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MEASURING BUSINESS PROCESS INNOVATIONS AMONG TOURISM ENTERPRISES IN THE CZECH REPUBLIC: A PLS-GLM APPROACH

Abstract. *The Czech Republic has experienced momentous tourism expansion in recent years. Nevertheless, there is a lack of empirical investigation about this development. Innovations are an essential factor for the sustainable development of the tourism industry in the Czech Republic. The paper expounds on the effect of technical and process innovations among the tour and travel companies in the Czech Republic. The study surveyed 96 travel and tour operators aged 18-40 working in the various small, medium, and large travel agencies to determine their perceptions towards innovation in their respective travel businesses. A two-phased statistical process that combined PLS-SEM and GLM examined the responses of the individuals. It revealed that technical innovation had a robust and positive relationship with corporate profitability. Process innovation remains a grey area for Czech travel businesses. The study builds upon the Process Innovations in Colombia's Tourist Enterprises or PICTE framework to induct critical insights for travel agencies and tour operators to provide these businesses a way forward and make them more competitive and sustainable. It has been observed that tourism businesses that were not early adopters of disruptive technologies became vulnerable to market mechanisms. Therefore, the relevance of this study is further accentuated. COVID-19 has accelerated the climate of VUCA (volatility, uncertainty, complexity, and ambiguity) among Czech tour and travel operators, many of whom winded up or downsized operations. Many of these firms were in the medium and small segments. In light of the present situation, it becomes imperative that travel service providers invest in modern technologies and ensure the same diffusion among the staff. The paper gave the strategies towards human resource mapping and digital transformations for the best interest of the tourism industry. Future studies are recommended to focus on longitudinal measures towards understanding innovation propensities among small and medium-sized businesses. Mixed method studies are encouraged to comprehend the corporate dynamics of change management.*

Keywords: business innovation, tourism business, organizational dynamics, sustainable development.

Introduction. Advancement is imperative for an organization's manageability in the present business condition (Ceylan, 2013). To be creative, firms need to embrace various kinds of development exercises relating to all parts of the association instead of a solitary advancement action (Damanpour, 1991; Ceylan, 2013). The majority of the research on enterprise development has focussed on selected areas, namely finance, assembling, and innovation. Investigations towards comprehending the dynamics of process innovation remain a grey area. Schumpeter and Nichol (1934) indicated that business development was

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studied through different perspectives like new ventures, new market capacities, and new market constructions. In this scenario, the need to study the degree of business development becomes vital to determine the company's future trajectory.

Similarly, exploiting the capacities of Web 2.0 technologies, few travel businesses developed creative and distinctive lines and lengths of products and services. It was a paradigm shift from the conventional service innovation and delivery systems since 2000, as observed by Cruz (2005). The improvement of the travel industry in various nations, particularly in creating value, has influenced their economies and social orders. Be that as it may, many face issues of efficiency, development, and undesirable degrees of seriousness. Subsequently, enhancement in the administration and business promotion of the organization could assist in the organization's growth potential.

Nonetheless, how much advancement impacts the consequences of organizations is still under scrutiny. There are a few investigations particularly completed in organizations delivering merchandise. It is observed that advancement has a positive association with organizational perspective (Jiménez and Sanz-Valle, 2011). Hjalager (2010) stated an incredible gap between the scholarly world and practice on this point. Recently there has been more enthusiasm for the improvement of studies concentrated on development in organizations in the travel industry segment, considering four sorts of advancement such as advancement in forms, item advancement, Innovation in the territory of advertising, and, at last, development coordinated to authoritative administration (Hjalager, 2010). Specifically, process development is a subject important to academic networks. In any case, the travel industry organizations are inverse difficulties of increment and productiveness, disregarding developing dynamism in the travel industry segment in different goals and nations. Hjalager (2002) underscored that organizational advancement is rising as a mainstream improvement arrangement. Therefore, the major aim of this paper is to investigate the influence of technical and process innovation on firm profitability.

