

Универзитет Привредна академија у Новом Саду
University Business Academy in Novi Sad

Факултет за примењени менаџмент, економију и финансије Београд
Faculty of Applied Management, Economics and Finance Belgrade

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МЕФ

MEFKON22

International Scientific & Professional Conference

МЕЂУНАРОДНА НАУЧНО-СТРУЧНА КОНФЕРЕНЦИЈА

INNOVATION AS AN INITIATOR OF THE DEVELOPMENT

ИНОВАЦИЈЕ КАО ПОКРЕТАЧ РАЗВОЈА

INTERNATIONAL CONFERENCE PROCEEDINGS

ЗБОРНИК РАДОВА СА МЕЂУНАРОДНОГ СКУПА

INNOVATIONS

December 1st
Belgrade, 2022

Универзитет Привредна академија у Новом Саду

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Факултет за примењени менаџмент, економију и финансије, Београд

Faculty of Applied Management, Economics and Finance, Belgrade

Међународна научно-стручна конференција

International Scientific & Professional Conference

МЕФкон 2022 / MEFkon 2022

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Београд, 1. децембар 2022. године
Међународна научно-стручна конференција

МЕФкон 2022:

„Иновације као покретач развоја“

Зборник радова са међународног скупа –
електронско издање

**радови су објављени у изворном облику*

Belgrade, December 1st 2022

International Scientific & Professional Conference

MEFkon 2022:

“Innovation as an Initiator of the Development”

International Conference Proceedings – *digital
edition*

**papers were published in the original form*

Издавач / Publisher

Факултет за примењени менаџмент, економију и финансије Београд
Faculty of Applied Management, Economics and Finance Belgrade

За издавача / For the Publisher

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Sanja Anastasija Marković, MSc
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Дизајн / Design

Strahinja Vidojević, Bsc

Штампа / Print

Факултет за примењени менаџмент, економију и финансије Београд
Faculty of Applied Management, Economics and Finance Belgrade

Тираж / Number of copies

100

ISBN 978-86-84531-59-1

Организатор / Organizer:

Факултет за примењени менаџмент, економију и финансије, Београд
Faculty of Applied Management, Economics and Finance, Belgrade

Суорганизатори / Co-organizers:

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ПРЕДГОВОР

Иновације су и даље свуда око нас, па и ове године, традиционално као и седам претходних, Факултет за примењени менаџмент, економију и финансије је на основу пристиглих чланака, свеобухватног тематског аспекта припремио зборник радова. Примерено наслову „Иновације као покретач развоја“ иновације означавају и генеришу будућност, али почињу у садашњости која мора бити осветљена, анализирана и разматрана. Управо су то учинили многи угледни универзитетски професори, истакнути истраживачи, експерти и научни радници, како из Србије, тако и из иностранства послатим радовима (преко 50), које смо уврстили у овај зборник.

Зборник радова међународног значаја, категорисан у домаћој науци као МЗЗ, је у форми дигиталне едиције и биће доступан широј научној и стручној јавности. Радови у овој публикацији значајно доприносе утврђивању нераскидиве везе између иновација и развоја. Истовремено смо тиме показали да подручје иновација дефинитивно више није везано само за техничко – технолошки прогрес. У складу са тим, радови могу бити корисни и широј научној и стручној јавности, као и свим заинтересованим за утицај иновација на развој.

Београд,

Децембар, 2022.

Уредници

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FOREWORD

Innovations are still all around us, so this year, traditionally as well as the previous seven, the Faculty of Applied Management, Economics and Finance have prepared a book of proceedings of comprehensive thematic aspect based on the received articles. Appropriate to the title " Innovation as the initiator of development", innovation means and generates the future, but it begins in the present that must be illuminated, analyzed, and considered. This is exactly what many eminent university professors, prominent researchers, experts, and scientists, both from Serbia and abroad, have done with the submitted papers (over 50), which we have included in this collection.

The book of proceedings of international importance, categorized in domestic science as M33, is in the form of a digital edition and will be available to the wider scientific and professional public. The papers in this publication significantly contribute to establishing the unbreakable link between innovation and development. At the same time, we have shown that the field of innovation is no longer related only to technical-technological progress. Accordingly, the works can be useful to the general scientific and professional public, as well as to all those interested in the impact of innovation on development..

