Tourism in Digital Era

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Abstract

In a society facing a real technological revolution, tourism sector could not stay away from modern technique. Tourism entered the digital era with favorable results on profitability, competitiveness, and sustainability. The tourism sector has grown due to digitalization. People had access to viewing unknown locations and thus, the need arose to know new places. Obviously, access to more information is restricted by several factors in the development of society. In this paper, the impact of digitalization on tourism services is analyzed through panel data regression models, estimating the way in which the share of people who have planned their trips online depends on the level of economic development, education, and knowledge in using the Internet, on security and safety of ICT infrastructure. The data refer to 29 European countries, over a 9 year – time period (2010-2018). The fixed effects model proved to be the most efficient. At the same time, the existence of a significant country effect on the use of online tourist booking services was highlighted. Western European countries economically developed have a positive propensity for digitalization in tourism, while Eastern European countries, mainly former communist countries, with a lower level of economic development are less in favor of digitalization in tourism.

Keywords

ICT, Digitization, Online Touristic Services, Panel Data Regression Analysis

Introduction

The innovation process and the development of modern information and communication technologies have become important factors in boosting the competitiveness of the tourism sector (Molz, 2012; Sigala and Chalkiti, 2014), but it has also facilitated tourists' access to information (Sigala, 2014). Thus, the usage degree of online services in travel planning, in booking accommodation and transport was higher in the case of trips abroad (59%), compared to the domestic ones (2014). The age profile of tourists planning their travels using modern information and communication technology is similar to that of people using the Internet. A higher prevalence of online bookings is found in the case of air transport (67%), with more significant weights, which exceed 75% in the case of young age groups (15-34 years) (Eurostat, 2016). According to a survey conducted in 2015 regarding the use of ICT by individuals and households, 39% of the population aged 16-74 stated that they used the Internet to inform about travel. 65% of Europeans using the internet services ordered products and services online, while over 50% of them booked or planned their holiday trips (accommodation and transport) by these means. In 2018, the share of people who have planned their trips for personal purposes by using online technology has registered large variations in territorial profile. The leading countries, with high weights, were the Netherlands (54%), Denmark (50%), UK (48%), Norway (47%) and Sweden (45%), with very high accessibility to Internet services, with a high level of digital skills of individuals and

with a significant degree of services digitization. At the opposite end of the ranking are Romania (only 3%), Croatia (4%) and Bulgaria (6%) (Eurostat, 2016).

The present paper performs an analysis of the impact of digitalization on online bookings of tourist services, using panel data econometric models (fixed and random effects) and data provided by Eurostat for 29 European countries, for the period 2010-2018. The influence factors cover the country development level, education, IT security and tourism sector.

Literature review

In general, it is recognized that ICT services have provided modern tools to facilitate and create new distribution channels, a competitive business environment (Molz, 2012; Sigala and Chalkiti, 2014), they have facilitated the connections between business partners, the circulation of information and the tourists' access to this information (Sigala, 2014), brought innovation in organizing the activity and in strategies (Hjalager, 2015; Baum, 2015). A number of studies mention the main arguments for which ICT services are seen as a catalyst for tourism activity: the potential of these services in ensuring the survival of tourism organizations, facilitating the access of the general public to tourism products, and ensuring the efficiency of activities in the field (Mihajlović, 2012; Bethapudi, 2013). A study conducted in 2016 on the factors that influence the share of people booking online tourism services indicates the positive impact of their well-being, public spending on education and the share of people using the Internet in various activities, but also the negative impact of their reduced abilities in Internet use (Dumičić, et al., 2016).

In Europe, there are over 2.3 million SMEs operating in the touristic sector, with about 12 million employees. Studies have shown that SMEs in tourism face several difficulties in implementing digital techniques, the most important ones referring to the lack of time resources, the lack of necessary skills, the shortage of trained personnel and knowledge. Participation in digitized tourism is especially important in rural areas, with an emphasis on promoting the ecological dimension of tourism activity, although there are also difficulties related to limited access to technology in these areas. Such difficulties are encountered especially in the less developed countries (Dredge, et al., 2018). ICT also blurs the boundaries between sectors, but may have some negative implications for the hospitality industry (Hojeghan and Esfangareh, 2011).

