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PERCEPTION OF THE NECESSITY OF DIGITAL INNOVATIONS APPLICATION AS AN ELEMENT OF HEALTH PROTECTION AND SUSTAINABLE HOSPITALITY SECTOR FUTURE

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Abstract: Hospitality, which suffered a huge blow during the Covid-19 period and had to adapt its operation to pandemic measures, heads for its recovery. Innovation is one of the ways to get out of an unfavourable situation having in mind that health risks can represent a significant factor affecting participation in tourism. The paper specifies the perception of the necessity of digital innovations application as health protection factor and sustainable mean of hospitality sector development. It shows how of tourism participant in domestic condition of Slovak republic perceive the need of their application to hospitality services. Through the questionnaire method it examined opinion of domestic visitors in hospitality and its direction towards the digitization of services in this sphere, and subsequently tested by Mann-Whitney and Kruskall-Wallis tests. The results show that Slovak tourists treat digital innovation in hospitality services as the ones, that are a necessary part of tourism services portfolio. Their specifics can also be defined in terms of health protection. They can act as an element of health protection by eliminating contact among individual tourism participants. At the same time, they also perceive them as a means that tends to keep the hospitality industry alive even in the post-pandemic period.

Key words: Digital innovations, digital hospitality, sustainable hospitality, health protection, hospitality recovery

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INTRODUCTION TO DIGITAL TOURISM CONCEPTS

We know that digital technologies affect every aspect of our lives. The wave of industrial digitalization is also transforming the behaviour, values and demands of consumers, making them the primary stakeholder and forcing companies to adopt digital technologies into everyday usability (Šambronská et al., 2017). Digital technology is increasingly important in achieving business goals, and its pervasive effects have resulted in the radical restructuring of entire industries. Consequently, managers' extensive interest in handling digital innovation is not surprising. A lot of research has shown how digital technologies create a huge potential for product and service innovation that is difficult to control and predict. Therefore, firms need dynamic tools to support themselves in managing the new types of digital innovation processes that emerge. The nature of these processes forces firms to challenge prior assumptions about their product and service portfolio, their digital environment, and ways of organizing innovation work.

As stated by many authors such as: Papagiannidis and Davlembayeva (2021), Van et al. (2020), users, who have already experienced tourism through some digital technologies will always look for the same level, or more, of the experience with functional and emotional values, compared to traditional tourism consumers. Currently, many studies provide insight into the perceptions and use of digital technologies in the tourism industry from different points of view. Also, the author's teams Lu et al. (2021) found that consumers strongly agree with prioritizing digital technology in both tourism and other industries and are willing to use it even after the pandemic because it is perceived as a new form of health protection. This was likewise to aim of this study. According to Deb and Ahmed (2022), numerous studies on the impacts of epidemics on the tourism and hospitality found that tourists usually took a long time to be comfortable with the post-crisis period, and they usually go through a series of mental stages to avoid their potential health crisis and to revisit destinations. This study aims to find out how the participants of domestic tourism in the conditions of the Slovak

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Republic perceive the use of digital innovations in the domestic hospitality sphere. It analyses the perception of their importance by domestic tourism participants as an element of health protection and sustainable growth. The study thus fills a gap in the market, due to the lack of research on this issue in Slovak conditions so far.

Importance of digital innovations in tourism

Innovation is not only related to new ideas or research and development, but also refers to the successful utilization and commercialization of novel ideas (Charter et al., 2017). In the tourism industry, innovations are significant to enhance efficiency, improve productivity, and increase customers' loyalty (Bilgihan and Nejad, 2015). The adoption of digital technologies is also driven by the growing interest and preferences of tourists, they are a means of maintaining the health and safety of tourists and local communities (Nylen and Holmstrom, 2014; Dick-Forde et al., 2020; Fennell, 2021).

Innovation, through digital technologies, is useful to allow tourism firms to face the social constraints imposed by the pandemic while respecting the social aspect of sustainable development (Bauer et al., 2008; Saseanu et al., 2020). Sustainable tourism takes full account of the current and future economic, social and environmental impacts, while meeting the needs for both visitors and hosts while improving opportunities for future generations (Šenková et al., 2020).

