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Павленко Ирина Геннадьевна – кандидат экономических наук, доцент,
доцент кафедры туризма и сервиса.

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Ставропольский государственный аграрный университет;
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доцент, Дальневосточный федеральный университет.

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В сборнике опубликованы результаты работы международной научно-практической конференции по вопросам инновационных составляющих национального и регионального туристского продукта, развития туристической инфраструктуры, повышения доступности туристических продуктов, совершенствования управления в сфере туризма, решения современных проблем и перспектив развития сервиса и гостеприимства.

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ОРГАНИЗАТОРЫ КОНФЕРЕНЦИИ:

Ставропольский государственный аграрный университет (Ставрополь), Россия
Географический институт «Йован Цвиич», Сербская Академия Наук и искусств (Саса), Белград, Республика Сербия
Институт экономики сельского хозяйства, Белград, Республика Сербия
Факультет гостиничного менеджмента и туризма в Врнячка Баня, университет Крагуевича, Крагуевич, Республика Сербия
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Академия Государственного Управления при Президенте Азербайджанской Республики (Баку), Азербайджанская Республика
Барановичский государственный университет (Барановичи), Республика Беларусь
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КЛИМУК Владимир Владимирович – первый проректор, *Барановичский государственный университет (Барановичи), Республика Беларусь*
ОВЧАРЕНКО Наталия Петровна – директор департамента туризма и гостеприимства, доцент, *Дальневосточный федеральный университет (Владивосток), Россия*

ОРГАНИЗАЦИОННЫЙ КОММИТЕТ:

ИВОЛГА Анна Григорьевна – и.о. декана факультета социально-культурного сервиса и туризма, зав. кафедрой туризма и сервиса, доцент, *Ставропольский государственный аграрный университет (Ставрополь), Россия*
ПАВЛЕНКО Ирина Геннадьевна – доцент кафедры туризма и сервиса, доцент, *Ставропольский государственный аграрный университет (Ставрополь), Россия*
ЕЛОЧНИК Марко – институт магистров сельскохозяйственной Экономики, (Белград), *Республика Сербия*
ДОМАЗЕТ Ивана – доктор, Института экономических наук, (Белград), *Республика Сербия*
ГАТАУЛЛИНА Светлана Юрьевна – доцент департамента туризма и гостеприимства, *Дальневосточный федеральный университет, (Владивосток), Россия*

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JUSTIFICATION OF HIGH TECHNOLOGY IN TOURISM AND HOTEL INDUSTRY AFTER PANDEMIC IN SERBIA

Gajić Tamara,

PhD, Senior Research Associate, Geographical Institute „Jovan Cvijić“ SASA, Belgrade, Serbia.
tamara.gajic.1977@gmail.com

Petrović Marko D.,

PhD, Senior Research Associate, Geographical Institute „Jovan Cvijić“ SASA, Belgrade, Serbia.
m.petrovic@gi.sanu.ac.rs

The pandemic, which changed the business system in all economic sectors, also had an impact on the tourism business. High technology began to be introduced, and the assumptions were that it would continue in the direction of replacing the human workforce in the tourism sector. The aim of the research was to determine to what extent tourists believe that it is necessary to continue with the introduction of high technology and the replacement of human labor after the pandemic. A survey was conducted on a sample of 863 respondents in the period of 2022 in Serbia. The analyzed results indicate that tourists believe that online technology can contribute to the development of the quality of service, the promotion of tourist attractions and the quality of the human workforce, but that the robotization of the service has negative implications for each of the three factors mentioned. The importance of research has theoretical and applied applications, primarily as a supplement to the existing literature, but also as an informative basis for strategic planning for future business in tourism and hotel industry.

Key words: tourism, high technology, pandemic, Serbia.

