, forests, crater lakes, rivers, streams, historical places, especially in contrast to the hot and humid weather of the holiday resorts on the coastline. These regions become centers of attraction due to their cultural and archaeological values, mountain and nature walks, rafting, winter sports, hunting and sports, angling, grass skiing, healing waters, plateau festivals and handicrafts (Kozak et al., 2001: 26).

Plateau tourism; It creates a great tourism activity if used integrated with other types of tourism such as hunting, hiking, thermal, winter sports and mountain tourism (Tunç and Saç, 1998: 30).

Ecotourism was developed as an alternative to mass tourism. It includes rural and cultural tourism elements. It is expressed as the most suitable type of tourism that can be developed in natural and cultural areas (Kuter and Ünal, 2009:146).

Nowadays, the activities that people do in order to relax, have fun and satisfy their hobbies in unspoilt natural places intertwined with nature are defined as ecotourism. Among these, canyon walks, alpinism, trekking and hiking, caving, angling, bird and plant

observation activities are the most popular activities, especially among nature-loving tourists, and are becoming increasingly important today (Gülüm and Torun, 2008: 111).

Travels made for the purpose of resting during annual holidays or short-term free time are included in the scope of leisure tourism (Toskay, 1989: 156).

Sun-sea-sand activities constitute the basis of tourist activity, especially during summer holidays. Recreational tourism is carried out in a clean environment and in minimum standard accommodation facilities. Holiday villages in mass tourism were born from this idea (Bayer, 1992: 23).

#### **2.4.2.6. Entertainment Tourism**

Entertainment tourism is a type of tourism whose main touristic activity is within the scope of the entertainment industry. In general, any of the tourism activities has a direct or indirect purpose of entertainment. However, entertainment tourism appears as a branch of tourism that serves the purpose of entertainment entirely, includes products and services to meet the need for entertainment, and requires specialization in entertainment (Baş and Kutukız, 2007: 186).

Entertainment-oriented establishments and activities in tourist centers have a special attraction power. Disneyland in America, Tivoli entertainment center in Denmark, theatres, ballet shows, night clubs and game halls in some big cities constitute important sources of touristic attraction with their entertainment opportunities (İçöz, 2005: 47).

#### **2.4.2.7. Culture and History Tourism**

Cultural tourism is the travel of people from their current location to gain new information, gain experience and meet their cultural needs (Richards, 1996: 24).

Gülcan (2010: 102) defines cultural tourism as a type of tourism that is carried out for the purpose of seeing the tangible and intangible values of contemporary and past cultures and obtaining information and experience about them, and consists of direct and indirect activities depending on the purchase of related products and services. .

The beginning of tourism does not begin with holiday tourism, but with cultural trips realized with the instinct of knowing the unknown, seeing the unseen and learning (Çulha, 2008: 1827).

Since ancient times, human beings have traveled under the influence of various factors such as religion, war, conquest, trade, migration and curiosity. Authors who examined these factors placed culture at the top of the list of reasons why people travel (Dinçer and Ertuğral, 2000: 69).

#### **2.4.2.8. Business and Shopping Tourism**

Business tourism, which developed rapidly in the 1980s, continued its development in the 1990s with the increase in national and international economic activities. The intensification of economic relations in the world causes millions of people to travel for business purposes (Usta, 2002: 13).

Business tourism is a very important type of tourism. That is, the spending tendencies of those participating in business tourism are higher than holiday tourists. Thus, thanks to business tourism, the income of accommodation, transportation and other tourist service providers increases. Although holiday travel is generally done in the summer months, business tourism can spread throughout the year. Since business tourists are more educated and have more money than holiday tourists, they can contribute to the social and cultural development of the regions. In addition, the trips that companies can make to reward their employees and provide training also contribute



to the development of the package tour market (Güner, 2007: 227-228).

Shopping and tourism are an inseparable whole (Hsieh and Chang, 2006: 139). Shopping serves tourists to have something that belongs to the emotions and memories obtained from past experiences (Güner, 2007: 233).

Geuens et al. (2004: 616-617) evaluated tourists' shopping decisions in functional, social and experiential dimensions. According to this; The most important factors in functional decisions are that the product has a good price, is useful, has a wide variety of products and has good quality. Social shopping decisions include reasons such as communicating with other people with similar interests and communicating with sellers. What is important in experiential decisions is the environments that provide new and entertaining experiences.

#### **2.4.2.9. Congress and Meeting Tourism**

A congress can be defined as an event whose subject, date and content have been previously announced with a program (Arber, 2008: 8).

Congress tourism, on the other hand, is a tourism activity that arises when people come together to exchange information on certain subjects in academic fields or professions that require expertise, outside the places where they constantly stay or work (Kara, 2007: 244).

Congress tourism is called MICE tourism in foreign literature, consisting of the first letters of the words meetings, incentives, conventions and exhibitions. MICE tourism is a multifaceted industry and requires many different activities. These activities are as follows (Mistilis and Dwyer, 1999: 57):

- Domestic and international transfer services

- Accommodation services
- Tour opportunities before and after the event
- Building special venues for congress tourism
- Professional conference and exhibition organization services
- Food and beverage services
- Social programs for participants
- Technical support to provide visual and audio services
- Exhibition facilities to display products.

As can be seen, congress tourism is a sector that triggers many sub-sectors, has high added value and a wide employment area. It also contributes to the improvement of infrastructure in places where congresses and meetings are held. Congress tourism, which is of great importance in terms of socialization and development, is also a good promotional tool (Kara, 2007: 248-249).

#### **2.4.2.10. Health tourism**

As can be seen, congress tourism is a sector that triggers many sub-sectors, has high added value and a wide employment area. It also contributes to the improvement of infrastructure in places where congresses and meetings are held. Congress tourism, which is of great importance in terms of socialization and development, is also a good promotional tool (Kara, 2007: 248-249).

It is possible to examine health tourism under three headings: thermal tourism, medical tourism and geriatric tourism.