Belgrade,

December, 2022

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Analysis of the impact of Digital Skills Gap Index (DSGI) score on global travel and tourism

Анализа утицаја индекса дигиталних вештина (ДСГИ) на глобална путовања и туризам

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Abstract: *New technologies have significantly influenced the development and change of tourist offers. Technologies such as artificial intelligence, the Internet of Things or blockchain have enabled the personalization of the tourist offer, but also the opening of tourist destinations to tourists around the world. The above raises the question of whether countries with a higher level of digital literacy are also countries with a higher number of visits by international tourists. Based on the above, the goal of this paper is to determine whether there is a relationship between the level of digital competence of a country, which can be measured through The Digital Skills Gap Index (DSGI), and the number of arrivals to countries by international tourists. The conducted research showed that there is no correlation between the level of digital competence of the country and the number of arrivals from international tourists. Moreover, the most visited countries during the past year achieve low and medium values of The Digital Skills Gap Index but represent countries with a long-standing tradition and a strong tourism brand. The conducted research determines how new technologies can improve and innovate the tourist offer, but they are not decisive for tourist visits.*

Keywords: global travel, global tourism, digital competences, DSGI, correlation analysis

Апстракт: *Нове технологије су значајно утицале на развој и промену туристичке понуде. Технологије попут вештачке интелигенције, интернета ствари или блокчејна омогућиле су персонализацију туристичке понуде, али и отварање туристичких дестинација туристима широм света. Из наведеног се поставља питање да ли су земље са вишим нивоом дигиталне писмености и земље са већим бројем посета међународних туриста. На основу наведеног, циљ овог рада је да утврди да ли постоји веза између нивоа дигиталне компетенције неке земље, који се може мерити преко Индекса дигиталних вештина (ДСГИ), и броја долазака у земље према међународних туриста. Спроведено истраживање је показало да не постоји корелација између нивоа дигиталне компетенције земље и броја долазака страних туриста. Штавише, најпосећеније земље у протеклој години постижу ниске и средње вредности Индекса јаза у дигиталним вештинама, али представљају земље са дугом традицијом и јаким туристичким брендом. Спроведено истраживање утврђује како нове технологије могу да унапреде и иновирају туристичку понуду, али оне нису пресудне за туристичке посете.*

Кључне речи: глобална путовања, глобални туризам, дигиталне компетенције, ДСГИ, анализа корелације

Introduction

The emergence of new technologies had a significant impact on the further development of society, as well as on changes in its behavior. It was the new technology that influenced the need for new competencies of people, which are related to digital literacy. The increasing influence of the Internet as a source of knowledge had an impact on the complete transformation of business models and management (Kovačić et al., 2022). In addition, the Internet and social media have become everyday life for many people and have opened up the possibility of distributing a large amount of information and content. It is precisely new technologies that have become a key tool for organizations to attract new users, as well as tourist destinations for attracting tourists. The use of technologies for the creation of predictive analyzes facilitated easier decision-making, but also significantly influenced the creation of strategies and the simulation of new trends (Buntak et al., 2021). Based on new technologies, new forms of tourism offer and even tourist destinations are being developed, where the concept of smart tourist destinations is being developed, the goal of which is to use new technologies for the purpose of improving the tourist experience (Buntak et al., 2019). From the previously mentioned, it is possible to conclude that new technologies had a significant impact on the development of tourism, as well as on changes in the tourist offer.

Most of the previous research on the impact of new technologies on tourism focuses on describing new concepts in tourism or case studies of specific tourist destinations, and so far, there is no research that offers a different perspective on the topic. Precisely for this reason, the possibility of researching the influence of global indexes on global tourism was recognized. Various global indexes, through complex methodologies, rank the countries of the world according to the degree of digital skills, and DSGI is one such index. DSGI ranks countries based on defined indicators and assesses whether these countries have the digital power for sustainable growth and development. Based on the above, the goal of this research is to determine whether there is a correlation between the realized value of DSGI and the total visitation of the country by international tourists. More precisely, this research tries to answer the following research question: "Does the level of digital competence of the state affect the number of tourist visits?". In accordance with the research question, two hypotheses are defined:

- H1: Countries that achieve higher DSGI values have a higher number of international tourist arrivals.
- H2: There is a strong correlation between DSGI and the number of international tourist arrivals.

