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# An Expert System for Recommendation Tourist Destinations: An Innovative Approach of Digital Marketing and Decision-Making Process

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**Abstract:-** The analysis of decisions and choices of tourists is of and increased importance. Characteristics, determinants and anticipation of tourism demand attract the interest of academic and scientific circles as well as tourism professionals and those who are responsible for tourism policy. Also, the integration of expert systems in tourism policy can be a helpful method in decision-making process in tourist destination in order to improve understanding of one's traveler preference formation and choice. The proposed a system, within the domain ESTD.GR, is an Expert System for Tourist Destinations collaborating with user-tourist-type. It deals with the key aspects of the consumer behavior of tourists, such as their motivations, choices and decisions. The choice of appropriate variables is based on several factors such as the tourist type, countries of origin, time period considered due to economic crisis, costs, user ratings and the forms and type of tourism we are concerned with.

**Keywords:-** Digital Marketing, Tourist Destinations, Expert System, Consumer Behavior, Data Mining, Decision-Making.

## I. INTRODUCTION

Finding on-line information on travel destinations is one of the most popular processes from which tourists are increasingly benefiting. A growing use of online reports about travel destinations and their planning has been observed in recent years. For this reason, an e-WOM (electronic word of mouth) can have a significant influence on the decisions related to the movements of the tourists that have been implemented. Relevant e-Marketer surveys indicate that the use of travel critics has proven to be a beneficial process for planning a trip (e.g. booking a place of residence). In view of the above, the present research attempts to investigate whether the online reviews influence the behavior of the tourist-traveler in planning his journey and that the traveler's own personality, and in particular aspects of his emotional intelligence, play a key role by mediating in decisions-making to choose the appropriate travel destination.

The tourism industry is one of the largest and most developed industries in the world that brings a fairly high percentage of revenue to the tourist countries, including

Greece. Greek tourism maintains a high position in a continuous effort to improve the standard of living of the population while at the same time achieving convergence with the European average (Swarbrooke, & Horner, 2007). It is a highly competitive form of tourism and tourists have an unlimited freedom to choose the form of holiday they want. Tourism has always been a demand-driven industry and its changes can have incalculable effects on the economy, so all countries have to constantly renew the services they offer. A tourist destination can be considered as a combination of all the products, services and experiences offered at the place.

Additionally, tourism represents a consumer behavior that is related to a complicated decision-making process that involves subconscious emotional and cognitive responses which can be combined and thus can be related to the travel preference of a tourism destination. In an essay of investigating consumer behavior and precisely tourist preferences as far as travel destinations is concerned, other researchers have integrated neuroscience and neuromarketing tools and methods to test the cognitive and emotional parameters that are being involved to the consumer preference of a tourist destination (Ramsoy et al., 2019), which an innovative approach to consumer decision-making process. The purpose of the present study is the creation of an expert system which includes a variety of factors that are included and can formulate a consumer's travel destination choice. The proposed expert system is an innovative digital tool for travel destination based on the principles of digital marketing with the aid of data analytics and can provide useful information for the consumer's behavior and decision-making process.

### 1. Types and Tourism Forms

The wider tourist system is subdivided into forms and types of tourism, which are described by the relationships and phenomena that exist between objective and subjective tourist elements. Tourism forms are determined by the results of tourism involvement, while tourism styles are formed in response to the needs and preferences of prospective tourists visiting destinations of their choosing. This resulted in the following list of tourism forms and categories.

Tourism can be classified into the following categories:

- Recreational and leisure tourism: This is the most prevalent form of tourism because it offers the greatest degree of choice in terms of both tourist market and service and resource requirements.
- Agrotourism: A series of events brings the tourist into contact with nature and tradition.
- Athletic tourism is a subset of tourism in that athletes who are regularly involved in athletics or sporting activities combine these terms with vacation.
- Selective tourism: Those who prefer this form of tourism are typically well-off and demanding.
- Religious tourism refers to those who travel to other locations for the purpose of worship or to participate in religious activities or ceremonies.
- Ecotourism is the pursuit of green experiences in conjunction with financial support for environmental conservation and education (*Fennell, 1999*).
- Economic tourism: This format entails the organisation of international conferences and exhibitions in locations that provide additional opportunities.
- Cultural tourism: This is a form of tourism that, depending on the cultural event, attracts tourists primarily for the purpose of participating in it.
- Health tourism: This form of tourism is preferred by those who prioritize maintaining or improving their physical and mental health.