Communication, mobile technologies (connected rooms, robotic room services and contactless hosting, social media, drone tourism, geospatial technologies, e-shop, etc.) may provide benefits for the tourism industries in terms of robust for health-safety and sanitary measures (Caballini et al., 2021; Mondal et al., 2021; Srivastava et al., 2021), by limiting social interaction between visitors and local population by avoiding congested areas or even minimizing massive international tourism (Streimikiene and Korneeva, 2020). Beyond the health crisis, digital technologies open the doors for sustainable business model innovations that focus on providing services that allow tourists with disabilities and the elderly to overcome the physical and space difficulties while staying at home and hiring local guides to provide real-time, interactive, and personalized tours (Kwok and Koh, 2021). This results in tourism that is more equitable. It respects the need of the different categories of tourist. Digital products and services must not only be efficient to use and easy to learn, but also provide a rich user experience. Firms must remain in phase with the technological advances in their industries to be always up to date to ensure their survival and strengthen their position within their environment (Lu et al., 2021).

Theoretical Background

The necessity of directing the hospitality sphere towards the digital future

The tourism sector is undergoing an accelerated digital transformation, augmented by the pandemic, and tourists must adapt to this new environment. Olechowski (2020) points to the facts that the tourism and hospitality industry has been at the forefront of digital and continues to be transformed by brand new technologies in virtually every aspect of operations. Considering the fact that tourism is based on cooperation between a wide range of services and products, the benefits of the digital revolution in this industry are quite obvious (Zsarnoczky, 2018). There are many options for digitalisation in the tourism sector and their success depends on the grade of tourist satisfaction (Galán et al., 2022).

The rapid growth of technology has digitally empowered tourists through the proliferation of smartphones and mobile digital devices (Buhalis and Sinarta, 2019), fostered gratification (Zollo et al., 2022) and has also increased tourists' access to information (Kotoua and Ilkan, 2017). Digital technology not only changes the strategy and structure of the firm, but also affects partners, customers, and more generally the firm's ecosystem network (Chamboko-Mpotaringa et al., 2023; Zhao et al., 2023). Lall et al. (2017) highlighted the weak ability of SMEs to make the right strategic technology investment decisions because they focus more on day-to-day operations and omit the long-term vision (Marcon et al., 2019; Le-Dain et al., 2023). This is a management barrier when the time spent on strategic vision planning is insufficient. Digitization offers many new opportunities that can be exploited by providers in the tourism industry (Bireswar et al., 2022).

At the same time, competition is being intensified and companies have to keep pace with digitization in order to remain on the same level. Without any question, "digitization can be viewed as the motor of transformation for the tourism industry in the age of the internet economy (Werthner et al., 2015). In the age of the global Internet, wide informatization of services, and digitization of economy, the tourism and hospitality industry changes quickly (Elkhwesky et al., 2022). Digitization offers promising potential in the tourism industry regarding both the supplier and customer perspective. Therefrom, all business processes before, during and after a journey are affected.

These processes include the application and preparation of travel offers, the digital implementation, post-processing or customer recovery (Ighalo, 2014). Digitization can be defined according to different levels of intensity: from the pure presentation and information (website), the sales channel function (e-commerce), business process integration (E-Business) to new business models with virtual products or services (Breier et al., 2021; Song, 2022). The H&T firms need to advance their digital capacities and skills by accelerating a large-scale use of accessible and inexpensive technologies (e.g., social media, e-commerce platforms, and smartphone applications) and then invest in more sophisticated technologies (e.g. robots, big data, AI, and VR) to achieve a high level of digital transformation (Elkhwesky et al., 2022).

Managers of the H &T firms must adopt a transformational leadership style (Elkhwesky et al., 2022) to evolve employee skills through the adoption of digital technologies while developing a shared long-term vision that integrates responsible tourism principles. The applications of digital technologies in the hotel sphere for the purpose of improving the system of services' quality, reducing the service time, increasing the competitiveness of hotel companies, and reducing the costs of servicing the consumers. Digital application will help to reduce the time requires for search for applicants, perform the initial analysis of the applicants' data, skills, and experience, and improving the organization's electronic document turnover (Kolobkova et al., 2021).