This paper is divided into several parts. After the introduction, the second part includes a short review of the literature, which includes an overview of global tourism, as well as an overview of DSGI. The third part of the paper covers the research methodology, while the fourth part contains the results of the conducted research. The fifth part includes a discussion of the determined results, while the last part contains the conclusion.

Literature review

Global travel and tourism overview

The travel and tourism industry are considered one of the fastest growing industries worldwide. The GDP growth of the travel and tourism industry is even 50% higher than the growth of the global economy (Sofronov, 2018). New technologies have influenced changes in the tourism sector, and some of the key technologies that have had and are having a significant impact on these changes are listed in the following table.

Table 1. Impact of new technologies on tourism

Technology	Impact on tourism
Augmented and Virtual Reality	These technologies are being used either for content marketing or for the enhancement of the customers' experiences.
Artificial Intelligence	It has an impact on automatization and speeding up the processes, while improving quality and performance, and decreasing costs,
Internet of Things	There are numerous uses of this technology, such as tracking luggage or completely personalizing tourist services.
Voice Technology	Customers are starting to switch from typed-in search to voice interactions and more tourist facilities are using voice-activated devices.
Wi-Fi connectivity	Investing in network services helps companies to provide flawless and highly personalized experiences to their users, while at the same time stimulating efficiency of work operations, fast and efficient decision-making processes, strengthening physical security with the use of CCTY, as well as cybersecurity, along and data privacy.
Wearable devices	This offers customers a more personalized and united experience. A good example is a RFID-equipped band that is connected to the infrastructure of a tourist place.
Blockchain technology	This technology mainly refers to the use of cryptocurrencies as a form of payment in tourist destinations.

Source: Sofronov, 2018

New technologies played a key role in the sustainability of the tourist offer, especially during the pandemic in 2020. Important technologies developed in that period were the so-called virtual tours. Virtual tours enabled the tourist offer at a distance and influenced the tourist offer after the pandemic period. Conducted research shows that although virtual tours were successful during the pandemic, in the post-pandemic period they find their application as a promotional tool or an alternative product during the crisis (El-Said & Aziz, 2022).

According to the report of the World Travel & Tourism Council (2022), the tourism industry lost US\$ 4.5 trillion in 2020, which resulted in the loss of 62 million tourism-dependent jobs (World Population Review, 2022). During 2021, the number of tourist visits increased, but far from the level it was before the pandemic. The United Nations World Tourism Organization shares the available data on the number of international tourist arrivals, which is also reported by the World Population Review, and which can be found in the following table.

Table 2. International tourist arrivals (in 000)

	April	May	June	July	August	September
2019	118,044	120,666	136,344	163,255	164,841	131,868
2020	3,877	5,508	12,279	34,413	39,599	30,397
2021	17,310	22,528	31,073	54,548	61,099	49,355

Source: World Population Review, 2022 according to UNWTO, 2022

Although the year 2022 is underway, the World Population Review (2022) has released data on international tourist arrivals. According to the mentioned data, the most visited countries are France, Spain, United States, China, Italy, Turkey, Mexico, Thailand, Germany and the United Kingdom. France leads the list of the ten countries with 89,400,000 arrivals, followed by Spain with 83,700,000 arrivals. The United States makes 79,300,000 arrivals, China 65,700,000, Italy 64,500,000, Turkey

51,200,000, Mexico 45,000,000, Thailand 39,800,000, Germany 39,600,000, while the United Kingdom makes 39,400,000 arrivals.

The mentioned countries, as well as the number of arrivals of international tourists in 2022, are shown in the following figure.

