

IMPACT OF DIGITAL TOOLS ON THE INTEREST IN VISITING HERITAGE OBJECTS IN TOURISM

Jaroslava GBUROVÁ* 

University of Ss. Cyril and Methodius, Institute of Management, Trnava, Slovakia, e-mail: jaroslava.gburova@ucm.sk

Michal LUKÁČ 

University of Ss. Cyril and Methodius, Institute of Management, Trnava, Slovakia, e-mail: michal.lukac@ucm.sk

Daniela MATUŠÍKOVÁ 

The University of Prešov, Faculty of Management and Business, Department of Tourism and Hotel Management,
Konštantínova, Prešov, Slovakia, e-mail: daniela.matusikova@unipo.sk

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Abstract: Heritage objects play an important role not only for the development of tourism but also for the knowledge of humanity. This contribution is focused on the perception of the importance of applying modern digital tools to heritage objects. The aim of the paper is to find out and analytically evaluate whether the implementation of modern digital tools motivates to a more significant visit of heritage objects. Based on a sample of respondents from the Slovak Republic, it finds out whether the implementation affects their interest in visiting the mentioned heritage objects as part of the development potential of tourism. The research objective was implemented through questionnaire research methods. The obtained data were verified by selected statistical methods. The research results point to certain differences in the perception of their importance as a tool to support their visitors' rate. The main difference was found in the case the gender of respondents. There was found out, that women pay more attention on the level of digital tools implementation when deciding about visiting them.

Keywords: tourism, digital tools, heritage object, visitors' interest, digital experience, cultural heritage, technologies, visitors' rate, pandemic

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INTRODUCTION

The world is constantly changing and adapting to current trends. The same applies to digitalization, which are encountered today and are used in various industries. The aforementioned modern phenomenon also affected the field of tourism. Especially during the pandemic period. The digital transformation of society and the trend towards a highly technological environment has not avoided the tourism industry either. Businesses of its services have started to apply more and more digital innovations, one of which is virtual reality, which has become a popular tool of selected businesses, especially during the pandemic period. This period inspired tourism developers to create new tools which help to participate in tourism and reach more effective experience.

Today's technology is able to unite the whole world. We can "travel" to places we would never go in real life. We can talk, discuss, learn and exchange culture with people from the other side of the Earth. However, easy access creates the problem of a huge amount of information that no human being is able to process; at least in real time. We live in the era of big data and culture. Technology is a means of communication and the spread of culture. Cultural organizations must define their presence in this world, and people should be able to "survive" in this world without losing their roots. Therefore, we need to reevaluate the position of technology in culture, especially if it is a massive current expressed through big data (Pouloupoulos and Wallace, 2022). Within the current context of tourism, it is necessary to consider how the COVID-19 pandemic could affect the acceptance of alternative ways of developing pandemic and post-pandemic tourism. Within this perspective, it is important to deal not only with alternative forms of tourism as consequences of alternative consumer lifestyles, but also with all alternative ways of organizing and conducting business in tourism (Vujičić et al. 2022). During the pandemic, the heritage objects were among the first who started using digital tools, and at least providing their services to virtual tourism participants in a limited form at that time. They were thinking about new ways and approaches to provide tourists with what they could not visit due to the mandatory isolation. It was the time in which digital tools proved to be an interesting alternative to how to offer the experience.

LITERATURE REVIEW

Theoretical background

Cultural heritage is an integral part and at the same time a subset of cultural policy. It represents the irreplaceable wealth of the state, material or non-material type (Beel and Wallace, 2020). Cultural heritage is an expression of ways of life developed

* Corresponding author

by a community and passed down from generation to generation (Šenková et al., 2020), including habits, customs, places, objects, artistic expressions and values. The preservation of cultural heritage is currently a very important aspect of our lives. Thanks to such a link, we learn about our ancestors, production methods and their ways of life. They provide means for documentation, restoration and presentation of cultural heritage objects (Skublewska-Paszkowska et al., 2022).

