INFORMATION AND COMMUNICATION TECHNOLOGIES IN TOURISM - INFLUENCE, DYNAMICS, TRENDS

E + M

Josef Zelenka

Introduction

Tourism is for many social, economic, technological, and geopolitical reasons the biggest industry in the world today, with an actual high quantitative and qualitative growth dynamics and high growth potential in future. The information and communication technologies (ICT) have change tourism industry (e. g. [3], [13], [33]) in many aspects, mainly by the 80' of the last century and we can speak about revolution in the tourism products' distribution process, communication with consumers and among business subjects, destination image (more accurate „mental maps") creation, information access, reduction of tourism products prices, transportation security, market competition, or CRM (Customer relationship management). A. M. Morrison in his book „Hospitality and Travel Marketing" (1989) wrote that tourism and hospitality marketing were retarded in comparison with other industries for about 10 to 20 years. A very quick development of the ICT in tourism completely changed situation, and in the „Internet and Mobile Communication Age" tourism marketing is a sophisticated, multileveled, dynamic and highly developed part of tourism industry.

The ICT is for tourism industry in many cases the most important comparative advantage. The role of information is underlined by UN WTO ([37], cited in [5]): „the key to success lies in the quick identification of consumer needs and in reaching potential clients with comprehensive, personalized and up-to-date information".

According to BUHALIS ([5], adapted), the ICT is a driver for tourism industry:

- **Cost**: increasing efficiency; low distribution, communication, and labour costs; facilitation of flexible pricing; minimization of the waste factor.
- **Market**: satisfying sophisticated demand; flexibility in time of operation; specialisation and differentiation support; providing last minute deals; accurate information (consumer protection, comparison products, destinations etc.); support of the relationship marketing strategies for frequent flyers/guests; quick reaction to demand fluctuations; multiple/integrated products; yield management (marketing strategy for profit maximisation via overbooking, price differentiation, or choice of short/long terms reservations); corporate intelligence; marketing research.
- **Competition**: enterprises networks management; value-added skill building; flexibility; knowledge acquisition; strategic tool; barrier to entry.
- **Government and regulatory**: deregulation; liberalisation; government supported.

Below there is an overview of the chosen technologies and applications of the ICT (in combination with other sciences) in tourism industry as an evidence of the sophisticated use of the advanced types of the ICT, different influences of the ICT on tourism industry, and the chosen aspects of the state-of-the-art ICT application in tourism industry and connected problems. There are discussed perspective trends of the ICT use in tourism industry and vision of the ICT using in tourism industry too.

1. Web Pages

It seems (web pages today influence tourism industry, a growing amount of web services, or web pages interconnection to other types of information systems) that the web pages were made for tourism industry and the web space is a „mirror of the tourism sector". The web pages with their audio, video presentations, possibility to information structuring into the logical levels and logical interconnections, graphical interactivity (e. g. interactive maps, plans), data and graphic personalisation ability (interactive maps, GIS applications, route

finders etc.) offer huge amount of tourism applications. According to LAKE ([22], cited in [26]), about 95% of the American web surfers use the web to gather travel-related content, and about 93% indicate that they visited tourism websites when planning their vacations. The tourism web space has been very dynamic developed from the quality and quantity point of view in the last 10 years. USAID presentation in 2006 [31] presumes that „the Internet will account for 25% of travel purchases within the next five years." And from USAID presentation [31] once more about the web pages penetration: „50% of German tourists use the Internet to get information on destinations." What are typical/important subjects of research studies of the web space application for tourism?

The crucial tourism web pages' parameter is their quality. DOOLIN - BURGESS - COOPER [8] studied New Zealand's tourism web pages and presented an extended model of the Internet Commerce Adoption (eMICA). The model eMICA describes the typical life cycle of the commercial web pages and the main development parameter is a growing interactivity (chat room, discussion forum, multimedia, newsletters or updates by email etc.) in three stages of development: promotion - provision - processing.