In other studies, competitiveness is seen as an advantage that digitization can offer to tourism, through the reduction of operational and transaction costs (Bojnec and Kribel, 2004; Buhalis and O'Connor, 2005; Buhalis and Kaldis, 2008). On the contrary, other authors have shown that a significant direct correlation between the implementation of modern communication and information techniques, on the one hand, and the competitiveness in the hospitality industry cannot be demonstrated (Dos Santos, Peffers and Mauer, 1993; Byrd and Marshall, 1997; Mihalič, 2007).

Another category of studies analyzed the effect of ICT implementation in the tourism sector on the market share. Although there seems to be no clear evidence of a significant positive impact, there are researches that have revealed an effect of reducing the market share for SMEs as a result of digitization (Evans and Peacock,1999), or others that have highlighted the use of ICT as a tool for maintaining and consolidating their market position (Buhalis, 2003). A series of research points to the role of ICT services in changing demand and supply in the hospitality industry (Chakravarthi and Gopal, 2012; Ali and Frew, 2014), as well as the existence of discrepancies in access to technology at the territorial level, which fuels the gaps between different countries or regions. Regions with limited access to such modern technologies enter a digital shadow cone or a "digital silence", decreasing their tourist attractiveness and negatively affecting the region's economy (Miller, 2013). Despite the clear advantages of introducing digitization in the tourism field, such as reduced costs of producing and distributing marketing materials, promoting messages in a more attractive, suggestive and efficient way, studies show the need to combine modern, virtual tools with traditional ones in promoting tourist destinations (Dasgupta, 2011).

Data and Methodology

In order to analyze the impact of digitalization on online bookings of tourist services we have used data provided by Eurostat for 29 European countries for the period 2010-2018. In the analysis the dependent variable is *the share of people who planned their online trip* (as a percentage of the country's inhabitants). While tourism depends on the country's level of development, one of the independent variables included in the regression analysis is the *GDP per capita* expressed at purchasing power parity. To use the online planning of a touristic holiday, the level of education of the population is particularly important. Thus, we have chosen as independent variables the *expenditure on education as a percentage in GDP*. Moreover, to make online reservations, all internet transaction must be secured. So, we have included in our analysis the *volume of internet servers that provide security* to the internet user (secure servers per million people). As an indicator of external tourism in the reference country, we have included in the analysis the variable *Number of tourists leaving the country relative to one million inhabitant*s. Panel data econometric models is our choice for this analysis, as long as they provide information about individual behavior, both in terms of space and time dimensions.

The simple linear panel data regression model used in econometrics can be described as:

$$y_{it} = \beta_0 + \sum_{k=\overline{1,4}} \beta_k x_{k_{it}} + u_{it} \qquad i = \overline{1,29}, \; t = \overline{1,9}, \tag{1}$$

where the residual component is u_{it}

For the purpose of modelling individual heterogeneity, the term error is determined by two distinct components: individual effects which are constant over the entire time period (fixed effects) and effects which combine the individual and temporal influence (random effects).

Thus, the regression model can also be written:

$$y_{it} = \beta_0 + \sum_{k=\overline{1,4}} \beta_k x_{k_{it}} + \alpha_i + \varepsilon_{it} \qquad i = \overline{1,29}, \; t = \overline{1,9}. \tag{2}$$

The error ϵ_{it} is considered to be independent of the regressors and of the individual component. Determining the type of model depends on the degree of correlation between the individual error and the model regressors. If the correlation is strong, the recommended model being the fixed effects model (FE). However, if the error-specific component is not correlated with independent variables, it means that preference is given to the random effect panel regression model (RE). The choice of the optimal model is based on the Hausman-Wu test. The null test hypothesis states that the FE estimator is consistent and the RE estimator is consistent and efficient, while the alternative hypothesis indicates that the FE estimator is consistent and the RE estimator is inconsistent.

The impact of digitization on online bookings of tourist services – panel data analysis results

The main purpose of this analysis is to reveal the level of acceptances of Europeans for the online holiday planning method, based on the socio-cultural and digital development of a country.