Not everyone has the opportunity to encounter cultural heritage for various reasons (health, social, economic, political, etc.) and therefore it is important to find ways to make cultural heritage accessible to the largest possible audience. Here, new modern technologies represent a huge potential. Their implementation in the services of heritage objects brings many positives, how to make heritage objects more accessible and at the same time more attractive. As many authors as Cecotti; Baglioni and others state, virtual heritage can represent cultural heritage in realistic virtual environments where the public can immerse and or interact with these artifacts (Cecotti, 2022; Baglioni et al., 2021). The rapid development of digital technologies enables an increasingly faithful reflection of this area of life. Rich cultural heritage, both tangible and intangible, can be preserved for future generations thanks to the use of advanced digital technologies (Skublewska-Paszkowska et al., 2022). However, authenticity should be preserved where possible, especially in the context of preserving intangible cultural heritage, there is also a contested history that often plays a significant role in local heritage and tourism (Bec et al., 2019; Zhu, 2015). Technological development brings new ways of interactive communication in the field of multimedia applications of cultural heritage. Virtual and augmented reality technologies facilitate access and increase the value and public awareness of cultural and natural heritage (Russa et al., 2015; Bruno et al., 2020). Evaluating user experience is a complex process that involves evaluating the ease of use and effectiveness of media as well as the entertainment they provide (Okanovic et al., 2022; Nastišin et al., 2022).

The use of digital tools to engage the local community in the protection and promotion of cultural heritage values is gaining increasing attention (Liang et al., 2021; Jeffrey et al., 2020). Digital technologies can improve preservation and conservation techniques, enrich archives with interactive media, map heritage using a geographic information system, expand participatory experiences, support communication between stakeholders, and deepen understanding of cultural connection (Miles et al., 2016; Popple, 2015). Digital and social media are considered to be one of the most important mediators (Štefko et al., 2023) to support the two-way cooperation between authorities and citizens (Falco and Kleinhans, 2019; Hronec et al., 2022). The development of heritage objects in connection with modern technologies is definitely in favor of the development of tourism itself. Technologies can increase the level of attractiveness and make historical values more interesting and valuable. As the authors Law et al. (2014) and Koo et al. (2015) mention, the progress from traditional tourism to the foundations of innovation and technological orientation of the entire industry was ensured by the widespread adoption of information and communication technologies in the tourism industry. Naturally, this development continues with the prevalent adoption of social media by tourists and travel agencies (Abou-Shouk and Hewedi, 2016), recognizing technology as an infrastructure in tourism that will include various intelligent computing technologies that integrate hardware, software and network knowledge with the aim of optimizing business processes and business performance (Gonçalves, 2022), as well as registering the mobility of tourist information and tourism consumers (Beresecká and Svetlíková, 2022).

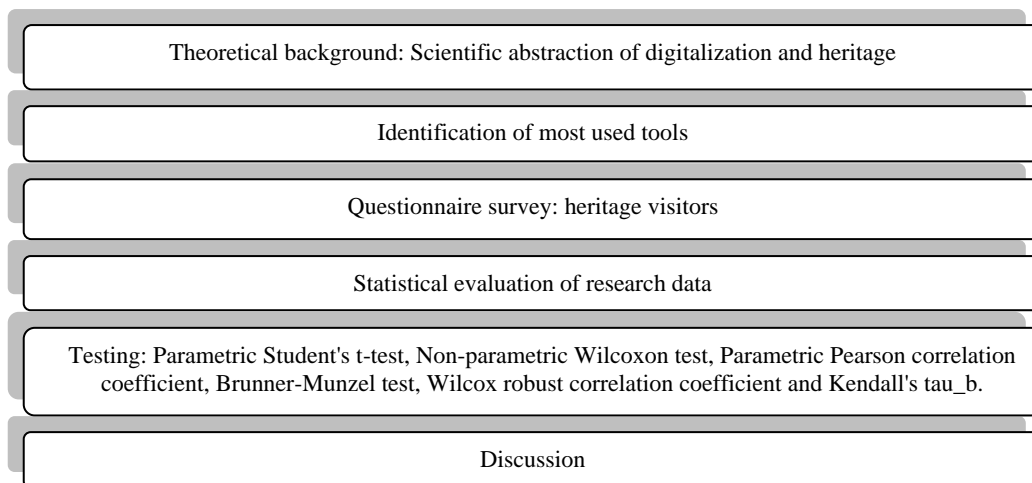


Figure 1. Scheme of methodology steps (Source: Own processing)