##### **2.4.2.10.1. Thermal Tourism**

Hot water resources have an important place in human history. It has been an important criterion in choosing a settlement since ancient times, and these resources have been used as drinking water, utility water and healing water (Şimşek, 1991: 5).

In Turkish, hot waters and the places where they come out are called *Ilıca*. With the construction of suitable facilities and baths, they began to be called indoor spas, and later the word spa developed (Karagülle, 2008: 3).

Hot water resources have been an important criterion in choosing a settlement since ancient times, and these resources have been used as drinking water, utility water and healing water in the form of hot springs and springs (Şimşek, 1991: 5).

Thermal tourism is the use of mineral waters containing molten minerals for relaxation, invigoration, treatment, etc. It arises from a series of relationships arising from its use for its purposes (Kozak et al., 2008: 20).

Nowadays, people are moving away from unhealthy and monotonous urban environments and returning to nature, and staying in places with mineral thermal waters that affect human health in order to benefit from natural tourism resources (Özbek, 1991: 15).

Especially in countries where industrialization is intense, people participate in thermal tourism activities in order to protect their health, be healthy, spend quality time and engage in different activities (Tunçsiper and Kaşlı, 2008: 121).

Developed and developing world countries, which attach importance to healthy living and human health, realize the effectiveness of mineralized thermal waters and make great profits by making significant progress in tourism with their investments and treatment units. Thermal tourism, within the country's tourism, has gained an important place in the country's economy and tourism sector, thanks to the foreign currency income it provides and its benefits to public health (Özbek, 1991: 16-17).

Thermal tourism occurs by combining various types of methods such as thermomineral water bath, drinking, inhalation, mud bath, as well as by combining supportive treatments such as climate cure,

physical therapy, healing, exercise, psychotherapy, diet, as well as the use of thermal waters for entertainment and recreation purposes. It is a type of inbound tourism (www.kultur.gov.tr, 2010).

It is a medically accepted fact that thermal waters, depending on the properties of mineral salts in their composition, are effective in the treatment of a wide variety of diseases, in relieving muscle and nervous fatigue and in restoring the body's strength and health (Bayer, 1992: 161).

#### **2.4.2.10.2. Medical Tourism**

Medical tourism is traveling from one country to another for the treatment to be more economical, the waiting time to be shorter, and for quality health care. It is possible to travel from one country to another for spa treatment, which is determined by health reports (Aydın, 2008: 6).

Medical tourism has emerged as a niche with the rapid increase in people traveling overseas for treatment or surgical intervention and is developing rapidly around the world (Connel, 2006: 1094).

In medical tourism, people travel to purchase health services in their own country or in other countries. Travel for medical treatment purposes, which is influenced by many factors, constitutes an important part of health tourism (Gençay, 2007: 178).

It can be said that medical tourism emerged as a result of the joint production of goods and services by the medical sector and the tourism sector (Gümüş and Büyük, 2008: 435).

Going to another country to receive health care is not a new thing, but the concept of medical tourism has emerged in the last 10-15 years (Yanos, 2008: 16).

In tourism, the theme of getting away from normal life and regaining health in warm regions comes to the fore. The concept of

health tourism generally covers all concepts related to staying healthy and fit. (Kiremit, 2008:8).

#### **2.4.2.10.3. Geriatrics Tourism**

The concept of geriatric is used to refer to activities related to the health care of elderly people receiving special care. Although the concept has similarities with third-age tourism, geriatrics differs from third-age tourism because it has an approach focused only on health and health protection (Gençay, 2007: 177).

Since the mid-nineteenth century, life expectancy and world population began to increase significantly in parallel with the developments in science, technology and health, leading to the emergence of the concept of geriatrics in the twentieth century (Bozoğlu and Naharcı, 2009: 26).

Geriatric tourism can be defined as travels aimed at protecting the health of elderly individuals, preventing diseases that may develop, and for their diagnosis and treatment (Gençay, 2007: 177).

Elderly tourism is when elderly people in need of care travel to other countries to meet their care needs. In this context, undertaking elderly care in another country combines elderly care and tourism at one point (Çetinkaya and Zengin, 2009:173-174).

### **3. TOURISM IN TURKEY**

Turkey is the country with the most important critical position in the world. Our country has many features in terms of tourism types. Tourism types can emerge according to the area that people want, their travel purpose and budget.

Turkey transitioned to a free market economy in 1983. Thanks to the incentives provided in these years, the tourism sector has developed. Before these years, the number of foreign tourists coming to our country was low. After this, there was a significant increase in the number of tourists. The reason for this is due to their policies and strategies. The strategy determined in these years is to increase the tourism supply for mass tourism, especially on the western and southern coasts. In recent years, the strategy followed is to spread tourism to all regions of Turkey and all months of the year. It will be possible with the development of alternative tourism. This strategy is achieving success year after year and tourism has begun to develop in all regions of Turkey. Apart from the summer season, it has also started to be performed in the winter season. All the investments that Turkey has made in tourism and the strategies it has implemented to date have enabled the Turkish tourism sector to be among the top ten in the world rankings. Today and in the future, the tourism industry provides and will provide economic benefits to our country in many areas. In the forecasts made for Turkey, it is estimated that the contribution of the tourism industry to the economy will continue to increase.

The most preferred tourism types in Turkey are below.

1-Health and Thermal Tourism: Our country, which has rich and healing thermal waters, is a spa paradise. It awaits those seeking healing in qualified facilities.

2-Winter Tourism: There are high mountains with snow on them both in summer and winter. It provides services with ski facilities in these mountains.

3- Plateau Tourism: Plateau life has an important place in the rich living culture of Turkey, which has its own geography and climate.

4-Hunting Tourism: Turkey's geographical structure, vegetation and wildlife offer significant potential to those interested in hunting and hunting tourism.

5-Cave Tourism: Compared to other countries in the world, our country has a high number of caves.