## II. Consumer Behavior - Tourism

### 2.1 The concept of Consumer Behavior

Consumer behavior is the study of how individuals, communities, and organizations choose, acquire, use, and discard concepts, products, and services in order to meet their needs and desires. It refers to consumer behavior in the marketplace and the underlying motivations for that behavior. Consumer conduct, more precisely, refers to the acts taken by customers in connection with their decision-making regarding the purchase of different products and services. To run an effective marketing campaign, it is important to understand the psychological or other factors that influence people's decisions to purchase or reject a product, and to use these habits in ways that inspire customers to shop.

Marketers anticipate that by knowing why consumers purchase specific goods and services, they will be able to determine—the products are essential in the marketplace, which are outdated, and how to present the goods to consumers more effectively. Additionally, marketing professionals recognize that there is a direct correlation between culture and customer behavior. Along with age, gender, and culture, culture has a significant impact on how customers invest their money and which goods, among other choices, they want to purchase. This is something that businesses must recognize in order to build customer trust and faith and continue to drive sales.

Consumer behavior research is predicated on the premise that consumers are business actors. The role theory

perspective presupposes that customers fulfill a variety of positions in the marketplace. Consumers play a variety of roles in the decision-making process, from information provider to customer to payer to disposer.

To fully appreciate how consumer behavior influences marketing, it's critical to grasp the three factors that influence consumer behavior: psychological, personal, and social.

#### Psychological Factors

Consumers are impacted regularly by a variety of topics that are special to their thinking process. Psychological factors may include an individual's understanding of a need or circumstance, their capacity to learn or comprehend knowledge, and their attitude. A marketing message can elicit a response from each person based on their perceptions and attitudes. As a result, advertisers must consider these psychological factors when developing campaigns to ensure that they appeal to their target audience.

#### Personal Factors

Personal factors are traits that are unique to a person and may not be shared by members of the same group. These characteristics can include a person's decision-making process, their unique behaviors and interests, and their perspectives. When personal factors are considered, decisions are often affected by factors such as age, gender, history, community, and other personal concerns.

For example, an older person's shopping behavior is likely to be different from that of a younger person, which means they may choose goods differently and spend their money on things that might be uninteresting to the younger generation.

#### Social Factors

The third significant factor affecting consumer behavior is social characteristics. Social influencers come in a wide variety of forms and can include a person's family, social interactions, work or school groups, or any community of people with whom a person can identify. Additionally, it may refer to a person's social class, which includes their wages, living conditions, and level of education. Social variables are numerous and can be challenging to assess when designing marketing strategies.

However, it is important to take social factors into account when analyzing consumer behavior, since they have a significant impact on how consumers react to marketing messages and make buying decisions. For instance, how using a well-known spokesperson can sway buyers.

### 2.2 Consumer Behavior in Tourism

Consumer behavior is critical to the growth, promotion, and sale of tourism products. Motives are the internal impulses that drive people to take action in order to fulfill their needs. Understanding customer motivation is one of the most successful ways to offer a competitive hosting product, such as a hotel tour or hotel reservation,

and is widely recognized as a critical factor in competitive organizations' success. Clearly, in order to maximize the efficacy and efficiency of marketing campaigns, we must first attempt to understand how customers make purchasing or use decisions for tourism items. If we understand their behavioral patterns, we will be able to determine when we need to interfere in the process to achieve the desired results. We would know who to target with a specific tourism product at a particular time. More importantly, we will understand how to convince them to select those goods that we have more successfully developed to satisfy their unique needs and desires. Understanding customer behavior is also critical for marketing success.

