Interdisciplinary Description of Complex Systems 17(1-B), 209-225, 2019

DETERMINANTS OF INNOVATION IN HOTEL AND TRAVEL AGENCY SERVICE INDUSTRY: IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGIES AND ENTERPRISE READINESS

Zrinka Marušić[1,] *, Ana Aleksić[2], Mirjana Pejić Bach[2], Mislav Ante Omazić[2] and Jovana Zoroja[2]

[1]Institute for Tourism
Zagreb, Croatia

[2]University of Zagreb – Faculty of Economics and Business
Zagreb, Croatia

DOI: 10.7906/indecs.17.1.19
Regular article

Received: 15 October 2018.
Accepted: 8 January 2019.

ABSTRACT

Innovation is generally considered as one of the main key drivers of economic growth. Fostering innovation activity helps firms to improve and maintain a competitive advantage on a global market, which is especially important for tourism firms that operate in a very competitive environment. The goal of the article is to explore the determinants of innovations in hotel and travel agency services. We tried to investigate the impact of information and communication technologies and the enterprise readiness on the innovations in hotel and travel agency service industry. In order to achieve this goal, the empirical survey was conducted on a sample of hotels and travel agencies in Croatia and Montenegro. Principal component analysis with Varimax factor rotation was applied on a set of information and communication technologies items. Three logistic regression models were developed for the hotel firms and travel agencies, separately. The research results showed the usage of information and communication technologies as well as enterprise readiness for innovations have a significant impact on innovation activities, but the impact was different between hotel firms and travel agencies.

KEYWORDS

innovation, ICT, tourism industry, Croatia, Montenegro

CLASSIFICATION

JEL: L83, O31, Z32

*Corresponding author, η: Zrinka.Marusic@iztzg.hr; +385 1 390 9655;
Institute for tourism, Vrhovec 5, 10 000 Zagreb, Croatia

INTRODUCTION

Innovations are based on a new, creative and unique way of thinking, learning, doing or producing [1, 2]. They can also be defined as an application of new product or service; creation of new methods of enterprise, production or supply; introduction of changes in business activities regarding business processes and employees [3, 4].

Study of innovation activity and process in the service sector has attracted many attention in the last decade, as a result of emerging prominence of services and their influence in economic activity [4, 5]. Innovation in services may be defined "as the conversion of ideas into products, processes or services which are valued by the market" [6; p.283]. It "creates value for customers, employees, business owners, alliance partners, and communities through new and/or improved service offerings, service processes, and service business models" [7; p.5].

Tourism is considered as the world's largest service industry [8] and innovation is recognized as one of the key factors for tourism enterprises' competitiveness [9, 10]. Innovation is considered to be at the very center of tourism enterprises' success and the primary survival condition [11], with various types of applications, such as mobile apps [12, 13], websites [14], and social media [15]. Beside ensuring differentiation in the market [16, 17] it helps enterprises to acquire long-term success by achieving lower costs and enhancing their products and services, as well as processes to satisfy changing client needs and habits [18, 19]. Innovativeness of tourism enterprises positively affects financial performance [20], and as well improves company image, enhances profitability and increases customer satisfaction [6]. Interesting results is that when it comes to clients they are generally willing to pay more for hotels that exhibit greater innovative activities [21].

Still, in spite of realizing the importance of innovation for tourism enterprises, it seems that tourism cannot be described as a best practice industry [22]. Results of the empirical studies indicate a modest level of innovation activity [20, 23], and thus many authors [16, 18, 24] indicate need for further research oriented towards understanding determinants in tourism innovation.

Innovation like in other service industries is under influence of many external and internal factors [25]. When looking generally, Weiermair [26] emphasizes three basic groups of factors which determine the level and pace of innovation in tourism, including supply and supply–related determinants, demand drivers and the level and pace of competition. Divisekera and Van Nguyen [27] stress the difference among innovation inputs concerned with internal enterprise elements (i.e. collaboration, human capital, information technology, and funding), and institutional factors (i.e. foreign ownership, market competition, firm size, and environment), while Tejada and Moreno [28] stress the importance of non-technological determinants as size, cooperation, capital structure and dependency on tour operators. A study by Grissemann et al. [18] found employee engagement, customer participation, innovation management, innovation networks, and information technology to be the main drivers of innovation. However, innovations in technology are often a source of risks related to security issues [29].

As previous research above shows, Information Communications Technology (ICT) has been recognized to have a strong impact on tourism, and as Law et al. [30] emphasize ICT has brought changes at the operational and strategic level of management in tourism. As of the high information content, ICT was given a central role in the innovation activities of service firms [6]. Research, however, shows that only when ICT is combined with other internal strategic and enterprise issues, especially the ones related to employees, one can expect to improve productivity [25]. Importance of funding, as an important internal element, is also stressed.

As it is not possible to cover all potential determinants inside and outside enterprises, this article orients on the influence of the two aforementioned determinants that have been recognized to have a significant potential impact on innovation activity. They are the ICT and enterprise readiness encompassing several internal elements related to employees and their engagement and participation as well as capital structure and funding. Therefore, the purpose of this article is to provide additional understanding of the innovation activity in tourism enterprises, namely hotels and travel agencies, with special emphasis on analyzing the role of ICT and enterprise readiness in this process. In that sense, we hope to provide a deeper understanding of factors that could foster innovation and increase their competitiveness. The research was done on a sample of hotels and travel agencies in Croatia and Montenegro, with statistical analysis of data by using principal component analysis with Varimax factor rotation and three logistic regression models that were developed for the hotel firms and travel agencies, separately.

The article is organized into five sections. Introduction part is the first section where innovation as a driver of tourism development is emphasized, and determinants of innovations in tourism have been recognized. The goal of the article and methodology are shortly described in the Introduction part also. In the second section, Literature review, main issues of the article and hypothesis are described: impact of the ICTs and enterprise readiness on innovations in tourism industry and impact of the ICTs and enterprise readiness on innovations in hotel and travel agencies. According to the hypothesis, research model is presented. In the third section, data and methodology are described, together with research instrument and data collection method. Definitions of the variables for the regression models and factor analysis are explained also in this section. The results of the econometric examinations regarding the impact of the ICTs and enterprise readiness on innovation in hotel and travel agency service industry are presented in the fourth section. The last, fifth section of the article concludes the article. Comparison with other similar research is done, practical implications of the results are presented, as well as future research steps and limitations of the article.

THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Tourism presents a highly information-intensive industry with a considerably long value chain where information has one of the strongest influences [31]. For these reasons, the impact of ICT in the tourism industry is inevitable and integration of ICT in everyday business is essential for tourism success [32]. Its usage becomes relevant on all operative, structural, strategic and marketing levels as it can enable global interaction among all members of the value chain [33]. Moreover, ICT has a crucial role in innovation activities [22, 34, 35]. Empirical results show that ICT increases innovation activities [18] by "taking advantage of intranets for reorganizing internal processes, extranets for developing transactions with trusted partners and the Internet for interacting with all its stakeholders and customers" [33; p.74]. Aldebert et al. [36] stress how tourism managers need to bear in mind that tourism industry has moved to end-customer oriented technologies and attention has to be on a spread of mobile or RFID technologies. Moreover, e-business oriented on digitalization of all processes becomes crucial. As such, these areas provide an emerging impetus and niche for innovations in the tourism sector. Based on the importance stressed on ICT and its influence on innovations in tourism we propose our first hypothesis:

H1: ICT is a predictor of innovations, both in hotels and travel agencies.

Every innovation presents a form of change, and as such, it seeks enterprise-level readiness to accept such a change. Enterprise members' commitment to implement a change, as well as capabilities to do so, can be seen as two major elements of enterprise readiness [37]. Enterprise readiness is expected to have a significant influence in determining service firm

innovation readiness [38]. Research on innovation in tourism has shown several elements to be important determinants in enterprise readiness for innovation, such as employee engagement and participation [18, 39], capital structure [28] as well as dedicated time and resources [40]. Employees have one of the crucial roles in the process as of the simultaneous production and consumption of services and importance of human factor in providing them [24]. Successful innovation seeks for employee commitment and engagement to carry that innovation. In addition, if financial resources are adequate and continuing this can determine innovation level and its implementation activities [40]. Additionally, empirical results provide strong support for external financial support to carry out the innovation process [23]. Based on the above stated we propose our second hypothesis:

H2: Enterprise readiness is a predictor of innovations, both in hotels and travel agencies.

Innovations of all kind are important for competitiveness and survival of all tourism enterprises. Still, large tourism enterprises are often characterized by higher levels of innovation [41] resulting from their ability to implement and support innovation more quickly [42]. In addition, empirical results indicate differences in innovation level among different enterprises, as lodging and accommodation sector seems to be the most innovative ones [6, 9]. This is somehow expected, as "inter-firm differences and inter-branch differences in production, investment and marketing conditions" [26; p.61] exist and they can affect innovation level and a process of different enterprises. Also, as of different roles and processes in the value chain, hotels, and travel agencies experience different roles of ICT in their enterprise [33]. Thus, based on the above we propose our third hypothesis:

H3: ICT and enterprise readiness have a different influence on innovations in hotels and travel agencies.

With the intention to better understand determinants of innovation activity in tourism enterprises, more specifically hotels and travel agencies, we have developed the research model as shown in Figure 1. The model specifically addresses the role of ICT and elements of enterprise readiness in the prediction of use of innovation in hotels and travel agencies. In that sense, we presume that innovation is under the positive influence of ICT (H1) and enterprise readiness (H2). We also presume that ICT and enterprise readiness have a different relationship with innovativeness in hotels and travel agencies (H3).

Research model is presented in Figure 1.

METHODS

In this section following issues will be presented: research instrument and data collection method, sample characteristics and design and data analysis.

RESEARCH INSTRUMENT AND DATA COLLECTION METHOD TITLE

Our research is focused on innovation at the level of the tourism firm. Hotel and travel agency service industry in Croatia and Montenegro has been used as case study. Email survey with two follow-ups has been conducted in autumn of 2013 in order to collect data on firms' characteristics which may influence their innovativeness. In order to increase a response rate, the survey in Croatia was partly conducted in cooperation with The Association of Small and Family Hotels and The Association of Croatian Travel Agencies.

As it can be seen in Table 1 the survey instrument, a structured questionnaire adapted to the requirement of a mail survey, has three parts. The first one was dealing with firm's characteristics regarding the type and size of the firm. The second one was focused on

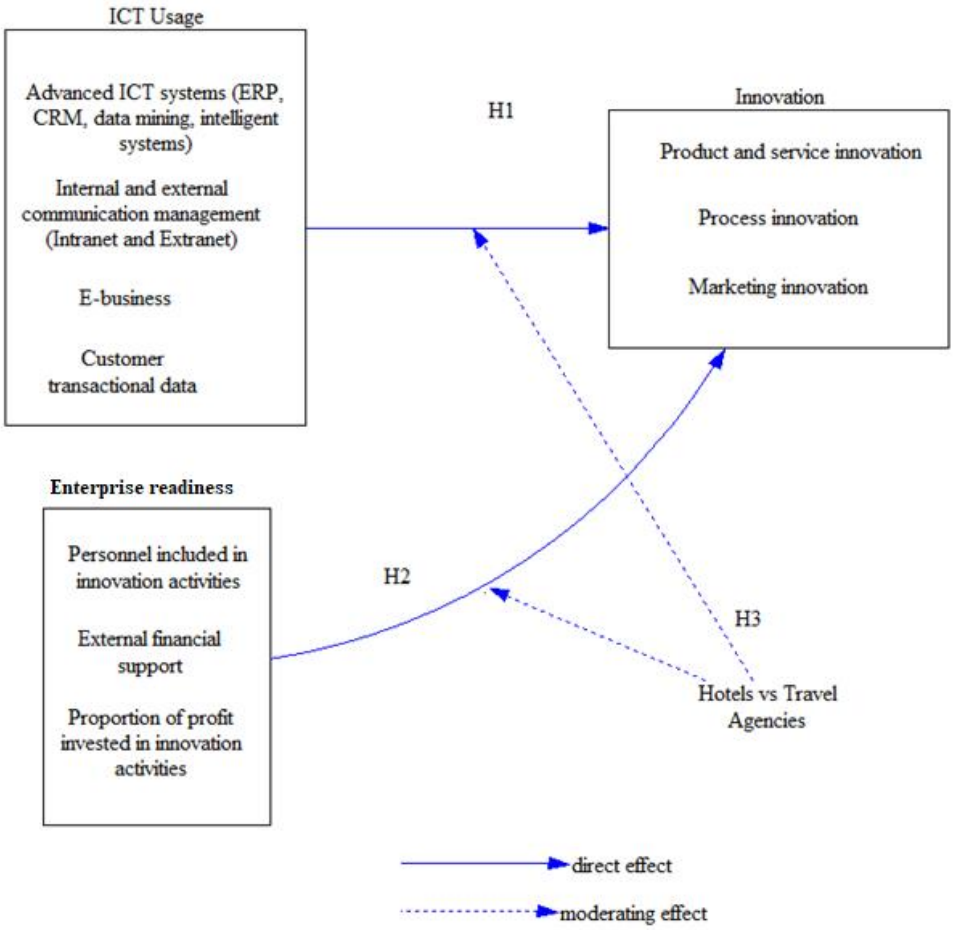

Figure 1. Research model (authors's work).

