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# The ICT Impact on Inbound and Outbound Tourism Demand in the EU

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**Abstract:**

**Research question:** This paper investigates whether a relationship exists between ICT as well as between the Internet and tourism demand (inbound and outbound) in the EU. **Motivation:** Our goal was to explore if there exists a strong link between the observed determinants. The paper draws on research of Garin-Munoz and Perez-Amaral (2011). Their research indicates a positive relationship between the use of the Internet and travels abroad. Also, the paper is based on the research of Ramos and Rodrigues (2013), Bethapudi (2013) and Pulido-Fernandez, Cardenas-Garcua, & Carrukki-Hidalgo (2017). **Idea:** Because the ICT has a significant impact on tourism demand the core idea of this paper was to explore if there exists a stronger relationship between the use of the Internet and outbound tourism demand than is the relationship between the use of the Internet and inbound tourism demand. **Data:** Research information base has included the ITU 2016, Measuring the Information Society Report 2016, as well as the data about tourism expenditures and total population from Eurostat Database (European Commission, 2017). **Tools:** The following methods are used in the paper: regression and correlation analysis. The regression analysis has examined the impact of the ICT on the tourism demand. The correlation analysis has examined the relationship between the use of the Internet and tourism demand. **Findings:** the results of the correlation analyses indicate that there is not a statistically significant correlation between the level of development of ICT and tourism expenditure per capita, while that there is a statistically significant correlation between the application of the Internet and tourism expenditures per capita. The regression analysis indicates that sub-indices of ICT Development Index (IDI) influence tourism expenditure per capita. It can be concluded that the ICT and the Internet present one of the most important determinants of tourism demand. **Contribution:** In the paper special attention was paid to the ICT as well as to the Internet as the most important determinants of tourism expenditure on the macro level.

**Keywords:** ICT, Internet, tourism demand, tourism expenditure, EU, IDI.

**JEL Classification:** O30, Z30

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## 1. Introduction

In recent decades, the combination of tourism and the information and communications technology (ICT), has originated considerable changes in tourists' behaviour (Ramos & Rodrigues, 2013). Tourism is one of the main users of ICT. The existing articles in the travel and tourism literature have emphasized the importance of e-commerce and the Internet in travel and tourism (Law & Wong, 2003; Feshari, 2016). The application of ICT makes a tourism destination and its stakeholders more competitive, because it satisfies the variable and sophisticated needs of contemporary tourists (Petrovic, Milicevic, & Djeri, 2017). The Internet has a significant impact on tourism in which case it significantly affects tourism supply and tourism demand.

Tourism demand can be analysed at either macroeconomic or microeconomic level (Wang & Davidson, 2010). At the macroeconomic level, the unit of analysis are aggregated data such as total arrivals, nights spent and tourism expenditure (Crouch, 1994; Disegna & Osti, 2016). Special attention in the paper is paid to the analysis of tourism demand at the macro level which was measured by tourism expenditure per capita.

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In the above mentioned context, understanding tourism expenditure, as well as the influence the Internet on tourism expenditure is critically important because tourism is an expenditure-driven economic activity (Wang & Davidson, 2010) and tourism consumption is “at the centre of the economic measurement of tourism” (Mihalic, 2014, p. 81). Tourism plays a very important role in the economic development and value creation of the European countries (Krstic, Radivojevic, & Stanistic, 2016).

Tourism expenditure and its determinants at the macro level have been widely investigated in the literature (Marrocu, Paci, & Zara, 2015), but the analysis of tourism expenditure at the micro level has received less attention (Craggs & Schofield, 2009). However, ICT and the Internet as the factors of tourism expenditure are paid due attention only at the micro level in literature. Some authors (Tsiotsou & Vlachopoulou, 2011; Neuts, Romao, Nijkamp, & Leeuwen, 2012) pay special attention to the use of e-services on the tourism expenditure in the destination, however, at the micro level.

Having in mind that the use of the Internet leads to differences in expenditure among tourists (Mills & Law, 2005), as well as that ICT and the Internet are not paid special attention in the literature on tourism expenditure, the main purpose of this paper is the analysis of the impact of ICT, as well as the Internet on domestic and outbound tourism demand on the macro level. Tourism demand is measured by domestic and outbound tourism expenditure per capita. Specific goals of the paper are: 1) indicating the difference in influence of development and application of ICT in the EU countries on domestic and outbound tourism demand; 2) analysis of interdependence between the use of the Internet in the EU, on the one hand, and their domestic and outbound tourism demand, on the other hand. In order to analyse the impact of ICT and Internet on tourism demand, the correlation method and the regression method are applied.