The issue with consumer behavior academic disciplines is that, while numerous general models of consumer behavior have been advanced, no empirical study has been done to compare these models to real behavior trends. This is particularly true in the tourism market, where consumer behavior research is still in its infancy. Despite a dearth of empirical studies, many models of consumer behaviour in tourism have been proposed.

Consumer behavior is an enthralling yet challenging area of research. This argument is especially pertinent in the tourism industry, where a consumer's buying decision is emotionally charged. The purchase of a vacation, for example, entails a significant financial investment on the part of the buyer. The holiday that the customer purchases would almost certainly be the year's high point – an opportunity to escape from work and gray skies and rejuvenate the spirit. When consumers make purchasing decisions, they are motivated by a variety of internal and external motivators and determinants. It is extremely difficult to conduct research on how these numerous motivators and determinants influence the consumer's decision-making process. They can be impacted differently depending on the type of product or service purchased. For example, the experience of buying a vacation would be very different from that of purchasing an everyday food item in a supermarket. It is likely to take significantly longer and require more careful consideration and selection, especially given that vacations typically consume a large portion of income.

### **2.3 Consumer Behavior and Personality Traits in Tourism**

The global financial world has entered an uncharted economic process. The global financial system's massive crisis, which began in developing countries, has created a risk of insolvency, fragile economies, and millions of jobless people. Today, national economies are inextricably

linked. Additionally, commercial and financial information is rapidly disseminated through the Internet and mobile networks. It is true that adverse economic conditions have an effect on the travel industry market, which requires adjustment in an unpredictable economic climate in order to meet even the most demanding and needs of travelers. A useful factor that the travel industry must consider is the various personality characteristics of travelers that influence their booking behavior and influence their decision-making when it comes to selecting a travel destination.

In terms of the impact of personality characteristics on consumer behavior, especially booking behavior, recent developments in personality psychology can assist us in forecasting tourist motivation. Traits are enduring and stable patterns of actions, attitudes, and emotions that are unique to each person. Historically, researchers were motivated by an interest in understanding how individuals vary, and therefore invested considerable effort in determining how to quantify, chart, and describe personality traits. The groundbreaking work of psychologists such as Gordon Allport, Henry Odbert Raymond Cattell, and Hans Eysenck is credited with the invention of trait theory. Via trait theory, an attempt has been made to describe personality traits (*Gkintoni et al., 2016*). According to trait theory, personality is composed of a set of quantifiable attributes or units known as traits. Traits are a type of predispositional characteristic that is relatively stable. Each personality is comprised of a specific set of traits, and given their consistency, individuals possessing a given set of traits can be expected to behave consistently through situations and over time.

### **2.4 The Tourism-Consumer Decision to be taken**

A decision model seeks to represent a variety of factors or variables that influence consumer decision-making and can be seen as "a detailed diagram showing the main elements of a larger system". In fact, a model seeks to simulate or approach realistic, as far as possible, the complex processes of preference and consumer choice, as well as consumer behavior.

This is a complex decision-making process that is affected by a large number of factors, such as the preference structure, past experiences, perceived risk, and decision-making rules, the key element of which is the search for information. In this context, a study on the decision-making process for long-term holidays, conducted by P. Shul and J. Crompton, identified tourists looking for information from too many sources to decide on a tourist destination and a package of package holidays.