Table 1. Research instrument description (authors' survey).

Construct	Item name	Item description
Enterpriseal readiness for innovation	OR1	Person / persons employed for innovative activities
	OR2	Some form of financial support for innovation activities have been received within last three years
	OR3	Part of profit allocated to innovation annually
Innovativeness	INNO1	New or significantly improved products or services introduced within last three years
	INNO2	New or significantly improved processes introduced within last three years
	INNO3	New or significantly improved marketing activities introduced within last three years
ICT usage	ICT1	LAN
	ICT2	Intranet
	ICT3	Extranet
	ICT4	Products/services offered through the Internet
	ICT5	Products/services ordered through the Internet
	ICT6	ERP Enterprise Resource Planning
	ICT7	CRM Customer Relationship Management
	ICT8	Consumer transaction data
	ICT9	Data mining
	ICT10	Intelligent systems

innovativeness, defined as, both, the firm's readiness for the innovations as well as a current level of innovativeness of the firm.

In line with the previous research on the innovation related to the specifics of tourism [36] we analyzed three types of innovations: product or service innovation, process innovation, and marketing innovation. The third part of the questionnaire oriented on the level of ICT used within the firm, and this was assessed through a construct consisting of 10 items describing different types of ICT. All of the items were dichotomous, with 1 standing for Yes, and 2 for No.

SAMPLE CHARACTERISTICS AND DESIGN

An email survey in Croatia was sent to 169 hotel firms and 344 travel agencies. A list of hotel firms comprised of almost 90 % of all hotels in Croatia operating at the time when the survey was conducted. The list of hotels firms covered both large hotels and family and small ones. The list of travel agencies covered all agencies members of The Association of Croatian travel agencies (a total of 260 agencies) and a sample of active non-member agencies (a total of 84 agencies). A total response rate for the Croatian sample was relatively low 15 %, despite the use of names of the responding trade associations and the two follow-up letters. The higher response rate was obtained for the hotel sample (18 % or a total of 30 hotel firms) in comparison to that of travel agencies(13 % or a total of 46 travel agencies). The obtained response rate was in accordance to the well-documented response rate to mail surveys [43, 44], although somewhat lower than the 25 % obtained by Paraskevas and Buhalis [45] on the sample of small hotels in UK and Greece using e-mail survey. Still it is significantly higher than that obtained by Keegan and Lucas [44] who experienced a response rate of 10 % on the sample of small hospitality firms and doubled it with direct personal contact through the follow-up procedure.

Montenegro's sample was a convenient one, targeting both, hotel firms and travel agencies. The obtained sample comprised of 10 hotel firms and four travel agencies which leads to the total sample of 40 hotel firms and 50 travel agencies. Table 2 depicts the sample characteristics, compared between the hotel firms and travel agencies.

Hotel firms are significantly larger firms compared to travel agencies regarding the number of employees, both full-time and seasonal. While 57 % of hotel firms have up more than 10 employees, only every fifth tourist agency is in that category. Hotel firms are also bigger regarding the total revenue, with 16 % of all hotel firms and 6 % of all agencies having total revenue in 2012 over 10 million Euros, and over one-third of all agencies and only 5 % of hotel firms having total revenue below 100 000 Euros. Interestingly, there is no significant difference between the two groups regarding the increase/decrease in revenue during the last three years. The majority of all firms are private, with a share of public or mixed ownership higher, but not significantly, among the hotel firms. Hotel firms are also older than the travel agencies on average, with 16 % of all hotels firms and only 2 % of all agencies built before 1989.

Table 2. Sample characteristics, authors' survey (continued on p.215).

	Hotel firms (*N* = 40)		**Travel agencies (*N* = 50)**		***p*-value**
	n	**%**	***n***	**%**	
Number of full-time employees	40	100,0	50	100,0	0,0023***
1	4	10,0	6	12,0	
2	2	5,0	13	26,0	
3-5	3	7,5	12	24,0	
6-10	8	20,0	9	18,0	
11-20	12	30,0	5	10,0	
21-100	4	10,0	4	8,0	
> 100	7	17,5	1	2,0	

Table 2. Sample characteristics, authors' survey (continuation from p.214).

Number of seasonal employees	40	100,0	49	100,0	0,0008***
0	7	17,5	17	34,7	
1-2	1	2,5	11	22,4	
3-5	8	20,0	5	10,2	
6-10	8	20,0	6	12,2	
11-20	3	7,5	7	14,3	
21-100	5	12,5	3	6,1	
> 100	8	20,0	0	0,0	
Type of ownership	40	278,9	50	272,0	0,1361
Private	35	87,5	48	96,0	
Public or mixed	5	12,5	2	4,0	
Year of establishment	38	100,0	50	100,0	0,0461**
Prior to 1989	6	15,8	1	2,0	
1989 to 1999	11	28,9	23	46,0	
2000 to 2005	13	34,2	12	24,0	
2005 up today	8	21,1	14	28,0	
Total revenue in 2012, €	37	100,0	50	100,0	0,0189**
< 100 000	2	5,4	17	34,0	
100 000-500 000	17	45,9	14	28,0	
500 000-1000,000	5	13,5	4	8,0	
1000 000-3 000,000	4	10,8	9	18,0	
3 000 000-10 000 000	3	8,1	3	6,0	
More than 10.000,000	6	16,2	3	6,0	
Revenue during the last 3 years	36	100,0	49	100,0	0,5896
Significantly increased	3	8,3	7	14,3	
Increased	19	52,8	18	36,7	
The same level	7	19,4	10	20,4	
Decreased	6	16,7	13	26,5	
Significantly decreased	1	2,8	1	2,0	
Part of corporation	40	100,0	50	100,0	0,4718
Yes	6	15,0	5	10,0	
No	34	85,0	45	90,0	
At more than one location	40	100,0	50	100,0	0,4479
Yes	8	2,0	7	14,0	
No	32	80,0	43	86,0	
In more than one country	40	100,0	49	100,0	0,8191
Yes	2	5,0	3	6,1	
No	38	95,0	46	93,9	
The main market	38	100,0	49	100,0	0,0863
Domestic	7	18,4	13	26,5	
Neighboring	4	10,5	0	0,0	
EU countries	24	63,2	29	59,2	
Other countries	3	7,9	7	14,3	