5-Golf Tourism: Turkey is a center where quality and prestige meet, bringing together world golf lovers with its internationally qualified golf facilities that have been put into service in recent years.

6-Yacht Tourism: Surrounded by seas on three sides, our country is a paradise for yachtsmen with its bays and bays of extraordinary beauty and well-equipped marinas.

7- Silk Road Tourism: Anatolia has formed one of the most important historical crossroads, starting from China, passing through Central Asia and extending to Europe.

8-Faith Tourism: Turkey, which has hosted both polytheistic and monotheistic religions throughout history, has monuments that people of all faiths can see.

9-Air Sports Tourism: Turkey is a country that should be explored for air sports enthusiasts such as paragliding, sailing, gliding, parachutes and balloons.

10-Mountaineering Tourism: The country has rich mountains of different heights distributed in all regions.

11-River-Rafting Tourism: Turkey, which has long and flowing rivers that surround all parts of the country, offers its visitors an important whitewater tourism potential for water sports.

12-Underwater Diving Tourism: Important wrecks and underwater caves in Turkish waters are waiting to be discovered by divers.

13-Bird Watching Tourism: It is an observation sport that allows you to get to know nature from the world of birds. There are 450 types of birds in Turkey.

## **4. EXPERT SYSTEMS**

### **4.1. Definition of Expert System**

Experience can be defined as the knowledge and skills that a person has gained in various fields over many years. In scientific and technical fields, it takes a long time to acquire knowledge and skills. In addition, the success of these skills varies from person to person. In order to ensure commonality in areas of expertise and to prevent it from changing depending on the person, experience-based information must be classified and brought together in an orderly manner (Özkan and Gülesin, 2001, p.169).

Experts rarely solve problems within their field through their creativity alone; In solution and decision-making, the knowledge they have gained from previous events supports their thoughts, that is, their expert knowledge and experiences affect their future decisions. Using valid expertise in uncertain decision situations and drawing the most appropriate conclusion from incomplete information is also considered expertise. When such a behavior is desired to be demonstrated in accordance with the programming technique, a guide is required that enables conclusions to be drawn from the acquired knowledge and event-specific data. Here, on the one hand, there are facts and events that express general knowledge, and on the other hand, there are rules that represent the special experiences of the expert; By combining them, results are obtained (Bilginoğlu, 1993).

Expert systems are a field of artificial intelligence that focuses on creating high-performing programs on a subject where expertise is at stake. As a result of expert systems solving problems depending on the subject; A new type of software has emerged, with its unique principles, tools and techniques, forming the basis of information engineering (Öz and Baykoç, 2004).



Expert systems are computer programs that can solve complex problems by using knowledge and logical inference. They are models developed to solve these problems (Doğaç, 1990).

An expert system is a computer program that reflects the applicable knowledge and experience of a person with skills and experience in a particular field. It aims to help experts and non-experts make better and more consistent decisions and to spread rare expertise throughout organizations as much as possible (O'Neil and Morris, 1992).

#### **4.2. Features of Expert Systems**

General features of expert systems can be listed as follows (Kurbanoğlu, 1992, p.190):

- The approach they use in problem solving is in a hierarchical order and they are at least as good as an expert in this solution,
- They consist of real rules and relationships rather than numerical data and algorithms,
- They consult the user while solving and defining problems, and the structure and form of this consultation changes according to the information available, the problem and the form of the question,
- They can provide intermediate results when requested, before reaching the end of the problem solution,
- Be able to explain why they asked a particular question or how they reached a particular conclusion,
- Ability to deal with precise or incomplete information and produce approximate results for these,
- Explaining the results of the solved problem in natural language,

- Once installed, they can be easily developed and changed by the user, without the need for a programmer,
- While solving problems, they can improve themselves by adding the data of the solved problem to their own knowledge in order to use it in later solutions.

### **4.3. Differences of Expert Systems from Traditional Systems**

There are several differences between expert systems and traditional systems. The main goal of the expert system is to realize the expertise of experts with the knowledge they have and to disseminate it. In this regard, the goal of traditional programs is to implement a given algorithm. Traditional systems take a long time to develop. Such systems are written and developed by programmers. Therefore, their development and updating are costly. Although they give good results with numerical values, they are weak with symbolic values (Kurbanoğlu, 1992, p.191).

The data to be used in other computer programs had to be precise and processed using precise algorithms, and most importantly, the solutions had to be systematized and programmed in advance. However, Expert Systems can make suggestions and suggest possible solutions by drawing their own conclusions from the determined data (Akınoğlu, 1992, p.146). In traditional programming, since the software and the knowledge base or data are in the same environment, the program must be rewritten when changes are required within the program. On the other hand, since the modules in expert systems are independent of each other, the same program can be used for other purposes by making the desired changes in the knowledge base. An expert system can explain the decisions it made, or why it performed a particular action, or why it inquired about particular information.

#### **4.4. Benefits, Uses and Obstacles of Expert Systems**

Expert Systems provide significant economic and other benefits to users. These can be grouped under the following main headings.

1. **Production Increase:** Since Expert Systems are much faster than human experts, they provide the opportunity to produce more in less time, which means they increase efficiency.

2. **Continuity:** Unlike experts, there is no forgetfulness in Expert Systems and it can be used constantly with the same capacity.

3. **Cost Saving:** The cost of using expensive and rare human experts, especially in frequent and uncertain times, is very high and they must be paid constantly.

4. **Increasing the Quality Level:** Expert Systems make stable and consistent recommendations. They make decisions by "thinking" quickly and without rushing. Very low error rates and consistent decision making increase the quality.

5. **Reduction of Downtime:** Many Expert Systems are used to diagnose malfunctions and provide repair recommendations. Performing this function with Expert Systems significantly reduces vehicle idleness.

6. **Dissemination of Expertise:** Creating an Expert System in areas where there are not enough experts eliminates the problems. In particular, the problems caused by experts leaving their jobs due to retirement and other reasons are reduced.

