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## Intelligent system applications in electronic tourism

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## ABSTRACT

Recent changes in tourists' behavior and the growing importance of Information and Communication Technologies mean that much more attention needs to be given to electronic (e)-tourism. With the Internet becoming the preferred media choice for many travelers to obtain travel information, online travel agencies and their offers are gaining more importance all over the world, also in Turkey. Turkish travel web sites usually provide static information which can be accessed by some kind of search forms, but users need more such as recommendation tools, trip planners which include a Decision Support System inside. For this reason, this paper offers a new approach to the marketing strategies for Turkish travel agencies, but the recommendation tool is also a generic model for all tourism agencies in the world. An intelligent system which works as a recommendation tool for trip planning is created by using Case based reasoning algorithm. The inspiration module of the proposed model recommends users the most available trip alternatives by comparing the older cases with the new client.

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## 1. Introduction

A revolutionary transformation accelerated by technologic developments formed the world-wide economy of the 20th century. The quick development of Information and Communication Technologies (ICTs) and the global expansion of Internet changed industrial structures all over the world. This transformation affected the tourism sector as it affected all the sectors of economy (Bell & Tang, 1998; Buhalis, 2003; Buhalis & Law, 2008; Hanna & Millar, 1997; Lace, 2004). Strong interaction between technology and tourism brought basic changes by creating new timeliness to the businesses in marketing, in planning of destination and in advertising (Jakkilinki, Georgievski, & Sharda, 2007). ICTs radically changed the effectiveness of the tourism organizations, the manner of how businesses are driven in the market as well as how consumers interact with these organizations (Buhalis, 2003; Buhalis & Law, 2008; Michopoulou, Buhalis, Michailidis, & Ambrose, 2007). It is clear that online trip's benefits extend both of them: individual travelers and marketing organizations of tourism (Lau, Lee, Ho, & Lam, 2004; Niininen et al., 2006; Soh, Mah, Gan, Chew, & Reid, 1997; Wang & Fesenmaier, 2004). For tourism suppliers, Internet assures a way to sell their products to their potential travelers in any hour of the day. These suppliers then can check their servers in order to expose information about their products or services in an instantaneous way. For travelers, Internet allows them to pass directly the demands to agencies, and buy online products/services, at any time in any where (Heung, 2003).

In the 21st century, importance of the electronic (e)-commerce cannot be ignored. To surpass their rivals in their sectors, businesses must be driven by adapting their selves to new technologies. The way of developing a marketing strategy, and being the starter of innovative applications, is the usage of intelligent systems in the infrastructure of a commercial website. E-business develops quickly, so businesses always spend more in improvement of their online services. In Commerce Software Takes Alternative, the authors of Forrester Research declined that the expenditure of online customers had reached to \$20,3 milliards in 1999 and this amount would jump to \$144 milliards by 2003 (Ansari, 2000). Research results find out that online retail endorsement has reached \$172 milliards by 2005 in USA. According to an inquiry of Jupiter Research, the amount of online endorsement will arrive to \$329 milliards by 2010. It has been declared that in Europe, e-commerce sales which was \$133 milliards by 2006, has reached \$200 milliards by 2007 (Sakin, 2008).

In 2004, the population of net surfers in the world was 945 million. The majority of society accepts the fact that influences of growing Internet on customer behaviors manage and will manage today's and tomorrow's marketing models. Internet brought several changes to how businesses are driven through e-commerce (Lau et al., 2004). In Europe, the number of Internet users has passed over 402 million, and in the world, it reached 1.663 million. Europe penetration seems 1.5 times over the world's penetration with a ratio of 50.1%. In Turkey, estimated population of the year 2009 is 76.805.524 and the share of Internet users in this penetrated population is 34.5% with 26.500.000 Internet users. These numbers show the importance of internet in our daily lives and the spreading power of electronic businesses (ICT, 2009).

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The goal of this paper is to analyze the concept of electronic (e)-tourism, to understand what intelligent systems are, and to propose an online travel agency model which works by an algorithm of Case based reasoning (CBR) that replies automatically to the users, by analyzing customer behaviors. The reason of the choice of this technique is that tourism concept depends on the experiences. A system using old cases that contain travel preferences will obtain more convenient solutions than the existing systems. It is desired to create a recommendation unit within the framework of intelligent systems suitable to tourism concept. Therefore, CBR seemed the closest solution to this wish. In addition, there are several studies and applications realized about e-tourism using the method CBR (Cavada, Mirzadeh, Ricci, & Venturini, 2003; Venturini & Ricci, 2006) which confirms the appropriateness of its use in this study.