The paper is structured as follows: Section 2 outlines the brief literature which enlightens the factors of tourism demand and the impact of ICT and the Internet on tourism demand. Section 3 elaborates the methodology used in the research. This section also includes hypotheses which are being tested in the paper. Section 4 interprets the results of the research. Section 5 ends the paper by concluding, stating the contribution of paper and recommending some future directions.

## 2. Theoretical Background

The demand theory implies that the tourism demand is affected by determinants such as tourists' income, prices, exchange rates, transportation costs, dummy variables on various special events and deterministic trends (Crouch, 1994; Vanegas & Croes, 2000; Li, Song, & Witt, 2005; Wong, Song, Witt, & Wu, 2007; Song & Li, 2008), as well as political unrest, economic recession and mega events (Lee, Var, & Blaine, 1996).

Comprehensively observed, factors that affect tourism demand can be divided into: social-psychological, economic and exogenous factors (Uysal, 1998). However, the majority of econometric studies tend to examine the demand for tourism by focusing predominantly on economic factors (Ryan, 2003). The studies have confirmed that as per capita incomes rise, more people are likely to travel, and tourism expenditures are a positive function of income (Stronge & Redman, 1982; Lee, et al., 1996; Chhorn, 2018).

The price variables should include the prices of the goods and services related to both the destination and substitute destinations (Song, Li, Witt, & Fei, 2010). However, some studies (Lee, et al., 1996) have pointed out that relative prices have a significant impact on tourism demand, while others (Vanegas & Croes, 2000) have shown that their impact is not significant. There is also the issue that visitors may incorrectly perceive relative prices, as such information is not readily available (Greig & McQuaid, 2004).

The role of information explains the importance of ICT applications, especially the importance of the Internet applications in tourism (Steinbauer & Werthner, 2007). „The permanent interaction between tourists and ICT generates large volumes of crowdsourced data” (Veloso, Leal, Malheiro, & Burguillo, 2019, p. 2).

New tendencies in the process of diffusion and collection of information on tourism destinations are the subject of study of many contemporary researches (Chen, Shang, & Li, 2014; Werthner, Neidhardt, Proll, Ricci, Scaglione, Stangl, Stock, & Zanker, 2015; Tribe & Mkono, 2017; Xiang, 2018; Liu, Zhang, Zhang, Sun, & Qiu, 2019; Tavakoli & Wijesinghe, 2019). The analysis of new, internet-based technologies (social networks, geolocation systems, development of mobile phone apps, etc.) as an explanatory variable of tourist spending gains an increasing interest (Pulido-Fernandez, et al., 2017), because those technologies affects tourist behaviour. Some authors have tried to contribute to a better knowledge of consumer behaviour by

identifying the determinants that influence potential tourists to use the Internet for travel planning. In recent years, viewing travel information online has become a necessary step before the tourists' decision-making (Liu, Yang, & Pu, 2015).

The application of the Internet can contribute to a better availability of such information, as well as to possibility to reserve tourist services at lower prices. On the supply side, the Internet helps tourism providers to make information and booking facilities available to large numbers of tourists at relatively low costs. It enables tourism providers to implement new pricing strategies and global market access. On the demand side, it is possible to reduce the uncertainty related to the products via forums, or to exert an instantaneous control over the quality of products supplied (Garin-Munoz & Perez-Amaral, 2011). The Internet allows potential tourists to obtain information about the tourism offer, compare prices and quality of tourism services, book and pay for service. It has helped facilitate the flow of information at a faster pace and made business transactions instantaneous, reduced costs of travel and allowed for a more effective use of time of potential tourists (Uysal, 1998; Liu, et al., 2015). However, the Internet provides tourists with opinion-based information (ratings, likes, reviews and shares about tourism destinations). The Internet represents the "second most important source of information when researching a tourism destination" (Pulido-Fernandez, et al., 2017, p. 73). This information based on the opinion of predecessors have influenced the decisions of current and future tourists (Book, Tanford, & Chen, 2016; Zhang, Wu, & Mattila, 2016). Having in mind the significance of the Internet for collecting the information on tourism services and their prices, as well as the possibility of buying the same service at a lower price as a result of using the Internet, it is required that special attention should be paid to the impact of ICT and the Internet on tourism demand, all of which belong to exogenous determinants of tourism demand.