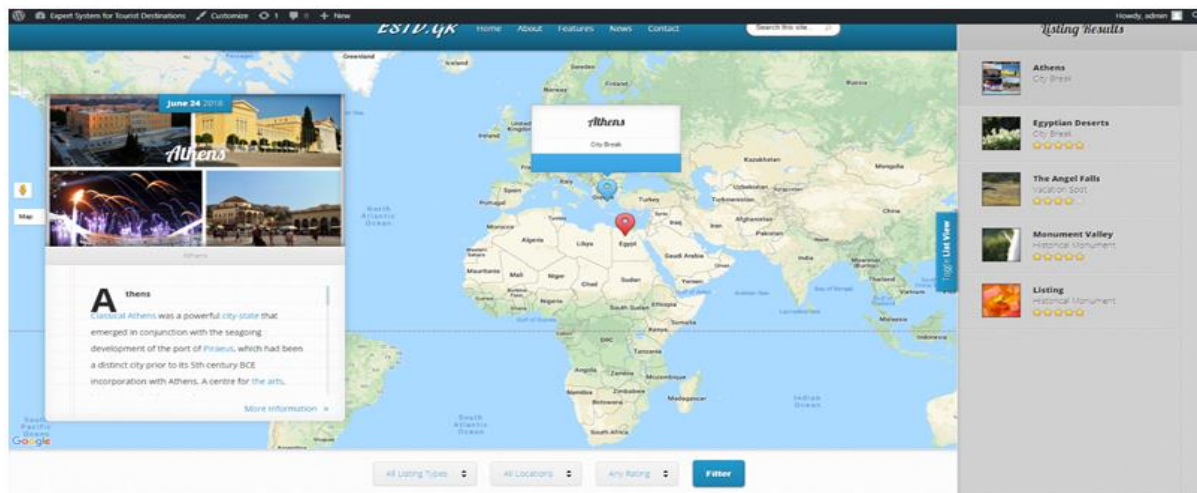


Figure 1: Tourist Recommendation Platform

A simple model of decision making by the tourist according to D. Foster, there are four categories of factors that influence the decision-making process:

- The first category concerns socio-economic factors - social and occupational category, resulting influences, characteristics, perceptions and values of the personality - who determine the motives, needs and desires of the potential tourist.
- The second category includes the characteristics of the destination - cost and quality of equipment, facilities and attractions, type and variety of travel possibilities, quantity and quality of available information on the destination - which determine the image of the tourist site.
- The third category includes all the factors that trigger a stimulus and, consequently, an impact such as advertising, sales promotion, brochures and brochures, friend recommendations and travel agency advice.
- Fourth, the other factors include the confidence that the potential tourist has to travel agents (travel agents) and their own previous experiences. Equally important are time and budget constraints.

A survey conducted on behalf of Tour Operators has identified twelve different lifestyle categories. According to

J. Abbey, these categories allow a determination of their preferences and a better knowledge of the tourist market.

Twelve types of tourists are recorded:

- The tourist who prefers family vacations
- The tourist pursuing economic holidays
- The tourist without confidence
- The organized tourist
- The tourist who seeks self-determination and confirmation of his ego
- The tourist who loves the story
- The tourist interested in nightlife
- The "social" tourist
- The "environmentalist" tourist
- The "intellectual" tourist
- The "cultural" tourist
- The "athletic" tourist

### III. METHODOLOGY

#### 3.1 Expert System Architecture

The proposed system, within the domain ESTD.GR, is an Expert System for Tourist Destinations collaborating with user-tourist-type. Creating an Expert System applying to Web portal <http://www.estd.gr> using an open source platform (CMS) with MySQL database.

