

ELECTRONIC COMMERCE AND TOURISM

Has e-commerce past its prime or just resting? Business and stock market expectations have not been fulfilled. However, in some sectors such as the travel and tourism industry online transactions are continuously increasing, despite its tough economic problems and fewer travelers. This industry is the leading application in the B2C (business-to-consumer) arena. Whereas in other industries there is a stronger hold to traditional processes, the tourism industry is witnessing an acceptance of e-commerce to the extent that the structure of the industry is changing. The net is used not only for information gathering; there is an acceptance of ordering services over the Internet. A new type of user is emerging, who seems to accept to become his own travel agent and to build his travel package.

In 2002 the US online travel market increased by 45% up to 27 Bn. US\$, accounting for 14.4% of the total travel market; and in Europe the online travel increased by 67%, making up 3.6 % of the total market (according to the Danish Center for Regional and Tourism Research, www.crt.dk). In the same year 32 % of US travelers have used the Internet to book travel arrangements (see www.nua.com/surveys/). And [9] forecasts that by 2007 30% of all B2C transaction in the European German speaking countries will be done via the Internet. However, other market research institutes publish other, both higher and lower, numbers. These statistics have the problem that they are based on varying, either broad or narrow, definitions: either distinguishing between *e-business* and *e-commerce* (seeing the latter as part of the first) or not, and using different variables and measurement methods. But even when following different definitions, all the statistics given for the travel domain point upwards. However, all those definitions fall short in one important aspect as we can see in the tourism case: they are all transaction and business oriented and ignore the fact that the Web is also a medium of curiosity, of creating communities or having just fun, all of which may or may not result into business. Especially the tourism product has to do with emotional experiences, with fun; it is not just business.

1 The Industry

The travel & tourism industry as a global (and a globalization) industry shows very specific features:

- Travel and tourism represents approx. 11% of the world wide GDP (following the tourism satellite account method of the World Travel & Tourism Council).
- There will be one Billion international arrivals in the year 2010 (following the World Tourism Organization), and on average tourism grows faster than the other economic sectors.
- As an umbrella industry it relates to many sectors such as culture or sport, over 30 different industrial components have been identified that serve travelers.
- This explains the industry's heterogeneity, and due to its SME structure (especially when taking a destination point of view) it has a huge importance for regional development. For example, in the EU the hotel and restaurants sector accounts for more than 1.3 million enterprises, these are 8.5 % of all European enterprises. 95.5 % of these enterprises are very small, e.g., 1-9 employees.
- The supply and the demand side form a worldwide network, where both production and distribution are based on cooperation.
- The product is perishable and complex: i) a hotel bed not sold for one night represent a lost income. Suppliers are in a risky situation, which can be reduced if access to information is available; ii) the tourism product itself is a bundle of basic products. To support the rather complex bundling products must have well defined interfaces with respect to consumer needs, prices or also distribution channels.

Tourism is an information based business, the product is a "confidence good"; an a priori comprehensive assessment of its qualities is impossible. Tourists have to leave their daily environment for consuming the product. At the moment of decision-making, only an abstract model of the product is available, which is based on a range of information acquired through a multiple set of channels (Web, TV, brochures or friends). This characteristic of tourism products requires information on both, the consumers' and suppliers' sides, entailing high information search costs and causing informational market imperfections. These, in turn, led to the establishment of comparably long information and value chains.