In the literature, special attention is paid to the impact of ICT on tourism demand. Ramos and Rodrigues (2013) investigated the impact of ICT on tourism demand in developing countries. Bethapudi (2013) concluded that ICT has a positive and significant impact on the number of tourists in India. Wahab (2017) explored the importance of ICT for tourism demand in India. Bekteshi and Bekteshi (2017) indicated from the empirical evidence that with an increase in the use of ICT, the tourism demand increases.

However, the literature about the impact of ICT or the Internet on domestic and outbound tourism demand is rare. Garin-Munoz and Perez-Amaral (2011) indicate that the use of the Internet is much more intensive when planning a trip abroad than for domestic travel, as well as that there are positive relationships between the Internet usage for travel and Internet penetration rates and travels abroad. In this paper, special attention is paid to the analysis of influence of ICT on the domestic and outbound tourism demand as well as the relationship between the Internet usage and (outbound and domestic) tourism demand.

### 3. Research Methodology and Hypothesis

The research relies on the following methods: correlation and regression analyses. The correlation analysis has examined the relationship between the IDI, on the one hand, and domestic and outbound demand, on the other hand in 2016. The regression analysis has examined the impact of the IDI sub-indices on tourism (domestic and outbound) demand of the countries surveyed in 2016. The correlation analysis has examined the relationship between the use of the Internet, on the one hand, and domestic and outbound demand, on the other hand. Program SPSS Statistics 19 is used for correlation and regression analyses.

The research includes all members of the EU except the United Kingdom due to the lack of data about tourism expenditure. The development and application of ICT was measured by ICT Development Index (IDI) and its sub-indices. The IDI is a unique benchmark of the level of ICT development in countries across the world. The main objectives of the IDI are to measure: the level and evolution over time of ICT developments within countries and their experience relative to other countries; progress in ICT development in both developed and developing countries; the digital divide, i.e., differences between countries in terms of their levels of ICT development; and the development potential of ICTs and the extent to which countries can make use of them to enhance growth and development in the context of available capabilities and skills. The IDI includes 11 indicators that are grouped into the following three sub-indices (ITU, 2016): IDI access, IDI use and IDI skills. The sub-index IDI access is created based on the value of five following access indicators: Landline telephone subscriptions, Mobile-cellular telephone subscriptions, International Internet bandwidth per Internet user, Households with a computer, and Households with Internet access. The sub-index IDI use is created on the value of the following three indicators: Individuals using the Internet, Fixed (wired)-broadband subscriptions, and Wireless-broadband subscriptions, while the sub-index IDI skills is based on the value of three following proxy indicators: Adult literacy, Gross secondary enrolment, and Gross tertiary enrolment.

In the paper, special attention was paid to the IDI sub-indices as well as to the indicator “Individuals using the Internet”. The “Individuals using the Internet” indicator is one of indicators that determine the value of sub-index IDI use.

The hypotheses to be tested in the study are the following:

- H1 – There is the significant correlation between the level of ICT development and domestic tourism demand;
- H2 – There is the significant correlation between the level of ICT development and outbound tourism demand;
- H3 – The level of ICT development has stronger influence on outbound tourism demand than on domestic tourism demand;
- H4 - There is a stronger positive relationship between the use of the Internet and outbound tourism demand than between the use of the Internet and domestic tourism demand.

#### 4. Research Results and Discussion

The results of the correlation analysis have shown that there is no statistically significant correlation between the development of ICT in the EU and domestic tourism demand of their residents that was measured by domestic tourism expenditure per capita, not statistically significant correlation between the development of ICT in member states of the EU and international tourism demand of their residents that was measured by outbound tourism expenditure per capita since the value of Sig. is not lower than 0.01, as indicated in Table 1. We can determine that hypotheses H1 and H2 are unsupported.

**Table 1:** Pearson's correlation coefficient - the interdependence between the IDI and tourism expenditure per capita

		IDI	Domestic expenditure	Outbound expenditure
IDI	Pearson Correlation	1	-.041	.263
	Sig. (2-tailed)		.840	.185
	N	27	27	27
Domestic expenditure	Pearson Correlation	-.041	1	.324
	Sig. (2-tailed)	.840		.099
	N	27	27	27
Outbound expenditure	Pearson Correlation	.263	.324	1
	Sig. (2-tailed)	.185	.099	
	N	27	27	27

Source: Prepared by the authors (SPSS Statistics 19)

Bearing in mind that statistically significant interdependence between the IDI sub-indices could influence the results of regression analysis, i.e., the impact of IDI sub-indices on domestic and outbound tourism demand, in Table 2, special attention was paid to the correlation analysis between the IDI sub-indices. The results of correlation analysis indicate that there is no statistically significant correlation between the IDI sub-indices, because the value of Sig. is not lower than 0.01.