The perception of COVID-19 varies from organization to organization (Bangwal et al., 2022; Mirčetić and Mihić, 2022; Araujo-Cabrera et al., 2021). Researchers propose global strategies to reduce the consequences of COVID-19 for the hotel business (Casais and Ferreira, 2023; Bangwal et al., 2022; Wu et al., 2021).

On the other hand, organizations develop contingency plans and strategies to keep their operations running (Salem et al., 2021; Abuelhassan and AlGassim, 2022). During the pandemic, consumers developed an appetite for contactless services (Almeida et al., 2023), which led large hotel chains to implement various technologies to ensure health safety and attract tourists to a safe environment (Lin and Mattila, 2021; Fang and Partovi, 2022; Awada et al., 2022).

According to the studied studies, digital technologies for the development of tourism are mainly expected to create innovations for consumers that support sustainable competitive advantage for organizations from the point of view of suppliers as well as the sustainability of buildings within the framework of smart tourism (Bangwal et al., 2022; Awada et al., 2022; Abuelhassan and AlGassim, 2022). Digital transformations lead to the development of increasingly sophisticated electronic devices, which from a technological point of view seek to improve the user experience in tourism (Wang et al., 2023). This phenomenon of digital transformation has led to the development of increasingly sophisticated electronic devices, which in technological terms seek to improve the user experience and, in the tourism, context allow providing a better experience to tourists during their visit. In this sense, mobile technology has taken special connotation in recent years and has become an important channel for contracting tourism products and services (Félix et al., 2020).

Most studies focus on the consumer's adoption of innovations, but in many cases encounter resistance to the adoption of innovations due to the lack of time to learn how to use the new one (Wolverton and Cenfetelli, 2020). Current studies on active resistance to innovation mainly focus on investigating the relationship between consumers' perceived barriers to using innovations and consumer resistance, such as refusal and postponement of use (Lu et al., 2021). Several authors have conducted research on consumer resistance to innovation and artificial intelligence, which have great practical and theoretical implications, especially in the context of hospitality (Huang et al., 2021; Demir et al., 2023). Previous research has sought to understand consumer responses to digital innovation applications in terms of attitudes (e.g. Lin and Mattila, 2021), trust (Tussyadiah et al., 2020), experiences (Calero-Sanz et al., 2022; Huang et al., 2021), satisfaction (Seo, 2022; Lojano Chapa, 2023) and intention to use (Lee et al., 2021).

Based on the statements from several scientific studies about the perception of digital technologies, as an important tool for the health protection of tourism participants (even in the post-pandemic period), the purpose of this study was to find out the answers in Slovak conditions to the following research questions (RQ1-RQ5):

RQ1: Do domestic tourism participants using the services of the Slovak hospitality perceive digital tools as an important means of technological innovation?

RQ2: Do domestic tourism participants using the services of the Slovak hospitality perceive modern digital tools as a means of progressing towards a sustainable hospitality?

RQ3: Do domestic tourism participants using Slovak hospitality perceive modern digital tools as a means of increasing the safety of tourism participants in hospitality services?

RQ4: Do domestic tourism participants using Slovak hospitality perceive modern digital tools as a means of protecting the health of tourism participants in hospitality services?

RQ5: Do domestic tourism participants using Slovak hospitality perceive modern digital tools as a means of reducing the risk of infection/disease transmission among tourism participants in hospitality services?

All research questions were aimed at domestic tourism participants in Slovakia, who use and intend to use the services of domestic hospitality establishments.

MATERIALS AND METHODS

Methods

The aim of the paper is to specify the perception of the necessity of digital tools application as health protection factor and sustainable mean of hospitality sector development and growth. The main aim of the research was to set the profile of tourism participant using hospitality services in domestic condition of Slovak republic and its direction towards the digitization of services in this sphere. For the purpose of the research as well as for this study, several research methods were used:

- Scientific abstraction- oriented the abstraction of resources with a focus on digital innovations in tourism and digital hospitality in the context of its sustainability and health protection.
- questionnaire – oriented to identification of perception of the necessity of digital tools application as health protection factor and sustainable mean of hospitality sector development. Research sample consisted of tourism participants consuming the services of hospitality sector and willing to consume them in the future in domestic tourism in the territory of Slovak republic. In total 553 respondents participated in the research.
- Mann-Whitney U-test- verification of set hypothesis concerning the age.
- Kruskal-Wallis test ANNOVA- verification of the hypothesis concerning differences between age generations, education and status.