The notion of innovation in contemporary literature is diverse. Various definitions are based on the objectives of the investigation undertaken per se. A theoretical contribution to the innovation theory has been derived from the following disciplines: business organization, management, tourism, and economics. Kanter, 1983 gave a more pronounced definition of the subject in tourism entrepreneurship. The researcher described the process innovation as solving any problem using novel ideas. It could be understood as a continuum through which new ideas are generated, accepted, and implemented in the particular tourism business.

Furthermore, the Oslo manual defined process innovation in the context of applied research as the introduction and implementation of novel and enhanced products, goods, and/or services through an upgraded technical process, a revamped marketing strategy, or a new corporate methodology. The study proposed to emulate, adapt and expand the predicting capacity of Zuniga-Collazos et al. (2018) developed linear regression model known as the “Process Innovations in Colombia's Tourist Enterprises” or PICTE framework (equation i):

$$Prx = \beta 0 + \beta 1 Tech - Inn + \beta 2 Proc - Inn + \varepsilon \quad (1)$$

where Prx = Profitability and $\beta 0$ = Constant.

The independent variables are InnProc1, Inn-Proc2. Inn-Proc1= Technical or Techno-Physical Innovation (Abernathy and Utterback, 1978), and Inn-Proc2 is Process innovation (Zuniga-Collazos et al., 2018) erratum.

Literature Review. Baaijens et al. (2000) conducted a pioneering study on the tourism industry in the Greek Island of Lesvos to gauge the impact of innovation on small and medium-sized tourism-related firms. The authors observed a positive and significant impact on the profitability of the selected firms when

a particular product or service was redefined. Crouch (1995) used a meta-analysis to detect a positive association between innovation deployment and international tourism demand by integrating 80 extant investigations. In the study, tourist originating, and reception regions manifested as factors of international tourism demand related to the level of innovation in the tourist destination. Bowen (2010) analysed 158 relationships between tourism business performance and innovations introduced at the firm level. 55 investigations were culminated to arrive at the above-given observation. Hjalager (2010) systematically reviewed topics in tourism business innovation from the previous 2 decades. The author articulated that research in the domain is still scarce. All empirical investigations in the knowledge corpus indicate an overall positive relationship between innovation implementation and significant profit outcomes for the tourism firms. Hjalager (2009) demonstrated that innovation could be measured among tourism firms using the Shumpeter (1934) model. This model comprises four determinants: processes, administrative, market, and process. Authors like Baglieri and Consoli (2009) studied corporate modernization in the tourism and travel industry, deploying the Rogers innovation dissemination model (IDM). In this framework, innovation is employed as a modification course for the tourism organization. The IDM also implies a revamp of the corporate system, such as adopting disruptive ERP systems or innovating software for its client delivery mechanism. From contemporary examinations conducted in the field, it is evident that substantial innovation drives the growth of a particular tourist destination. However, there is a need to scholastically pursue the effects of innovation in the tourism process at both the micro and macro levels (Zuniga-Collazos, 2018). The OECD provides for the narrates four levels to define the ambit of process innovations:

- innovations at the product level (new offerings generated by the business or attempts to improve existing offerings);
- innovations at the process level (radical changes made to the method of manufacture and circulation of products and services);
- innovations at the corporate level (implementation of changes at the administrative and managerial systems of the corporate and lastly,
- innovations at the marketing level (changes concentrated in the organization's marketing tactics like pricing, marketing communication, and sales strategizing).

Guisado-Gonzalez et al. (2014) observed that innovations in processes and products in the tourism and travel sector, given their attributes are independent. Research by Weiermair et al. (2004) purported that touristic corporations should rather shift their focus on process innovation to ensure sustainability and steady profit lines as innovation in the product may lead to imitation and subsequently decrease. That was corroborated by Damanpour and Gopalakrishnan (2001). In addition to the existing discourse, the rudimentary objective of process innovation is to cut down on expenses regardless of the demand situation (Fagerberg et al., 2004). Process innovations in tourism are important as «each player within the tourism sector should focus on improving the production of services to increase internal productivity and/or enhance consumer value». Mai et al. (2019) studied the effect of innovation on the long-term profitability of firms. It was observed that innovative firms have higher profits than the ones that are non-innovative. Canh et al. (2019) studied the relationship between process and product innovation on firms' profitability. Their study empirically observed that when process and product innovations are conducted at the organizational level, it leads to a persistent increase in profitability. Atalay et al. (2013) argued that every endeavour towards introducing process innovations among Turkish automotive supplier firms. A major objective of this study is to interrogate the effect of process innovation on organizational profitability. Therefore, the study hypothesis is as follows:

H1: process innovation has a positive effect on firm profitability.