7. **Providing Training:** The explanation feature provides training to users who do not have sufficient knowledge by providing them with information about the solutions to the problems they encounter. This is especially important for educating students.

8. **Producing Healthy Suggestions:** No matter how talented some experts are, they get anxious when time is limited and lose their ability to make healthy evaluations. Thus, the possibility of reaching wrong conclusions increases. This is not the case for a computer

program, that is, Expert Systems have the ability to efficiently research problem areas to find solutions.

9. Reliability: Expert Systems are reliable systems because they examine all the details without neglecting them. Additionally, they do not cause problems such as getting tired, getting sick, or not coming to work with excuses, and they work 24 hours a day. They do not go on strike or talk behind their superiors' backs.

10. Ability to Work with Complete and Imprecise Information: Unlike other computer programs, Expert Systems can produce results just like human experts, even if the answers they receive at the stage of asking questions are "I don't know" or "I'm not sure". They can even make probabilistic suggestions in response to the user's probable answers. There are methods specifically developed to work in uncertain environments.

11. Ability to Show Intermediate Results: Sometimes it is useful to see intermediate results first in order to better understand and manage the managed system.

12. Ability to Benefit from Results: Information can be used to evaluate various opportunities obtained as a result of the operation of the system. Moreover, the Expert can review all possible relationships in the System. When their number is very large, the expert finds it difficult to do this.

13. Contribution to the Development of Factories of the Future: Expert Systems are one of the software dimensions of the automated factories expected to be reached in the future. Unmanned factories can only be established with Expert Systems that will replace human experts. The database of the system is an important issue in terms of readability.

We can list the most common application areas as follows:

1. Interpretation: Reaching a conclusion by inferring the values coming from the sensors.
2. Fault Diagnoses and Repair Suggestions: Revealing the causes of various machine and system malfunctions by making observations and making suggestions to eliminate them.
3. Design: Producing drawings taking into account limited conditions.
4. Planning: Very efficient applications, especially in project and process planning. Most expert planning systems are rule-based systems.
5. Control: In order to keep the operational parameters within the prescribed limits in various production processes, controlling the changes of the factors affecting these parameters and compiling the statistics of these values.

There are some obstacles to expanding the areas of use of Expert Systems and increasing their degree of expertise. The obstacles are as follows.

1. Lack of Expert Knowledge: In some subjects, trained experts cannot be reached and most of the experts do not have time to transfer their knowledge to the knowledge engineer.
2. Difficulties in Obtaining Experts' Information: This is one of the most difficult reasons in Expert System design. Experts are reluctant to give the information they have due to various psychological reasons. These reasons may include fear of losing one's job and suspicion of new technology.
3. Experts Have Different Perspectives on the Same Subject: Although each expert's approach to his subject is correct, it may also be different. Expert System based on information obtained from only one expert. Only an expert can approach the solution of the problem from a different angle and perhaps more economically and/or more accurately.

4. Expert Systems Are Aimed at Narrow Areas: Getting efficiency from Expert Systems is still only possible by staying in narrow areas. Sometimes this area even has to be very narrow. Leaving this area, even a little, makes it difficult for the system to work.

5. Conservatism of Upper Management: It is difficult to get Expert System software accepted by managers and bosses who support the status quo. Managers' suspicion of new technology and their unwillingness to spend extra money play a role here. It may be difficult to understand why there is a need to develop a new technology when there are experts doing the same job.

6. Lack of Objective and Independent Audit Mechanisms for Experts: Many experts work with personal methods and they have difficulty explaining these methods. This situation causes designers to think that it is not possible to create an Expert System that works with full accuracy.

7. Lack of Common Terminology: The words used by many experts are not specific to the expert in terms of their meaning. In other words, the meanings that experts attribute to some professional words are different from the general known meanings of those words. This situation causes misunderstandings.

8. High Cost and Time Excess: Creating Expert Systems is costly and takes a long time. Costs occur in a wide range of different amounts.

9. Creativity: An expert can be more creative than an Expert System, especially in unusual situations.

10. Learning: Human experts provide agile adaptation to environmental change. It is difficult for the Expert System to do this immediately. In other words, designing a learning Expert System is a problem in itself.

#### **4.5. General Structure of Expert Systems**

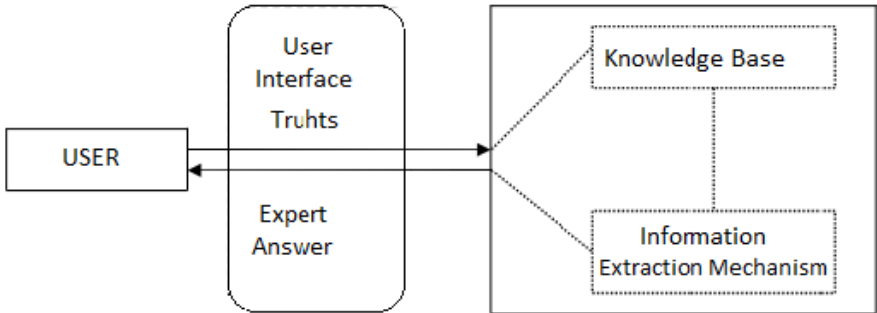
The key element of an Expert System is the information collected while creating the system. Information should be customized to be easily processed and made suitable for decision making. As we mentioned before, Expert Systems are programs that generally act as an expert in certain application areas. In order for Expert Systems to act like an expert, they must have the knowledge to solve certain problems. An Expert System must be able to explain its decisions and behavior in any way possible, like a true expert. Explaining the decisions made with their reasons is important for the user's trust in the system, especially in medical and technical diagnosis issues where there is a lot of uncertainty. Therefore, Expert Systems must be user-friendly and transparent. Another feature sought in Expert Systems is the ability to take uncertainty into account. Information about the problem to be solved is incomplete and inconsistent, and the relationships in the problem set can be approximated.

To design a US, the following functions generally need to be developed.