Note: *p*-value from Chi-square or Fisher Exact test.
**statistically significant at 5 %
***statistically significant at 1 %

DATA ANALYSIS

In order to analyze collected data, three statistical methods have been used: (i) univariate analysis, (ii) principal component analysis (PCA), and (iii) logistic regression. Univariate analysis was performed comparing the difference in firm's characteristics and level of innovativeness between the hotel firms and travel agencies. The significance of differences was assessed by Chi-square or Fisher's Exact test in case of the small number of observations. Principal component analysis (PCA) with Varimax factor rotation was applied on a set of ICT items in order to address their underlying structure in the smaller number of factors. Logistic regression was performed to find possible predictors of innovativeness, separately for the two groups of tourism firms. The stepwise elimination strategy was applied to extract the significant predictors. Probabilities of less than 0,10 were accepted as the evidence of statistical significance.

RESULTS

In this section, research results are described. In Table 3 innovation activities of hotels and travel agencies are presented. In all three categories, both, hotel firms and travel agencies, are oriented toward innovation activities. Hotel firms are fostering more innovative processes and marketing activities (70 %), while travel agencies are fostering more innovative products/services (89,6 %). It can be concluded that travel agencies in all three categories foster innovation activities more than hotel firms. Category Innovative products/services is statistically significant at 1 % for hotel firms and travel agencies (*p*-value = 0,0053), as well as innovative processes at 10 % (*p*-value = 0,0801). Categories Innovative marketing activities and Innovative processes are not statistically significant.

Table 3. Innovation activities of hotels and travel agencies (authors' survey).

	Hotel firms (*N* = 40)		**Travel agencies (*N* = 50)**		***p*-value**
	n	**%**	***n***	**%**	
Innovative products/services (INNO1)	40	100.0	48	100.0	0.0053***
Yes	26	65.0	43	89.6	
No	14	35.0	5	10.4	
Innovative processes (INNO2)	40	100.0	48	100.0	0.0801
Yes	28	70.0	41	85.4	
No	12	30.0	7	14.6	
Innovative marketing activities (INNO3)	40	100.0	49	100.0	0.1985
Yes	28	70.0	40	81.6	
No	12	30.0	9	18.4	

Note: *p*-value from Chi-square or Fisher Exact test.
*statistically significant at 10 %
***statistically significant at 1 %

In Table 4 ICT usage and enterprise readiness of hotels and travel agencies are presented through 10 items, presented in Table 1. In only three categories out of 10, hotel firms use ICT in a higher percentage (ICT1: 82,1 %; ICT4: 92,5 %; ICT8: 92,5 %), while in other categories, hotel firms use ICT in lower percentage (e. g.: ICT2: 38,5 %). Only 21,1 % hotel firms have person/persons employed for innovative activities and only 10 % of hotel firms have some form of financial support for innovation activities in the last three years. Approximately 50 % of profit is allocated to innovation annually.

The situation is quite similar to travel agencies. In only three categories out of 10, travel agencies use ICT in a higher percentage (ICT1: 80 %; ICT8: 86 %; ICT4: 64 %), while in other

Table 4. ICT usage and enterprise readiness of hotels and travel agencies (authors' survey).

	Hotel firms (*N* = 40)		**Travel agencies (*N* = 50)**		***p*-value**
	n	**%**	***n***	**%**	
ICT1 – LAN	39	100,0	50	100,0	0,8070
Used	32	82,1	40	80,0	
Not used	7	17,9	10	20,0	
ICT2 – Intranet	39	100,0	50	100,0	0,5255
Used	15	38,5	16	32,0	
Not used	24	61,5	34	68,0	
ICT3 – Extranet	40	100,0	50	100,0	0,0833*
Used	20	50,0	16	32,0	
Not used	20	50,0	34	68,0	
ICT4 – Products/services offered through the Internet	40	100,0	50	100,0	0,0015***
Used	37	92,5	32	64,0	
Not used	3	7,5	18	36,0	
ICT5 – Products/services ordered through the Internet	40	100,0	49	100,0	0,1076
Used	16	40,0	28	57,1	
Not used	24	60,0	21	42,9	
ICT6 – ERP Enterprise Resource Planning	40	100,0	49	100,0	0,1130
Used	9	22,5	5	10,2	
Not used	31	77,5	44	89,8	
ICT7 – CRM Customer Relationship Management	40	100,0	50	100,0	0,1090
Used	10	25,0	6	12,0	
Not used	30	75,0	44	88,0	
ICT8 – Consumer transaction data	40	100,0	50	100,0	0,3296
Used	37	92,5	43	86,0	
Not used	3	7,5	7	14,0	
ICT9 – Data mining	39	100,0	47	100,0	0,1126
Used	19	48,7	15	31,9	
Not used	20	51,3	32	68,1	
ICT10 – Intelligent systems	39	100,0	48	100,0	0,0016***
Used	14	35,9	4	8,3	
Not used	25	64,1	44	91,7	
OR1 – Person/persons employed for innovative activities	38	100,0	49	100,0	0,1631
Yes	8	21,1	17	34,7	
No	30	78,9	32	65,3	
OR2 – Some form of financial support for innovation activities have been received within last three years	38	100,0	49	100,0	0,1442
Yes	4	10,5	11	22,4	
No	34	89,5	38	77,6	
OR3 – Some percent of profit allocated to innovation annually	39	100,0	50	100,0	0,0083***
Yes	23	59,0	42	84,0	
No	16	41,0	8	16,0	

Note: *p*-value from Chi-square or Fisher Exact test.
*statistically significant at 10 %
***statistically significant at 1 %

categories, travel agencies use ICT in lower percentage (e.g. ICT10: 8.3%). Only 34.7% of travel agencies have person/persons employed for innovative activities and only 22.4% of hotel firms have some form of financial support for innovation activities in the last three years. Approximately 84% of profit is allocated to innovation annually, which is higher percentage compared to hotel firms.