The simple regression model - OLS

The simple regression model does not differentiate the spatial component from the temporal component. The model is applied to 29 European countries and for a period of 9 years (2010-2018), meaning 261 observations (9 years x 29 states). The estimated model is:

$$y_i = \beta_0 + \sum_{k=\overline{1,4}} \beta_k x_{k_i} + u_i \qquad i = \overline{1,261}$$
(3)

The model has a high explanatory power and is statistically significant. Specifically, the share of people who planned their trip online is explained in proportion of 74.9% by the regression model. To accept the model, it is important that the residuals meet the properties of the classical regression model. In this case, the residuals converge to a normal distribution, the dispersion of the residuals is approximately constant over time and the predicted values of the model are very close to the real values, which indicates a low forecast error. Moreover, the quality of this model also depends on the significance of the explanatory variables (Figure no. 1).
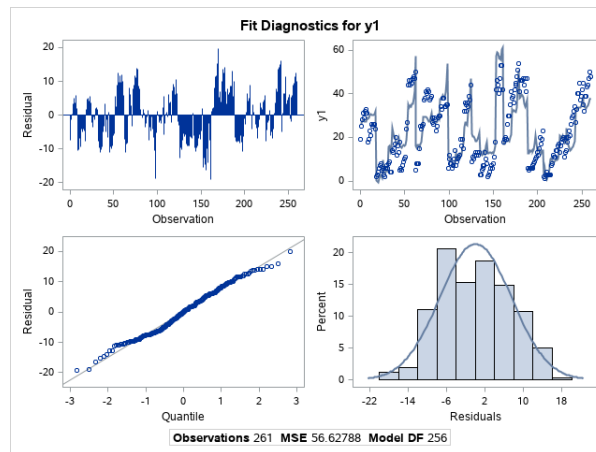
Figure no.1. Residuals analysis of the regression model for grouped data
Source: own processing in SAS Enterprise Guide

All estimated parameters of the model are statistically significant for 0.01 significance level. Thus, the share of people planning their holiday online is directly influenced by individual well-being, education expenses, the number of tourists who materialize their vacation and the security of personal data in online environment, as a result of secure servers existing in a country (Table no. 1).

Table no. 1. Parameter Estimates, model regression for grouped data

Parameter Estimates					
Variable	Df	Estimated	Standard Error	t Value	Pr > |t|
Intercept	1	-25.3690	2.6867	-9.44	<.0001
Edu from GDP	1	4.0408	0.4972	8.13	<.0001
GDP	1	0.2277	0.0113	20.10	<.0001
Secure servers	1	0.0002	0.0000	6.45	<.0001
External Tourists/million inhabitants	1	0.2025	0.0254	7.98	<.0001

Source: own processing in SAS Enterprise Guide

One percentage point increase in education expenditures, when the other variables remain constant, determines an increase with 4,0408 percentage points of people who make online reservations. One unit increase in GDP will lead to an increase with 0.2277 percentage points of the dependent variable, when the other variables remain constant. The share of people planning their vacation online increases by 0.2025 percentage points, when the number of people going on holiday in a European country increases by one unit, it means that there is a materialization of the reservation.

The equation of the estimated regression model is:

$$\widehat{Y_1} = -25.3690 + 4.0408 * \text{Edu from GDP} + 0.2277 * \text{GDP} + \qquad (4)$$

$$0.0002 * \text{Secure servers} + 0.2025 * \text{Turisti/milion}$$

From this model it can be seen that the share of people who use the Internet to plan a trip is much more elastic to the proportion of education spending in GDP and almost as elastic to the other three factors.