- The problem-solving function must be able to use certain domain knowledge, which may be necessary to deal with uncertainty.
- The user relationship function must be able to explain the system's bias and decisions to the user during and after the problem solving process. These two functions can both be very complex, depending on the application area and practical requirements. Many different and complex problems may arise during design and implementation. These are problems with the presentation of information.

The general structure of an expert system is shown in Figure 1 (Allahverdi, 2002, p.72).

- User
- User Interface
- Knowledge Base
- Inference Mechanism



**Figure 4.1.** General Structure of an Expert System

#### 4.5.1. User

Various expert systems have been developed and continue to be developed in various fields. These expert systems have many users. While these users may sometimes be non-experts who want direct consultancy, sometimes they may be a student or new staff who wants to learn, and sometimes they may be an expert system developer who wants to improve their knowledge base.

Expert system users may not have detailed knowledge about information technologies or computers. Users use expert systems to reach decisions and decision support faster and less costly.

The human factor is very important in the development, installation and use of expert systems. When we look at the human factor in expert systems, it is possible to see experts, knowledge engineers and system developers.



#### **4.5.1.1 Expert**

The expert can solve problems or give advice with his knowledge, experience, method, judgments and abilities. The main task of the expert, or in a sense, his place in the system, is to convey to the expert system his tasks and how to do them. An expert is someone who knows the facts in the problem area and can understand the relationship between these facts. The expert system definitely needs an expert in the problem area to solve the problem it models.

#### **4.5.1.2 Information Engineer**

The knowledge engineer provides the interaction between the expert and the system developer. The information that will be used to solve the problem belongs to the expert, and this information must be transferred to the system. The information engineer provides this configuration. The information engineer interprets and analyzes the answers to the questions asked to the expert and structures them in a way that the system developer can use. In some developed systems, the information engineer and the system developer may be the same person.

#### **4.5.1.3 System Developer**

He is the person who designs the expert system and implements it, using the system structure he received from the knowledge engineer. In many expert systems this is done by a group. System developers dynamically prepare the system they develop to reduce the need for information engineering. In a system prepared with this method, information can be transferred to the system by an expert. Another job that system developers do is to ensure the integration of the expert system with other information systems.

### **4.5.2. User Interface**

The user interface is the tool that provides interaction between the user and the system. Thanks to the user interface, the user asks the system his question and communicates with the system to see the results. There are different interfaces such as simple menu systems, complex interfaces, and natural language interfaces.

The task of the user interface is to ensure the exchange of information between the user and the inference mechanism. It converts the information it receives from the user into a form suitable for the system and transmits it to the system, or it converts the information it receives from the system into a form that the user can understand and transfers it to the user.

The success of the user interface depends on the application area, expertise, expectations, differences between users, software performance, and existing experience.

### **4.5.3. Knowledge Base**

It is the structure where information is stored for the solution of the problem for which the system is developed. The information contained in the knowledge base increases over time with the inferences of the system and the experience of the expert. This structure consists of the rules base and database content. While the database contains raw information, the rule base contains rules. The database contains all the facts obtained in expert systems. Facts are statements that specify the properties and values of objects. These facts can create new facts within the expert system. These types of systems are also known as dynamic systems.

The rule base is the unit that stores the "If - Then" rules that work in certain situations within the expert system. "If - Then" structures create generative rules, and each rule consists of two parts. The first is Antecedent (assumption) AND OR etc. It consists of

sentences combined with logical conjunctions such as. The second one, Consequent, consists of one or more sentences showing the solution resulting from the rules or the action to be performed. In general terms, “If assumption (antecedent), then conclusion (consequent)”. In other words, it is a sample of rules determined to find the antecedent situation. If the facts in the database are compared with the sample and found to be the same, it is determined that the rule has been processed (Allahverdi, 2002).

#### **4.5.4. Inference Mechanism**

New information is obtained by changing existing information. This new information is called inference (Allahverdi, 2002).

The inference method is the cornerstone of the expert system. Rules specific to knowledge are used to solve problems.

In the inference method, reasoning is based only on the use of forward chain or backward chain inference processes. In the forward chain theory, the expert system receives information from the end user. It follows the appropriate rules from the knowledge base until the problem is solved. There is continuous communication between the user and the expert system. These are carried out in a logical order according to predetermined rules.

In the backward chain, the reverse of the forward chain is applied. Here, it asks the end user for the desired goal. Then it investigates whether the goal is correct or not. For this, it returns to the "If-then" theory of logic. If the rules based on knowledge comply with the goal, the result determined by the user is the solution to the problem. Other methods used in the inference mechanism are as follows (Allahverdi, 2002).

- Induction,
- Hypothetical reasoning,
- Object-oriented reasoning,

- Dynamic rule change.

#### **4.6. ADVANCEMENT OF EXPERT SYSTEMS**

For expert systems to advance, people who can store information and explain it in specific formats are needed. Because many experts cannot write programs, and the knowledge is usually hidden and uncoded in the hands of the expert. In order for this information to become codifiable, a knowledge engineering method is needed (Önder, 2003).

Information engineering is defined as all the methods and systems that deal with information. This discipline is actively used in many fields of science. The knowledge engineer, on the other hand, is the person who transforms the expert's views about the problem and its solution into a system that is precise, complete, not contradictory, and produces solutions that are as successful as those produced by the expert himself (Allahverdi, 2002, p.25).

The main purpose of developing an expert system is to obtain the knowledge of the expert for the selected field and subject and to use this knowledge in modeling the expert's problem solution in the expert system. From this perspective, the development of the expert system consists of four stages;

- The problem is determined at the field and subject selection stage.
- During the selection of experts stage, an expert on the subject is determined.
- In the process of obtaining information, the knowledge of experts on the subject is obtained.
- During the program development phase, the system is developed and implemented.