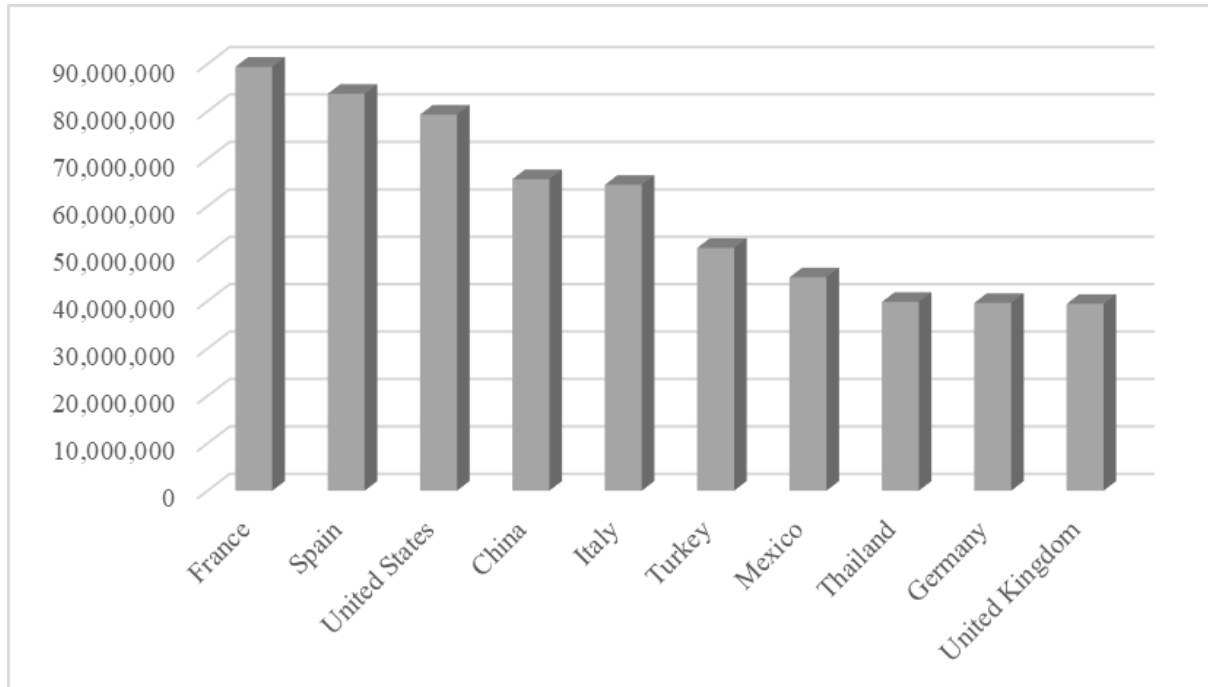


Figure 1. Most visited countries in 2022

Source: World Population Review, 2022

Of the remaining countries, it is important to emphasize that the Republic of Croatia is in the middle with 17,400,000 international tourist arrivals, followed by Hungary with 16,900,000, while the worst results are achieved by Cambodia, Uzbekistan, Kyrgyzstan, and Iran.

The Digital Skills Gap Index (DSGI)

DSGI refers to the Digital Skills Gap Index. Using this index, it is possible to identify and evaluate the factors that support digital strength and resilience. The purpose of this index is to evaluate and rank countries according to the level of adopted digital skills necessary for sustainable growth and resilience. DSGI is based on the following six pillars (Wiley, 2021):

- Digital skills institutions;
- Digital sensitivity;
- Government support;
- Supply, demand, and competitiveness;
- Data ethics and integrity;
- Research intensity.

Each of the pillars contains additional subpillars.

The first pillar, which refers to digital skills institutions, includes basic levels of literacy, as well as higher levels of digital literacy that can be obtained through formal education. This pillar covers the availability of education, as well as acquired digital competences obtained through formal education.

The second pillar, digital sensitivity, refers to changing educational systems based on the demands of the environment. This pillar measures the digital resilience of an economy, which is visible through the adaptation of offered skills to the changing environment. The third pillar refers to government support in bridging the digital divide. Government support should be based on defined digital strategies, as well as dialogue with key institutions and interested parties. The fourth pillar is considered the most important stage, and is based on the alignment of supply, demand, and competitiveness. Within this pillar, the compliance of the necessary digital skills for work defined by the job providers and the digital skills possessed by the job seekers and their impact on the overall competitiveness are measured. The pillar of data ethics and integrity encompasses data security, as well as sustainable digital development, while the last pillar, research intensity, examines the level of implementation of conducted digital research at the local and regional level of a country.