Questionnaire method was used as a primary data collection, in order to fulfil the research objective. The research sample was founded on purposive sampling. All the respondents had to fulfil the precondition of consuming hospitality services as well as that they are willing to consume them in the future and they know and are clearly familiar with the available modern digital innovations in the hospitality industry. The questionnaire was created in two versions. The first version was created in MS Forms. This online filling method has been expanded through email addresses and social networks (62%). The second group of respondents was approached to participate in the questionnaire in the form of a

personal meeting (38%). This group filled out the questionnaire in its printed version. Each of them was subsequently processed into digital form. Respondents were approached to participate in the research in the months of October to December in 2022. A total of 700 respondents were approached, of which 553 respondents were willing to fill out the questionnaire and provide correct data in domestic, Slovak conditions. Respondents were asked to answer to 20 questions of which 5 were used for the purpose of this study. All the question were based on 5-points Likert scale (disagree, rather disagree, neither agree nor disagree, rather agree, agree). As the variables, age, gender, education level and current status (employed, unemployed, student) were set. Based on them, 4 hypotheses were tested.

H1: We assume that there are statistically significant differences in the perception of digital technology as a means of health protection and sustainability of hospitality services with regard to the gender of the respondents.

H2: We assume that there are statistically significant differences in the perception of digital technology as a means of health protection and sustainability of hospitality services with regard to the age of the respondents, i.e. between generation X, Y and Z.

H3: We assume that there are statistically significant differences in the perception of digital technology as a means of health protection and sustainability of hospitality services with regard to the level of education of the respondents.

H4: We assume that there are statistically significant differences in the perception of digital technology as a means of health protection and sustainability of hospitality services with regard to the status of the respondents.

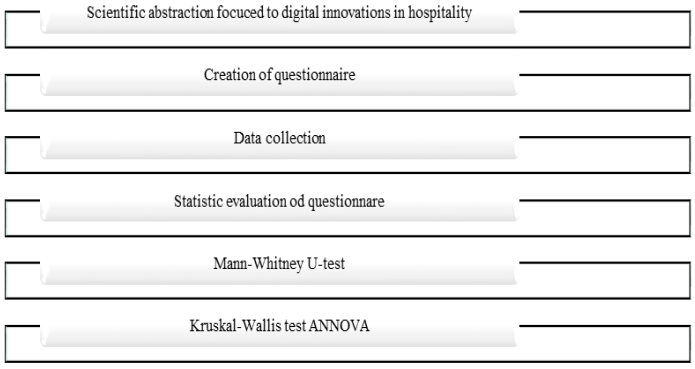

Figure 1. Metodology steps scheme

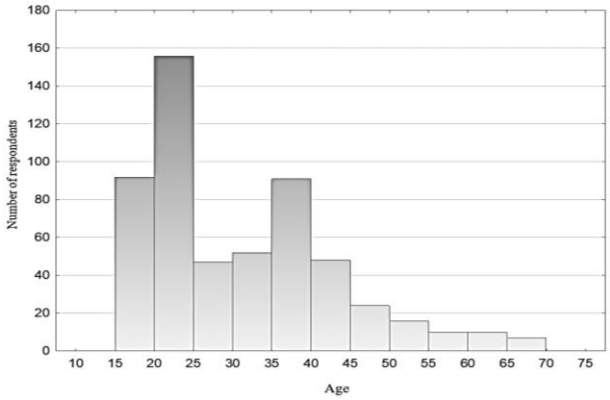

Figure 2. Histogram of the relative frequency of respondents in individual age categories

Data

The questionnaire research was performed at the sample of 553 respondents (n=553). In total 700 respondents were addressed, but only 553 questionnaires were valid for further evaluation. Women dominated in the sample (66.73%). The youngest respondent was in the age of 18 years and the oldest one was 69 years old (Figure 2, histogram).