The role of cultural heritage itself has been challenged with the argument that in disseminating cultural heritage the audience should not passively receive information but should play an active role in promoting culture and research like other media. Regarding the virtual user experience, it has been proven that the use of virtual tools to enhance the exhibition does not affect the user experience in any way (Jin and Liu, 2022; Pierdicca et al., 2015). The truth is quite the opposite. New research has shown that using technology to reshape the way audiences explore cultural heritage can increase overall satisfaction levels (Choi and Kim, 2017). Virtual reality technology is a new visual derivative of traditional art media, a new visual phenomenon in the context of digital media. The main goal of virtual heritage is to represent cultural heritage in realistic virtual environments where the public can immerse and/or interact with these artefacts. Virtual heritage directly includes computer graphics and/or multimedia content, i.e. 3D objects, 2D images, sounds, music (Cecotti, 2022; Dey et al., 2022; Mollik et al., 2024; Garvin, 2018). The impact and effects of digital technologies on visitors is an issue that

requires further discussion. While digital technologies continue to create new opportunities and possibilities for heritage display, they could also negatively impact heritage communication and interfere with the visitor experience if not carefully developed and applied (Guss, 2020; Boudreau et al., 2022). Consequently, it is important to gain a holistic understanding of visitors' reception, experience and expectation of digital interpretation and presentation in order to improve the design of digital display at heritage sites and to develop lasting relationships between visitors and monuments (Liu, 2020). Technology is a tool that tourism companies and customers can collectively use for value co-creation. With the help of modern technologies customers share insightful information with their family, friends and peers and such words are taken as a suggestion. Tourism companies can use customers as major brand protagonists, provided they are fully satisfied with the services (George, 2023; Agrawal and Rahman, 2015). The development of the digital era facilitates faster and easier access for people to the information they need and which is also very important in the field of tourism. Moreover, in this digital age, technology also brings many benefits from various fields such as politics, economy, socio-culture, defense or security, information technology and many others. However, it is undeniable that every application brings challenges in every business area (Anisa and Tihin, 2023). For this reason, the aim of the study was to find out through research questions:

RQ1 Are digital tools important in heritage objects services/offer?

RQ2 Do the tourists search for digital tools when visiting heritage objects?

MATERIALS AND METHODS

The aim of the paper is to find out and analytically evaluate whether the implementation of modern digital tools motivates to a more significant visit of heritage objects. The main aim of the research was to statistically evaluate the relation between the visiting of heritage objects and the extent of their possession of modern digital elements.

For the purpose of the research as well as for this study, several research methods were used:

- Questionnaire – aimed at determining the interest in visiting heritage objects in connection with the application of digital tools to support their visitors rate in the Slovak Republic on the basis of selected sociodemographic characteristics and other factors that influence the visitors rate of heritage objects in Slovakia as well as abroad. The research sample consisted of participants in the tourism industry who visit or are willing to visit heritage objects in the Slovak Republic in the future. In total 226 respondents participated in the research.

- To verify the research hypotheses, the following methods were used: Parametric Student's t-test, Non-parametric Wilcoxon test, Parametric Pearson correlation coefficient, Brunner-Munzel test, Wilcox's robust correlation coefficient and Kendall's tau_b.

Questionnaire method was used as a primary data collection, in order to fulfil the research objective.

H0: We assume that there are statistically significant differences in the interest in visiting heritage objects and the extent of their possession of modern digital elements in view of the selected characteristics of the respondents.