The term „virtual tourist community" was used by many authors but there has been no clear definition yet. The theoretical foundation of the concept of a virtual tourist community authors WANG - YU - FESENMAIER [32] is based upon the core characteristics of the virtual communities and the fundamental needs of community members. They identified three dimensions of similarities between the „classical" community and the virtual community: space - cyberspace ([1], cited in [32]: „The cyberspace has geography, a nature, and a rule of human law. In the cyberspace the common man and the information worker can search, manipulate, create or control information directly; she/he can be entertained or trained, seek a solitude or a company, win or lose the power...indeed, she/he can ‚'live'' or ‚'die'' as she/he will"), symbolic dimension, and virtual dimension („common value systems, norms, rules, and the sense of identity, commitment and association that also characterize various physical communities", [32]). The authors from the point of view of the members of the virtual tourist community discuss the implications for marketing and design: brand building, relationship building, category building, cost reduction (see discussion in [5]), revenue provision, and community design.

The trends of the tourism related web pages:

- **Personalisation** - according to a nationality, roles, users activities; an information and services access according to the users preferences.
- **Intelligent search and results sorting** - logical sorting, logically determined full text search, semantic web, AI search support.
- **Growing interactivity** - hypermedia, interactive maps, pseudo-virtual reality (3D presentation, space virtual models).
- **„Total" information topicality** - web cameras (cruises, destinations), information on the actual position of transportation vehicles, an immediate state of the disposable service offer.

2. Marketing

The best way to start thinking about the ICT use in tourism industry is to discuss tourism product characteristics and tourism marketing specifics. Typical for tourism product is mainly their complexity, unique capability to fit consumer needs, dependence on time and place, broad spectrum of quality and price relations and dependence on cooperation and human factor. Every aspect of the tourism product characteristics and tourism marketing specifics is importantly influenced by the ICT. How the ICT is changing tourism market and support/change tourism marketing:

- The ICT change the way the organizations distribute their tourism products in the marketplace [2], [5], [13].
- The ICT enable cooperation among many partners (typically tens partners - airlines companies, airlines alliances, hotel chains, credit cards companies, or rent-a-car companies) in the frame of frequent flyer/user programmes - the control of personnel account, automatic accounting, online informing of consumers, programs promotion [12].
- Flexible and immediately accessible information did born a broad acceptance of the last minute offer in different forms - tour operators/travel agencies packages, airlines waiting lists.

- E-business (broad meaning, not only purchasing, but promotion, too) via different media/technologies is substituting traditional personnel marketing.
- The ICT is a powerful tool for market study - neural networks are used for market segmentation [2], usual tool is a software for analyses of guest history/preferences on web pages.
- The strengthen role of a brand: 80 percent of the on-line customers prefer buying from companies they already know [31].
- the ICT using knowledge of other sciences (economy, statistics, or mathematics) is able to model and forecast tourism demands (see study below).
- Quality and accuracy of decision can be effectively supported by marketing decision support systems, as described by WÖBER [36] for TourMIS in Austria.
- The increased efficiency/enables Yield management, marketing strategy targeted on profit maximalisation through overbooking, or market segmentation (American Airlines: „selling the right seat to the right customer at the right time").

The ability to forecast tourism demand can provide an important market advantage. SONG and LI [29] proposed a detailed study of different approaches to achieve forecast of tourism demands via modelling and forecasting. They analysed published studies and articles on modelling and forecasting of tourism demands since 2000 and concluded that:

- Quantitative forecasting techniques can be divided in three categories: time-series models, the econometric approach, and other methods including AI techniques.
- New trends to further enhance forecast accuracy include a combination of the quantitative approaches and an integration of the quantitative and qualitative approaches.
- Future development: better calculation with seasonality, unexpected events, tourism destination life cycle analysis.
- According the authors „there is no single model that consistently outperforms other models in all situations".

Different author studied different effects of the websites on consumer's behavior and consumer's cognitive functions - an influence on formation of destination mental map/imagery [13], a correspondence of consumer psychological characteristics to the web sites behavior [30]. FRÍAS - RODRÍGUEZ - CASTANEDA [13] studied the influence of information processing on formation of destination mental map/image when they compared process obtaining destination information solo from travel agency, or solo from websites, or as a combination of both resources. They concluded that destination image was worse when consumers used a travel agency and websites together (reason - information overload on web, unsuitable website structure).