We need to pay attention to some points when developing an expert system. First, the expert system should be developed on a

narrow and well-defined topic. It is really difficult to develop a system that can provide expertise in many fields. The second issue is that instead of developing an expert system for a field, a system that can provide expertise on a specific job in a field should be aimed. The determined area of expertise should be neither too easy nor too difficult. One of the points to be considered is that it is not possible to develop an expert system based on information obtained through senses. Because it is impossible to put these senses into words and show them with symbols used in system development (Doğaç, 1990).

#### **4.7. INFORMATION ON EXPERT SYSTEMS**

Knowledge is a very important element for expert systems because they enable modeling the work done by expert people by using their knowledge. A knowledge engineer is a person who collects the information necessary for the system from experts and various other sources and organizes it in the knowledge base. The process of creating the knowledge base occurs in three stages based on the information received from the expert (Allahverdi, 2002).

Knowledge is a very important element for expert systems because they enable modeling the work done by expert people by using their knowledge. A knowledge engineer is a person who collects the information necessary for the system from experts and various other sources and organizes it in the knowledge base. The process of creating the knowledge base occurs in three stages based on the information received from the expert (Allahverdi, 2002).

##### **Stage 1: Defining the Disciplinary Area and Problem**

- The characteristics of the solved problems are determined.
- Objects in the discipline area are determined.
- Relationships between specified objects are determined.
- The information presentation model is selected.

- The special qualities of the disciplinary field are revealed.

#### Stage 2: Obtaining Information

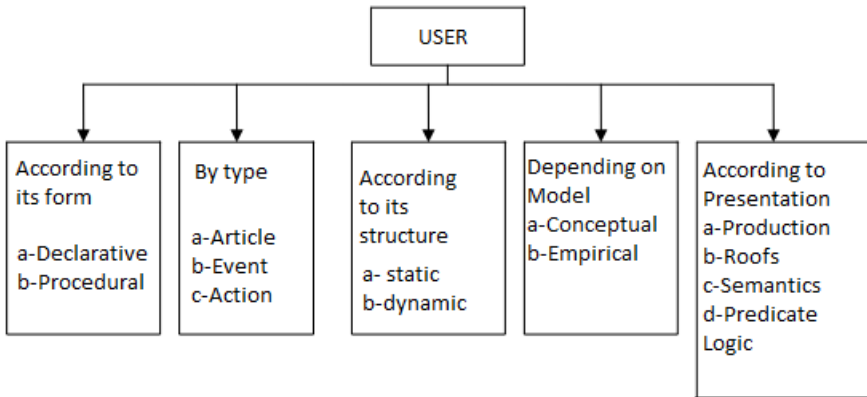
In the process of obtaining information, the information engineer and experts should work together to determine the boundaries of the problem. The process of obtaining information is not linear, but cyclical. First, the knowledge engineer obtains as much information as possible from the expert about any part of the disciplinary field or about the characteristics of a field. This information is then analyzed and, if there are disagreements, these are clarified. Then the information is expanded and developed. It is checked whether there are any discrepancies. Thus, the capabilities of the expert system are increased cyclically, step by step (Allahverdi, 2002).

There are different methods used to obtain information (Liebowitz, 1997).

- Interview Method
- Planned Interview Method
- Observation Method
- Survey Method
- Working with an Expert
- Protocol Analysis
- Delphi Technique
- Brainstorming
- Nominal Group Technique
- Focus Group Discussions

#### Stage 3: Determining the Method and Model of Presentation of Information

Allahverdi (2002, p.47) classified knowledge in five different aspects. This classification is shown in Figure 4.2.



**Figure 4.2** Classification of Information

#### **4.8. USAGE AREAS OF EXPERT SYSTEMS**

Expert Systems are used in many areas. The fields used are listed below.

- Environment Engineering Science
- Space Technologies
- Trade
- Law
- Information Systems Management
- Chemical
- Medicine
- The military
- Defense industry
- Communication
- Banking
- Agriculture
- Education
- Maths
- Geology

- Coal
- Electronic
- Transport
- Meteorology

However, it is used in many places other than the usage areas mentioned above.



## **5. APPLICATION OF EXPERT SYSTEMS TO THE TOURISM BUSINESSES SECTOR IN TURKEY**

Tourism is people's travel and accommodation requests outside the place they live. People have been traveling since ancient times. The increase in people's income, standard of living and free time has increased the interest in tourism.

In the tourism industry, all activities, including accommodation, travel and food and beverage establishments, are included in the tourism industry. a privileged application can be applied for loans used in the tourism sector ( Altınışık, 2022).

Considering the main needs of tourists, businesses can be classified as travel, accommodation, transportation, food and beverage, entertainment and recreation and shopping.

### **5.1.Travel Businesses**

#### **5.1.1. Tour Operators**

A tour operator is a business that plans and programs a package tour and offers it for sale directly or through intermediary businesses. Tour operators prepare package tours before demand arises. The World Tourism Organization defines tour operators as "enterprises that organize traveling and accommodation tours in a specific center by combining transportation, accommodation and other touristic products before the demand for travel and tourism arises, and offer these tours for a certain fee." Tour packages prepared by the tour operator include transportation to and from selected holiday resorts, accommodation, day trips or long tours, and recreational services. The start and end dates of the tours, travel programs and accommodation units are determined in advance.

### **5.1.2. Travel Agencies**

Travel agencies are intermediaries between tourists and service providers. Travel agencies are units that sell services to consumers. These services are generally businesses that reserve places, issue tickets and accept payment in return. Travel agencies are service providers under an agency contract.

### **5.2. Accommodation Establishments**

The accommodation sector is the unit that meets the accommodation, food and beverage, entertainment and other needs of tourists. Since the reasons for travel, travel styles, expectations, income levels and tastes of the tourists who benefit from this unit are extremely different, the businesses that make up the accommodation sector also vary greatly. In terms of accommodation types, there are hotels, motels, holiday villages, guesthouses, camping, apart hotels, chalets, youth hostels and floating facilities.