ОБОСНОВАНИЕ ПРИМЕНЕНИЯ ВЫСОКИХ ТЕХНОЛОГИЙ В ТУРИЗМЕ И ГОСТИНИЧНОМ БИЗНЕСЕ ПОСЛЕ ПАНДЕМИИ В СЕРБИИ

Гаич Тамара, Петрович Марко Д.

Пандемия, которая изменила бизнес-систему во всех секторах экономики, также оказала влияние на туристический бизнес. Начали внедряться высокие технологии, и предполагалось, что это будет вести к замене рабочей силы в секторе туризма. Целью исследования было определить, в какой степени туристы считают необходимым продолжать внедрение высоких технологий и замену человеческого труда после пандемии. Опрос был проведен по выборке из 863 респондентов в период 2022 года в Сербии.

Проанализированные результаты показывают, что туристы считают, что онлайн-технологии могут способствовать повышению качества обслуживания, продвижению туристических достопримечательностей и качеству рабочей силы, но что роботизация сервиса имеет негативные последствия для каждого из трех упомянутых факторов. Важность исследований имеет теоретическое и прикладное применение, прежде всего в качестве дополнения к существующей литературе, но также и в качестве информационной

основы для стратегического планирования будущего бизнеса в сфере туризма и гостиничного дела.

Ключевые слова: туризм, высокие технологии, пандемия, Сербия.

Tourism is the area that may have suffered the greatest consequences during the pandemic, but even the decline of this area affected the quality of life. The decline in tourist demand was undoubtedly caused by the closing of borders and the prevented influx of foreign tourists, and foreigners have always been in charge of the largest part of the demand for tourist content in Serbia. According to the foreign exchange inflow from tourism and the number of overnight stays, 2022 is considered the most successful year after 2019, which was the most successful year for Serbian tourism before the pandemic (www.stat.gov.rs). A growth trend is expected in 2023 as well. According to data from the National Bank of Serbia, the foreign exchange inflow from tourism in Serbia for 10 months of 2022 amounted to 1.3 billion euros, which is an increase of 49% compared to the same period in 2020 (www.stat.gov.rs). According to statistical data, in Serbia, in the first nine months of 2022. In 2021, about 6.5 million overnight stays were registered, which is 28% more than in the same period in 2021 (www.stat.gov.rs). After the decline in January and February 2020, tourism activity in March, and then during the second and third quarters, recorded better results (www.stat.gov.rs). In that period, domestic guests made 4.7 million overnight stays, which is 14.6 percent more than in the same period of the previous year (www.stat.gov.rs). By the way, the number of stays by domestic tourists is 103.6 percent higher compared to the same period in 2020 (www.stat.gov.rs). About 1.8 million overnight stays were recorded in 2022, which is an increase of about 83 percent compared to 2020 (www.stat.gov.rs). Most of them were, of course, during the summer months when the epidemiological situation was significantly better. Most of the visitors were in the spa resorts, where about 2.2 million overnight stays were made, which is a third of the total number. There are slightly more than 83,000 people in Serbia, who are engaged in the hotel industry, according to the data of the Republic Institute of Statistics (www.stat.gov.rs). During the pandemic, which lasted for more than two years, crucial changes took place in the work system in tourism and the hotel industry. The expansion of high technology, and robotization in order to replace the human workforce and reduce contact between people, in order to stop the pandemic, but also for more productive work, started. All predictions were that this trend would continue. In order to improve the user experience before, during and after the trip, high technology is used. Tourism companies are constantly aware of their environment and are influenced by external economic factors. Economic and social instability, the pandemic, globalization, as well as the growth of competition on the tourist market, force tourist companies to find new solutions in order to operate as efficiently and profitably as possible. Tourism companies react to new challenges by changing their size, structure and internal configuration, and the economic system provides them with a framework for such changes. The use of technology in the travel and tourism sector is essential as it helps companies carry out their day-to-day activities while improving the customer experience.