3. E-business

E-business provides new channels for the tourism global marketing of products and services, and presents opportunities to create new businesses providing information and other knowledge-based intangible products. According to [31] e-tourism the leading B2C application is with 40% share of all B2C e-commerce. The current tourism e-business trends and implications are described in [10]; any described trends are conflicting, opposite, parallel (opportunities and/ or threads for business subject):

- The ICT enables tourism service providers to interact directly with consumers, which puts enormous pressure on traditional intermediaries (i.e. travel agencies and tour operators). The extent to which intermediaries are bypassed differs considerably between various sub-sectors.
- The ICT solutions may also provide new online opportunities for traditional players and newly emerging online intermediaries through securing their position on the market by offering value-added online services.
- Market consolidation is driven by an organisation growth, mergers, acquisitions and strategic alliances. This can increase in competitiveness on company level, but might lead to reduced competition in the tourism market in the long run.
- Growing offer and demand for dynamic packages.
- E-Ticketing - usual at low-cost airlines, „traditional" airlines (members of The Inter-

national Air Transport Association - IATA) achieved a 100% penetration of e-ticketing at the end of 2007; the process is completed by bar-coded boarding passes.

HO - LEE [19] identified and verified on the base of factor analyses five core components of e-travel service quality: information quality, security (transaction's safety, privacy), website functionality (easy navigation, easy access to webpage, or quick and easy to complete a transaction), customer relationships and responsiveness, and did find a high correlation among the five factors. Each component sub-factor (see [19]:1441, tab. 5) can be operationally used for e-travel service quality testing.

BUHALIS and LICATA [2] analysed position and development trends of traditional electronic tourism intermediaries (travel agents, tour operators and incoming travel agencies supported by computer reservation systems, global distribution systems - GDSs', and tour operators' videotext systems) and new electronic tourism intermediaries (according to [2] a wide range of organisations including suppliers - airlines, or hotels, selling direct on the Internet by allowing users to directly access their reservation systems; web--based travel agents; the Internet portals and vortals, and auction sites). Below there are authors' conclusions about future market changes:

- GDS, tour operators and travel agencies will move closer to customers.
- Main role of GDS will be a data supplement for future E-business technologies - the Internet, IDTV and mobile devices (mobile phones, PDA's etc.).
- Tourism product personification will play a key role for future success in the frame of E-business which will depend on the partnership with suppliers.
- GDS will possess or cooperate with the online tour operators/travel agencies that will be one of the possibilities of „cross" sale of tourism products.
- Direct airline tickets sale via CRS of airline companies will continue the growth which will be supported through special offers, frequent flyer (FF's) programs, CRM management.
- Tour operators and travel agencies must adapt to a new situation, and in the frame of package creators the role will be more online.

- Main factors of concurrence ability are new distribution channels and tourism product personification.
- Evident cooperation of the Internet, IDTV, and mobile devices will further strengthen their market position mainly because they will be able to offer multiplatform interface for the access of different customers in different places and different time.
- One from the main factors of differentiation on the online target is accessibility of up-to-date, relevant and rich content information; that is difference of new and old one (e. g. GDS) E-business cannels too.
- Potential of IDTV and mobile devices further increase the market penetration via E-business.

4. Location Based Services

Location based services (LBS) have a very big potential for tourism industry due to the:

- Growth of wireless data transmission speed (HSCSD, GPRS, UMTS; [39]),
- technological progress of small intelligent and multifunction interfaces (mobile phones, PDA's - Personal Digital Assistants, [39]),
- accurate positioning methods (combining GPS, mobile phone technology, compasses),
- interconnection mobile devices to different data and information application resources (e. g. GDS and CRS on web),
- development of new transmission protocols, accent on LBS personalisation [27], appropriate transmission security (cryptology),
- and lowering LBS technology equipment prices.

5. Sustainable Tourism Development

The sustainable tourism development is based on the appropriate development of tourism infrastructure, participation of local people, or monitoring and managing of tourism flows. How can the ICT be helpful in sustainable tourism development support?