Differences between hotels and travel agencies are statistically different in the following categories: (i) Some percentage of profit allocated to innovation annually (*p*-value: 0.0083), (ii) ICT4 (*p*-value = 0,0015), (iii) ICT10 (*p*-value = 0.0016), (v) ICT3 (*p*-value = 0,0833).

The overall measure of sampling adequacy for the application of PCA on ICT items was acceptable (overall MSA of 0,697). Relying on Kaiser criterion, PCA resulted in the extraction of four factors with eigenvalues greater than 1,0, accounting for 64 % of total variance. Four-factor structure following the Varimax rotation applied in order to increase the interpretability of the factors is presented in Table 5.

Table 5. Factor loadings for ICT dimension (authors' survey).

ICT dimensions		Factor 1	Factor 2	Factor 3	Factor 4
ICT1	LAN	0.164	0.156	**0.515**	0.070
ICT2	Intranet	0.096	**0.824**	0.139	-0.018
ICT3	Extranet	0.175	**0.819**	0.097	0.032
ICT4	Products/services offered through the Internet	0.079	0.122	**0.720**	0.147
ICT5	Products/services ordered through the Internet	0.013	-0.020	**0.756**	-0.231
ICT6	ERP Enterprise Resource Planning	**0.839**	0.075	0.022	-0.110
ICT7	CRM Customer Relationship Management	**0.855**	0.172	0.110	0.013
ICT8	Consumer transaction data	-0.044	-0.018	-0.007	**0.935**
ICT9	Data mining	**0.633**	0.151	0.130	0.408
ICT10	Intelligent systems	**0.713**	0.062	0.126	-0.032

The four extracted factors are: (i) Factor 1: Advanced ICT systems (ICT6-ERP, ICT7-CRM, ICT8-Data mining, ICT10-intelligent systems); (ii) Factor 2: Internal and external communication management (ICT2-Intranet, ICT3-Extranet) ; (iii) Factor 3: E-business (ICT1-LAN, ICT4-Products/services offered through the Internet, ICT5-Products/services ordered through the Internet), and (iv) Factor 4: Customer transactional data (ICT8). By extracting these four factors, it was possible to determine specific dimensions of ICT that serve as determinant of innovation activity.

Logistic regressions were performed in order to identify the predictors of innovativeness in the hotel industry and travel agencies. As dependent variables, three variables describing the innovativeness within the firm were used: INNO1 – innovation in products/service, INNO2 – innovation in processes and INNO3 – innovation in marketing activities. As the independent variables, there was the firm's readiness to introduce the innovative activities (person employed for innovation activities, external financial support for innovation activities, a proportion of profit invested in innovation activities) and four ICT factors. The results are presented in the following tables.

Logistic regression yields (Table 6) that Innovation of products and services (INNO1) for hotel firms depends on Profit allocated to innovation (OR3) and Advanced ICT systems (Factor1):

$$\text{logit}(p) = 1{,}94 + 1{,}34 \cdot \text{OR3} + 0{,}91 \cdot \text{Factor1}. \quad (1)$$

The increase of profit allocated to innovation increases the odds of the implementation of innovation of product and services in the hotel industry. Hotels with higher profit allocation to innovation are more likely to have innovative products and services. Similarly, hotels with higher usage of advanced ICT systems innovation are more likely to have innovative products and services. Specifically, an increase of factor score by one increases odds of innovative products and services used for 2,49 times (i.e. odds ratio = $e^{0,91}$). The model correctly separates 83 % of cases.

For travel agencies, more variables retained in the model: Persons employed for innovative activities (OR1), Profit allocated to innovation (OR3), Advanced ICT systems (Factor1) and E-business (Factor3). The obtained model is:

$$\text{logit}(p) = -30{,}11 + 63{,}45 \cdot \text{OR1} + 77{,}31 \cdot \text{OR3} - 25{,}45 \cdot \text{Factor1} + 25{,}97 \cdot \text{Factor3}. \quad (2)$$

Here, model completely separates travel agencies that use innovative products and services from those not using (correct classification by the model is 100%).

Table 6. Logistic regression results for dependent variable INNO1 (innovation in products or services) (authors' survey).

	Hotel firms		**Travel agencies**	
	b	***p***	***b***	***p***
Intercept	1.94		–30.11	
OR1			63.45	0.000***
OR3	1.34	0.000***	77.31	0.000***
Factor 1	0.91	0.085*	–25.45	0.000***
Factor 3			25.97	0.000***
Classification table	%		%	
Correctly yes	86.36		100.00	
Correctly no	76.92		100.00	
Correctly – overall	82.86		100.00	
–2 Log likelihood	28.08		0.00	
Nagelkerke R^2	0.55		1.00	

*statistically significant at 10 %

***statistically significant at 1 %

Process innovation (INNO2) in hotel firms depends on Persons employed for innovative activities (OR1) and Advanced ICT systems (Factor1), Table 7:

$$\text{logit}(p) = -41{,}50 + 20{,}35 \cdot \text{OR1} + 1{,}84 \cdot \text{Factor1}. \quad (3)$$

The high regression coefficient for OR1 (20,35) is a consequence of the fact that all hotel firms with persons employed in innovative activities are also innovative in their business processes. So, the presence of OR1 gives 100 % chance of the presence of process innovation.

Model for travel agencies includes different predictors: Financial support for innovation activities (OR2), Profit allocated to innovation (OR3) and Customer transactional data (Factor4). The model is:

$$\text{logit}(p) = 42{,}17 + 53{,}83 \cdot \text{OR2} + 107{,}97 \cdot \text{OR3} + 33{,}51 \cdot \text{Factor4}. \quad (4)$$

The model results with 97,7 % correct classifications. travel agencies obtaining financial support for innovation activities, investing higher part of the profit in innovation and having a higher score of Customer transactional data are more likely to be innovative in their business processes.

Predictors for Marketing innovation (INNO3) in hotel firms are Persons employed for innovative activities (OR1), Profit allocated to innovation (OR3) and Advanced ICT systems (Factor1) (Table 8):

Table 7. Logistic regression results for dependent variable INNO2 (innovation in processes) (authors' survey).