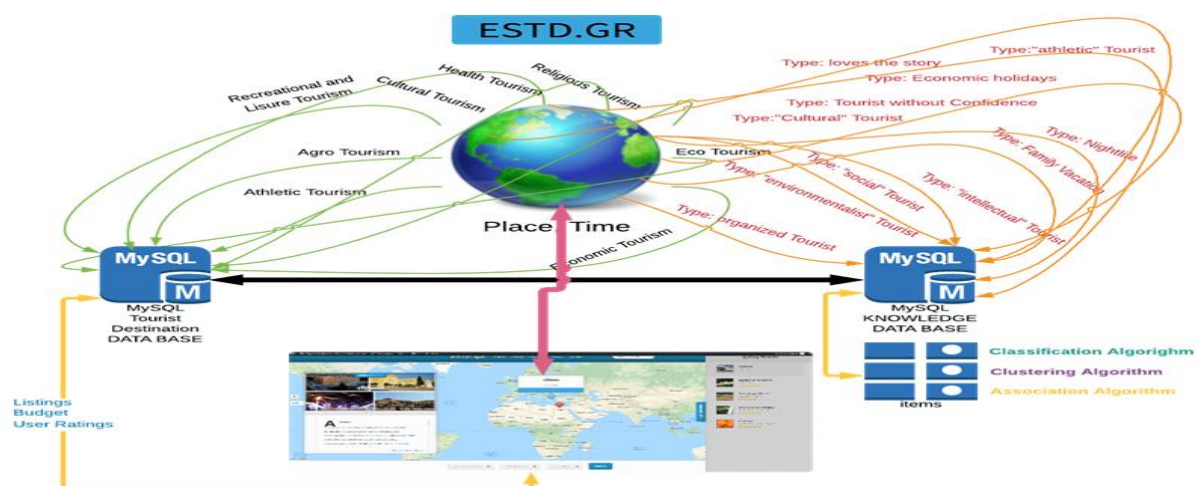


Figure 2: Proposed Model Architecture

ESTD.GR is a location-based Web Platform. Listings become part of a journey (Fig. 1). With the ability to create geo-location-based listings, the platform becomes a great tool for recommendation tourist destinations, building travels destination, travels blogs, travel guides and more combined with user-tourist-types and star ratings of the stored locations (*Development Core Team, 2008*).

For each pattern which consists of parameters (tourist types, listings, budget, desirable area location, user ratings, etc.) given by the user (visitor of the website), it proposes a valuable destination which after a random modification from an data mining algorithm is determined. The system's ability to collaborate with the user is based on parsing continuous streams of natural data (listings, budget, desirable area location, user ratings,) and then determining indirectly the functions of human gestures by choosing the optimized location for tourist destination. Such interaction is analogous to a conversation paradigm; there is a sequence of spontaneous utterances determined within a collaborative structure that is interactively managed by the participants. The key ideas behind the proposed system is to mining the best optimized personalized tourist destination from the Knowledge Data Base created from the users. The system architecture is shown in Fig. 2. At first, the user-tourist determines the input pattern to which a response from the system is required. The user-tourist uses the lists of types in webpage and with key press to filter on the Webpage in order to signal both the beginning and the end of the input pattern of the favorite listings. Then, the system stores the input Pattern to a Knowledge Data Base (MySQL). In general, the Knowledge Data Base of the proposed system consists of classification, clustering and association rules extracted during a preprocessing phase.

### 3.2 Tourist User-Ratings-Satisfaction

The potential of User-Ratings-Satisfaction for a tourist destination is examined using HOLSAT, a model that compares the performance of positive and negative holiday attributes against a holidaymaker's expectations (*Tribe & Snaith, 1998*). The HOLSAT model is essentially developed around the concept of satisfaction. HOLSAT is a relatively new model that attempts to address the complexity of measuring satisfaction with a destination. Tribe and Snaith (1998) developed the HOLSAT model and used it to evaluate holiday satisfaction at the popular resort area of Varadero, Cuba. HOLSAT is based on the disconformity paradigm outlined above and is therefore in line with the general thrust of the literature. However, the developers of this approach claim that it overcomes some of the limitations of other models when satisfaction is measured for a destination rather than a specific service. These will be outlined below.