Static and dynamic models can be used for visitor's management optimization, or prediction of visitors flows. Examples:

- MURDOCK [24] realized space and climbers behaviour modelling which included

an access paths network, quality and difficulty of climber's paths, landscape resources, landscape complexity, visitors flows data, results of psychological tests, and climber's preferences. The main modelling target is to forecast measure of visitors management efficiency.

- DUMONT - GULINCK [9] developed a landscape visitor's model which works with several parameters: gateways to the area, exits from the area, visitor's targets, the area parts, push and pull factors, parts of paths, connected roads, barriers. The model outputs are compared with the GPS research, interviews, camera monitoring, photograph monitoring, season changes, photograph comparison, landscape preferences studies, and walking preferred directions.
- HENKENS ET AL (2006) presented and discussed methods and outputs of the international project PROGRESS (PROmotion and Guidance for Recreation on Ecologically Sensitive Sites) which was focused on the GIS use for visitors flows and visitors distribution modelling versus ecosystems distribution.

Very important is the monitoring ([23], [6] - an overview of monitoring methods) and the evaluation of tourism flows and impacts of tourism activities. SHOVAL - ISAACSON [28] compared accuracy and operability of systems for tracking tourists - land-based tracking, satellite navigation (GPS), and hybrid systems. The question is how tracking measurement change the tourist behaviour. Accurate and reliable measurement of tourist flows (and tourist behaviour) is very important for the monitoring, application of LAC (limits of acceptable changes) method or the method of carrying capacity, visitors' management, or the modelling of visiting.

The GIS was used for an overlap map of biological zoning which was created on the bases of 17 species mapping, the mapping of tourism infrastructure including up-to-date and planned routs and ad hoc zoning (GOKHELASHVILI ET AL, [15]).

6. Cognitive Science and Artificial Intelligence Approaches

The cognitive science approaches are helpful in growing amount of the ICT application in

tourism industry. The typical applications are in marketing and below the chosen examples are described.

Authors CHIOUA - WAN - LEE [7] studied how cognitive preferences affect consumers. They compared virtual experience vs. brochures in the advertisement of scenic spots and concluded that there were two very different groups of consumers: „*visualizers (the consumers who prefer visual information and the products that stress the visual) or verbalizers (the consumers who prefer written or verbal information and products).*" The visualizers prefer the virtual experience and verbalizers traditionally prefer the printed brochures. That effect was very strong. When there was a combination of both presentation modes, better results were if the preferred way of presentation was applied as second one.

A multidimensional perceptual mapping used as a method of study of perception and preference attributes of the online travel agencies/ gateways to the GDS authors KIM - KIM - HAN [21]. They did find that most important feature was find low fares, followed by security, easy navigation and other services. The authors created the multidimensional perceptual maps of the position of the different online travel agencies/ gateways to the GDS according to the chosen perception attributes.

GOVERS - GO - KUMAR [15] combined in their „methods validation research" the qualitative questionnaire methods (qualitative research), computerized content analysis technologies (content analyses using artificial neural network software), the multidimensional destination mental map model envisaged by Echtner and Ritchie ([11], cited in [15]; functional characteristics, psychological characteristics, attributes; holistic - imagery; unique; common) and a statistical method after the quantitative representation of the qualitative research to measure a destination image. Methods combination seems to give valid results and is perspective for future research.

PAN - FESENMAIER [26] implemented the cognitive approaches to the study of the online information search in the frame of vacation planning process. The authors created a semantic mental model of a vacation planner ([26]:fig.1, p.814), described a process of information search through the information search protocol ([26]:817) and represented the process of infor-

mation search through the semantic map and evaluation diagram. They compared the semantic models of tourists and the information space for San Diego. They concluded that:

- Vacation planning on the web is a complex, dynamic, and contingent process (conclusion as a confirmation of previous results, see e. g. [20], cited in [26]).
- Vacation planning on the Internet is an information intensive task which is often beyond the searchers' processing capability and is an adaptive process that mostly follows a contingent structure.
- Each „virtual" tourist appears to have a distinct semantic mental model regarding the designated destination, navigating through the tourism information space in their unique paths accordingly.
- On the other site there are commonalities among „virtual" tourists: they usually made accommodation choices first; tourists have the intrinsically different semantic models with comparison of the web space and there is a substantial difference in the used key words.