Reports from the OECD and Eurostat defined the concept of technical innovations as the implementation of advanced technical interventions in product or process development by corporations. Such endeavours are reflected in the company's operating systems and marked by changes in its techno-

physical structure. The adoption of new technology could achieve this transformation at the corporate level. For example, this category includes switching to new software, operating system, physical capital (e.g., Hardware), efficient and appropriate Global Distribution System (GDS), New Distribution Capability (NDC), etc. Furthermore, technological innovation is divided into dimensions. Abernathy and Utterback (1978) identified that the first dimension distinguishes between process innovation and product/service innovation. According to Damanpour (1991), the second dimension categorizes the degree of uniqueness as «incremental» or «radical innovation». In this case, this study considers the role of incremental innovation, which could be related to the implementation, development, and adoption of novel technologies in processes and systems. The span of incremental innovation could range from the degree of automata deployed in business processes to reorganizing organizational control mechanisms like CRM, ERP extension, AI for SEO and SMM, and Machine Learning Algorithms for customer database mining. A study by Pencarelli et al. (2021) shows that innovation via technological tools is used to leverage product/service positioning and advanced technological solutions in travel agencies to facilitate customer interaction. However, tourists still use outmoded tools like paper-pen-catalogs throughout their product decision process. However, the situation is different with Czech tourists who choose their trip using the Internet (70%), and fewer customers use classic catalogs. Krcal (2014) studied the dynamics of technical innovation on profitability. Notably, a comprehensive model was developed to assess the impact of technical innovation on long-run corporate profitability. The study results indicate a positive association between technical innovation and firm profitability. Leiponen (2006) corroborated the stance that innovations in technical processes of the corporation drive profitability and help it to achieve its financial goals. Furthermore, Akinwale et al. (2017) studied the growth trajectories of Nigerian firms. They detect those innovations at the technical level, especially those dealing with R&D in manpower development and skilling, positively impact the firm's financial performance. The second key objective of this study is to comprehend the impact of technical innovation on profitability, which would be tested using the following assumption:

H2: technical innovation has a positive effect on firm profitability.

Methodology and research methods. Respondents were purposively chosen from travel and tour operators from across the country (members of the Association of Tour Operators and Travel Agents of the Czech Republic) between the ages of 18-40 and having at least attained their bachelor's degree (Dey et al., 2020a; Dey et al., 2020b). A total of 120 questionnaires were deployed online. In turn, 96 questionnaires were returned, thereby achieving a response rate of >50%. A GPower based a priori estimation of the sample size using 0.15 as f2 (medium effect size), power (1-β err prob) of 0.95, and α err prob of 0.05 reveals 89 to be the effective minimum sample size (Figure 1).

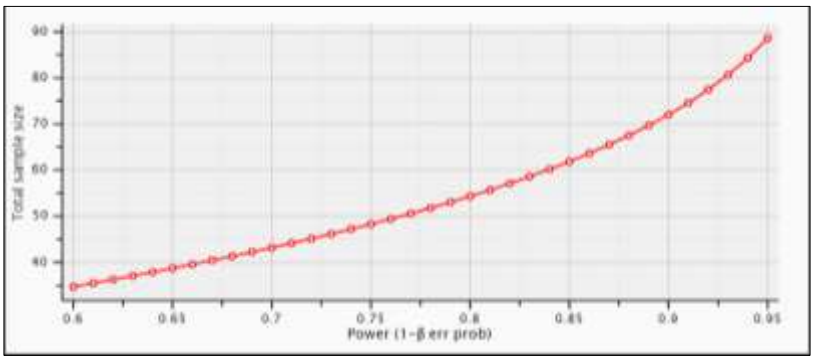

Figure 1. Sample size estimation

Sources: developed by the authors.