**Table 2:** Pearson's correlation coefficient - the interdependence between the IDI sub-indices

		IDI access	IDI use	IDI skills
IDI access	Pearson Correlation	1	.051	-.223
	Sig. (2-tailed)		.800	.263
	N	27	27	27
IDI use	Pearson Correlation	.051	1	.150
	Sig. (2-tailed)	.800		.454
	N	27	27	27
IDI skills	Pearson Correlation	-.223	.150	1
	Sig. (2-tailed)	.263	.454	
	N	27	27	27

Source: Prepared by the authors (SPSS Statistics 19)

In order to avoid the issue of multicollinearity when analysing the impact of IDI sub-indices on domestic tourism expenditure per capita, as well as their impact on outbound tourism expenditure per capita, the backward method will be applied in the following regression analyses.

**Table 3:** The common impact of the IDI sub-indices on domestic tourism expenditure per capita

Model	R	R Square <sup>c</sup>	Adjusted R Square	Std. Error of the Estimate
1	.845 <sup>a</sup>	.715	.679	208.50738
2	.845 <sup>b</sup>	.715	.692	204.29468

a. Predictors: IDI skills, IDI access, IDI use

b. Predictors: IDI access, IDI use

d. Dependent Variable: domestic tourism expenditure per capita

Source: Prepared by the authors (SPSS Statistics 19)

The results of the regression analysis, i.e., the common impact of IDI sub-indices on domestic tourism expenditure per capita are given in Table 3. The determination coefficient is 0.715. When we express the above mentioned ratio in percentages, it can be concluded that the impact of the common IDI sub-indices on domestic tourism expenditure per capita is 71.5%. The value of the observed regression coefficient is statistically significant because the Sig. value is lower than 0.01. The individual impact of the IDI sub-indices on domestic tourism expenditure per capita is tested in Table 4. Based on the values of Beta and Sig. values, it can be concluded that a statistically significant impact on domestic tourism expenditure per capita is also made by IDI use and IDI access.

**Table 4:** The value of regression coefficients – influence of the IDI sub-indices on domestic tourism expenditure per capita

Model	Unstandardized Coefficients <sup>a</sup>		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	IDI access	-71.573	27.491	-1.517	-2.603	.016	.035	28.553
	IDI use	126.533	34.760	2.241	3.640	.001	.031	31.871
	IDI skills	.022	31.620	.001	.001	.999	.021	48.184
2	IDI access	-71.562	21.501	-1.517	-3.328	.003	.055	18.192
	IDI use	126.548	25.731	2.242	4.918	.000	.055	18.192

a. Dependent Variable: domestic tourism expenditure per capita

Source: Prepared by the authors (SPSS Statistics 19)

The results of the research indicate that the level of networked infrastructure, access to ICT and the level of use of ICT represent the important factors of the domestic tourism demand. The level of education has no impact to the domestic tourism demand.

The results of the regression analysis, i.e., the common impact of IDI sub-indices on outbound or international tourism expenditure per capita are given in Table 5. The determination coefficient is 0.798 when we observe the impact of all indicators and 0.785 when we observe only the impact of IDI use and IDI skills. When we express the above mentioned ratios in percentages, we can conclude that the impact of the common IDI sub-indices on outbound tourism expenditure per capita is 79.8%, and when we observe only the impact of IDI use and IDI skills, it amounts to 78.5%. The value of the observed regression coefficient is statistically significant because the Sig. value is lower than 0.01.

**Table 5:** The common impact of the IDI sub-indices on outbound tourism expenditure per capita

Model	R	R Square <sup>c</sup>	Adjusted R Square	Std. Error of the Estimate
1	.893 <sup>a</sup>	.798	.773	362.35254
2	.886 <sup>b</sup>	.785	.767	366.87232

a. Predictors: IDI skills, IDI access, IDI use

c. Predictors: IDI skills, IDI use

c. Dependent Variable: outbound tourism expenditure per capita

Source: Prepared by the authors (SPSS Statistics 19)

The individual impact of the IDI sub-indices on outbound tourism expenditure per capita is tested in Table 6. Based on the values of Beta and Sig. value, it can be concluded that IDI use and IDI skills have a statistically significant impact on outbound tourism expenditure per capita.

The results of regression analysis have indicated that the level of ICT development in the EU has a significant impact on domestic tourism expenditure per capita as well as on outbound tourism expenditure per capita. But the development of ICT in the EU has a stronger influence on outbound tourism demand (79.5%) than on domestic tourism demand (71.5%). The hypothesis H3 is supported.