The systematic analyses of the use of tourism knowledge in [19] is helpful in the defining of the research approaches (quantitative and qualitative methods as well), use knowledge in management, marketing, or promoting innovation.

Although we can find many cognitive science and AI approaches in tourism industry, the hospitality industry is far behind. HALLIN - MARNBURG [17] on the bases of analyses of the existing knowledge management (KM) applications in the hospitality industry conclude that KM is especially relevant for building up a competitive advantage in the hospitality industry (e. g. knowledge sharing can improve employees' knowledge of unique guests'/customers' needs) but with the exception of some major hotel chains (e.g. the Accor and the Hilton) hospitality industry is underdeveloped in practical use of KM application in comparison with other sectors.

Conclusion

The ICT influences tourism industry in a growing manner, both in the quantitative and qualitative aspects, with their final individual consumers and group's business users, in many dimensions

and many non-predictable ways. The ICT penetration into the tourism sector will be supported by novaday's development and establishment of new online technologies (web pages, WAP, mobile phones, PDA, IDTV, etc.), the growing ICT interactivity (hypermedia, interactive maps, GIS applications etc.), growing personalisation (e. g. sophisticated information search, presented information structure on the base of user's preferences and behaviour), growing information transmission speed, interconnection among different IS in networks of „classical" online and mobile online services (e. g. GDS, LBS, CRS), growing security of E-business transactions (cryptology, biometry, communication protocols), and via other factors (e. g. social, economic). The chosen the ICT and cognitive approaches influence:

- The ICT support horizontal, vertical or diagonal integration of services providers [14].
- Frequent connection of tourist with their friends and relatives change their perception of „on the way" and „at home" - according to [35] easy and frequent contact with friends and family members is associated with a feeling of being simultaneously at ‚'home" (and continued participation in pre-existing social networks) and at the same time being ‚'away''.
- Cost reduction - E-business (global concurrence, price comparison, lower distribution and promotion price etc.), introducing customer self-service check-in solutions.
- Growing security - transportation management, biometry passengers check, secure cryptology transmissions, introduction RFID for luggage handling [10]:7.

We can formulate the following ICT implementation trends in tourism sector [10], [25], [34]:

- Low barriers to new market entrants (e. g. virtual travel agencies), which pose a threat for traditional players.
- Ongoing the ICT-based substitution of services provided by traditional players.
- Online distribution channels strengthening the role of suppliers.
- Consumers are becoming more directly involved in the production, compilation or innovation of products and services (e. g. dynamic packaging, direct market research

- study of „web sites consumers behaviour" including prediction and support of tourist decision process).
- Growing competition in the online market ([34]: „Winners take it all").
- Growing presence of customer community on tourism websites (blogs, photo galleries, discuss groups, visitors books etc.) which is positively perceived by other consumers.
- LBS will change the preparation for travelling and will simplify the access to appropriate information on the way [27].

References:

[1] BENEDIKT, M. Cyberspace: Some proposals. In BENEDIKT, M. (Ed.), *Cyberspace: First steps, C*ambridge: MIT Press, 1991. pp. 119-224. ISBN 0262521776.

[2] BLOOM, J. Z. Market Segmentation. A Neural Network Application. *Annals of Tourism Research* [online], 2005, Vol. 32, No. 1, pp. 93-111. [cit. 2008-03-01]. <www.sciencedirect.com>.

[3] BUHALIS, D., LICATA, C. The future eTourism intermediaries. *Tourism Management* [online], 2002, Vol. 23, pp. 207-220. [cit. 2008-03-01]. <www.sciencedirect.com>.

[4] BUHALIS, D., O'CONNOR, P. Information Communication Technology Revolutionizing Tourism. *Tourism Recreation Research* [online], 2005, Vol. 30, Iss. 3, pp. 7-16. [cit. 2008-03-08]. <http://epubs.surrey.ac.uk/cgi/viewcontent.cgi?article=1004&context=tourism>.

[5] BUHALIS, D. Strategic use of information technologies in the tourism industry. *Tourism Management* [online], 1998, Vol. 19, Iss. 5, pp. 409-421. [cit. 2008-03-01]. <www.sciencedirect.com>.