The aim of the research in this manuscript was to determine the attitude of tourists on whether the introduction of high technology should continue after the pandemic in order to improve the quality of services, the promotion of tourist attractions and the quality of the human workforce, in order to facilitate business in the future. The results undoubtedly show that tourists believe that the introduction of high technology to an excessive extent will not contribute to the development of the mentioned quality factors. Since there is a small amount of literature on this issue of the introduction of high technology, except for the assumptions that it is necessary and that it will dominate the world in the near future, this research will implement the results in the theoretical and scientific sector. Many future researches, as well as strategic planning of the development of tourism and hotel industry, will be able to use the data.

During the pandemic that ruled the world for more than two and a half years, huge changes were made in the business system in tourism and hotel industry (Zhao et al., 2022). The biggest changes concerned the closing of catering establishments, and the use of courier services and delivery companies for delivering food to consumers (Gajić et al., 2023). Some researches indicate that this trend of home delivery of food is maintained even today after the pandemic (Vuković et al., 2022). Among the other changes that followed at the global level were reservations via the Internet, and reduced visits to tourist agencies. Next, a robotic system of work in hotels at the reception desk, then guest services, information services, etc. In some countries, robotization is becoming completely justified as a way of life (Assaf et al., 2017). However, it is believed that in the country of Serbia, this work system will not survive for a long time (Petrović et al., 2023). The fact is that hotels, airlines, restaurants and other businesses must keep up with the latest technological developments (Sharma et al., 2019). However, tourism is more than a company that sells tourism goods to visitors who engage in tourism activities and seek the services of these businesses (Cobanoglu et al., 2011). The socio-cultural composition of the local population, as well as the psychology and habits of tourists, influence the experience of tourism because tourist goods are abstract (Xiang et al., 2015). As a result, businesses in the industry compete with each other to attract visitors and keep them coming back (Dagata et al., 2013). Innovation is therefore necessary to achieve competitive advantage (Hamari et al., 2016; Tauber et al., 2022). The use of IT, e-commerce and other similar technological solutions in the fields of tourism, travel and hospitality is increasingly justified if they work for the benefit of tourists and their needs (Gajić et al., 2023). The goal of hotel and travel technology can be to help organizations and their staff, improve the travel experience for customers, or both (Kim & Kim, 2022). Automating travel and related processes, saving time, reducing costs and improving the consumer travel experience are the ultimate motives or goals behind the implementation of high technology (Xiang et al., 2015). Modern technology and robotization can help tourism companies simplify their operations or even automate tasks that previously required direct human interaction (Moslem et al., 2020). This could help the company reduce the number of required employees, reduce costs and increase revenue, all of which would

improve financial results and reduce human errors (Zhang et al., 2015). Some authors believe that the introduction of modern technology and ground-level human labor contributes to a more successful fight against increasingly strong competition on the global tourist market (Yang et al., 2015).

At the global level, the tourism sector contributes to the creation of new jobs and an increase in employment (Petrović et al., 2023). However, there are opinions of many researchers that the introduction of modern technology can contribute to the opposite effect than expected (Li, 2017). The replacement of human resources in the tourism and hotel industry did not go well (Go et al., 2020). In Serbia, new jobs are opening in the tourism sector because tourism is developing into a significant driver of socio-economic development, and the forecasts are also very positive (Vuković et al., 2022). Social networks somehow have a good effect in the direction of marketing destinations and facilities (Mariani et al., 2021). The best way to spread information is through social networks (Assaf et al., 2017). They have a positive effect and do not greatly threaten the human workforce, although the number of reservations via the online system has increased (Mira et al., 2019). Theories and utility of social networks began in the 1980s (Hamari et al., 2016). Since entrepreneurs are part of their social environment, entrepreneurship researchers have often studied the value of networks in describing entrepreneurial success (Gajić et al., 2023). Networks are used to provide access to new opportunities as well as necessary information, resources, advice, support and encouragement (Osei et al., 2020). It is in the interest of every destination that the offer from the destination is as visible on the market as possible and as easy to book as possible (Tauber et al., 2022). Some authors point out that most of the innovations that occur in tourism are not technological, but relate to changing the behavior of the company (Prayag, 2020). One of the main factors that affects the development and implementation of innovations in a country is related to the way of support and the attitude of the state (Selen & Ogulin, 2015). However, most of the so-called innovation support is focused on enabling access to new markets, rather than product improvement at the enterprise or destination level (Mira et al., 2015). Innovation is often seen as one of the ways in which a company can increase its comparative advantage, and it can also have an effect on ensuring the company's growth or increasing profitability (Petrović et al., 2023). Smart tourism includes three fundamental components in which technology (digitalization) is the catalyst for innovation, including smart destinations (focus on destination management), smart experiences (focus on improvement, personalization of experiences), and smart business ecosystem (focus on strengthening competitiveness and improving the efficiency of stakeholders in the tourist offer segment) (Gajić et al., 2023). Based on the review of the literature and research issues, initial hypotheses were set:

H1: Tourists positively perceive the use of high technology in tourism and hotel industry.

H2: There is justification for continuing the use of high technology after the pandemic.

H3a: Online service has a positive effect on the quality of tourist and hotel services.

H3b: Online service has a positive effect on the promotion of the tourist attraction.

H3c: Online service has a positive effect on the quality of human labor.

H4a: Robotic service has a positive effect on the quality of tourist and hotel services.

H4b: Robotic service has a positive effect on the promotion of tourist attractions.

H4c: Robotic service has a positive effect on the quality of the human labor.

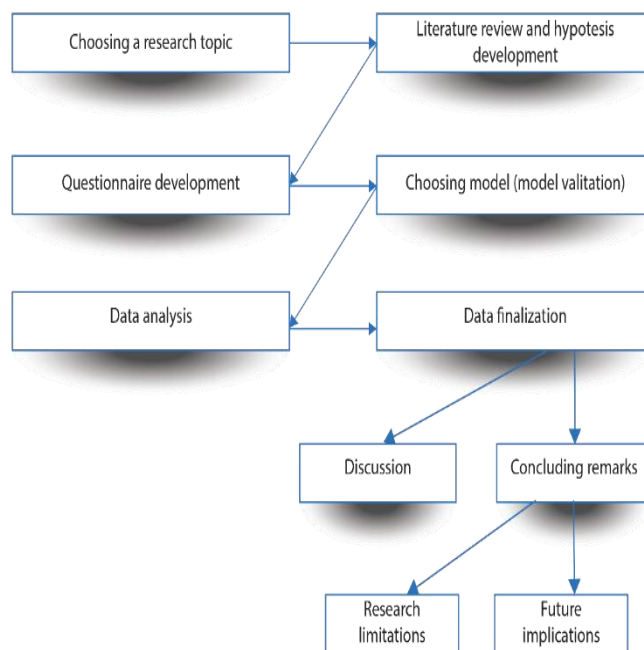


Figure 1. Research design. Source: Gajić et al., 2023.

Sample and procedure

The authors of the paper conducted a survey on a total sample of 863 tourists during the period from January to June 2022. The goal of the research was to determine to what extent the respondents believe that it is necessary to continue the introduction of modern technology in tourist and hotel companies after the pandemic. A random survey was carried out and it was of a voluntary nature. The required sample size was calculated using G*power. Taking into account that there was a total of 2 predictors and 3 criterion, the required effect size was set to $\eta^2 = 0.15$, with a statistical power of 0.95, and it was calculated that a sample size of 863 is a representative sample. The research was carried out in the following cities of Serbia: Novi Sad (215 samples), Belgrade (459 samples), Kragujevac (106) and Niš (83). The research area is shown in Figure 2.



Figure 2. Research area. Source: www.mapsofserbia.com

Table 1 shows the sociodemographic characteristics of the respondents who participated in the research. The highest percentage of women is 57,7 %, and respondents between the ages of 31 and 50. Also, the participation of tourists with a university degree and an income of 500 to 1,000 euros stands out.

