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Application of communication technologies (ICT) within the tourism industry in the European Union

Abstract

The information and communication technologies (ICT) are revolutionizing the tourism industry. This research note will make a brief diagnosis of the relationships between tourism and ICT in the European context by presenting an index to characterize the digitization of the tourism sector and its comparison with a reference index, which reflects the introduction of the ICT in every country. The proposed indicator will allow us to know the degree of integration of these ICT in EU countries when talking about tourism accommodation reservations. The results indicate divergent behavior patterns in digital accommodation management and in how ICTs are managed, as well as a different perception of trends between different geographical areas of the European Union. From the comparative analysis of the indicators, we can observe that in the South of Europe/Mediterranean area both the tourism integration and ICT are quite commonly below the European results. In other countries like Holland and Spain, the traditional channels are still used despite of their outstanding digitalization. These patterns provide relevant insights for the companies, especially for the tourism agencies, and allow establishing sector needs within the digital field.

Key words: tourism; ICT; competitiveness; convergence; European Union

Introduction

Advances in information and communication technologies (ICT) have transformed the behavior pattern of the economic agents and their interaction with the social and economic environment. The increasing competition and the technological advances have led to fast changes in the demand (Nudurupati, Bititci, Kumar & Chan, 2011), and the innovative development of telematics applications and programs has created a new scenario where activities, information channels and new generation products have been developed. The tourism industry is no stranger to these changes (Buhalis & Law, 2008; Fesenmaier, Leppers & O'Leary, 2003), and these technological advances have modified the behavior of the users of tourism services who have seen how the consumption and their buying habits have also been affected by the new technologies. ICTs have had a significant impact on the productivity the industry businesses (Kim, Nam & Stimpert, 2004) and their competitiveness (Gretzel, Yuan & Fesenmaier, 2000).

The use of ICT is playing an important role in the development of tourism innovation, resulting in new products and market research as well as a radical change the industry landscape (Hjalager, 2010, Ayeh, Au & Law, 2013). There are many articles that relate tourism and ICTs, as evidenced by the numerous literature reviews; from the studies of Frew (2000) and Leung and Law (2007), to the recent

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review made by Ukpabi and Karjaluoto, (2017) that delves into the dynamics of consumers' adoption of ICT in tourism services, but few studies present a framework analysis within the European framework, which makes the present research note especially relevant.

We will focus our analysis on the incidence of ICTs in the tourism accommodation bookings, by developing an integration indicator of tourism accommodation bookings through the internet (IITate) and another indicator of integration in the use of ICTs (IITtic) for the EU countries as an empirical measure of this great transformation. Finally, we propose a series of conclusions and we propose new lines of further research.

Methodology and indicators´definition

We have used data from Eurostat to develop our analysis. Data was collected by the competent national authorities of the Member States and is compiled according to a harmonised methodology established by EU regulations before transmission to Eurostat[1]. Surveys were generally conducted on a monthly or quarterly basis and consolidated anually.

For the preparation of the IITate indicator, we used data from Eurostat´s "Number of trips by type of organization (from 2014 onwards)" [tour_dem_ttorg]. A total of 7,132 entries were used with information about the respondents´ reservations made by Internet or by operators / travel agencies, for a holiday or business purpose, to national destinations, which involve, at least, one or more consecutive nights spent away from the usual place of residence. This information on tourism demand concerned trips for the population aged 15 years and over. Luxemburg, Portugal, France and Latvia were excluded as incomplete or no data available.

For the elaboration of the IITtic indicator, data obtained from the "Community survey on ICT usage and E-commerce in enterpriser" carried out in 2014 have been used, as this survey is carried out annually among the EU countries. Out of a total of 18,916 entries are studied.

Methodologically, for this study we looked at the concept of Revealed Comparative Advantage (RCA) proposed by Balassa (1965, 1977) to study the specialization of countries in international commerce (exports) by defining an index for comparation. Other authors have used this indicator to study different industries (Dieter & Englert, 2017; Wang, 2016; Mora & López, 2016). We adapted the index to analyze the specialization in e-commerce in the tourism sector and in the use of the internet, of the EU countries. Finally, we made a comparison of the indexes which will allow us to understand the relationship between the specialization between e-commerce in tourism and the use of the internet.

The Tourism Integration indicator (IITate) was calculated using the online bookings of tourism accommodations along with bookings made through agencies and tour operators in the European Union, using the data obtained from Eurostat.

$$\text{IITate} = \frac{(\text{Xrp}/\text{Xrue})}{(\text{Xvp}/\text{Xvue})}$$

IITate: integration index of tourism accommodation bookings using the internet in the UE.