[6] CESSFORD, G., COCKBURN, S., DOUGLAS, M. Developing New Visitor Counters and their Applications for Management. *Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings ed. by A. Arnberger, C. Brandenburg, A. Muhar*, 2002, pp. 14-20. [cit. 2008-03-08]. <http://www.boku.ac.at/ifl/veranst/mmvconference/>.

[7] CHIOUA, W. B., WANB, CH. S., LEE H. Y. Virtual experience vs. brochures in the advertisement of scenic spots: How cognitive preferences and order effects influence advertising effects on consumers. *Tourism Management*, 2008, Vol. 29, pp. 146 - 150. ISSN 0261-5177.

[8] DOOLIN, B., BURGESS, L., COOPER, J. Evaluating the use of the Web for tourism marketing: a case study from New Zealand. *Tourism Management* [online], 2002, Vol. 23, pp. 557-561. [cit. 2008-03-01]. <www.sciencedirect.com>.

[9] DUMONT, B., GULINCK, H. Push and pull assemblages for modelling visitor's flows in complex landscapes. *Proceedings of the second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas, June 16-20, 2004, Rovaniemi, Finland* [online], pp. 386 - 392, ISBN 951-40-1930-X. [cit. 2008-03-01]. <http://www.metla.fi/julkaisut/workingpapers/2004/mwp002-57.pdf>.

[10] *EC Sector Report No. 8/2006* [online]: ICT and e-Business in the Tourism Industry. [cit. 2008-03-01]. <http://www.union-network.org/unitourism.nsf/c642ee014caad5a6c12568110025fa6a/ca4331bb83d20869c125726b0030ebe0/$FILE/report%20e-business%20watch%202006.pdf>.

[11] ECHTNER, C., RITCHIE, J. The Measurement of Destination Image: An Empirical Assessment. *Journal of Travel Research*, 1993, Vol. 31, Iss. 4, pp. 3-13. ISSN 0047-2875.

[12] *Frequent flyer programs* [online]. [cit. 2008-03-08]. <http://www.frequentflyer.oag.com/loyalty_programs/flyer1.asp>.

[13] FRÍAS, D. M., RODRÍGUEZ, M. A., CASTANEDA, J. A. Internet vs. travel agencies on pre-: visit destination image formation: An information processing view. *Tourism Management* [online], 2008, Vol. 29, pp. 163-179. [cit. 2008-03-08]. <www.sciencedirect.com>.

[14] GARCÉES, S. A. ET AL. Implications of the Internet - an analysis of the Aragonese hospitality industry, 2002. *Tourism Management* [online], 2004, Vol. 25, pp. 603-613, [cit. 2008-03-01]. <www.sciencedirect.com>.

[15] GOKHELASHVILI, R. ET AL. Tourism Infrastructure Planning in Tusheti National Park of Georgia. *Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings ed. by A. Arnberger, C. Brandenburg, A. Muhar,* 2002 [online], pp. 74-77, [cit. 2008-03-08]. <http://www.boku.ac.at/ifl/veranst/mmvconference/>.

[16] GOVERS, R., GO, F. M., KUMAR, K. Virtual Destination Image. A New Measurement Approach. *Annals of Tourism Research* [online], 2007,

Vol. 34, No. 4, pp. 977-997, [cit. 2008-03-01]. <www.sciencedirect.com>.

[17] HALLIN, C. A., MARNBURG, E. Knowledge management in the hospitality industry: A review of empirical research. *Tourism Management* [online], 2008, Vol. 29, pp. 366-381. [cit. 2008-03-01]. <www.sciencedirect.com>.

[18] HENKENS, R. J. G. H. ET AL. Development of a Zoning Instrument for Visitor Management in Protected Areas In: SIEGRIST, D., CLIVAZ, C., HUNZIKER, M., ITEN, S. (eds.) *Proceedings of the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas.* 1st ed. Switzerland, Rapperswil: University of Applied Sciences Rapperswil, 2006. pp. 243-245. ISBN 3-033-00935-2.