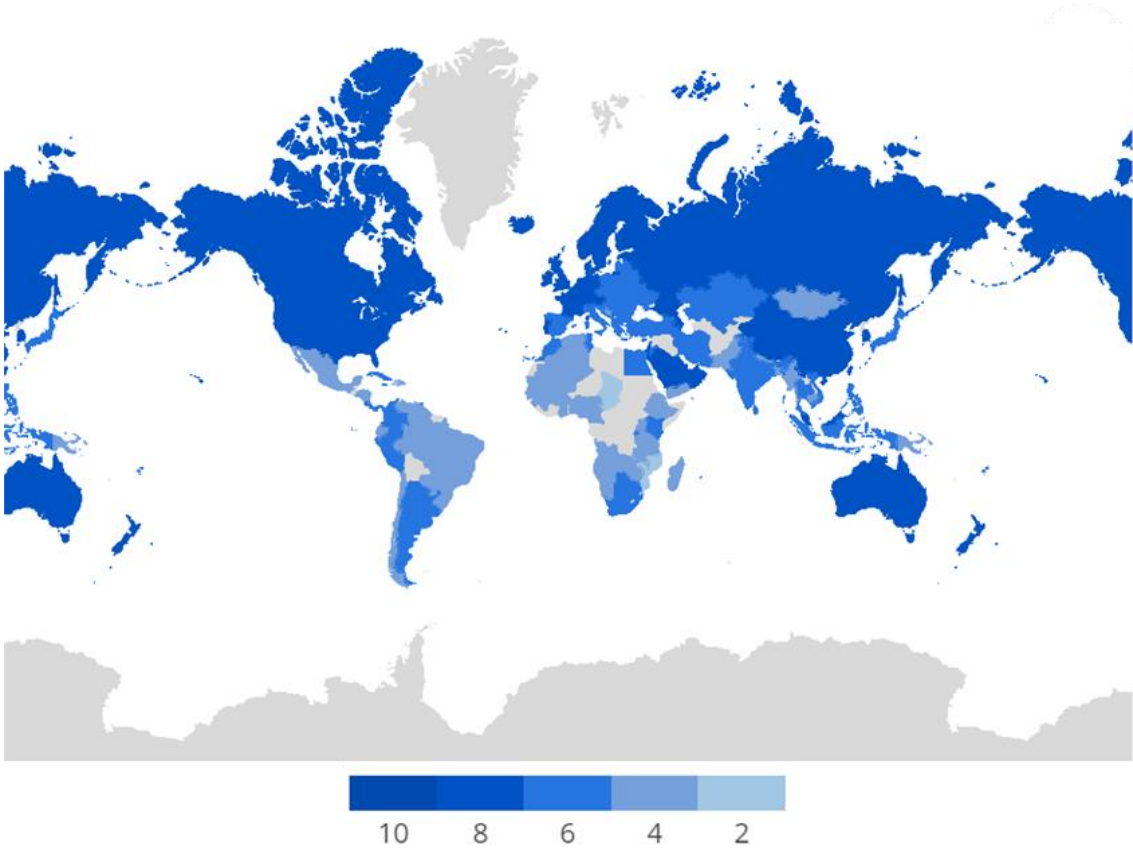


Figure 1. DSGI on global level

Source: World Population Review, 2022

In the previous figure, it is possible to see the DSGI at the global level. As previously mentioned, DSGI is a composite index, consisting of several pillars, which can achieve a maximum value of 10. It is important to mention that in the above figure, the countries marked in dark blue include those countries that achieve DSGI values in the range of 8 to 10, then the lighter blue color includes DSGI values in the range from 6 to 8, then the next range is from 4 to 6, then from 2 to 4 and from 0 to 2.

When it comes to European countries, the highest score is achieved by Finland with a DSGI of 7.5, followed by Sweden with a DSGI of 7.3. At the lowest level is Bosnia and Herzegovina with DSGI 3.1, which means that all European countries are in the range between 3.1 and 7.5. The Republic of Croatia achieves a DSGI of 4.8, the same as Serbia, while Montenegro and Bulgaria achieve a value of 5.0. Slightly better results are achieved by Hungary and Albania, with a DSGI of 5.2, and Slovenia with a DSGI of 5.7.

Looking at all 134 countries included in this research, it is possible to conclude that all countries are in the range of 1.2, the value achieved by Haiti, and up to 7.8, the value achieved by Singapore. After Singapore, the best results are achieved by Finland and the UAE with DSGI 7.5, and Qatar and Sweden with 7.3. Along with Haiti, Mozambique has the worst score with a score of 1.8 and Chad with a score of 1.9.