Fixed Effects Model

Fixed effects model is applied to highlight if there is a correlation between explanatory variables and the individual unobserved effect. This type of model can highlight the country effect, meaning that each country has a distinctive coefficient that influences the dependent variable. The existence and representativeness of the individual (country) effects on the analysed variable is verified by using F test for no fixed effects. The hypotheses of this test are:

H_0: there are no individual fixed effects; H_1: there are individual fixed effects

Table no. 2. Testing the existence of fixed effects

F Test for No Fixed Effects			
Num DF	Den DF	F Value	Pr > F
28	228	27.58	<.0001

Source: own processing in SAS Enterprise Guide

For a 99% confidence level, there is insufficient statistical evidence to accept the null hypothesis, which means that the individual (country) fixed effects are statistically significant (Table no. 2). In terms of explanatory power, the model is representative and valid. The share of people planning their trip online is explained by the panel regression model with fixed effects in the proportion of 94.28%. Moreover, the residuals verify the hypothesis of homoskedasticity, normality and accuracy of the forecast (Figure no. 2).

The coefficients of the explanatory variables are statistically significant, for 0.1 significance level. The fixed effects are also mostly significant with a significance level above 0.1. Equation of the estimated regression model:

$$\widehat{Y1}_i = 22.87 - 1.44 * Edu\ from\ GDP + 0.07 * GDP + 0.10 * Secure\ Servers +$$

$$+ 0.29 * Turisti/million + \alpha_i \text{ , where } i = \overline{1,29}, \alpha_i \text{ - the fixed effect of the country i} \qquad (5)$$
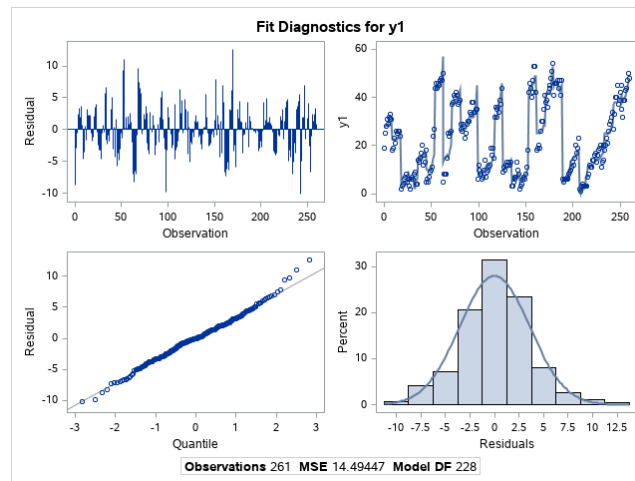

Figure no. 2. Residuals analysis of the fixed effects model
Source: own processing in SAS Enterprise Guide

It is interesting how in this context a higher share of spending on education could have a negative effect on the proportion of people planning an online trip. This could be explained by the fact that higher shares of education expenditure would not imply an efficient use of resources. If individual well-being for a Europeans increases by one unit, then the share of people making online reservations can increase by an average of 0.073 percentage points. Also, the increase by one unit of secure servers will increase the average by 0.004 percentage points of the share of individuals who will plan the trip online. An increase of one unit per unit in the number of tourists traveling outside the country determines an increase of 0.293 percentage points in the share of people who book their trip online. This indicates that online bookings materialize with a holiday in a foreign country. The reference country for fixed effects is United Kingdom. Ireland, Luxembourg, Netherlands, Norway and Sweden do not have significantly different effects (for a significance level of 5%) from the United Kingdom in terms of online booking. The other states are significantly different from the United Kingdom, especially Bulgaria, Germany, Italy, Poland, Romania (Table no. 3).

Table no. 3. Parameter Estimates for the regression model for the type panel date