In tandem with Grice (2001) and Estabrook and Neale (2013), the study firstly conducted a PLS analysis of the postulations deploying a Structural Equation Model (Figure 2). Zuniga-Collazos et al. (2018) (equation i) truncated the framework into an SEM schema under guidelines laid by Hair et al. (2017) and Hair Jr. et al. (2017).

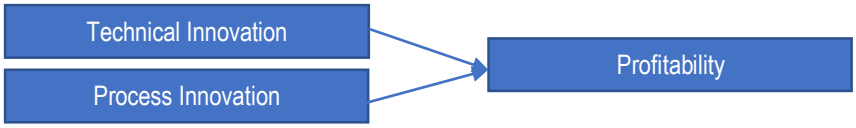

Figure 2. Adapted SEM

Sources: developed by the authors based on (Zuniga-Collazos et al., 2018).

This procedure serves two major purposes. Primarily, it assists the researchers in understanding the perception of the tour operators by measuring the psychometric components of the PLS-SEM model, which is essential in business research (Hair et al., 2014) and, in alignment with Huber et al. (2004), who advocate the use of latent scores extracted from the PLS regression output to conduct general linear modelling. A measurement instrument or the so-called questionnaire was built from existing scales, and the items were adapted to suit the context of the research as given in Table 1. Likert Scale with «high agreement» to «high disagreement» ranges (1-5) was installed in the questionnaire (Table 1).

Table 1. Measurement instrument

Construct	Items	Source
Technical Innovation	Technical innovation (TI) like captive mobile applications, api/xml integrations, a virtual reality enabled websites, chatbots, etc., could improve the implementation of new products and acquire new customers. TI optimizes the decision-making process TI improves the overall quality of tourism services TI reduces the working capital requirements of travel agency TI has the efficacy in incrementing profits	(Zheng et al., 2017)
Process Innovation	Process Innovations like automata, client live-support, digital hotel vouchers, paperless travel documents (QMR codes), etc. will help my travel agency in sustaining a competitive edge over our competitors PI will help my travel agency in expanding the existing market PI will catalyze growth in the short and medium term PI helps the travel agencies to be more creative and customer-oriented	(Cho and Linderman, 2020)
Profitability	My travel agency can serve its debts without raising additional debts My travel agency has no standing arrears in terms of salaries to employees or payment to vendors My travel agency can engage in capital investments (buying machinery, IT infrastructure, etc.) from its reserves My travel agency doesn't suffer from a working capital shortage	(Stavropoulos and Skuras, 2016) and (Morgan et al., 2009)

Sources: developed by the authors.

Therefore, in conjunction with precedents set by extant studies, the present study deployed a PLS-GLM procedure, first to reveal preceptory propensities among the respondents using PLS regression and test the hypothetical dimensions so formed. Second, to comprehend linear association among Process Innovation, Technical Innovation, and Profitability. The motivation to use the PLS-SEM method is that it

handles small sample sizes, and the non-normal distribution of data is not an issue (Hair et al., 2019; Streukens et al., 2017). Table 2 represents the demographic descriptions of the sample respondents.

Table 2. Descriptive of the respondents

Items	Category	Frequency	Ratio(%)
Gender	Male	46	47.91
	Female	50	52.09
Age	18-23	10	10.41
	24-29	29	30.20
	30-34	27	28.12
	35-39	20	20.83
	40+	10	10.41
Education	Master's or higher	32	19.80
	Graduate Degree	45	33.34
	High School	19	46.88

Sources: developed by the authors.

The generalized Linear Model is flexible with any type of exponential distribution type. The modelling technique allows for multiple variable types. It becomes comparatively easier to interpret the factors involved in the regression expression (GLM). Furthermore, unlike other linear regression procedures like OLS or CATS, GLM doesn't have any rigid assumptions (Pekar and Brabec, 2018). Figure 3 provides a snapshot of the process flow. For the PLS-SEM segment ADANCO version. 2.2 was used. The GLM procedure was coded into R Studio IDE version 1.2.5033, the package GLM by Simon et al. (2011) was utilized to test and validate the model.