Table 1 Research questions formulation

RQ	***Research question formulation***
RQ1	Are digital innovations an innovative mean of hospitality services?
RQ2	Are digital innovations a mean of sustainable development of hospitality in the future?
RQ3	Do digital innovations increase the safety of tourism participants in hospitality services?
RQ4	Are digital innovations a mean of health protection of tourism participants in hospitality services?
RQ5	Do the digital innovations reduce the risk of disease transmission among participants in tourism and hospitality services?

Table 2. Respondents structure according to the age of respondents

	N	**Average age**	**Median age**	**Min**	**Max.**	**Standard deviation**
Women	369 (66.73 %)	30.0000	25	18	69	11.7269
Men	184 (33.27 %)	35.0815	37	18	66	11.6895
Total	553 (100%)	31.6908	29	18	69	11.9468

RESULTS AND DISCUSSION

Table 3 shows the descriptive statistics of the answers to five question and their results. In general, it is possible to conclude that the results of all five questions had at the end comparable results (Table 3). The perception of Slovak tourism participants consuming hospitality services is very positive towards to digital innovation in general and as well as a health protection and sustainable development and growth factor. In the case of the first question, the respondents agreed that digital technologies are an innovative means of hospitality services.

Comparing to the first question the average values is lower. In case of the second question, the respondents perceive the digital innovations as a mean of sustainable development and growth of the hospitality in the future. According to the results of the third question, Slovak respondents think, that digital innovations increase the safety of tourism participants in hospitality services. Results of the fourth and five questions show the almost same values. Respondents think that digital innovations can be perceived as a mean of health protection of tourism participants in hospitality services as well as that they are able to reduce the risk of disease transmission among participants in tourism and hospitality services. Table 4 and 5 show the obtained values according to the respondents´ gender.

Table 3. Descriptive statistics: perception of the importance of applying digital elements in hospitality- all respondents (Source: authors´ processing based on data obtained in 2022)

	Average	Median	Mode	Mode frequency	Min	Max	Lower quartile	Upper quartile	Standard deviation
RQ1	4.1790	4	4	290	1	5	4	5	0.7533
RQ2	3.7993	4	4	264	1	5	3	4	0.8626
RQ3	3.6239	4	4	230	1	5	3	4	0.9087
RQ4	3.8156	4	4	244	1	5	3	4	0.9298
RQ5	3.9964	4	4	245	1	5	4	5	0.9089

Table 4. Descriptive statistics: perception of the importance of applying digital elements in hospitality- women (Source: authors´ processing based on data obtained in 2022)

	Average	Median	Mode	Mode frequency	Min	Max	Lower quartile	Upper quartile	Standard deviation
RQ1	4.1978	4	4	201	2	5	4	5	0.7005
RQ2	3.8347	4	4	190	1	5	3	4	0.8091
RQ3	3.6341	4	4	157	1	5	3	4	0.8431
RQ4	3.8482	4	4	168	1	5	3	4	0.8900
RQ5	4.0407	4	4	176	1	5	4	5	0.8444

Table 5. Descriptive statistics: perception of the importance of applying digital elements in hospitality- men (Source: authors´ processing based on data obtained in 2022)

	Average	Median	Mode	Mode frequency	Min	Max	Lower quartile	Upper quartile	Standard deviation
RQ1	4.1413	4	4	89	1	5	4	5	0.8503
RQ2	3.7283	4	4	74	1	5	3	4	0.9593
RQ3	3.6033	4	4	73	1	5	3	4	1.0297
RQ4	3.7500	4	4	76	1	5	3	4	1.0041
RQ5	3.9076	4	4	69	1	5	3	5	1.0228

Table 6. Evaluation of obtained results Q1-Q5 (Source: authors´ processing based on data obtained in 2022)