Table 1. Sociodemographic characteristics of the respondents

Gender	Age	Earn	Education
Male 42.3%	18-30 28.1%	300-500* 18.4%	High school 14.2%
Female 57.7%	31-55 46.4%	500-1.000* 65%	Faculty 62.9%
	56 + 25.5%	> 1.000* 16.6%	MSc, PhD 22.9%

*euro

Questionnaire design and measurement

In their research, the authors relied on the factors investigated by Zhao et al., (2022, pp.7), where they determined that "the integration of digital economy and traditional tourism" can effectively improve tourist attraction, and that it is the driving force. And promoting the development of smart tourism, all this contributes to improving the popularity of picturesque places. They presented their results in a manuscript titled Impact of the Digital Economy in the High-Quality Development of Tourism – An Empirical Study of Xinjiang in China. We have designed experiments in relation to their research, in order to determine to what extent high technology affects the quality of service, the quality of human labor and promotion of the tourist attraction. The following variables (with Cronbach alpha α reliability values) were used to construct the factor I and determine the impact on the criterion variable: Introduce online reservations ($\alpha = 0,729$), Introduce robots

instead of staff – waiters ($\alpha = 0.684$), Payment via vending machine ($\alpha = 0,835$), Automated menus ($\alpha = 0,912$), All room services can be monitored with online applications ($\alpha = 0,739$), Robotize receptions ($\alpha = 0,700$), Robotize information services ($\alpha = 0.807$), Introduce robots and food preparation machines ($\alpha = 0.690$), Create a distance between tourists – communication through the online system ($\alpha = 0,918$), Introduce information machines and machines every 500 m in the city (0,937), Introduce rooms with virtual trips ($\alpha = 0,921$), Introduce smart rooms with touch unlocking fingers ($\alpha = 0,872$). All values of Cronbach's alpha are within the permissible limits of reliability, so all questions will be included in further considerations and analysis.

The obtained results were analyzed in SPSS version 26.00 software. Descriptive statistical analysis was used to calculate, display and describe the basic characteristics of statistical series. Cronbach's alpha was estimated for each factor, as a way of assessing the reliability of the questionnaire. None of the variables presented Sk (skewness) or Ku (kurtosis) values that could indicate a violation of the normal distribution. In addition, exploratory factor analysis was used to extract questions from the questionnaire and determine a smaller number of factors. The Kaiser-Meyer-Olkin and Bartlett's Test values were as follows: $\chi^2 = 1912.562$, $df = 66$, $p = 0.00$, which points to a further justified process of factor analysis. Factor analysis is one of the most popular multivariate techniques that has two goals: identifying and understanding the basic idea, i.e. common characteristics for several variables and reducing the number of variables in the analysis when there are too many of them, with some of them «overlapping» because they have similar meaning and behavior. Determining the impact of manifest variables on the criterion variable was performed by multiple regression analysis.

Table 2 gives descriptive values for questions related to the assessment of high technology in the justification of its use in the tourist and hotel sectors after the pandemic.

Table 2. Descriptive values of variables

Q1 Introduce online reservations	3.63	1.267
Q2 Introduce robots instead of staff - waiters	1.82	1.093
Q3 Payment via vending machine	3.14	1.416
Q4 Automated menus	2.41	1.289
Q5 All room services can be monitored with online applications	1.23	0.898
Q6 Robotize receptions	1.45	0.924
Q7 Robotize information services	1.48	0.869
Q8 Introduce robots and food preparation machines	1.53	0.778
Q9 Create a distance between tourists - communication through the online system	1.75	0.559
Q10 Introduce information machines and machines every 500 m in the city	2.57	0.819
Q11 Introduce rooms with virtual trips	1.75	0.535
Q12 Introduce smart rooms with touch unlocking fingers	1.48	0.766
Hipoteza H1 and H2 $\frac{1}{2}$ ✓		

It can be seen that the variables related to the robotization of the Service System received the lowest ratings, because the values on the Likert scale from 1 to 5 were slightly above 1. The average rating for online technology was above 2, and some of the questions such as booking services and paying via vending machines, as well as automated menus and information devices for tourists in the city had an average rating above 3, which indicated the justification of this type of technology in business.