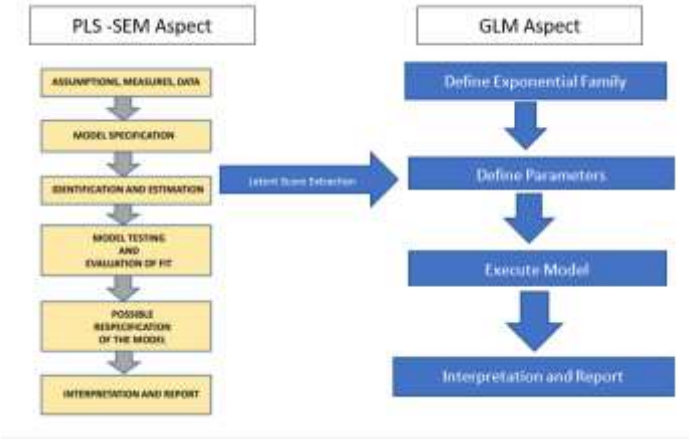

Figure 3. Dual process PLS-GLM

Sources: developed by the authors.

Results. Firstly, the construct reliability and convergent validity are established via the parameters provided in Table 3. Construct reliability indicated through Dijkstra-Henseler's rho, Jöreskog's rho, and Cronbach's alpha is observed to be within the accepted threshold (>0.7) as recommended by Hair et al. (2019). Convergent reliability indicated by the AVE values is noted to be admissible (>0.5) as noted by (Farrell, 2010).

Table 3. Construct reliability

Construct	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_c)	Cronbach's alpha(α)	Average variance extracted (AVE)
Technical Innovation	0.7874	0.7500	0.7554	0.5792
Profitability	0.7377	0.7919	0.7731	0.5008
Process Innovation	0.8112	0.8384	0.7759	0.5751

Sources: developed by the authors.

Table 4 displays the indicator loadings of the items considered for the study. It is evident from the values being reported (>0.5) that all items have robustly loaded to their corresponding variables (Hair et al., 2019).

Table 4. Individual item loadings

Indicator	Technical Innovation	Profitability	Process Innovation
TI1	0.7707		
TI2	0.6566		
TI3	0.5998		
TI4	0.7486		
TI5	0.7757		
PI1			0.5849
PI2			0.7616
PI3			0.8336
PI4			0.8891
PROF1		0.6260	
PROF2		0.7724	
PROF3		0.8542	
PROF4		0.7038	

Sources: developed by the authors.

Table 5 explicates the effect sizes for the hypothetical pathways formulated to study the implication of process innovation and technical innovation on profitability. From the readings, it could be assumed that the technical effect has a robust medium impact (0.25) on profitability in the context of the study's tour and travel operators.

Table 5. Effect size

Effect	Beta	Indirect effects	Total effect	Cohen's f^2
Technical Innovation -> Profitability	0.4476		0.4476	0.2563
Process Innovation -> Profitability	0.1665		0.1665	0.0354

Sources: developed by the authors.

Table 6 represents the VIF or variance inflation factor used to identify any multicollinearity issue in the data. It may be adjudged that all the values presented herewith are below the critical threshold of 3 (< 3), signifying the dataset to be free of any multicollinearity issue (Hair et al., 2019).

Table 6. Variance inflation factor

Indicator	Technical Innovation	Profitability	Process Innovation
TI1	1.4141		
TI2	1.3399		
TI3	2.5331		

Continued Table 6

TI4	2.3157		
TI5	1.0663		
PI1			1.2881
PI2			1.6389
PI3			1.5850
PI4			2.0543
PROF1		1.1523	
PROF2		1.3648	
PROF3		1.6286	
PROF4		1.4350	

Sources: developed by the authors.

Post the evaluation of the structural and outer model. It is revealed that the study can further proceed to test the hypotheses formulated empirically. Therefore, the following section reports the bootstrapping procedure and discusses the implications of the observed outcomes.