Xrp: Bookings of tourism accommodations of the country using the internet for national destinations.

Xrue: Bookings of tourism accommodations in the EU using the internet for national destinations.

Xvp: Bookings using the internet for operators or travel agencies of the country for national destinations.

Xvue: Bookings using the internet for operators or travel agencies of the EU for national destinations.

When this indicator is bigger than the unit, it indicates that the country's quota in Internet hosting reservations in the country with respect to the EU is bigger than its share of any type of reservations (internet, operators or agencies) with respect to the EU. The indicator means the opposite when its value is below one. Therefore, we can observe certain specialization of the country in online reservations when the value is bigger than one.

As a basis for comparison, we also defined the integration indicator of ICTs in the EU.

The integration indicator of ICTs (IITtic) was calculated by looking at the use of the internet in the last 12 months of year 2014 in the country and the use in the rest of Europe together with the population of the country and Europe with the data obtained from Eurostat.

$$\text{IITtic} = \frac{(\text{Xtp}/\text{Xtue})}{(\text{Xpp}/\text{Xpue})}$$

IITtic: Integration index of internet use in the last 12 months of year 2014 in the EU.

Xtp: Internet use of the country's population.

Xtue: Internet use of the EU's population.

Xpp: Country's population.

Xpue: Population of the EU countries participating in this study.

In this case, with this index we obtained the degree of usage of ICTs in an integrated way in the country that is the target of the analysis. This shows us whether a country makes a higher than average usage of the Internet in relation to the population of the country. In any of the indices proposed, a value greater than one indicates a higher rate than the rate of the countries of the European Union. Therefore, the country have a degree of specialization that is above the European average. On the other hand, when the value of the index is less than one, a degree of specialization below the European average is indicated.

Analysis of results and discussion

Obtaining the integration degree in the use of the internet, allows us to determine not only the use of the ICTs but also to understand if its use exceeds the use of ICTs globally in the country of the analysis. That is, it allows us to analyze if a country makes a use above of the average in the use of the internet with respect to the population of its country. The calculated values for year 2014 are listed in table 1.

Table 1
Indicators

Country	Tourism integration indicator (ITT_{ATE})	Integration indicator of ICTs (ITT_{TIC})
Austria	1.009	1.072
Belgium	1.087	1.124
Bulgaria	0.767	0.771
Croatia	0.851	0.915
Cyprus	0.705	0.915
Czech Republic	1.104	1.059
Denmark	1.076	1.255
Estonia	1.169	1.124

Table 1 **Continued**

Country	Tourism integration indicator (ITT_{ATE})	Integration indicator of ICTs (ITT_{TIC})
Finland	1.041	1.216
Germany	1.059	1.151
Greece	0.853	0.850
Hungary	1.230	1.007
Ireland	1.132	1.072
Italy	0.961	0.837
Lithuania	0.187	0.954
Malta	0.914	0.968
Netherlands	0.873	1.229
Poland	1.112	0.902
Romania	0.301	0.771
Slovenia	0.837	0.968
Spain	0.672	1.007

Source: Calculations based on Eurostat data.

An IITate greater than the unit indicates that the accommodations quota of the country booked using the internet is greater to the European quota for the aggregate of trips, meaning that the country will have a degree of specialization of this type of reserves higher than the European average. Analyzing the data, the cases of countries such as Hungary, Estonia, Ireland, Czech Republic and Belgium stand out as the countries of the European Union with a greater integration indicator of online tourism accommodation bookings. As such, we can deduce that these countries when making their tourism accommodations bookings prefer to do it, with respect to the EU average, using the internet instead of using the traditional means.