RQ1 Digital innovations are an innovative means of hospitality services				
Question 1	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
disagree	4	4	0.72%	0.72%
rather disagree	12	16	2.17%	2.89%
neither agree nor disagree	56	72	10.13%	13.02%
rather agree	290	362	52.44%	65.46%
agree	191	553	34.54%	100%
RQ2 Digital innovations are a means of sustainable development of tourism in the future				
Question 2	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
disagree	9	9	1.63%	1.63%
rather disagree	24	33	4.34%	5.97%
neither agree nor disagree	146	179	26.40%	32.37%
rather agree	264	443	47.74%	80.11%
agree	110	553	19.89%	100%
RQ3 Digital innovations increase the safety of tourism participants in hospitality services				
Question 3	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
disagree	14	14	2.53%	2.53%
rather disagree	33	47	5.97%	8.50%
neither agree nor disagree	188	235	34.00%	42.50%
rather agree	230	465	41.59%	84.09%
agree	88	553	15.91%	100%
RQ4 Digital innovations are a means of protecting the health of tourism participants in hospitality services				
Question 4	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
disagree	14	14	2.53%	2.53%
rather disagree	25	39	4.52%	7.05%
neither agree nor disagree	140	179	25.32%	32.37%
rather agree	244	423	44.12%	76.49%
agree	130	553	23.51%	100%
RQ5 Digital innovations reduce the risk of disease transmission between participants in tourism and hospitality services				
Question 5	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
disagree	8	8	1.45%	1.45%
rather disagree	28	36	5.06%	6.51%
neither agree nor disagree	97	133	17.54%	24.05%
rather agree	245	378	44.30%	68.35%
agree	175	553	31.65%	100%

From the results in Table 6, it can be judged that the lowest level of disagreement was recorded for RQ1, where the respondents perceive digital innovations as an innovative means of hospitality services. On the contrary, the highest rate of disagreement at the level of 2.53% was recorded for RQ3 and RQ4. However, the final value is low. Disagreement level was comparable in the case of RQ2 (1.63%) and RQ5 (1.45%). The highest level of agreement was recorded again for RQ1 (34.54%). RQ5 had the second highest level of agreement (31.65%). The lowest one was observed in RQ3- the safety of tourism participants in hospitality services (15.91%). In all five question the respondents agreed in the most frequently chosen evaluation at a value of 4 (Likert scale-agree). The most recorded agreeable opinions were in the case of RQ3, that is, the respondents perceive digital innovations as a means of sustainable development of tourism in the future (47.74%) and safety tool of tourism participants in hospitality services (41.59%). After the evaluation of the individual questions, the established hypotheses were verified by following the selected variables. Among the four variables were: the gender of the respondents, the age of the respondents, the level of education of the respondents as well as their current economic status.

Hypothesis 1: We assume that there are statistically significant differences in the perception of digital innovations as a mean of health protection and sustainability of hospitality services with regard to the gender of the respondents.

To verify the established hypothesis 1, the Mann-Whitney U test was used, the results of which are shown in Table 9. The results of the Mann-Whitney U-test showed that there is *no statistically significant difference in the perception of the importance of applying digital innovations to hospitality services between men and women.* Hypothesis 1 is thus rejected.

Table 7. Mann–Whitney U test (Source: authors´ processing in statistical program Statistica)

Dependent variable Identified factors		Independent variable: Gender		Marked tests are significant at the level p <0.050				
		Valid N	Rank Sum Group	U	Z	p-value	Z Adj.	p-value
RQ1-RQ5	Women	369	103715.5	32445.50	0.8484	0.3962	0.8484	0.3962
	Men	184	49465.50					

Hypothesis 2: We assume that there are statistically significant differences in the perception of digital innovations as a mean of health protection and sustainability of hospitality services with regard to the age of the respondents, i.e. between generation X, Y and Z. Hypothesis 2 was based on the assumption that there are statistically significant differences in the perception of digital innovations in hospitality services due to the age category of the respondents. Several studies carried out so far often divide respondents according to their age into generation X (1965-1979 – possibly we also included older respondents in this category), generation Y (1980-1995) and generation Z (1996-2010). To test the second hypothesis, we used the Kruskal-Wallis H test, the results of which are shown in Table 8.

Based on the results of the analysis, we can evaluate *that there is no statistically significant difference between age categories and the evaluation of the factor of digital innovations in hospitality services as an innovative and at the same time sustainable means of health protection* (RQ1-RQ5). Hypothesis 2 was thus not confirmed.

There is a statistically significant difference in the multiple comparisons of p values between the oldest while consuming hospitality services, and the youngest generation Z, for which is the situation opposite.