Table 7. Standard bootstrap results

Hypothetical Effect	Original coefficient	Standard bootstrap results				
		Mean value	Standard error	t-value	p-value (2-sided)	p-value (1-sided)
Technical Innovation -> Profitability	0.4476	0.5078	0.1088	4.1150	0.0000	0.0000
Process Innovation -> Profitability	0.1665	0.1882	0.1267	1.3136	0.1893	0.0946

Sources: developed by the authors.

As per Table 7 given above, the first hypothetical assumption that technical innovation has a positive effect on profitability is proved with a β of 0.4476 and a t-value of 4.115 corresponding to a p-value significant at 0.0000. It corroborates with studies done by Krcal (2014) and Akinwale et al. (2017), who explicated the positive relationship between technical innovation and firm profitability. The empirical finding from this study also reflects the observation of Mai et al. (2019), who have predicted the long-term positive effect of engaging in technical innovation on corporate profitability. The second hypothetical dimension of the study is not empirically supported. With a β of 0.1665, a t-value of 1.3136, which corresponds to an insignificant p-value of 0.0946, the supposition that process innovation positively affects firm profitability is rejected. This result is in contravention with existing studies like Mai et al. (2019), Canh et al. (2019), and Atalay et al. (2013). The findings corroborate with Baer and Frese (2003) to some extent. The researchers contend that process innovation is not the only vehicle for sustaining firms' long-term profitability. In their study of 47 mid-sized German companies, the authors have highlighted that other factor like «climates for initiative and psychological safety» have a higher capacity to predict firm profitability. For the subsequent GLM treatment of the PICTE model, latent construct scores for the two independent variables (technical and process innovation) and one response variable (profitability) were extracted from the PLS regression output and were plugged in the GLM model. In conjunction with (Pekar and Brabec, 2018), the dataset was coerced into the gaussian distribution with «identity» as a base to conduct the GLM procedure. The entire execution has been done on R programming software using GLM package (Simon et al., 2011). Table 8 records the readings from the GLM procedure using Gaussian family distribution using identity as a base. It could be assessed that the GLM regression agrees with the PLS-

SEM findings that Technical Innovation (t-value: 4.831 with significant p-value at 0.05) is positively correlated with Profitability, thereby incrementing the generalizability of the results.

Table 8. GLM report

Component	Estimate	$\sigma_{\bar{x}}$	t-value	Pr(>|t|)	C.I (2.5%)	C.I (97.5%)
Intercept	0.53727	0.22840	2.352	0.0208 *	0.08961645	0.9849287
Technical Innovation	0.54205	0.11220	4.831	5.47e-06 ***	0.32213785	0.7619575
Process Innovation	0.12983	0.07397	1.755	0.0826	-0.01514571	0.2748096

Significance codes: 0 '***'; 0.001 '**'; 0.01 '*'; or 0.05 '.' 0.1 ' ' 1

Null deviance: 49.535 on 93 d.f; Residual deviance: 36.534 on 91 d.f; Dispersion parameter for gaussian family taken to be 0.4014717; AIC: 185.93

Sources: developed by the authors.

Figure 4 shows that technical innovation (Tech1) has a more significant impact on profitability (Proft). Besides, it has an estimated capacity of >50% towards ascertaining profitability.

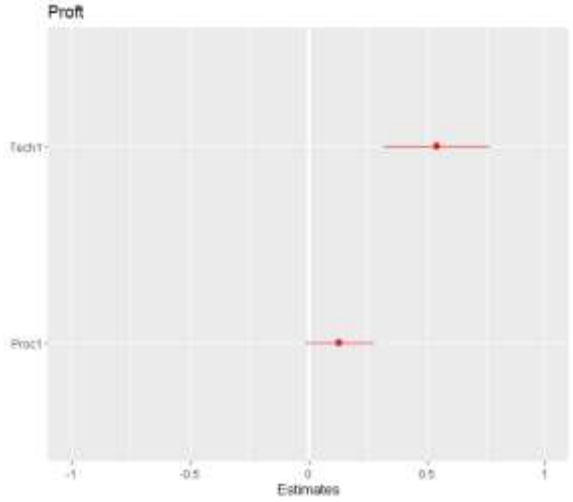

Figure 4. GLM estimation plot

Sources: developed by the authors.