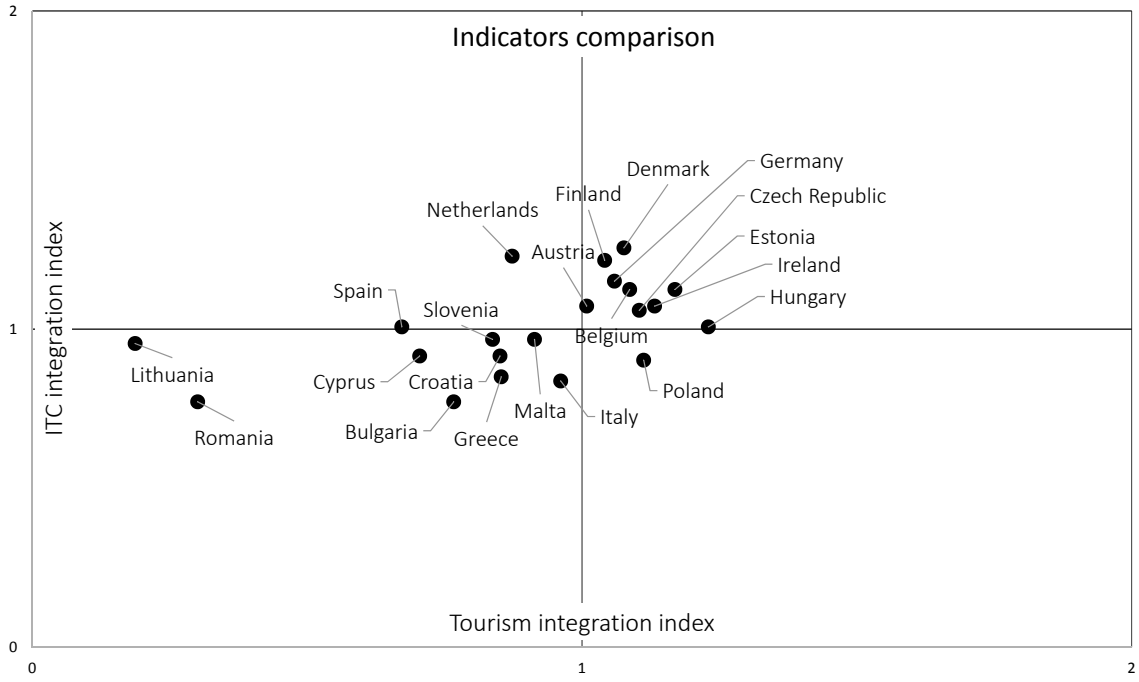
On the other hand, when the IITate is less than the unit it indicates that the country is not specialized in this type of destinations with respect to the European Union. In this situation, we have countries like Lithuania, Romania, Spain, Cyprus and Bulgaria. Therefore, we can deduce that these countries when making reservations for tourism accommodation prefer to use, on average with respect to other EU countries, traditional methods such as travel agencies or booking with operators before using the internet.

Although it is true that there is not a great dispersion in the results, with the exception of Lithuania and Romania, which exceed by more than 50% the booking of these services over the internet, a percentage that will have to increase in the coming years.

From the comparative analysis of the indicators, we find it common that in the South of Europe/ Mediterranean area, both the tourism integration and the ICTs are below the European results. This is the case of Italy, Greece, Croatia, Slovenia, Malta or Bulgaria. Romania could be included in this block, although it shows a particularly low index of tourism integration. Observing that these countries of the Mediterranean area show the same result is an important finding of this study and allows establishing differences with other countries of the North of Europe.

We also find it a relevant result to observe how the Netherlands and Spain show better integration rates of ICTs (above the European average), but a tourism integration index that does not reach the European average, indicating that in these countries bookings are still made through traditional channels despite its outstanding digitalization.

Figure 1
Indicators comparison



On the other hand, Poland and Hungary, despite presenting lower rates of ICTs integration below the EU, show better results in their tourism integration indexes. We therefore face a small grouping of leading central European countries in the ICT integration of tourism versus lower digitization rates.

Finally, a block of countries in central and northern Europe (Denmark, Finland, Germany, Austria, among others) show an alignment between their ICTs integration and the use of these technologies in tourism booking, in both cases above the European average.

Conclusions

The tourism industry is changing rapidly, the way customers and providers communicate has evolved. The new nexus of union are information technologies, and the future is to understand the evolution that these technologies are undergoing. The companies that know how to adapt to this new way of working will be those that gain in the market, those that give their back to these technologies will have a future in which they will have less and less importance.

In this context, this research note contributes to the analysis of the application of new technologies in the tourism sector in the following aspects: First and foremost, the analysis of the indicators allows us to determine a set of countries (with an IITate of less than one unit) with a potential for significant growth in the use of Internet reserves, which could lead to a fall in the traditional reserves (operators and agencies). This more powerful growth capacity is much more important in those cases with IITtic lower than unity, since as the use of the Internet increases, the number of people who can opt for this type of reserves will be greater, to the detriment of the traditional ones. It is also worth noting the discrepancies between both indices: as we have seen some countries do not show the same good behavior in ICT and tourism, and it seems, therefore, that momentum in eTourism may be losing despite an adequate index of digitization, as has observed for Netherlands.