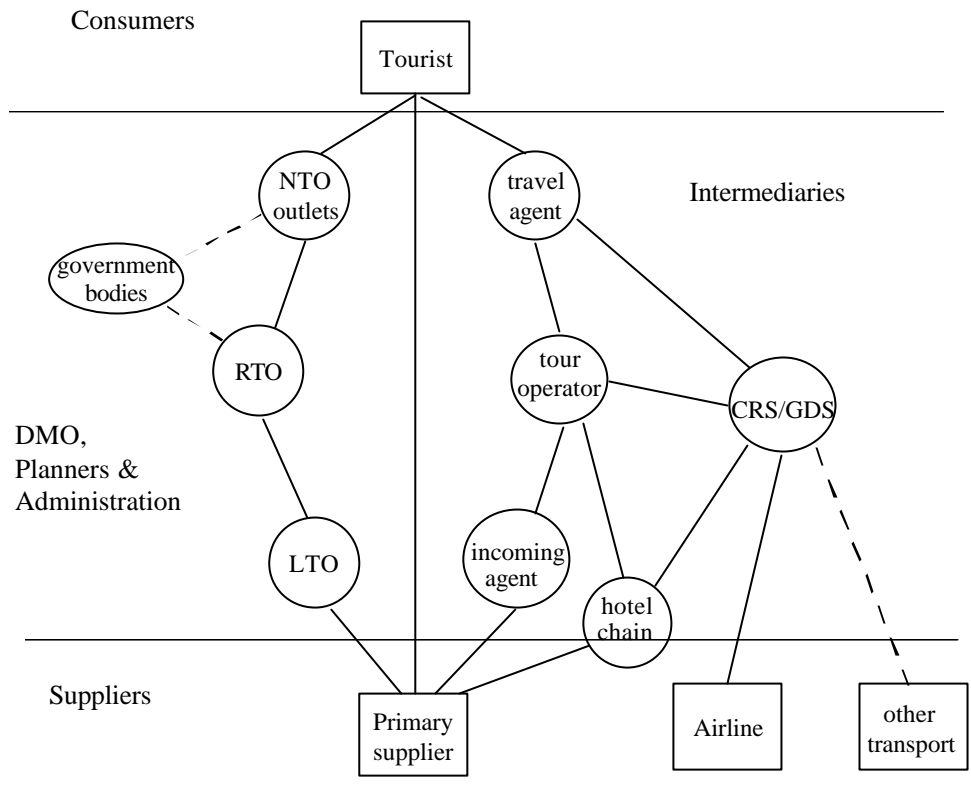


Figure 1. Structural view of the market [12].

Figure 1 differentiates between the supply and demand side and the respective intermediaries. Links mark the relationships as well as the flow of information. It only shows the most relevant links, the nodes indicate the relevant types of players in the field.

On the supply side we denote with “primary” suppliers enterprises like hotels or restaurants, mostly SMEs. With respect to a functional differentiation these companies are on the same level as the “big“ players like airlines. Tour operators can be seen as product aggregators, travel agents act as information brokers, providing the final consumer with the relevant information and booking facilities. CRS/GDS (Central Reservation Systems / Global Distribution Systems), stemming from the airline reservation systems already developed in the 60s, include also other products such as packaged holidays, or other means of transport. Whereas the intermediaries on the right side can be seen as the “professional“ connection between supply and demand (mainly based on the electronic infrastructure and functionality of CRS/GDS), the left side is relevant for the management, planning and branding of a destination. These national, regional and local tourism organizations are normally publicly funded, act on behalf of all suppliers within a destination and are not engaged in the booking process. The upstream flow of fig. 1 consists of product information, whereas the downstream flow reports on market behavior, mostly represented in terms of statistical aggregates. Both information flows create a tourist information network tying together all market participators and, apparently, reflecting the economic relationships between them.

2 Business is Changing

2.1 New Products and Services

The Web leads both to new ways to meet changing consumer behavior – they are less loyal, tend to make more, but shorter vacations, the time between decision making and consumption decreases – and to an “informatization” of the entire tourism value chain. This allows different strategies to generate value [11]:

- Value extraction: increases efficiency and reduces costs, e.g., automation of specific processes or outsourcing to clients such as self check-in of hotel guests or airline passengers.
- Value capturing: client and sales data are used to support the marketing, e.g., data mining for forecast or yield management.

- Value adding: a linear combination of products and services to create richer product bundles, e.g., new service quality for consumer by linking mobile services to existing Web sites to advise tourists during their travel.
- Value creation: the focus is on network effects, e.g., tourists within a destination participate in service definition and planning.

Thus, not only processes are changed, but also new services can be designed, extending the range of options to customize and to configure products. Customization describes the process of individualizing products or services, based on IT enabled mass-customization. Configuration refers to the bundling of different product or service components to integrated offerings. Companies combine their core products with layers of additional services.