	Hotel firms		**travel agencies**	
	b	***p***	***b***	***p***
Intercept	–41.50		42.17	
OR1	20.35	0.023**		
OR2			53.83	0.000***
OR3			107.97	0.000***
Factor 1	1.84	0.001***		
Factor 4			33.51	0.007***
Classification table	%		%	
Correctly yes	70.83		100.00	
Correctly no	72.73		83.33	
Correctly - overall	71.43		97.67	
-2 Log likelihood	27.57		3.82	
Nagelkerke R^2	0.52		0.93	

**statistically significant at 5 %
***statistically significant at 1 %

$$\text{logit}(p) = -39{,}04 + 19{,}72 \cdot \text{OR1} + 0{,}72 \cdot \text{OR3} + 2{,}12 \cdot \text{Factor1}. \quad (5)$$

The coefficient for OR1 is high because all hotel firms with persons employed for innovative activities use some innovative marketing activities. Further, hotel firms investing in innovation are more likely to apply to marketing innovations.

Again, the model for travel agencies includes different predictors: Financial support for innovation activities (OR2), Internal and external communication management (Factor2) E-business (Factor3). The model is:

$$\text{logit}(p) = -41{,}17 + 19{,}97 \cdot \text{OR2} - 0{,}92 \cdot \text{Factor2} + 0{,}78 \cdot \text{Factor3}. \quad (6)$$

Table 8. Logistic regression results for dependent variable INNO3 (innovation in marketing activities), authors' survey.

	Hotel firms		**Travel agencies**	
	b	***p***	***b***	***p***
Intercept	–39.04		–41.17	
OR1	19.72	0.078*		
OR2			19.97	0.016**
OR3	0.72	0.070*		
Factor 1	2.12	0.003***		
Factor 2			–0.92	0.045**
Factor 3			0.78	0.033**
Classification table	%		%	
Correctly yes	83.33		97.14	
Correctly no	81.82		33.33	
Correctly - overall	82.86		84.09	
-2 Log likelihood	22.31		30.61	
Nagelkerke R^2	0.64		0.43	

*statistically significant at 10 %
**statistically significant at 5 %
***statistically significant at 1 %

The regression results from Tables 6, 7 and 8 are summarized in Table 9.

Table 9. Summary of the logistic regression results (authors' survey).

	Innovation of products and services		**Process innovation**		**Marketing innovation**		**Hypotheses 1 and 2**
	Hotel firms	**travel agencies**	**Hotel firms**	**travel agencies**	**Hotel firms**	**travel agencies**	
Enterpriseal readiness							
OR1		(+) 1%	(+) 5%		(+) 10%		½ ✓ Partially confirmed
OR2				(+) 1%		(+) 1%	
OR3	(+) 1%	(+) 1%		(+) 1%	(+) 10%		
Usage of ICT							
Factor 1	(+) 10%	(–) 1%	(+) 1%		(+) 1%		½ ✓ Partially confirmed
Factor 2						(–) 1%	
Factor 3		(+) 1%				(+) 1%	
Factor 4				(+) 1%			
Hypothesis 3	✓ Confirmed		✓ Confirmed		✓ Confirmed		

All three items of the enterprise readiness for innovation, as well as all four dimensions of ICT, are significant predictors for at least one dimension of innovation. While, for example, the Customer transactional data, as one of the ICT dimensions (Factor 4) is a significant predictor just for the process innovation for travel agencies only, a variable Persons employed for innovative activities (OR1) is the significant predictor for all three dimensions of innovation – travel agencies having persons employed for innovative activities are increasing their odds to have innovative products and services, while hotel firms are increasing their odds to have, both, process innovation and marketing innovation. Financial support for innovation activities (OR2) is increasing odds of process and marketing innovation in travel agencies only.

The use of the Advanced ICT systems (Factor 1) is increasing the odds of pursuing innovation of product and services, processes and marketing in hotel firms, but is, at the same time decreasing odds of obtaining innovative products and services in travel agencies, similarly as the Internal and external communication management (Factor 2). Finally, E-business (Factor 3) is increasing odds of obtaining innovative products and services and innovative marketing in travel agencies, only.

CONCLUSION

Continuous innovation presents an instrument for the survival of modern firms. It enables development of new products and services, performance on new markets and provides channels for attracting new customers. Innovation is playing an important role also in the tourism industry, leading among others to better financial performance and higher customer satisfaction. Still, as seen from the literature many authors call for additional research on determinants of innovation in tourism.

For that purpose, this article analyzed the influence of ICT and enterprise readiness elements on a level of innovation in products/services, processes, and marketing activities. Additionally, we analyze whether their influence is different among hotels and travel agencies. By using univariate analysis, principal component analysis (PCA), and logistic regression our hypothesis were tested on the sample of hotels and travel agencies in Croatia and Montenegro.

When looking generally, level of innovation in both Croatian and Montenegrin hotels and travel agencies is high. In accordance with the previous research [6] it is seen that enterprises rarely innovate in only one field, and as it is the case of our sample, enterprises foster several types of innovations simultaneously. Still, travel agencies in all three categories of innovation,

foster innovation activities more than hotel firms. These results are somewhat different to the previous research which indicate that hotels are the most innovative as compared to other types of tourism enterprises [6, 9].

Our results also revealed a significant but somewhat different impact of enterprise readiness and ICT usage items on fostering the three-dimension innovation activity between hotel firms and travel agencies. Hotel firms should put special attention on the implementation and use of the advanced ICT systems such as ERP, CRM, Data mining, and/or intelligent systems in order to increase odds of innovation in their business, regardless the type of innovation (i.e. products and services, processes and marketing). In addition, a person/persons employed for innovative activities would increase the odds of the introduction of innovative processes in their business, and innovative marketing activities of hotels firms, while the allocation of some percent of profit to innovation would increase the odds of innovative products and services and marketing. Predicting the innovation activity in travel agencies is more dependent on the type of innovation. If innovation of their products and services is in a focus, they should allocate some profit to innovation and employ a person/persons in charge of innovative activities who would foster the use of E-business (LAN, Products/services offered/ordered through the Internet). In order to increase the odds of the process innovation in travel agency sector, the agencies should put more attention to use of customer transactional data together with the allocation of some funds to innovation, both from their own profit and by applying for some external support. Finally, both, relying on E-business and the external support for innovation would increase the odds of innovative marketing activities in travel agency sector.