[19] HO, Ch.Y., LEE, Y. L. The development of an e-travel service quality scale. *Tourism Management* [online], 2007, Vol. 28, pp. 1434-1449. [cit. 2008-03-01]. <www.sciencedirect.com>.

[20] JENG, J. *Exploring the Vacation Planning Hierarchy: An Interactive Web Experiment.* 1999, Unpublished Dissertation, University of Illinois at Urbana-Champaign.

[21] KIM, D. J., KIM, W. G., HAN, J. S. A perceptual mapping of online travel agencies and preference attributes. *Tourism Management* [online], 2007, Vol. 28, pp. 591-603. [cit. 2008-03-01]. <www.sciencedirect.com>.

[22] LAKE, D. *Americans Go Online for Travel Information* [online]. CNN (June 14, 2001). [cit. 2008-03-01]. <http://www.cnn.com/2001/TECH/internet/06/14/travelers.use.net.idg/index.html>.

[23] MUHAR, A., ARNBERGER, A., BRANDENBURG, Ch. Methods for Visitor Monitoring in Recreational and Protected Areas: An Overview. *Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Conference Proceedings ed. by A. Arnberger, C. Brandenburg, A. Muhar* [online], 2002, pp. 1 - 6, [cit. 2008-03-08]. <http://www.boku.ac.at/ifl/veranst/mmvconference/>.

[24] MURDOCK, E. Understanding Recreation Flow to Protect Wilderness Resources at Joshua Tree National Park, Kalifornia. *Proceedings of the second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas, June 16-20, 2004, Rovaniemi, Finland* [online], pp. 120-126. ISBN 951-40-1930-X. [cit. 2008-03-08]. <http://www.metla.fi/julkaisut/workingpapers/2004/mwp002-18.pdf>.

[25] NOOR, N. L. ET AL. Community Acceptance of Knowledge Sharing System in the Travel and Tourism Websites: An Application of an Extension of TAM. *13th European Conference on Information Systems Information Systems in a Rapidly Changing Economy*, 26-28 May, 2005 [online], pp. 12. [cit. 2008-03-08]. <http://is2.lse.ac.uk/asp/aspecis/20050056.pdf>.

[26] PAN, B., FESENMAIER, D. R. Online Information Search. Vacation Planning Process. *Annals of Tourism Research* [online], 2006, Vol. 33, No. 3, pp. 809-832. [cit. 2008-03-01]. <www.sciencedirect.com>.

[27] SCHMIDT-BELZ, B. ET AL. Personalized and Location-based Mobile Tourism Services. *Workshop on Mobile Tourism Support Systems in conjunction with Mobile HCI ,02* [online], 2002. [cit. 2008-03-08]. <http://www2.geoinform.fh-mainz.de/~zipf/mobileHCI-crumpet.pdf>.

[28] SHOVAL, N., ISAACSON, M. Tracking Tourists in the Digital Age. *Annals of Tourism Research* [online], 2007, Vol. 34, No. 1, pp. 141-159. [cit. 2008-03-08]. <www.sciencedirect.com>.

[29] SONG,H., LI, G. Tourism demand modelling and forecasting. *Tourism Management* [online], 2008, Vol. 29, pp. 203-220. [cit. 2008-03-01]. <www.sciencedirect.com>.

[30] STEINBAUER, A., WERTHNER, H. *Consumer Behaviour in e-Tourism. Consumer Behaviour in e-Tourism*, Proc. of ENTER [online]. NY: Springer, 2007. pp. 65 - 76. [cit. 2008-03-08]. <http://homes.tiscover.com/sixcms/media.php/3524/steinbauer.pdf>.

[31] USAID: *Information Communication Technologies (ICT) and Tourism. Presentation hold in Arusha, Tanzania, February 2006* [online]. [cit. 2008-03-08]. <www.usaid.gov/our_work/agriculture/landmanagement/tourism/sidebar/ict.pdf>.

[32] WANG, Y., YU, Q., FESENMAIER, D. R. Defining the virtual tourist community: implications for tourism marketing. *Tourism Management* [online], 2002, Vol. 23, pp. 407-417. [cit. 2008-03-08]. <www.sciencedirect.com>.