2.2 The New Business Network

Given the dynamics of the sector and the already very competitive e-market, nearly all stake holders have implemented their strategy. Tourism has also become the playing field for new entrants, either start-ups or companies from the media and IT sector. Since tourism is an information based business, it fits well with their respective background. One can observe a trend towards further specialization and an ongoing deconstruction of the value chain paralleled by an integration of players and products. Companies compete and cooperate at the same time, boundaries within the industry are blurring. All types of market players are affected:

- Tourists are addressed by more players, and they are also playing a more active role in specifying their services (e.g., using reverse auctions sites).
- Travel agents see a diminishing power in the sales channel, as a consequence they will put more emphasis on consulting and more complex products.
- Internet travel sites are further enhancing providing new market functionality and technology, focusing on personalized intelligent tools for travelers (see the recommendation functionalities used by major sites).
- Destination management organizations are developing cooperation models within destinations, where they will occupy a new role as consolidator and aggregator; see, for example, the case of Ireland.
- Tour operator will blur the boundaries between individual and packaged tour, based on mass-customization and flexible configurations (e.g., the Italian operator Costa Crociere has developed a personalized cruise builder).
- CRS / GDS show an "INTEL inside" marketing strategy by linking to major tourist Web sites for increasing their transaction volume, and they also move into direct sales for the retail segment.
- Suppliers will increasingly form alliances and support electronic direct sales, increasing price competition as well as price differentiation, and they will redefine customer processes such as electronic ticketing or automated check-in.

This leads to an evolution of the market best described as an ongoing interaction of concentration (e.g., as in the US with the major online travel sites such as Expedia, Orbitz or Travelocity) versus the simultaneous entering of new players. The related increased complexity, however, generates the need for new services such as providing transparent access, market overview, or price comparisons. This in turn will accelerate innovation, putting even more emphasis on technical innovation.

3 IT Systems: Features and Trends

The emerging business scenario is based on flexible network structures and an increasing consumer integration. If one adds the tourist life cycle – taking into consideration the mobility aspect of travelers – one can draw the following simplified figure of linking the respective tourist phases with companies' processes.

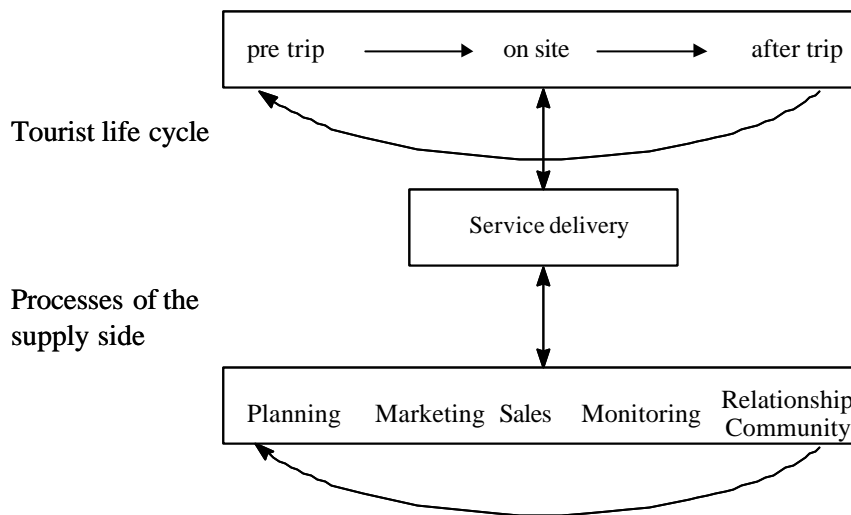


Figure 2. Tourist life cycle and companies' processes (both suppliers and intermediaries)

Obviously, processes cross company borders, leading to distributed b2b2c applications, supporting both cooperation between companies as well as mobile communication with the consumer. Technology – based on a common pervasive infrastructure – will become transparent, invisible for the consumer; information will be available at home, at work and during travel. In such a scenario IT systems should

- support **heterogeneous** data formats and business functions as well as **distributed** data sources, as they have to take into consideration different types of participating entities, with their functional differences;
- be **scalable** and **open** with regard to geographical and functional extensions. They will support the entire consumer life cycle and all business phases;
- enable full **autonomy** of the respective participants but enhance **cooperative** behavior, providing sophisticated tools for suppliers as well as for dynamic network configurations;
- **integrate mobile** and **fixed** services, enabling multi-channel access to services, provided by all the different types of players described previously;
- support **attentive user interfaces** and **personalization** through extensive exploitation of user modeling, taking into consideration user behavior and cognition as well as emotional aspects.