Research methodology

The research is conducted on a sample of the 40 most visited countries in 2022 according to the World Population Review. For each country, the total number of international tourist arrivals is defined, as well as the realized value of DSGI. Descriptive statistics for data on the number of international tourist arrivals are in the following table.

Table 3. Descriptive Statistics of International Tourist Arrivals

Descriptive Statistics		International Tourist Arrivals
N	Statistic	40
Range	Statistic	80,100,000
Minimum	Statistic	9,300,000
Maximum	Statistic	89,400,000
Sum	Statistic	1,132,000,000.
Mean	Statistic	28,300,000
Std. Deviation	Std. Error	3,389,625,953
	Statistic	21,437,876,856
Skewness	Statistic	1,593
	Std. Error	,374
Kurtosis	Statistic	1,756
	Std. Error	,733

Source: Authors' analysis according to World Population Review, 2022

Descriptive statistics for the data on The Digital Skills Gap Index, which was used in further analysis, can be found in the following table.

Table 4. Descriptive Statistics of DSGI ranking

Descriptive Statistics		DSGI ranking
N	Statistic	40
Range	Statistic	3,8
Minimum	Statistic	4,0
Maximum	Statistic	7,8
Sum	Statistic	235,0
Mean	Statistic	5,875
Std. Deviation	Std. Error	,1681
	Statistic	1,0631
Skewness	Statistic	-,132
	Std. Error	,374
Kurtosis	Statistic	-1,173
	Std. Error	,733

Source: Authors' analysis according to World Population Review, 2022

Pearson's correlation was calculated for the mentioned data sets. The value of the Pearson correlation coefficient ranges from -1 to +1, where -1 is a complete negative correlation, while the value +1 is a complete positive correlation. In addition to Pearson's correlation coefficient, Kendall's tau was also

calculated, which identifies concordant or discordant pairs of two variables, and also Spearman's (rho) rank correlation coefficient.

Results

The results of the correlation between the international tourist arrivals and the DSGI rank are shown in the following table.

Table 5. Correlation results

Correlations			
		International Tourist Arrivals	DSGI ranking
International Tourist Arrivals	Pearson Correlation	1	,046
	Sig. (2-tailed)		,777
	N	40	40
DSGI ranking	Pearson Correlation	,046	1
	Sig. (2-tailed)	,777	
	N	40	40

Source: Authors' analysis according to World Population Review, 2022

According to the conducted research, it can be seen that the correlation coefficient between international tourist arrivals and DSGI ranking is 0.046, which represents a very low level of correlation, however, the significance is 0.777 ($0.777 > 0.05(1)$), which means that the obtained result is not significant, more precisely that there is no correlation between international tourists' arrivals and DSGI ranking.

Table 6. Kendall's tau and Spearman's (rho) rank correlation coefficient results

Correlations				
			International Tourist Arrivals	DSGI ranking
Kendall's tau_b	International Tourist Arrivals	Correlation Coefficient	1,000	,052
		Sig. (2-tailed)	.	,640
		N	40	40
	DSGI ranking	Correlation Coefficient	,052	1,000
		Sig. (2-tailed)	,640	.
		N	40	40
Spearman's rho	International Tourist Arrivals	Correlation Coefficient	1,000	,076
		Sig. (2-tailed)	.	,640
		N	40	40
	DSGI ranking	Correlation Coefficient	,076	1,000
		Sig. (2-tailed)	,640	.
		N	40	40

Source: Authors' analysis according to World Population Review, 2022

Kendall's Tau and Spearman's rank correlation coefficient estimate statistical associations based on data ranks. The difference between these coefficients is that Spearman's rho is much more sensitive to

errors in the data, as well as to deviations in the data, unlike Kendall's Tau. And these two mentioned coefficients have a significance level of 0.640, which shows that the obtained result is not significant and confirms that there is no correlation between these variables.

Discussion

The obtained results show that there is no correlation between the number of international tourist arrivals and the realized value of DSGI. More precisely, the results show that the countries with the highest number of international tourist arrivals are not the countries with the highest DSGI values and that one value has no influence on the other value. The aforementioned can be confirmed by Table 7, which contains the ten most visited countries in 2022 and the 10 countries with the highest digital literacy, namely with the highest DSGI value.