Several limitations of current research need to be acknowledged. This study was done on a sample of enterprises from Croatia and Montenegro, thus findings might be under influence of cultural specifics of the sample. The sample size is another issue, as its' size and design do not allow universal generalization of the results. Additionally, this article analyzed the prediction of only several determinants of innovation, namely ICT and enterprise readiness, and many more determinants inside and outside of the enterprise need to be acknowledged for the future research. For instance, importance of cooperation [9, 28], driving forces of other business sectors and public sector related to tourism [42], or institutional factors as foreign ownership, market competition, and environment [27]. Nevertheless, we believe the article provided some additional insight into the subject of ICT and enterprise readiness as determinants of innovation in the tourism industry.

ACKNOWLEDGMENT

This work has been supported by the Croatian Science Foundation under the project STRENGTHS (project no. 9402, Project period: 2014-2018) and bilateral scientific project: Intelligent Systems and Innovations in Tourism; funded by the Ministry of education and science, Montenegro and Ministry of science, education, and sport, Croatia.

REFERENCES

[1] Vanhaverbeke, W. and Peeters, N.: *Embracing innovation as strategy: Corporate venturing, competence building and corporate strategy making*. Creativity and Innovation Management **14**(3), 246-257, 2005, http://dx.doi.org/10.1111/j.1467-8691.2005.00345.x,

[2] Pejić Bach, M.: *Exploring information and communications technology adoption in enterprises and its impact on innovation performance of European countries*. Ekonomicky Casopis **62**(4), 335-362, 2014,

[3] Meneses, O.A.M. and Teixeira, A.A.C.: *The innovative behaviour of tourism firms*. Economics and Management Research Projects: An International Journal **1**(1), 25-35, 2011,

[4] Camisóna, C. and Monfort-Mirb, V.M.: *Measuring innovation in tourism from the schumpeterian and the dynamic-capabilities perspectives*.
Tourism Management **33**(4), 776-789, 2012,
http://dx.doi.org/10.1016/j.tourman.2011.08.012,

[5] Gomezelj Omerzel, D.: *Innovativeness in tourism: Model development*.
Procedia Economics and Finance **23**(4), 750-756, 2015,
http://dx.doi.org/10.1016/S2212-5671(15)00550-X,

[6] Jacob, M.; Tintoré, J.; Aguiló, E.; Bravo, A. and Mulet, J.: *Innovation in the tourism sector: results from a pilot study in the Balearic Islands.*
Tourism Economics **9**(3), 279-295, 2003,
http://dx.doi.org/10.1177/135481660300900303,

[7] Ostrom, A.L., et al.: *Moving forward and making a difference: Research priorities for the science of service*.
Journal of Service Research **13**(1), 4-36, 2010,
http://dx.doi.org/10.1177/1094670509357611,

[8] Tahayori, H. and Moharrer, M.: *E-Tourism: The Role of ICT In tourism industry, innovations and challenges.*
European Online Journal of Natural and Social Sciences **2**(3), 566-573, 2006,

[9] Sundbo, J.; Orfila-Sintes, F. and Sørensen, F.: *The innovative behaviour of tourism firms – Comparative studies of Denmark and Spain*.
Research Policy **36**(1), 88-106, 2007,
http://dx.doi.org/10.1016/j.respol.2006.08.004,

[10] Zhang, W.B.: *A multi-country trade and tourism with endogenous capital and knowledge.*
Business Systems Research Journal **8**(1), 71-91, 2017,
http://dx.doi.org/10.1515/bsrj-2017-0007,

[11] Fu, H.-W.: *Organizational learning and organizational innovation in the tourist hotels – an empirical study*.
EURASIA Journal of Mathematics Science and Technology Education **13**(9), 6347-6356, 2017,
http://dx.doi.org/10.12973/eurasia.2017.01069a,

[12] Eriksson, N.: *User experience of trip arrangements: A comparison of mobile device and computer users*.
International Journal of E-Services and Mobile Applications (IJESMA) **4**(2), 55-69, 2012,
http://dx.doi.org/10.4018/jesma.2012040104,

[13] Khan, O.O.; Ahsan, K. and Salam, A.: *Assistive technology for night blind tourist: A mobile application approach*.
International Journal of E-Services and Mobile Applications (IJESMA) **6**(4), 43-65, 2014,
http://dx.doi.org/10.4018/ijesma.2014100104,

[14] Sambhanthan, A. and Good, A.: *Critical success factors for positive user experience in hotel websites: Applying Herzberg's two factor theory for user experience modeling*.
International Journal of E-Services and Mobile Applications (IJESMA) **5**(1), 1-25, 2013,
http://dx.doi.org/10.4018/jesma.2013010101,

[15] Roblek, V.; Pejić Bach, M.; Meško, M. and Bertoncelj, A.: *The impact of social media to value added in knowledge-based industries.*
Kybernetes **42**(4), 554-568, 2013,
http://dx.doi.org/10.1108/K-01-2013-0014,

[16] Ribaric, R.: *Drivers of innovation in sustainable tourism development – the conept and case of Istria destination*.
In: Janković, S. and Smolčić Jurdana, D., eds.: *3rd International Scientific Conference Tourism in Southern and Eastern Europe (ToSEE)*. Faculty of Tourism and Hospitality Management, Opatija, 2015,

[17] Stanovčić, T.; Peković, S.; Vukčević, J. and Perović, D.: *Going entrepreneurial: Agro-tourism and rural development in northern Montenegro.*
Business Systems Research Journal **9**(1), 107-117, 2018,
http://dx.doi.org/10.2478/bsrj-2018-0009,

[18] Grissemann, U.S.; Pikkemaat, B. and Weger, C.: *Antecedents of innovation activities in tourism: An empirical investigation of the Alpine hospitality industry*.
Tourism **61**(1), 7-27, 2013,

[19] Ambrož, R. and Gomezelj Omerzel, D.: *Business model innovation in tourism: How to survive in highly competitive environments*.
Academica Turistica **10**(2), 175-183, 2017,
http://dx.doi.org/10.26493/2335-4194.10.175-183,

[20] Kallmuenzer, A. and Peters, M.: *Innovativeness and control mechanisms in tourism and hospitality family firms: A comparative study*.
International Journal of Hospitality Management **70**, 66-74, 2018,
http://dx.doi.org/10.1016/j.ijhm.2017.10.022,