The results obtained partially confirmed the starting hypothesis H1: that tourists positively perceive the use of high technology in tourism and hotel industry, high technology is rated well by tourists, H2: that there is justification for the continuation of the use of high technology after the pandemic.

The results of the factor analysis with promax rotation indicated the existence of two factors, which was also confirmed by the criterion of the parallel analysis model (Table 3).

Table 3. Results of exploratory factor analysis (EFA)

Factors	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings	
	Total	Total	% of Variance	Cumulative %	Total
1F – Online service (OS)	2.469	2.469	20.571	20.571	2.439
2F – Robotic service (RS)	1.702	1.702	14.183	34.754	1.740

The first factor gathers indicators of online technology in tourist and hotel services and explains a larger percentage of the variance of the questionnaire (20.5 %), while a smaller percentage explains the second factor with indicators of robotization, and 14.1 % of the explained variance. The respective and cumulative explanation of the variance of rates after rotation is 35 %.

Figure 3 confirms the extraction of variables with the help of a scree plot on exactly two factors, because the sudden break in the curve occurs exactly on the second scale.

The results of the multiple regression analysis indicated a statistically significant effect of high technology on service quality ($F = 43.044$, $p = 0.00$). Predictor variables explain 30.1 % of the justification of the impact of high technology on service quality. The online technology predictor is low and positively related to service quality ($\beta = 0.227$, $t = 6.963$, $p = 0.00$), while robotization is highly and negatively related to quality ($\beta = -0.184$, $t = -5.635$, $p = 0.00$). This indicates that the more robotization is introduced into services, the lower the quality of the service.

The impact of technology on tourist attractions shows statistical significance ($F = 69.046$, $P = 0.00$) with a questionnaire explanation percentage of $R^2 = 37.2\%$. Online technology has a high and positive correlation to the criterion variable of tourist attraction promotion ($\beta = 0.350$, $t = 11.028$, $p = 0.00$), which means that online advertisements will have a positive effect on the promotion of attractions, while robotization has a low and negative effect on tourist attractions ($\beta = -0.104$, $t = -3.285$, $p = 0.00$). Greater robotization reduces the value of tourist attractions.