Parameter Estimates					
Variable	DF	Estimate	Standard Error	t Value	Pr > |t|
Austria	1	-0.16075	5.8444	-0.03	0.98
Belgium	1	-3.15475	5.7567	-0.55	0.58
Bulgaria	1	-18.2019	7.3199	-2.49	0.01
Croatia	1	-16.2166	7.1128	-2.28	0.02
Cyprus	1	-6.43549	6.8517	-0.94	0.35
Czechia	1	-13.5444	6.463	-2.1	0.04
Denmark	1	19.06912	6.2716	3.04	0.00
Estonia	1	-5.35985	6.9785	-0.77	0.44
Finland	1	13.51939	6.039	2.24	0.03
France	1	-3.91022	4.1954	-0.93	0.35
Germany	1	-18.6782	3.5172	-5.31	<.0001
Greece	1	-15.0212	6.6962	-2.24	0.03
Hungary	1	-9.68996	6.5943	-1.47	0.14
Ireland	1	4.090986	6.4926	0.63	0.53
Italy	1	-21.3416	4.2068	-5.07	<.0001
Latvia	1	-12.9965	7.0509	-1.84	0.07
Lithuania	1	-14.6245	6.9758	-2.1	0.04
Luxembourg	1	8.699573	8.8812	0.98	0.33
Malta	1	4.123147	6.9618	0.59	0.55
Netherlands	1	10.89886	5.1507	2.12	0.04
Norway	1	14.23813	6.3929	2.23	0.03
Poland	1	-17.0124	6.1735	-2.76	0.01
Portugal	1	-6.23242	6.9174	-0.9	0.37
Romania	1	-24.2049	6.3485	-3.81	0.00
Slovakia	1	-11.6001	6.9698	-1.66	0.10
Slovenia	1	-5.99437	6.7286	-0.89	0.37
Spain	1	-2.16553	5.6754	-0.38	0.70
Sweden	1	10.36917	5.1793	2	0.05
Intercept	1	22.87444	9.6935	2.36	0.02
edu from GDP	1	-1.4408	0.6611	-2.18	0.03
Gdp	1	0.073195	0.0391	1.87	0.06
secure servers	1	0.104345	0.0201	5.2	<.0001
turisti/milion	1	0.292799	0.1095	2.67	0.01

Source: own processing in SAS Enterprise Guide

Random effects model

The Breusch Pagan test will be applied to test the existence of random effects:

H_0: there are no random effects; H_1: there are random effects

According to this test, the model has significant random effects (Table no. 4).

Table no. 4. Testing the existence of random effects

Breusch Pagan Test for Random Effects (One Way)		
Df	m Value	Pr > m
1	439.3	<.0001

Source: own processing in SAS Enterprise Guide

The estimated random effects model has a lower explanatory power than the previous ones, but statistically speaking it is representative. The share of people planning their trip online is explained by the random effects regression model in proportion of approximately 30% (Table no. 5).

Tabel no. 5. Parameter estimates

Parameter Estimates					
Variable	DF	Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.9082	4.5339	-0.2	0.8414
edu from GDP	1	0.10422	0.6049	0.17	0.8634
Gdp	1	0.18846	0.0249	7.56	<.0001
secure servers	1	0.00012	0.00002	6.19	<.0001
turisti/milion	1	0.22579	0.0617	3.66	0.0003

Source: own processing in SAS Enterprise Guide

In this model, only the variable that indicates the share of education expenditures is not statistically representative. The share of people booking online is elastic to individual well-being, the number of secure internet servers and the number of tourists leaving the state of residence (Figure no. 3).
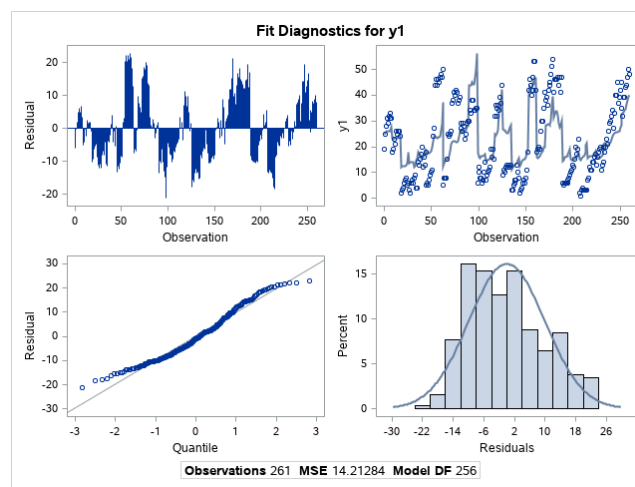

Figure no. 3. Residuals analysis of the regression model for random effects model
Source: own processing in SAS Enterprise Guide

The model with random effects is weaker, because the predicted values deviate a lot from the observed values. To decide which of the RE or FE models is better to use, the Hausmann test was used to test the hypotheses:

H_0: FE consistent; RE consistent and efficient; H_1: FE consistent; RE inconsistent

Table no. 6. Hausman test RMSE

Hausman Test for Random Effects			
Coefficients	DF	m Value	Pr > m
4	4	13.2	0.0104

Table no. 7. Calculation of

Model	RMSE
Grouped model	7.5252
Fixed effects model	3.8072

Source: own processing in SAS Enterprise Guide

There is not enough statistical evidence to accept the null hypothesis, so the model with random effects is not representative, because the estimators obtained are biased and inconsistent (Table no. 6). Given that the grouped model and the one with fixed effects are statistically significant, and the residual component respects the properties of the regression model, the optimal model is the one that minimizes the error. The fixed effects model has the smallest estimation error, so it can be used in describing the factors influencing the share of people who use technology to plan their vacation (Table no. 7). According to the model with fixed effects, two types of states can be distinguished: states that have a positive impact on the dependent variable and states that have a negative impact on the dependent variable. Thus, Denmark, Ireland, Luxembourg, Netherlands, Norway, Sweden and the United Kingdom are developed countries that have a positive trend regarding to the online booking of tourist

services. The opposite states are Bulgaria, Czech Republic, Croatia, Malta, Germany, Greece, Italy, Lithuania, Latvia, Poland, Romania and Slovakia, most of them former communist states, which do not have efficient education systems and are not high technology followers. It is interesting to see if Europeans sensitivity to tourism digitalisation can also be seen in their travel choices and their satisfaction with touristic services. Their holidays experience must be at least equal with their expectations, in order to consider that the tourists had a successful holiday.

Conclusions

Tourism is an important tool in capitalizing on the economic, social and cultural potential of some regions, contributing to their sustainable development and to creating or strengthening links with other regions. In the current economic environment, characterized by globalization and the increasing use of information technology, tourism takes on a new look, in which the trading of tourism products is gradually transferred from a physical dimension to a virtual, conceptual one, and in which balancing demand with supply is greatly facilitated by the new communication channels (Kelly, 1999). The purposes of using the Internet in tourism, as a modern communication and information means, are extremely varied, from the operative obtaining of complex information about certain tourist destinations to travel planning and booking, but the degree of use of this modern means in planning personal travel has registered large variations in territorial profile. In 2018, developed countries in northern Europe, such as the Netherlands, Denmark, the UK or Norway, stood out with shares of about 50% of the population who planned their trips (transport, accommodation) via the Internet, while at the opposite pole were placed the countries with a lower development level, such as Romania, Croatia or Bulgaria, with values close to 5%. Europeans have different approaches to holiday planning, depending on the country of origin. A developed state with a high standard of living and an education adapted to contemporary society has a greater acceptance of the ICT use in tourism. People understand how technology works, know how to use it, and know exactly how to avoid potential dangers in the online environment. According to the analysis, Western and Eastern Europe differ significantly in terms of access to online tourist services, and this differentiation is supported by individual well-being, education spending, the number of tourists and the safety of transactions made via the Internet, by using secure servers. It was observed that the number of people purchasing online tourism services is positively influenced by individual well-being, by a large number of tourists and the existence of more secure internet servers and negatively influenced by the share of education expenditures as a percentage of GDP. The negative influence of education expenditures can be explained in terms of their efficiency, meaning that there are states with reasonable shares of education expenditures, but it cannot be said that they have a higher level of education. Western European countries economically developed have a positive propensity for digitalization in tourism, while Eastern European countries, mainly former communist countries, with a lower level of economic development are less in favor of digitalization in tourism.

References

Ali, A. and Frew, A.J., 2014. ICT for Sustainable Tourism: A Challenging Relationship? *Information Technology & Tourism*, 14(4), pp.261-264.

Baum, T., 2015. Human resources in tourism: Still waiting for change?–A 2015 reprise. *Tourism Management*, 50, pp.204-212.

Bethapudi, A., 2013. The role of ICT in Tourism Industry. Journal of Applied Economics and *Business*, 1(4), pp.67-79.