Table 7. Comparison of the 10 most visited countries and countries with the highest DSGI

Rank	Most visited countries	Countries with the highest DSGI
1	France	Singapore
2	Spain	United Arab Emirates
3	United States	Finland
4	China	Qatar
5	Italy	Sweden
6	Turkey	Norway
7	Mexico	Luxembourg
8	Thailand	Netherlands
9	Germany	United Kingdom
10	United Kingdom	Malaysia

Source: Authors' analysis according to World Population Review, 2022

According to Table 7, it is evident that almost no country that was the most visited in 2022 is in the list of countries with the highest achieved DSGI. The exception is the United Kingdom, as the only country that is in the top ten most visited countries, but also as the country with the highest DSGI value. The exact relationship, i.e., the ranking of countries according to the number of international tourist arrivals, as well as the DSGI ranking for the ten most visited countries in 2022, can be found in Table 8.

Table 8. Comparison of the Countries rank by Number of International Tourists and DSGI

Countries (most visited)	Rank by Number of International Tourists Arrivals	DSGI rank
France	1	24
Spain	2	37
United States	3	26
China	4	18
Italy	5	46
Turkey	6	79
Mexico	7	92
Thailand	8	78
Germany	9	14
United Kingdom	10	9

Source: Authors' analysis according to World Population Review, 2022

According to Table 8, it is visible that the United Kingdom is the only country that has an almost equal place according to both ranking criteria. With the exception of the United Kingdom, the countries that are the most visited by the number of tourists are located in different places of the DSGI rank. At the same time, it is important to mention that the DSGI ranking includes 134 countries, therefore the achieved values shown in the table rank these countries towards the top or middle. Of the ten countries shown, Mexico achieves the worst DSGI ranking, as does Turkey. The obtained results are surprising and show that investing in reducing the digital gap, as well as encouraging the digital strength of the country, has no effect on the interest of tourists in the country's tourist offer. In order to get a clearer picture of the obtained result, it is necessary to conduct research on the preferences of tourists, as well as their attitudes towards the inclusion of new technologies in the tourist offer. Similar studies on the attitudes of certain groups of tourists have been conducted, but there are no studies that deals with the attitudes of tourists on the influence of the digital development of the country on the attractiveness of the tourist offer. However, the conclusions of some of the conducted research are important for further understanding of the field and the results obtained. Important research was made by the authors Şchiopu et al. (2016) in which they analyze the impact of new technologies on the consumption behavior of the millennials and conclude that millennials, although they are regular Internet users, during their visits to some countries, agree to stop this habit for a certain period of time. Along with the mentioned authors, similar research is also conducted by Milojica in 2019, who investigates user satisfaction with the content of tourist websites and concludes that users showed a high level of overall satisfaction, which affects the further recommendation of a tourist destination (Milojica, 2019). Authors Pai et al. (2020) investigate the impact of perceived experience with smart tourism technologies on satisfaction with the tourist service. The results of the research showed that smart tourism technologies are related to travel satisfaction and that travel satisfaction has a positive influence on tourists' intention to revisit. In addition to the above, it is important to mention the research of Zhang et al. (2022), which confirmed that smart technology has a positive effect on word-of-mouth recommendations, the intention to revisit and the willingness to pay a higher price.

Conclusion

In this paper, research was conducted on the impact of digital technologies, more specifically the digital power of states, on global tourism and travel. Although the review of the literature so far has established that the introduction of new technologies brings numerous benefits for countries and their tourism offer, through the conducted research it has been established that there is no correlation between the country's digital strength and the number of international tourist arrivals. More precisely, this research showed that countries do not have to be at a high level of digital readiness in order to achieve high tourist demand and a large number of tourists.

For the purpose of this paper, two hypotheses and one research question were posed. According to the results, none of the hypotheses is accepted, more precisely both hypotheses are refuted. The research proves that countries that achieve higher DSGI values do not have a higher number of international tourist arrivals, and also that there is no correlation between DSGI and the number of international tourist arrivals. Accordingly, the answer to the research question is that the level of digital competence of the state does not affect the number of tourist visits.

The limitations of this research stem from the use of secondary data sources. For future research, it is recommended to carry out primary research that will include examining tourists' opinions on the use of new digital technologies in the tourist offer, as well as determining the significance of the country's digital readiness in the development of new tourist programs and attracting more tourists.

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