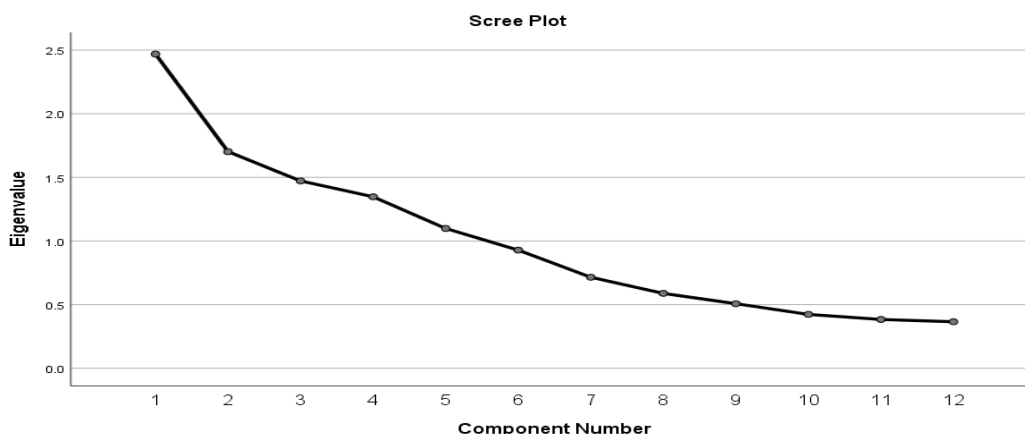


Figure 3. Scree Plot

The last impact of high technology on the replacement of human labor in tourism and hotel industry has the following statistical significance: $F = 24.685$, $P = 0.00$, $R^2 = 23.3\%$. Online services have a positive and low impact on the replacement of human labor ($\beta = 0.147$, $t = 4.424$, $p = 0.00$), while robotization has a negative and low impact ($\beta = -0.171$, $t = -5.139$, $p = 0.00$).

Table 4. Results of regression analysis

Predictors	β	t	p	R^2	F	P	Criterion variables	Confirmation of the hypothesis
F1- OS	0.227	6.963	0.00	30.1%	43.044	0.00	QS	H3a
F2- RS	-0.184	-5.635	0.00					H4
F1- OS	0.350	11.028	0.00	37.2%	69.046	0.00	TA	H3b
F2- RS	-0.104	-3.285	0.00					H4b
F1- OS	0.147	4.424	0.00	23.3%	24.685	0.00	HLF	H3c
F2- RS	-0.171	-5.139	0.00					H4c

OS-online service, RS – robotic service; QS – quality of service, TA – tourist attractions, HLF – human labor force

The initial hypotheses were confirmed by the research, but the results were harmonized with the results obtained by other researchers who dealt with the same issue. Due to the impressive growth of the tourism industry, tourism is recognized as a key driver of socio-economic progress. Globalization and changes in the environment, privatization and restructuring of companies greatly affect the success of companies in tourism. This dynamic growth is accompanied by extremely strong competition, which creates high pressure on tourism companies to constantly innovate in order to survive and develop. High technology is inevitable in the near future in almost all sectors of the economy, but it is considered that in tourism and hotel industry it should be reduced to a minimum, especially when talking about the robotization of services and the replacement of human labor.

One of the areas, which is often mentioned at the conceptual level but rarely

covered by empirical research, is related to the obstacles to the introduction of high technology, robotization or innovation in tourism (Gajić et al., 2023). Tourism policies that prioritize innovation also aim to increase production and promote expansion (Li, 2017). The application of new technologies and digital channels of communication, innovative business practices and strategies in the management of tourist destinations, modern marketing in tourism, innovations in the field of communications are becoming more and more necessary and more frequent in the replacement of human labor (Tong & Zhang, 2020). For this reason, there is a fear that in the near future business will be facilitated, but a large number of jobs will be lost (Go et al., 2020). All changes in the world tourism market did not happen suddenly, but are the result of continuous development, in which it is particularly evident that the period from innovation to implementation is significantly shortened (Osei et al., 2020). After the pandemic, which caused great damage to people and the world's global economy, the development of smart tourism is increasingly emphasized: from online reservations, robotizing services, creating easy ways to manage space, unlocking rooms, managing all devices via mobile applications, etc. (Petrović et al., 2023). Traditional tourism is slowly but surely entering the phase of electronic and robotic business, which is characterized by the adaptation of technology to the marketing and sales segment (Gajić et al., 2023). It is the stage where technology contributes to strengthening connectivity, collaboration and communication between different stakeholders in the destination resulting in innovation along the entire supply chain (Gajić et al., 2023).

The limited number of researches related to innovations in tourism is a significant problem. There are a large number of predictions that high technology will contribute to better business and that it will occupy the tourist market, but a small number of results indicate the acceptability of technology by tourists. Given that this issue is a relatively unexplored area, the results of this research will certainly contribute to supplementing the existing literature, as well as an informative basis for strategic plans for the development of tourism activities in Serbia and beyond. It is proposed to identify all the problems that stand in the way of introducing innovations in tourism, and the primary examination of the situation of tourists becomes of crucial importance.

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тел. 8(9624)48-43-77 E-mail: sekvoia26@mail.ru

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