H1: We assume that there are statistically significant differences in the interest in visiting heritage objects and the extent of their possession of modern digital tools with regard to the gender of the respondents.

H2: We assume that there are statistically significant differences in the interest in visiting heritage objects and the extent of their possession of modern digital tools in relation to the age of the respondents.

In order to verify the established hypotheses, after processing the responses of the respondents in Excel, the coded data were subsequently processed in the statistical programs R-project and IBM SPSS. Data collection took place electronically in the period from May to October 2023. The questionnaire was anonymous and contained 28 questions. The questionnaire research was performed at the sample of 226 respondents (n=226). In total 550 respondents were addressed, but only 226 questionnaires were valid for further evaluation. The research sample was founded on purposive sampling.

RESULTS AND DISCUSSION

Research sample description

The demographic statistics of the surveyed respondents are shown in Table 1. As Table 1 shows, 67.70% of the surveyed respondents were men while 32.30% were women. 50% of the surveyed respondents were between the age of 16 and 24. Likewise, 50% of the respondents were between the age of 25 and 63. A total of 226 respondents with an average age of 27 made up the research sample. The lowest age was 16 and the highest was 63. The median value was 24.50.

Table 1. Demographic statistics for 226 respondents (Source: Own processing)

Criterion	Factor	Frequency	Percentage
Gender	Female	153	67.70%
	Male	73	32.30%
Age	16-24	113	50%
	25-63	113	50%
Education	Basic	4	1.77%
	secondary	109	48.23%
	secondary education without high school diploma	6	2.65%
	university education I. degree	47	20.80%
	university education II. degree	54	23.89%
	university education III. degree	6	2.65%

Mode – the most common age value is 22 and the standard deviation is 7.389. The largest share of the research sample was 48.23% of respondents with secondary education with a high school diploma. Respondents with basic education had

the smallest share in the research sample, 1.77%. The same share, i.e. 2.65% were respondents with high school education without high school diploma and university level III. degree. 20.80% of the respondents had completed the I. degree of university education and the II. degree of university education. degree 23.89% of respondents.

Reliability of the constructs

The visitation of heritage objects in the Slovak Republic has its specifics also from the point of view of the gender. Analyzing this issue from this point of view can bring us interesting findings about the preferences, motivations and patterns of visits of individual genders. Men and women may have different interests and priorities when visiting heritage objects. Men may be more inclined to visit technical and military monuments, such as castles, fortresses or museums with a military theme. On the other hand, women may prefer visiting cultural and artistic monuments, such as museums, galleries or historic houses. In addition, there may be other factors that influence the visitation of heritage objects in terms of gender. For example, social expectations, stereotypes and gender norms can influence what types of monuments men and women visit. Cultural factors, such as upbringing and media influence, can also influence what activities are considered appropriate for each gender. It is important to know that these general trends may not apply to every individual and there are large individual differences between people. But... there is a question related to the digital tools. The first question investigated the interest of respondents in heritage objects according to the species collected. The most popular types can be seen in Figure 2 below.

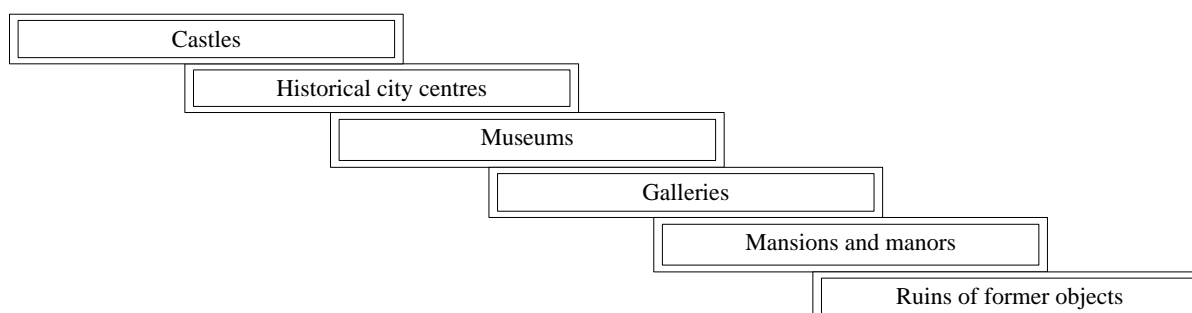


Figure 2. Most popular heritage objects (Source: Own processing)