### 3.3 Data Mining Techniques

Data mining is a relatively new method of knowledge exploration that involves extracting previously undiscovered, actionable information from extremely large scientific and commercial databases. It is compelled by the remarkable rise in the number of such databases. Typically, data mining processes derive rules from large amounts of

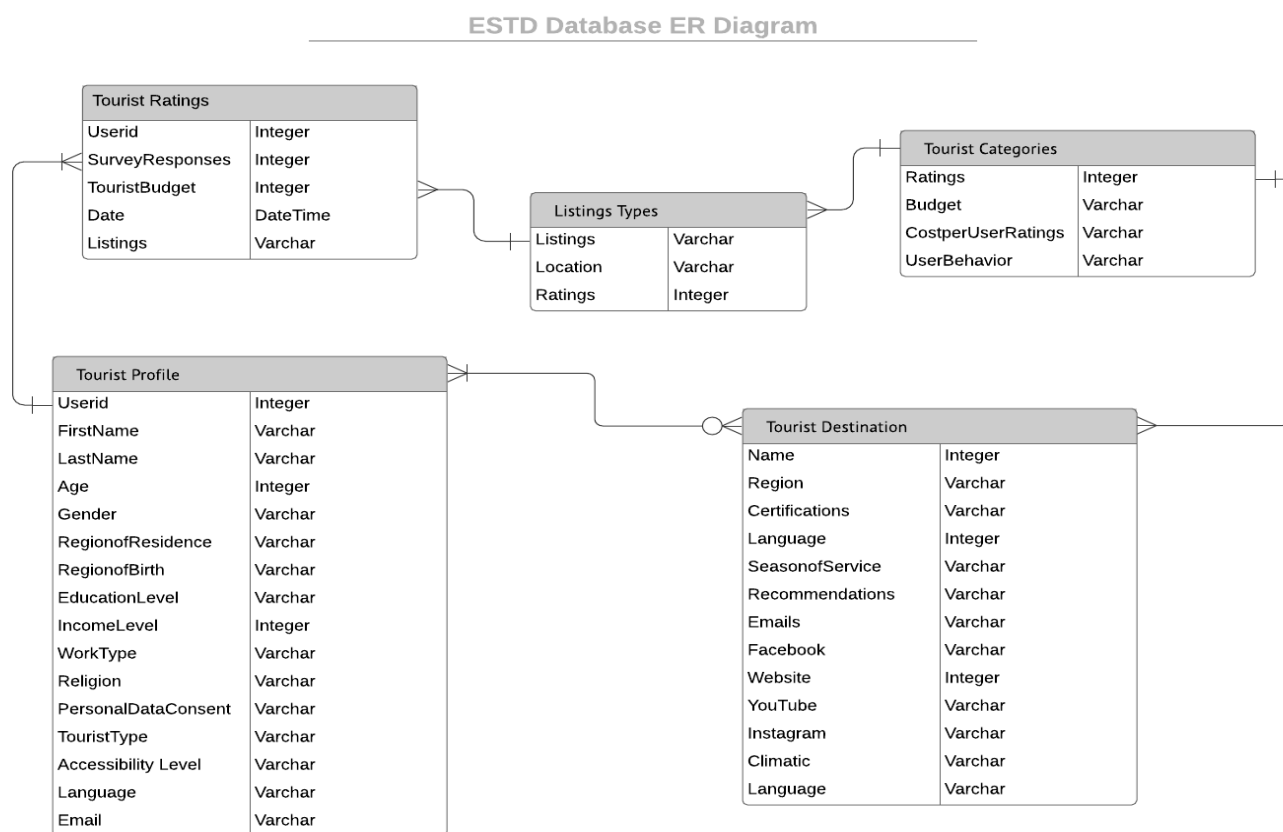
categorical and/or numerical data. The most well-known data mining tasks are classification, clustering, and association. Classification is a popular data mining task (*Tan et al., 2006*). Classification seeks to extract information that can be used to categorize data into predefined classes, each of which is characterized by a collection of attributes. Numerous schemas may be used to describe the extracted information. However, we test it in this paper using only association principles. Association Rule Mining is a widely used technique for discovering associations between a large number of variables. Apriori is a well-known algorithm for learning association rules in Data Mining. Apriori is intended to be used for databases that contain transactions (for example data collected from surveys in this case). As is customary in association rule mining, given a set of item sets, the algorithm seeks out subsets that share at least a minimum C of the item sets. Apriori takes a "bottom up" approach, extending frequent subsets one item at a time and testing groups of candidates against the results. When no further successful extensions are discovered, the algorithm terminates. Apriori efficiently counts candidate item sets using breadth-first search and a tree structure. It generates candidate item sets of length k from length k-1 item sets. Then it eliminates candidates with an uncommon sub pattern. The candidate set contains all frequent k-length item sets, as described by the downward closure lemma. Following that, it performs a search of the transaction database to evaluate the most frequently occurring item sets among the candidates. The Knowledge Data Base could be customized for any specific category of visitor. Thus, the method can determine which data mining rules are most similar to the input listing patterns by using the best rules from the output of the association algorithm (*Maimon, & Rokach, 2010*). The data mining rules that were chosen are updated and displayed in a google map along with information about the proposed tourist destination.