### **5.3. Transportation Enterprises**

Tourism and transportation are two concepts that are intertwined and cannot be separated. In the phenomenon of tourism, which is a movement of displacement, tourists need means of transportation to carry out this movement. The unlimited and rapid development of technology has also manifested itself in the transportation sector.

Developments in transportation have extended the duration of stay. The time saved from transportation is added to the tourist's stay. For example, the fact that a place that can be reached in three days can be reached by plane in three hours means that the time allocated for the journey is added to the accommodation and holiday period and can be used for a holiday. No matter how valuable the country's tourism resources are, if the transportation sector and road conditions cannot be operated well, the tourism of that country cannot develop.

Transportation enterprises are examined in four main groups. These are: Airways, Seaways, Roads, Railways.

#### **5.4. Food and Beverage Establishments**

Food and beverage establishments are restaurants, bars, cafes, casinos and taverns.

#### **5.5. Amusement-Recreation Businesses**

Entertainment establishments are discos, dance bars, nightclubs and casinos.

#### **5.6. Shopping Establishments**

People who travel, in addition to accommodation, food and beverage, transportation or entertainment establishments, also receive services from various shopping establishments in the places they go. These businesses include businesses selling souvenirs, jewelers, leather shops, carpet dealers, boutiques, various markets, etc. can be listed as follows. Tour operators perform an important function in extending tourism throughout the year by organizing shopping tours, especially in low seasons.

#### **5.7. System Design**

The application areas of expert systems are wide. One of the application areas of expert systems is applications for tourism businesses. The system was designed by taking the opinions of experts on this subject. For this purpose, studies were carried out in Antalya, which is rich in facilities in our country.

Artificial intelligence, which was initially used to facilitate marketing processes in tourism, is now being brought to the level of being able to meet all kinds of needs of guests, from welcoming them to hosting and sending them off to remembering them (Samala et al., 2022).

It can be said that the sub-sector where artificial intelligence applications are most widely used in the tourism sector is accommodation businesses. It is known that artificial intelligence applications are used in many units of these businesses, especially front office, food and beverage, room service and housekeeping (Çuhadar, Demiray, Öztürk and Alabacak, 2022).

Among global transportation systems, air transportation is considered the most preferred form of travel in tourism. The most important reason for this is that it is faster, safer and more comfortable than other transportation systems (Akkan and Cura, 2022).

When examining the subject of artificial intelligence in transportation companies, airline companies are mentioned.

Today, the internet has become an indispensable phenomenon for airline companies, as for all other businesses. Because the internet is considered the most important tool that businesses use to communicate with their customers, employees, suppliers and other stakeholders. Similarly, these businesses use artificial intelligence-based technologies extensively (Meydan, 2023).

As in every field of tourism, artificial intelligence applications in the food and beverage field help to facilitate business processes and make the processes related to these processes more efficient. For this reason, these applications have begun to be used in many areas such as robotic applications, data processing, personalization of food and beverage production, 3D applications, cell technology and nanoscale applications (Çerkez and Kızıldemir, 2020).

It is possible to collect the direct and indirect effects of these practices on food and beverage businesses under five main headings. These; These include sorting food and beverages, assisting and managing the supply chain, tracking and managing employees,

developing new products, and managing cleaning operations and equipment (Garver, 2018).

The current digital age, called Industry 4.0, has necessitated significant changes and transformations in the tourism sector, as in many other sectors around the world, with the new generation technologies it has created (Aydınbaş, 2023).

The tourism sector is a labor intensive sector. For this reason, this sector's personnel costs and poor performance due to work accidents and occupational diseases are higher than other sectors. On the other hand, the fact that work and transactions continue 24 hours a day, 7 days a week, necessitates working in multiple shifts and long-term working hours. All these practices also increase personnel costs. The use of artificial intelligence-supported robotic technologies and software in tourism will eliminate performance fluctuations and work accidents that may arise as a result of long working hours, resulting in a significant decrease in these expenses. On the other hand, it will provide significant savings to businesses in this sense due to its ability to operate 24 hours a day, 7 days a week, without the need for additional fees or wage increases, as long as energy and software updates are provided (Özgürel and Kılınç Şahin, 2021).

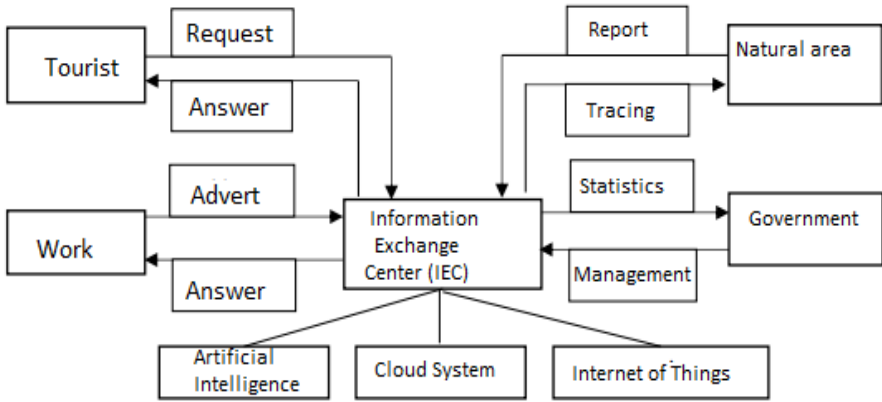
The main disadvantage of artificial intelligence-based applications is the acquisition cost of these applications. Moreover, it is necessary to add installation, maintenance and repair costs as well as software update costs to these costs. On the other hand, if the applications in question depend on outsourcing, the subscription "membership" fees to be paid to the relevant software developer and/or manufacturer also constitute an important item (Mil and Dirican, 2018).

Although artificial intelligence applications have high capacity, they require a constant power supply and some applications require an internet connection. In addition to the acquisition cost of these needs,

there will be a possibility that they may cause significant data and/or business loss in case of unexpected interruptions and malfunctions. In addition, human supervision is needed because the applications in question have limited ability to learn from experience and work independently, like humans. All these processes and needs naturally increase costs (Çuhadar et al., 2022).