While all the respondents of the research sample mentioned that they visit heritage objects, the aim of the second question was to find out whether they agree with the statement that the application of digital tools to heritage objects has the potential to increase their attractiveness and interest on the part of potential visitors. The results of the research conducted on the mentioned question (Table 2) show that a significant majority of respondents agree that modern digital tools can have the potential to reach a larger audience and be more attractive.

Table 2. Interest of the implementation of digital tools in heritage objects (Source: Own processing)

	Frequency	Cumulative Frequency	Relative frequency %	Cumulative relative frequency %
disagree	1	1	0,44 %	0,44 %
rather disagree	2	3	0,88 %	1,32 %
Nor agree nor disagree	9	12	3,92 %	5,30%
rather agree	56	68	24,78	30,08%
agree	158	226	69,92%	100%

For the evaluation of stated hypothesis, the other questions were used. The first one, in relation to hypothesis 1 was: Is your interest in visiting heritage objects influenced by the extent of implemented modern digital tools in it?

The aim of the research hypothesis H1 was to find out whether there are statistically significant differences in the interest in visiting heritage objects and the extent of their possession of modern digital tools with regard to the gender of the respondents. Three methods of triangulation were used to verify H1 - there will be used: the parametric t-test with greater power, the non-parametric Wilcoxon test with less power and the Brunner-Munzel test, which is suitable for variables with multiple equal values. Since there are no outliers in the statistical set, there is no need to use robust t-tests, which work with truncated group means, thereby eliminating the effect of skewness on the result of testing differences between two independent samples. As part of the operationalization, statistical hypotheses were formulated. The statistical null hypothesis for the t-test H0 assumes that the group means of men and women are equal. The alternative statistical hypothesis Ha states that the group means are not equal. The statistical hypothesis H0 for the nonparametric Wilcoxon test assumes that the mean ranks will be equal. The alternative statistical hypothesis Ha states that the mean ranks are not equal. We test at the usual test significance level of $\alpha = 0.05$. The test results are shown in the following tables.

The p-value in the t-test for two independent samples, as shown in Table 3, is 0.0353, which is lower than the predetermined significance level of the $\alpha = 0.05$ test. Therefore, it is possible to reject the statistical null hypothesis.

Table 3. Parametric Student's t-test – H1 testing (Source: Own processing)

Parametric Student's t-test
data: SKORE _{nasp} by Tot2gender t = - 2.1176 df = 224 p-value = 0.03531; alternative hypothesis: true difference in means is not equal to 0 95 percent confidence interval: -2.8219860 -0.1014629; sample estimates: mean in group 1 = 14.47945 mean in group 2 = 15.94118

Based on the results processed in Table 5, the p-value of the non-parametric Wilcoxon test is 0.0366, which is lower than the chosen significance level of the alpha test = 0.05. For this reason, it is possible to reject the statistical null hypothesis.

The p-value of the Brunner-Munzel test, the results of which are presented in Table 4, is 0.0300, indicating a lower value than the chosen level of significance of the alpha test = 0.05. For this reason, it is possible to reject the statistical null hypothesis. Descriptive statistics of SKOREnasp by gender are processed in Table 5.

Table 4. Non-parametric Wilcoxon test – H1 testing (Source: Own processing)

Nonparametric Wilcoxon test	
data:	women and men; W = 6543.5; p-value = 0.03665; alternative hypothesis: true location shift is not equal to 0

Table 5 Robust Brunner–Munzel rank order test- H1 testing (Source: Own processing)

Parametric Student t-test	
Stest. stat [1]	-2.188087; Sphat [1] 0.4141373; Sdhat [1] 0.1717253; Ss.e. [1] 0.03924097; Sp.value; [1] 0.03003018

Table 6. Descriptive statistics- SKOREnasp – gender (Source: Own processing)

Gender	Group average	Standard deviation	Group median	Frequency
Men	14.48	4.503	14.32	73
Women	15.94	5.010	15.92	153
Total	15.47	4.890	15.28	226

The difference in group averages by gender is 1.43, the standard deviations of the group averages are not large, their triples do not exceed the value of the arithmetic average. The difference in group medians is slightly larger (1.61).