[33] WERTHNER, H., KLEIN, S. ICT and the Changing Landscape of Global Tourism Distribution. *Electronic Markets* [online], 1999, Vol. 9, Iss. 4, pp. 256-262. [cit. 2008-03-08]. <www.geog.psu.edu/courses/geog497b/Readings/Werthner&Klein_Tourism.pdf>.

[34] WERTHNER, H. *Research in e-Tourism. Some Observations* [online]. [cit. 2008-03-08]. <www.phdworkshop.org/enter2007_phdws_HW_send.pdf>.

[35] WHITE, N. R., WHITE, P. B. Home And Away. Tourists in a Connected World. *Annals of Tourism Research* [online], 2007, Vol. 34, Iss. 1, pp. 88-104. [cit. 2008-03-08]. <www.sciencedirect.com>.

[36] WÖBER, K. W. Information supply in tourism management by marketing decision support systems. *Tourism Management* [online], 2003, Vol. 24, pp. 241-255. [cit. 2008-03-08]. <www.sciencedirect.com>.

[37] WTO: *Guidelines for the Transfer of New Technologies in the Field of Tourism.* Madrid: World Tourism Organisation, 1988.

[38] XIAO, H., SMITH, S. L. J. The use of Tourism Knowledge. Research Propositions. *Annals of Tourism Research* [online], 2007, Vol. 34, Iss. 2, pp. 310-331. [cit. 2008-03-08]. <www.science-direct.com>.

[39] ZIPF, A., MALAKA, R. Developing Location Based Services for Tourism - The Service Providers View. SHELDON, P., WÖBER, K. AND FESENMAIER D. (Eds.): *Information and Communication Technologies in Tourism 2001. Proceedings of ENTER 2001, 8th International Conference. Montreal. Springer Computer Science* [online]. Wien, New York. pp. 83 - 92. [cit. 2008-03-08]. <http://smartkom.dfki.de/Vortraege/EML/Developing_LBS.pdf>.

doc. RNDr. Josef Zelenka, CSc.
University of Hradec Králové
Faculty of informatics and management
Department of information technologies
josef.zelenka@uhk.cz

ABSTRACT

INFORMATION AND COMMUNICATION TECHNOLOGIES IN TOURISM - INFLUENCE, DYNAMICS, TRENDS

Josef Zelenka

The ICT influences tourism industry in a growing manner, both in the quantitative and qualitative aspects, with their final individual consumers and group's business users, in many dimensions and many non-predictable ways. The ICT penetration into the tourism sector will be supported by novaday's development and establishment of new online technologies (e. g. web pages, WAP, mobile phones, PDA, IDTV), the growing ICT interactivity (e. g. hypermedia, interactive maps, GIS applications), growing personalisation (sophisticated information search, presented information structure on the base of user's preferences and behaviour etc.), the growing information transmission speed, interconnection among different IS in networks of „classical" online and mobile online services (e. g. GDS, LBS, CRS, GIS), the growing security of E-business transactions (cryptology, biometry, protocols), and via other factors (e. g. social, economic). What will be dominant, are the different forms of E-business (both B2C and B2B) characterised by growing personalisation, interactivity, complexity and services concentration and at the same time usage simplification. In last years, the dominant role of the web pages/Internet will be transformed into the role of one according to the conditions used technology together with LBS and IDTV, and simultaneously these technologies will cooperate.

New age of usage of the ICT in tourism will influence not only sophisticated presentation and online technologies (web, LBS interfaces, IDTV) but also cognitive and AI applications (e. g. semantic representations, knowledge and expert systems), space oriented applications (the GIS), intelligent sorting and information search (which is very important for the exponentially growing information/ virtual space), or virtual reality applications. In the near future will have E-business in developed countries more consumers than in the traditional personal trade. And of course, tourism marketing will change itself more and more into the online form with many competition and business subjects' fusion consequences. On the other hand the ICT is an opportunity also for the small businesses (e. g. pensions, small private museums, bed-and-breakfast, specialised restaurants).

Key Words: *information and communication technology, tourism industry, E-business, marketing, GDS, IDTV, LBS, PDA, knowledge system.*

JEL Classification: *L86, L83.*