### 3.4 Technical specifications

The functionality of the system will be divided into three parts. In the database containing the data to be stored, viewed and edited, the Front-End interface with users and the back-end support system. The original specifications include data for the database. During the initial version of the system, the basic structure of the relational database is created based on specifications. The relational database is a data collection organized in correlated tables that simultaneously provides a mechanism for reading, writing, modifying or even more complex data processes. The purpose of the database is the organized storage of information and the possibility of extracting this information, in more organized form, according to queries placed in the relational database. The relational database management system to be used is MySQL (<https://www.mysql.com/>) and will be optimized for the needs of the ESTD.GR project. MySQL has several supporting utilities for table design and interconnection with these data. The most important one to use is MySQL Workbench (<https://dev.mysql.com/downloads/workbench/>) which provides database developers and designers with an integrated environment for Database Design and Modeling, SQL Query Development and Database Management.

According to the functional requirements of the experts, the Relationship Entity Chart (E-R) was created, as shown in Fig. 3. The E-R diagram describes the core entities of the system and the correlations between them. Users will be able to declare their preferences for the tourist destinations they want to access. This creates a more complete personal profile for each user. Additionally, tourist service providers or tour operators will be able to register with the system and add the service packages offered. In any

case, the system will only offer, either through an intermediary or with a smart user choice, recommended tourist destinations. The platform will not work as a reservation and availability management system, only suggestions and recommendations. For the logical design of the database we use the entities and create the basic tables of the logical shape of the database. These tables are as follows:



**Figure 3: ESTD E-R Diagram**

For each tourist destination, the name, location, registration date, credentials available, languages spoken and served, seasons, telephones, email, Facebook page, website, channel on YouTube, recommendations made by previous tourist clients, time zone, and capacity.

Backend will consist of those modules that will aim to integrate the Front End with the database, implement the specialized processing and search algorithms, and be a backend API (application programming interface) for the mobile application of the e-Tour Facilitator. This system will include Web services where one of the following Web Services specifications: SOAP, REST or JSON will be implemented.

Finally, an application will be developed to analyze the content of user feedback. The application will function as a mining tool for the recommendation tourist destinations offered and will categorize them in order to continuously evaluate and improve the services offered. A smart search

algorithm will also be implemented will be used by the recommendation system, which will suggest users the packages that fit their profile before they even search. The algorithm will evaluate the user's preferences when they register and will identify potential tourist destinations of interest to the user.

#### IV. CONCLUSION

Recent research data show that travelers are not influenced by the completeness of information. Most travelers appear to only search for information that satisfies their particular needs. Therefore, they are not interested in knowing everything about specific tourist destinations and may not pay attention to all the content in a user-review and maybe are only interested in the kind of information that satisfies their personal needs as far as information about tourist data is concerned. At this point the proposed model is comes to fill that gap in research. However, this is an experimental model at an early stage, we believe it may

have efficient results on the issue of optimal tourist selection associated with customized parameters that users choose themselves through an online tourism web platform. We can conclude therefore that the marketing planning process will be helped immensely if the marketing manager has a thorough understanding of the parameters of consumer behavior as far as tourist consumer decisions is concerned with the use of both web technologies through advanced techniques with data mining applications into decision-making process.

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