The p-values of the parametric t-test and the two non-parametric tests are quite similar, the triangulation contributing to greater confidence in our overall conclusion. The p-values of the three tests used are much lower than the established level of significance of the test alpha = 0.05, therefore the statistical null hypothesis can be rejected. The difference between the group averages of men and women is statistically significant. Women have a larger group average (15.47), and their group median is also larger (15.28). Based on the results obtained, H1 was confirmed.

Analyzing the investigated issue from the point of view of the gender can provide us with interesting insights into how genders perceive and visit cultural heritage. The finding that there are statistically significant differences in the visitation of heritage objects in connection with the level of implementation of modern digital tools in the Slovak Republic in terms of the gender of the surveyed respondents is an important result. This research underlines the diversity on the basis of which decisions are made and the preferences of men and women within the framework of visits to heritage objects. Differences in attendance between men and women indicate the need for a differentiated approach in the planning and management of cultural projects and tourist attractions. It is very important to be aware of these differences and take them into account when creating marketing strategies, presenting monuments and offering programs to reach a wide spectrum of visitors.

In the second hypothesis, the effort was to focus on age as an important variable. In general, younger generations, such as millennials and Generation Z, may tend to seek interactive and multimedia experiences when visiting heritage objects. For these groups of visitors, interactive exhibitions, digital interpretations or an activating program that enable them to obtain information and experiences from monuments through modern technologies can be attractive. Middle generations such as Generation X and Baby Boomers may be interested in deeper historical context and authentic experiences. For them, well-prepared tours with a professional guide who will provide them with detailed information about the history and culture of the given places can be important. Older generations, such as the silent generations and older Baby Boomers, may be interested in preserving and protecting cultural heritage for future generations. For this group of visitors, activities related to the protection and enhancement of monuments are important, such as the volunteer program, maintenance of historical gardens or support of local cultural events.

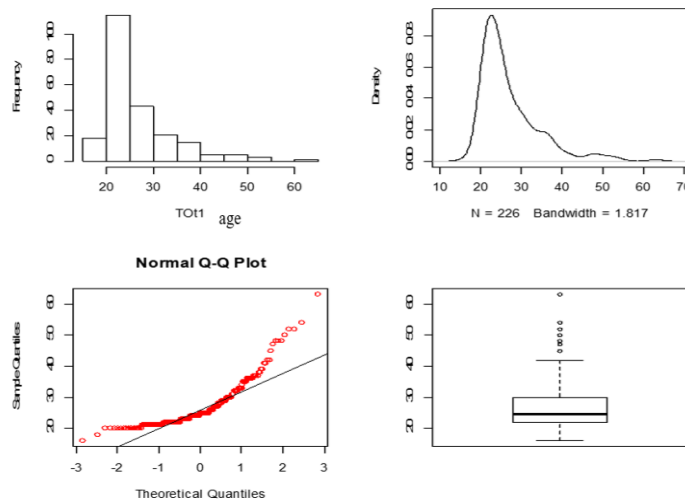


Figure 3. Distribution of the independent variable with a proportional scale – TOT1 Age (Source: Own processing)

On the basis of the above-mentioned knowledge, within the research hypothesis H2, we focused on finding out whether there are statistically significant differences in the interest in visiting heritage objects and the extent of their possession of modern digital tools in relation to the age of the respondents.