Conclusions. The Czech tourism industry consists of larger multinational corporations like Student agency, BCD travels, Collete Travel Group and native Czech firms like the Fischer group or CEDOK engaged in multiple verticals like inbound, outbound, group MICE tourism solutions. Larger entities in the market established in the more advanced economies like the UK, Canada, and Germany have the leverage of expanding their innovation scope through institutional channels like consultants. Still, the same is not true for domestic Czech travel agencies. To consolidate the traditional markets from China and Russia and explore new markets from the GCC, ASEAN, and SAARC regions, small, medium, and micro travel agencies in the Czech Republic should deliberate strategies towards establishing innovation as a culture at the corporate and unit level. Since process innovation has taken a backseat among Czech tour and travel business as revealed through this investigation. The authors proposed that human resource programming and enterprise resource planning are major elements in innovation design, which Czech travel agencies must converge. Transition into the e-commerce dimension, which was once a luxury, has now become a new normal, especially due to the growth of generation y and z customers. Service delivery

is more on hits and clicks rather than the usual bricks and mortar. Therefore, innovations in the 3 Ps are vital for the growth of Czech Travel Agencies: Products, Processes, and People. Furthermore, the study proposes conducting studies using pooled data from multiple countries and implementing certain experimental designs to capture employee perception significantly.

Author Contributions: conceptualization, Z V. and S. D.; methodology, S. D.; software, S. D.; validation, S. D., Z. T. and Z. V.; formal analysis, S. D.; investigation, S. D; resources, Z. T.; data curation, Z. T.; writing-original draft preparation, S. D; writing-review and editing, Z. T and Z. V; visualization, S. D.; supervision, Z. T.; project administration, Z. V; funding acquisition, Z. T.

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Оцінювання інноваційності бізнес-процесів туристичних підприємств Чеської Республіки: PLS-GLM моделювання

У статті авторами відмічено, що інновації провокують стрімкий розвиток туристичного сектору забезпечуючи дотримання основних принципів сталого розвитку. Узагальнення результатів теоретичного аналізу засвідчили, що наявні наукові напрацювання з означеної проблематики неповною мірою враховують вплив інновацій на сталий розвиток туристичного сектору. З огляд на це, метою статті є оцінювання впливу технічних та технологічних інновацій на діяльність туристичних компаній, на прикладі Чеської Республіки. Детерміновану вибірку даних сформовано на основі результатів опитування 96 туроператорів віком від 18 до 40 років, які працюють у малих, середніх та великих туристичних агенціях. У ході опитування визначено ставлення респондентів до впровадження інновацій у туристичному секторі. Емпіричне дослідження проведено з використанням двоетапної методики опрацювання статистичних даних, яка передбачає застосування інструментарію PLS-SEM та GLM-моделювання. Отримані результати засвідчили, що технічні інновації мають тісний та прямий зв'язок із прибутковістю компанії, а також є сірою зоною у туристичному бізнесі Чеської Республіки. З метою

визначення перспективних напрямів підвищення конкурентоспроможності туристичних агенцій Чеської Республіки здійснено критичний аналіз систем впровадження технологічних інновацій на туристичних підприємствах Колумбії (PICTE). У ході дослідження встановлено, що туристичні підприємства, які не впроваджують технологічні інновації є більш чутливими до змін ринкового середовища. Авторами зазначено, що COVID-19 прискорив розвиток VUCA-середовища (нестабільність, невизначеність, складність та неоднозначність) у туристичному секторі Чеської Республіки. Низка туристичних компаній (переважно середні або малі) скоротили або зупинили свою діяльність. Перед туристичним сектором постає необхідність не лише інвестувати у сучасні технології, але й забезпечувати розвиток компетенцій персоналу компаній. У статті представлено стратегії картографування людських ресурсів та цифрових трансформацій для розвитку туристичного сектору. Враховуючи отримані результати, подальші дослідження мають бути спрямовані на аналіз схильності малих та середніх компаній до впровадження інновацій.

Ключові слова: бізнес-інновації, туристичний бізнес, динаміка організації, сталий розвиток.