Table 8. Kruskal-Wallis test – age generations
(Source: authors´ processing in statistical program Statistica)

	RQ1-RQ5
Generation X	266.7965
Generation Y	268.6689
Generation Z	287.8952
K-W test	2.0992

Table 9. Kruskal-Wallis ANOVA – education

	RQ1-RQ5
Basic and secondary	279.3096
University- bachelor degree	308.3516
University- master, PhD.	255.1812
K-W test	8.8339
p value	0.0121

Hypothesis 3: We assume that there are statistically significant differences in the perception of digital innovations as a mean of health protection and sustainability of hospitality services with regard to the level of education of the respondents.

Hypothesis 3 was based on the assumption that there are statistically significant differences in the identified factors of perception of digital innovations as a mean of health protection and sustainability of hospitality services and respondents' education. We assumed that respondents with a higher education would perceive the importance of digital innovations more than respondents with a lower education. Based on education, we divided the research respondents into three groups. Group „1" – respondents with primary or secondary education (in the case of primary education, only younger respondents who did not have time to complete secondary education), „2" – respondents with first-level university education (bachelor) and „3" – respondents with university second level education or a higher degree (master, Ph.D. and others). The Kruskal-Wallis H test was used to test the third hypothesis, which statistically assumes that at least one population median of one group differs from the population median of at least one other group.

The test results are shown in Table 9 and graphically supplemented in Figure 3. Number 1- represents primary and secondary education, 2- higher education of the first degree, 3- higher education of the second degree and third degree. Based on the results of the Kruskal-Wallis analysis, we can evaluate that there are statistically significant differences between the evaluation (perception) of digital innovations as a mean of health protection and sustainability of hospitality services with regard to education. In this case, again, it is the respondents with higher education of second degree and even higher degree (PhD.), perceive digital innovations more as a mean of protecting the participant's health. On the contrary, respondents with a first-level university education perceive digital innovations in hospitality as a means of protection against

the pandemic the least. *Statistically significant differences were confirmed.* Multiple comparisons of p values (Table 10) again showed that the biggest differences are between the second and third groups. Thus, the hypothesis 3 was confirmed.

Table 10. Kruskal-Wallis test of education level comparison (Source: authors´ processing in statistical program Statistica)

	Multiple Comparison p values (2 tailed) Independent (grouping) variable: Education =8.833873 p=,0121		Kruskal- Wallis test: H (2, N=553)
Depend RQ1-RQ5	1 R:279.31	2 R:308.35	3 R:255.18
1		0.307864	0.359093
2	0.307864		0.009246
3	0.359093	0.009246	

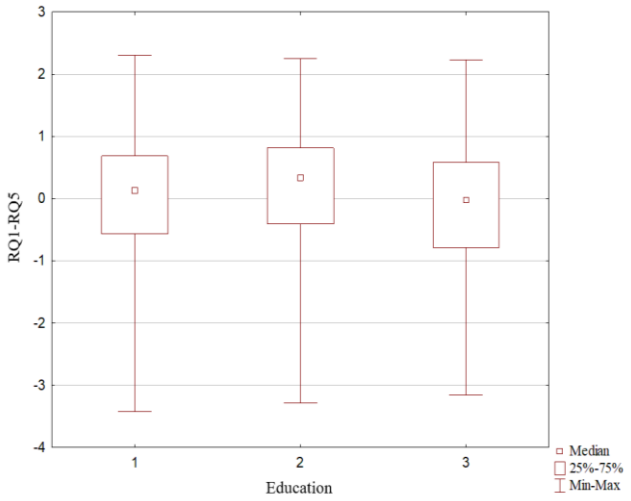

Figure 3. Box-Whiskers´ graph of factor score plot for respondents´ education (Source: authors´ processing in statistical program Statistica)