**Table 6:** The value of regression coefficients – influence of the IDI sub-indices on outbound tourism expenditure per capita

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	IDI access	60.950	47.776	.625	1.276	.214	.035	28.553
	IDI use	319.942	60.407	2.741	5.296	.000	.031	31.871
	IDI skills	-223.715	54.950	-2.591	-4.071	.000	.021	48.184
2	IDI use	334.711	60.027	2.868	5.576	.000	.033	30.700
	IDI skills	-181.486	44.409	-2.102	-4.087	.000	.033	30.700

a. Dependent Variable: outbound tourism expenditure per capita  
 Source: Prepared by the authors (SPSS Statistics 19)

The significant impact of IDI sub-index depends on whether we observe its impact on domestic or outbound tourism expenditure per capita. If we observe domestic tourism expenditure per capita, then statistically significant impact is also achieved by the development and application of ICT. However, if we observe outbound tourism expenditure per capita then statistically significant impact is a result of the application of ICT and education level of population measured through IDI skills.

The level of the use of ICT and the level of education have an effect on outbound tourism demand while the level of networked infrastructure and the access to ICT do not have an effect on outbound tourism demand. It can be concluded that the level of use of ICT represents the one of the most important factors of domestic tourism demand as well as of outbound tourism demand. The tourists that use the ICT more often and have a higher level of education have spent more for travelling abroad.

The results of correlation analysis have shown that there is a statistically significant strong positive correlation between the use of the Internet in the EU, on the one hand, and their domestic and outbound tourism expenditure per capita, on the other hand since the value of Sig. is lower than 0.01, as indicated in Table 7. Because the relationship between the use of the Internet and outbound tourism demand is stronger than that between the use of the Internet and domestic tourism demand, we can conclude that hypothesis H4 is supported.

**Table 7:** Pearson's correlation coefficient - the interdependence between the use of the Internet and tourism expenditure per capita

		Use of Internet	Domestic expenditure	Outbound expenditure
Use of Internet	Pearson Correlation	1	.534**	.676**
	Sig. (2-tailed)		.004	.000
	N	27	27	27
Domestic expenditure	Pearson Correlation	.534**	1	.324
	Sig. (2-tailed)	.004		.099
	N	27	27	27
Outbound expenditure	Pearson Correlation	.676**	.324	1
	Sig. (2-tailed)	.000	.099	
	N	27	27	27

\*\* . Correlation is significant at the 0.01 level (2-tailed).  
 Source: Prepared by the authors (SPSS Statistics 19)



The above results can be explained by the fact that people in developed countries in the EU use the Internet more, as well as set aside more funds for tourism expenditure outside of their country. Interdependence between tourism expenditure, per capita income and the use of the Internet will be the subject of some future study.

## Conclusion

One of the main users of ICT as well as of the Internet is tourism. The Internet has brought forth new ways of communication between tourism providers and contemporary tourists. Although ICT and Internet have influence on tourism demand, the literature has not paid special attention to the Internet as determination of tourism demand on the macro level. The paper has paid special attention to quantifying and analysing the influence the level of ICT development has on tourism demand in EU.

The contribution of this paper is threefold. First, it shows that ICT has significant impact on tourism demand. This indicates the need that special attention be paid to the influence of ICT on tourism demand in the literature. Second, the results of the regression analysis show that ICT has stronger influence on outbound tourism demand than on domestic tourism demand. At the same time, the results of the regression analysis indicate that the development and application of ICT in the EU have influenced their domestic tourism demand while the application of ICT and the level of education in EU have influenced their outbound tourism demand. More important, empirical findings of the study show that the EU residents who are more educated and who use the ICT to a larger extent spend more on travels abroad. Third, the results of the correlation analysis indicate that there is a significant and positive relationship between the use of the Internet and tourism demand (Ramos & Rodrigues, 2013; Bekteshi & Bekteshi, 2017). At the same time, the results indicate that there is a stronger relationship between the use of the Internet and outbound tourism demand than between the use of the Internet and domestic tourism demand. It can be concluded that the EU residents who use the Internet to a larger extent spend more on travels abroad and there is a positive relationship between the Internet usage and spending on travels abroad (Garin-Munoz & Perez-Amaral, 2011).

As in any study, this research has limitations that can provide potential avenues for future research. As a EU-based research, the current measurement will need to be tested bearing in mind that the EU consists of developed and transition countries. Therefore, future studies need to test the impact of ICT as well as the impact of the Internet on tourism demand in developed and transition countries in the EU.

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