Bojnec, Š. and Kribel, Z., 2004. Information and Communication Technology in Tourism. In: *Intellectual Capital and Knowledge Management. Proceedings of the 5th International Conference of the Faculty of Management Koper*, University of Primorska, 18–20 November 2004, Portoroz, Slovenia, pp.445-454.

Buhalis, D., 2003. *eTourism: information technology for strategic tourism management*. Essex: Pearson Education Limited.

Buhalis, D. and O' Connor, P., 2005. Information Communication Technology Revolutionizing Tourism. *Tourism Recreation Research*, 30(3), pp.7-16.

Buhalis, D. and Kaldis, K., 2008. eEnabled internet distribution for small and medium-size hotels: the case of Athens. *Tourism recreation research*, 33(1), pp.67-81.

Byrd, T.A. and Marshall, T.E., 1997. Related information technology investment to organizational performance: a causal model analysis. *OMEGA International Journal of Management Science*, 25(1), pp.43-56.

Chakravarthi, J. and Gopal, V., 2012. Comparison of Traditional and Online Travel Services: a concept note. *IUP Journal of Business Strategy*, 9(1), Article number: 45.

Dasgupta, D., 2011. *Tourism marketing*. New Delhi: Pearson.

Dos Santos, B.L., Peffers, G.K. and Mauer, D.C. The impact of information technology investment announces on the market value of the firm. *Information Systems Research*, 4(1), pp.1-23.

Dredge, D., Phi, G. T. L., Mahadevan, R., Meehan, E. and Popescu, E., 2019. *Digitalisation in Tourism: In-depth analysis of challenges and opportunities*. Executive Agency for Small and Medium-sized Enterprises (EASME), European Commission. Availabel at: <https://ec.europa.eu/docsroom/documents/33163/attachments/1/translations/en/renditions/native > [Accessed 14 March 2021].

Dumičić, K., Žmuk, B. and Mihajlović, I.M., 2016. Panel analysis of internet booking of travel and holiday accommodation indicators. *Interdisciplinary Description of Complex Systems,* 14(1), pp.23-38.

Eurostat, 2016, 2017, 2018. *Eurostat database, Tourism statistics*, [online] Availabel alt: <https://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_statistics> [Accessed 18 February 2021].

Evans, G. and Peacock, M., 1999. A comparative study of ICT and Tourism and Hospitality SMEs in Europe. In: Buhalis, D., & W. Schertler (Eds.), *Information and Communication Technologies in Tourism 1999*. Wien: Springer-Verlag, pp.247-257.

Hjalager, A.M., 2015. 100 innovations that transformed tourism. *Journal of Travel Research*, 54(1), pp.3-21.

Hojeghan, S.B. and Esfangareh, A.N., 2011. Digital economy and tourism impacts, influences and challenges. *Social and Behavioral Sciences*, 19, pp.308–316.

Kelly, K., 1999. *New rules for the new economy: 10 radical strategies for a connected world*. New York, N.Y., U.S.A: Penguin Books.

Mihalič, T., 2007. ITC and productivity – the case of the Slovenian travel industry. In: Keller, P., & T. Bieger (Eds.), *Productivity in Tourism: fundamentals and concepts for reaching growth and competitiveness*. Berlin: Erich Schmidt Verlag, pp.167-188.

Miller, T., 2013. Tourism and Media Studies 3.0. Tourism Social Media: Transformations in Identity, Community and Culture. *Tourism Social Science Series*, 18,pp.229-243.

Mihajlović, I., 2012. The impact of information and communication technology (ICT) as a key factor of tourism development on the role of Croatian travel agencies. *International Journal of Business and Social Science,* 3(24), pp.151-159. Molz, J.G., 2012. Travel connections: Tourism, technology, and togetherness in a mobile world. London; New York: Routledge.

Sigala, M. and Chalkiti, K., 2014. Investigating the exploitation of web 2.0 for knowledge management in the Greek tourism industry: An use–importance analysis. *Computers in Human Behavior*, 30, pp.800-812.

Sigala, M., 2014. Collaborative commerce in tourism: implications for research and industry. *Current Issues in Tourism* (ahead-of-print), pp.1-10.