[21] de la Peńa, M.R.; Núńez-Serrano, J.A.; Turrión, J. and Velázquez, F.J.: *Are innovations relevant for consumers in the hospitality industry?: A hedonic approach for Cuban hotels.*
Tourism Management **55**, 184-196, 2016,
http://dx.doi.org/10.1016/j.tourman.2016.02.009,

[22] Pikkemaat, B. and Peters, M.: *Towards the measurement of innovation – A pilot study in the small and medium sized hotel industry*.
Journal of Quality Assurance in Hospitality & Tourism **6**(3-4), 89-112, 2006,
http://dx.doi.org/10.1300/J162v06n03_06,

[23] Najda-Janoszkaa, M. and Kopera, S.: *Exploring barriers to innovation in tourism industry – the case of southern region of Poland.*
Procedia – Social and Behavioral Sciences **110**, 190-201, 2014,
http://dx.doi.org/10.1016/j.sbspro.2013.12.862,

[24] Chang, S.; Gong, Y. and Shum, C.: *Promoting innovation in hospitality companies through human resource management practices*.
International Journal of Hospitality Management **30**(4), 812-818, 2011,
http://dx.doi.org/10.1016/j.ijhm.2011.01.001,

[25] Hjalager, A-M.: *A review of innovation research in tourism*.
Tourism Management **31**(1), 1-12, 2010,
http://dx.doi.org/10.1016/j.tourman.2009.08.012,

[26] Weiermair, K.: *Product improvement or innovation: what is the key to success in tourism?*
https://www1.oecd.org/cfe/tourism/34267947.pdf,

[27] Divisekera, S. and Van K.Nguyen V.K.: *Determinants of innovation in tourism evidence from Australia*.
Tourism Management **67**, 157-167, 2018,
http://dx.doi.org/10.1016/j.tourman.2018.01.010,

[28] Tejada, P. and Moreno, P.: *Patterns of innovation in tourism 'small and medium-size enterprises'*.
The Service Industries Journal **33**(7-8), 749-758, 2013,
http://dx.doi.org/10.1080/02642069.2013.740469,

[29] Haufe, K.; Colomo-Palacios, R.; Dzombeta, S.; Brandis, K. and Stantchev, V.: *A process framework for information security management.*
International Journal of Information Systems and Project Management **4**(4), 27-47, 2016,
http://dx.doi.org/10.12821/ijispm040402,

[30] Law, R.; Buhalis, D. and Cobanoglu, C.: *Progress on information and communication technologies in hospitality and tourism.*
International Journal of Contemporary Hospitality Management **26**(5), 727-750, 2014,
http://dx.doi.org/10.1108/IJCHM-08-2013-0367,

[31] Januszewska, M.; Jaremen, D.E. and Nawrocka, E.: *The effects of the use of ICT by tourism enterprises*.
Szczecin University Scientific Journal **883**(2), 65-73, 2015,
http://dx.doi.org/10.18276/smt.2015.16-07,
[32] Bethapudi, A.: *The role of ICT in tourism industry*.
Journal of Applied Economics and Business **1**(4), 67-79, 2013,
[33] Mupfiga, P.S.: *Adoption of ICT in the tourism and hospitality sector in Zimbabwe*.
The International Journal of Engineering and Science **4**(12), 72-78, 2015,
[34] Morrar, R.: *Innovation in services: A literature review*.
Technology Innovation Management Review **4**(4), 6-14, 2014,
http://dx.doi.org/10.22215/timreview/780,
[35] Slivar, I.; Božić, S. and Batković, A.: *Innovation in tourism: Perception of tourism providers from Croatia and Serbia.*
Review of Innovation and Competitiveness **2**(4), 37-56, 2016,
[36] Aldebert, B.; Dang, R.J. and Longhi, C.: *Innovation in the tourism industry: The case of Tourism.*
Tourism Management **32**(5), 1204-1213, 2011,
http://dx.doi.org/10.1016/j.tourman.2010.08.010,
[37] Winer, B.J.: *A theory of enterpriseal readiness for change.*
Implementation Science **4**, No. 67, 2009,
http://dx.doi.org/10.1186/1748-5908-4-67,
[38] Yen, H.R.; Wang, W.; Wei, C-P; Hsuan-Yu Hsu, S. and Chiu, H.C.: *Service innovation readiness: Dimensions and performance outcome.*
Decision Support Systems **53**(4), 813-824, 2012,
http://dx.doi.org/10.1016/j.dss.2012.05.015,
[39] Ottenbacher, M.C. and Gnoth, J.: *How to develop successful hospitality innovation*.
Cornell Hospitality Quarterly **46**(2), 205-222, 2005,
http://dx.doi.org/10.1177/0010880404271097,
[40] Greenhalgh, T.; Robert, G.; Macfarlane, F.; Bate, P. and Kyriakidou, O.: *Diffusion of innovations in service enterprises: Systematic review and recommendations*.
The Milbank Quarterly **82**(4), 581-629, 2004,
http://dx.doi.org/10.1111/j.0887-378X.2004.00325.x,
[41] Martınez-Ros, E. and Orfila-Sintes, F.: *Innovation activity in the hotel industry*.
Technovation **29**, 632-641, 2009,
http://dx.doi.org/10.1016/j.technovation.2009.02.004,
[42] Hjalager, A-M.: *Repairing innovation defectiveness in tourism*.
Tourism Management **23**(5), 465-474, 2002,
http://dx.doi.org/10.1016/S0261-5177(02)00013-4,
[43] Cobanoglu, C.; Warde, B. and Moreo, P.J.: *A comparison of mail, fax and web-based survey methods*.
International Journal of Market Research **43**(4), 441-452, 2001,
http://dx.doi.org/10.1177/147078530104300401,
[44] Keegan, S.N. and Lucas, R.: *Hospitality to hostility: dealing with low response rates in postal surveys*.
International Journal of Hospitality Management **24**(2), 157-169, 2005,
http://dx.doi.org/10.1016/j.ijhm.2004.06.006,
[45] Paraskevas, A. and Buhalis, D.: *Outsourcing IT for small hotels: The opportunities and challenges of using application service providers*.
The Cornell Hotel and Restaurant Administration Quarterly **43**(2), 27-39, 2002,
http://dx.doi.org/10.1016/S0010-8804(02)80029-5.