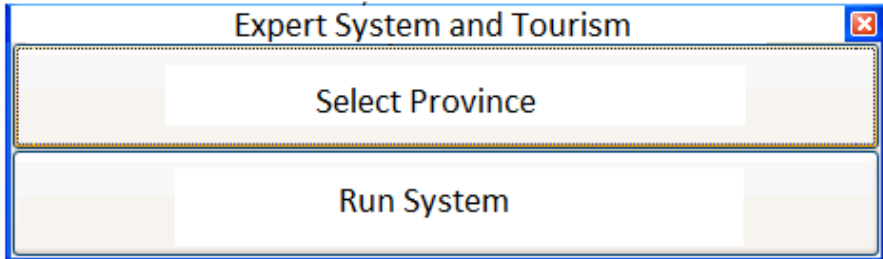
Finally, the fact that a nationally or internationally accepted legal regulation for artificial intelligence applications has not yet been created brings with it important problems based on information security and ethics (Katlav and Çobanoğlu, 2021).

Zhu et al. (2014, p. 554) state that smart tourism consists of five elements: tourist, government, natural area, information exchange center and business. According to this structure shown in Figure 5.1, tourists send their requests, such as making a reservation or buying a ticket, to the information exchange center, and then the center responds to this request. On the other hand, the information exchange center is responsible for monitoring natural areas, and visitor statistics must be forwarded to the information exchange center for analysis and archiving. This statistical data can be given to government officials for subsequent policies. Ultimately, hotels, restaurants, entertainment and other tourism-related businesses can ask the information exchange center to promote advertising and promotions to tourists.



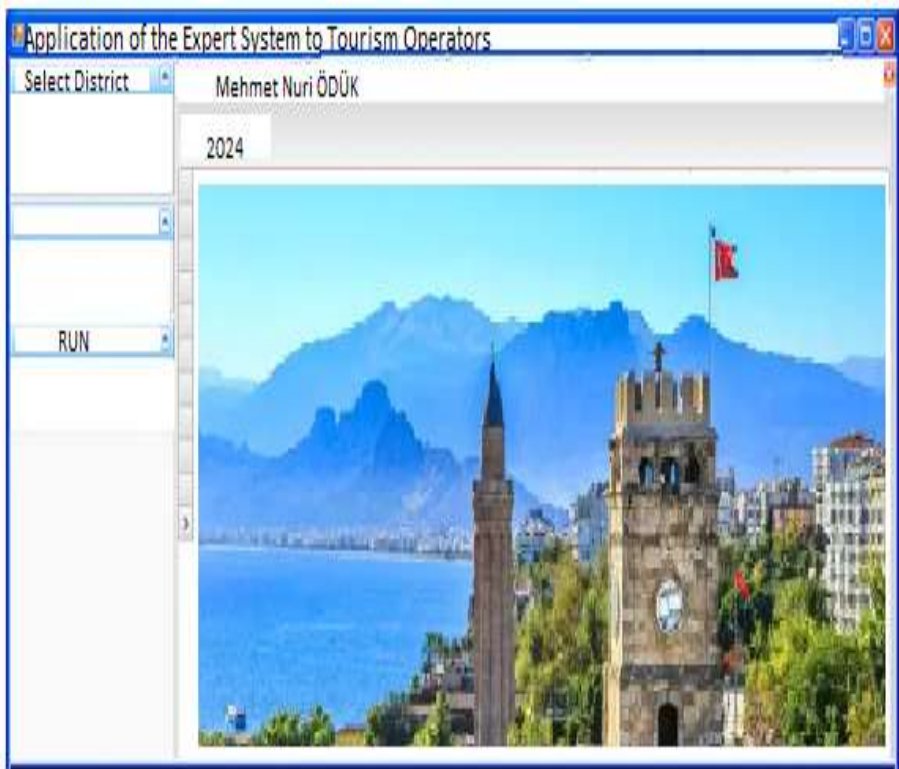
**Figure 5.1** Structure of Smart Tourism

Delphi program was used for system design. Below, we aim to obtain the desired values by offering various options to the users.



**Figure 5.2** Login to the System

After entering the system, the following image appears on the screen.



**Figure 5.3** Expert and Tourism



## **6. CONCLUSION**

The human development process is changing rapidly. Along with technology, change in the field of tourism is accelerating. In the field of tourism, artificial intelligence studies, developments in information technologies and robotic systems have come to the fore. Developments that have become widely used in almost every field of tourism; has put smart hotel systems into operation. Smart tourism applications implemented with artificial intelligence-based technologies offer various opportunities to tourism users before, during and after the holiday. It is to allow customers to see points of interest on their holiday routes in advance. They can check the traffic situation on their route with smart maps. It is possible to instantly follow customer comments, respond to questions and problems and produce solutions. Artificial intelligence applications in tourism also have advantages and disadvantages. Artificial intelligence applications eliminate work accidents, poor performance and overtime wages that may occur as a result of uninterrupted service in tourism and long working hours. On the other hand, it is argued that the ability to convey all kinds of information and documents to consumers completely and without language difficulties will have an increasing effect on consumer satisfaction. As long as the software and its updates are provided, it is possible to increase the performance of artificial intelligence applications and thus increase profitability. In addition to these advantages of artificial intelligence applications in tourism, the initial investment and software cost, dependence on external resources and energy, and the necessity of constant control, it is seen that there is no complete law regarding ethical and legal problems yet. It is an important cornerstone that artificial intelligence and artificial intelligence-based applications are indispensable for people and businesses.

For this reason, countries need to make effective, continuous and coordinated policies and plans to develop the technology in question and to adapt their citizens to the developing technology. It can be emphasized that researchers should focus on scientific studies and designs especially on this aspect of the subject, and that lawyers should conduct universal law studies on ethical and criminal situations.

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