The organization of the paper is as follows: In the second section, the definition and the situation of e-tourism is presented. Then, in the third section the method which is used for this paper, CBR, will be studied. A case study will be shown and explained in detail in the fourth section with examples and in the last section, the obtained results are discussed and concluded the paper.

## 2. e-Tourism

### 2.1. Definition of e-tourism

Tourism is a business based on information whose product is confidence. Tourists must leave their daily lives to consume the product. At the decision point, only an exposed model of the product is available on multiple chains as television, pamphlets, or Web (Werthner & Ricci, 2004). Transactions realized online as flight, hotel or room reservations compose the concept of e-tourism.

One of the most important behavioral processes specifying the travel decision can be generally described as information research and the treatment. Travel decisions necessitate a wide quantity of internal as much as external information and potentially include a lots of information research, about task or activity evaluation, integration. Travelers look for information frequently and actively as a part of their effort of travel planning by considering it an important component of travel experience. Travel information available to an individual has a considerable influence on the different aspects of decisions taken by travelers, particularly on destination choice. Several studies indicate that the principal function of information research is to support the decision-making process and product choice by reducing the risk and the uncertainty. Researches about information searches of travelers and decisional behaviors have a long history and made considerable contributions to tourism marketing.

### 2.2. e-Tourism in the world

With the growth of available information on Internet, questions occurred during information researches and consumer behaviors must be reconsidered and reinterpreted in this context. It is commonly accepted that the manner how consumers look for, treat and use information is a complex phenomenon which is not completely understood. In tourism, there is a growing interest on studies of traveler information research habits. Recently, it is shown that although huge quantity of available information on Internet can help travelers to plan their trips and/or to formulate wishes and expectations, it also causes an overload of information, and sometimes irritates travelers, because information research must be more specific. Obviously, a better comprehension of online information research and traveler behaviors will necessitate previously a better design and a better conception of information sys-

tems in online marketing for an improved performance (Fesenmaier, Wöber, & Werthner, 2006).

In the middle of 80s, travel agencies started to complain about the direct marketing because they believed that it stands out a great danger to agency networks. In 90s, this pressure was still going on. For example, boat trips ads encouraging the customers to make reservations via 800-lines were presented on television channels. Furthermore, in the fall of 1995 United Airlines launched a TV advertising campaign which offers an electronic ticket sale system (Walle, 1996).

Many hotel management formed their own web sites in order to use the growing potential of internet and used internet for various purposes. Beyond the fact that Internet is used more often as a tool of marketing and sales, it is also used as a reservation channel. Despite these improvements, many hotels still think that the traditional advertising methods as radio, television and the written press are the most efficient ways of representation. The rates of reservations taken via Internet are lower than the ones taken via telephone or fax. But increasing number of internet users, changes in generations, a mass of saved data and the importance of time saving in this century will help the consumers to accept e-commerce.

When we look at the benefit rates from information technologies in tourism sector in the world, according to the estimates of the experts, 10% of the internet users use internet for shopping, online banking, travel transactions. According to Travel Web's statistics, 14% of people who reserve hotels via internet are senior managers, 33% are people who are between 31–40 years old and 75% are Americans. The reasons of using internet in tourism sector are determined as easy access (82%), time saving (80%), easy to use (59%), being economic (50%), being enjoyable (36%), ability to compare alternatives (28%) and better information (21%) (Connolly, Olsen, & Moore, 1998).

According to ITB World Travel Trend Methods report in 2009, Europeans who use the internet to help with their travel arrangements now outnumber those who do not. Indeed, the share of internet users increased from 50% in January–August 2007 to 55% in January–August 2008. And the use of the internet for online booking continues to rise much faster than its use for simply 'looking' – gathering information prior to booking a trip. The share of online bookings (for at least part of a trip) has risen from 19% of total trips abroad in 2003 to 41% this year. While nearly 40% of all bookings are made at least partly online, 25% involve travel agents, 10% are booked direct with hotels and 7% direct with transport companies (see Table 1).

Literature has also a considerable number of researches on relations between tourism sector and Internet. Hanna and Millar (1993) discussed the development of an information service prototype established on the web. Problems principally occurred in page design, in administration and in the content of information. Wang and Fesenmaier (2004) developed a model of an online trip community using structural equation modeling. They discussed the implications for a dynamic and online travel community development. Lau et al. (2004) revealed some experimental results on Hong Kong travelers. They discovered that Hong Kong travelers

**Table 1**  
European online travel trends, January through August 2007–2008(% of trips) (IPK International's European Travel Monitor).

	January–August 2007	January–August 2008
Online booking	36	41
Online 'looking'	13	14
All internet users	50	55
Non-internet users	50	45

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