Secondly, the study of these new indicators allows determining the specific situation per country in the comparison between ICT integration and tourism integration: We observe that certain groupings or cluster by neighboring countries show similar results in tourism reservation systems and the use of ICTs. It allows us to characterize its behavior pattern. Opposite to Southern Europe or the Mediterranean area, weak in these indicators, we find a Nordic area and central Europe with a strong commitment in the use of the ICTs and the transfer of these to the tourism sector.

Also noteworthy are the good results of Poland and Hungary, compared to lower results in the Netherlands and Spain.

In addition, the analysis of the indicators allows us to complete the study developed by Berné, Gómez-Campillo and Orive (2015) including the perspective of consumers. The results obtained verify the importance of the continuing development of ICTs in the tourism distribution system.

The research note has limitations, mainly the use of data from national reserves, so the influence of international tourism is lost. The limitation is partially mitigated by the definition of the index, which normalizes the result using the national accumulated reserves at EU level. The results are also conditioned by the consolidated nature of the available data. In any case, the genuine observations formulated here provide new data on the reality of the European tourism in the digital age.

Given the scarcity of studies of this nature, by including a multi-country view, the research note contributes to the academic literature on a topic that is so important for the EU economy and opens new avenues of research to study and define possible paths of convergence in digital tourism among the European countries.

Notes:

[1] With the entry into force of the Regulation (EU) 692/2011 of the European Parliament and of the Council, Member States are transmitting microdata to Eurostat, which enables that data to be disseminated far more widely (since reference period 2012). Data are disseminated when they respect agreed validation rules and other quality criteria. The concepts and definitions used in the collection of data shall conform to the specifications described in the Methodological manual for tourism statistics. of "Number of trips by type of organisation" (from 2014 onwards) [tour_dem_ttorg].

References

Ayeh, J. K., Au, N. & Law, R. (2013). Predicting the intention to use consumer-generated media for travel planning. *Tourism Management*, 35, 132-143.

Balassa, B. (1965) Trade liberalization and "revealed" comparative advantages. *The Manchester School, 33*(May), 99-123.

Balassa, B. (1977). *Revealed comparative advantages revisited. Analysis of relative export shares of the industrial countries, 1953 – 1971*. Manchester: The Manchester School of Economic and Social Studies.

Berné, C., Gómez-Campillo, M. & Orive, V. (2015). Tourism Distribution System and Information and Communication Technologies (ICT) Development: Comparing Data of 2008 and 2012. *Modern Economy, 6*, 145-152

Buhalis, D. & Law, R. (2008). Progress in information technology and tourism management: 20 years on and 10 years after the Internet - The state of eTourism research. *Tourism management, 29*(4), 609-623.

Dieter, M. & Englert, H. (2007). Competitiveness in the global forest industry sector: an empirical study with special emphasis on Germany. *European Journal of Forest Research, 126*(3), 401-412.

Fesenmaier, D., Leppers, A. W. & O'Leary, J. T. (1999). Developing a knowledge-based tourism marketing information system. *Information Technology & Tourism, 2*(1), 31–44.

Frew, A. J. (2000). A critical analysis of tourism information technology research. In *Information and Communication Technologies in Tourism 2000* (pp. 39-52). Vienna: Springer.

Gretzel, U., Yuan, Y. L. & Fesenmaier, D. R. (2000). Preparing for the new economy: Advertising strategies and change in destination marketing organizations. *Journal of travel Research*, *39*(2), 146-156.

Hjalager, A. M. (2010). A review of innovation research in tourism. *Tourism Management*, *31*(1), 1-12.

Kim, E., Nam, D. & Stimpert, J. L. (2004). The applicability of porter's generic strategies in the Digital Age: Assumptions, conjectures and suggestions. *Journal of Management, 30*(5), 569–589.

Leung, R. & Law, R. (2007). Analyzing research collaborations of information technology publications in leading hospitality and tourism journals: 1986–2005. In *Information and communication technologies in tourism 2007* (pp. 547-556).

Mora, C. D. & López, E. G. (2016). Factores explicativos de las redes transnacionales de producción en la Unión Europea: economías centrales vs periferias sur y este. *Revista de economía mundial*, *43*.

Nudurupati, S. S., Bititci, U. S., Kumar, V. & Chan, F. T. (2011). State of the art literature review on performance measurement. *Computers & Industrial Engineering, 60*(2), 279-290.

Ukpabi, D. C. & Karjaluoto, H. (2017). Consumers' acceptance of information and communications technology in tourism: A review. *Telematics and Informatics*, *34*(5), 618-644.

Wang, L. (2016). The structure and comparative advantages of China's scientific research: Quantitative and qualitative perspectives. *Scientometrics*, *106*(1), 435-452.

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