The research and development activities crossing travel and tourism applications have addressed the above themes, producing some remarkable results. Quite naturally, many of those activities follow an AI based approach. In the following we reference some of them, focusing on those which either had been more influential or will have major impact. These are rather horizontal technologies that can be exploited in different applications such as travel planning and scheduling, visitor guidance systems, individual pricing, reversed auctions, or workflow management for supporting cooperative marketplaces

1. **Information Extraction.** Tourist information portals are still largely based on unstructured information. Therefore a critical problem in developing distributed systems consists in accessing data formatted for human use and transforming them into a structured data format, such as XML. This problem is tackled by wrapping techniques to learn highly accurate extraction rules that adapt to structural changes in the sites ensuring the correct extraction of data ([5], [6]).
2. **Information Integration.** Wrappers can be built on top of semi-structured or structured information sources. This sets the stage for systems that answer queries based on the extraction and combination of data fetched from multiple wrappers [4]. Tourism related information sources represent a perfect application for such technologies. For example, TheaterLoc is an information integration application that allows users to retrieve information about theaters and restaurants in the US that come from five distinct online sources [1]. The core component of this application is a mediator that exploits AI planning technologies, a domain model (containing a unifying ontology) and a set of axioms describing mapping relationships between the integrated data view and the sources. When queries are posed, the system reasons about the domain model and sources' descriptions in order to build a plan for retrieving and integrating the data.

3. **Information Presentation.** Tourism, and in particular cultural heritage, is a privileged application domain for intelligent information presentation techniques [10]. Natural language technologies have been used to build contextual presentations, speech and gesture recognition as well as animated characters support an augmented interactivity involving the user in the appreciation of the cultural heritage. Applications have been developed where the real exhibit and the information blends, i.e., the user, monitored by a set of sensors, can activate – on a mobile device – personalized windows where information on a given exhibit (e.g., in a museum) is provided. In addition, even unsolicited suggestions about further topics or objects can be delivered.
4. **Recommendations.** Recommender systems suggest products and provide consumers information to facilitate the decision process. In tourism there are some notable applications focusing on destination selection and travel products bundling ([2], [8]). In these applications the user is asked explicitly about his needs and constraints and the systems, combining content-based filtering technologies, interactive query management, and variations of the collaborative-filtering approach or case-based reasoning, rank suggestions extracted from structured catalogues. Tourism recommendation poses peculiar requirements that are related to the complexity and to the intangibility of the travel product. Recommendations must refer to a variety of products (locations, attraction, accommodation, flights, etc.) in order to provide a meaningful picture of the proposed travel.
5. **Semantic Web.** The semantic web vision, i.e., the idea of having data on the Web defined and linked in a way that it can be used by machines also for automation, integration and reuse across various applications, provides a unifying view over the above mentioned technologies. In tourism this technology may have a major impact (see, for example, the European project [3]). The industry provides a challenging test bed for peer-to-peer semantic Web services, based on the integration of the Semantic Web with peer-to-peer Web services. For instance, services for finding or integrating information providers eventually needs to directly exploit resources present at other nodes without intervention of any central server, where nodes may join and be integrated in an ad-hoc manner [7].
6. **Mobility.** Travelers expect to get access to services and information from various devices, whenever and wherever they need it. Typical mobile applications can be found in the following areas: airlines, hotels and restaurants, transportation, city guides, traffic and weather conditions, other services like translations or currencies conversion. Mobile terminals open up new and enhanced ways to support tourists while on tour. While the new technologies promise benefits and added value, they also raise challenges concerning usability, accessibility over different devices, trustworthiness and interactivity. The challenge is a context sensitive, personalized and effective model of interaction that take into account the constraints of ubiquitous access. But here sophisticated user models developed in the tourism domain as recommendation systems described previously may help to pass these obstacles.

4 Conclusions

Travel and tourism has shown how e-commerce may change the structure of an industry and the way business is done, and where such a process creates also new business opportunities. The deployment of more specialized services, flexible network configurations and further consumer integration will lead to smart market places, integrating all stakeholders. The underlying pervasive IT scenario enables as well as enforces this development, showing that tourism is an interesting field of application as well as research. As such it may also be of interest for other industries to learn from this development and to understand emerging e-market places.

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