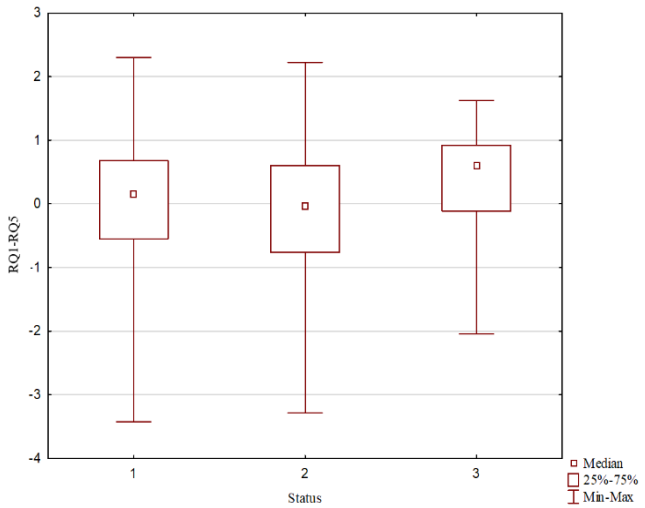

Figure 4. Box-Whiskers´ graph of factor score for respondents´ status Source: authors´ processing in statistical program Statistica

Hypothesis 4: We assume that there are statistically significant differences in the perception of digital innovations as a means of health protection and sustainability of hospitality services with regard to the status of the respondents.

As part of hypothesis 4, we assumed that there are statistically significant differences in the perception of digital innovations in hospitality with regard to the status of the respondents. We divided the respondents into three main groups: 1 – students, 2 – employed and 3 – unemployed (non-working, unemployed, pensioners, disabled pensioners, etc.). To test the fourth hypothesis, the Kruskal-Wallis H test was used, the results of which are shown in Table 11. For better clarity, the graphic representation in figure 3 is also added. Based on the results of the analysis, it can be assessed that there is again a statistically significant difference between the individual groups according to the status of the respondent and the evaluation of digital innovations in hospitality. *A statistically significant difference was confirmed.* In this case, the highest score was achieved in the group of unemployed (retired, unemployed, etc.), while the lowest level of perception of digital innovations in hospitality as a means of protecting health and sustainability was achieved by the group of workers (Table 12, Figure 4). The hypothesis 4 was confirmed.

Table 11. Kruskal-Wallis ANOVA – respondents´ status

	RQ1-RQ5
student	287.6485
employed	256.5036
non-employed	349.8889
K-W test	14.9731
p value	0.0006

Table 12. Kruskal-Wallis test of status comparison (Source: authors´ processing in statistical program Statistica)

	Multiple Comparison p values (2 tailed) Independent (grouping) variable: Status; p=,0006		Kruskal- Wallis test: H (2, N=553) =14,97309
Depend RQ1-RQ5	1 R:287.65	2 R:256.50	3 R:349.89
1		0.086449	0.050699
2	0.086449		0.000824
3	0.050699	0.000824	

CONCLUSION

The tourism sector is trying to get back on track after several years of unrelenting pandemic situation. Statistics from 2022 point to a sharp return to travel and the use of services in the tourism market. Due to global technological progress, hospitality services are also adapting. Digital progress is undeniable. It concerns all global areas of life, everywhere in the world. However, in the tourism industry, the pandemic has caused the initiative to develop digital elements and large contactless tools to be highlighted. They tend to decrease personal contact when providing services in a relatively mass industry. Some of them were even required by national policies in the difficult years of 2020 and 2021, which limited the participation in tourism and the use of its services due to the limitation of contact and reduction of the risk of infections transmission. For that reason, from a certain point of view, they began to be perceived as a means of protecting the health of tourism participants. Based at the example of studies carried out, taking into account the

perception of Slovak tourism participants and at the same time specifically using hospitality services, they confirm that global opinions on this issue are slowly but surely unifying. The perception of Slovak tourism participants who consume hospitality services is generally very positive towards digital innovations.

They perceive them not only as a means of innovating hospitality services, but also as a means of sustainable development and growth of the hospitality industry in the future. Considering the current direction of the tourism industry towards sustainability, this knowledge is important. Participants in the tourism industry also perceive the need to create sustainable concepts and through technology ensure that hospitality services can continuously progress.

Health protection did not remain in the background either. It also confirmed the thesis about the importance of digital technologies as an element of health protection of tourism participants. Overall, it can be assessed that digital technologies in tourism have a positive perception of their application by the public. The results also show that there are no significant personal characteristics of the respondents in their home conditions of Slovak republic, which, according to the observation, influenced this positive opinion. As can be seen, hospitality recovery thus used technological advances to support re-starting industries. The limitations of the study bring space for further research that could point to specific digital technologies that are used in domestic hospitality services and to their specific purpose.

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