The results processed in the histogram and density graph show a significant bias towards higher values. The Q-Q normality plot also indicates a highly skewed distribution. A large number of outliers can be read from the box plot. In this case, however, it is not about whether the distribution is normal, we are mainly interested in outliers and linearity, or non-linearity of mutual relations between two correlated variables. A total of 10 outliers were identified in the statistical set (47, 63, 45, 54, 48, 52, 52, 48, 48, 50), with values 52 and 48 being repeated.

Outliers are of great importance except for group comparisons of means, where they distort the arithmetic mean for correlation and regression analysis as well. Even one significantly outlier value can distort the result of the analysis. For this reason, Figure 4 is analyzed more closely as first to find out whether it is a linear or non-linear dependence.

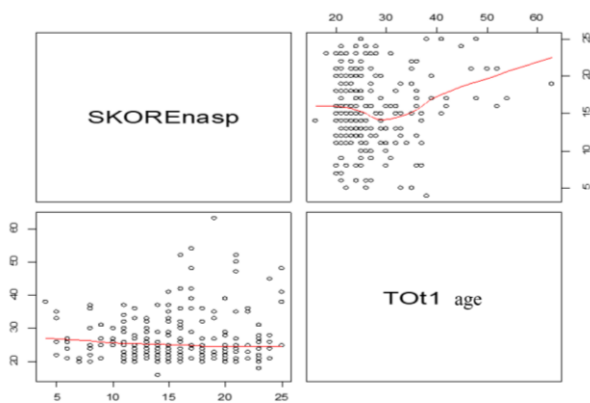


Figure 4. Scatter diagram (Source: Own processing)

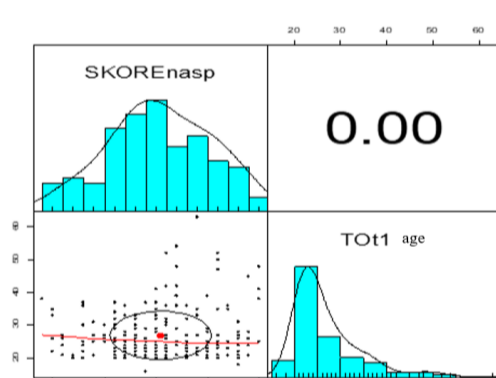


Figure 5. Spearman's correlation coefficient rho

Local non-linearity can be seen in Figure 5. The progress of a slightly decreasing linear regression curve is shown in Figure 3, which is important information for regression analysis (direction of dependence). Correlation analysis was used to verify H2. Considering the result of exploratory data analysis and a large number of outliers, both parametric and non-parametric correlation tests were used. Parametric Pearson's correlation coefficient r and Spearman's rank correlation coefficient ρ . Kendall's tau_b and Wilcox's robust correlation coefficient were also used. Data were tested at a significance level of $\alpha = 0.05$. The test results are shown in Table 7.

Table 7. Results of hypothesis H2 testing (Source: Own processing)

Correlation between the visitation of heritage objects with digital tools in the Slovak Republic and the age of the respondents				
Variables	Correlation	Spearman	Pearson	Kendall tau _b
		Tot1 Age		
SKOREnasp – visiting of heritage objects in the Slovak Republic	correlation coefficient	0.001	0.107	-0.002
	Statistical significance	0.994	0.109	0.960
	N – number of cases	226	226,00	226

Table 8. Wilcox's robust correlation coefficient – H2 testing (Source: Own processing)

Wilcox robust correlation coefficient
Scor [1] -0.07660171; Stest [1] -1.149848; Sp.value [1] 0.2514327; Sn [1] 226

The parametric Pearson correlation coefficient r has a value of 0.107, which is the lower limit of low correlation, p value 0.109 ($N = 226$). If the statistical null hypothesis were rejected, an error of 10.9% would be committed, while the chosen significance level of the test is only 5%. Non-parametric weaker Spearman's ρ and Kendall's tau_b have correlation coefficients below 0.1, both p values are above 0.9, ($N = 226$). If we rejected the statistical null hypothesis, we would commit an error of 99.4%, or 96%. In the following Table 8 we present the results of the Wilcox robust correlation coefficient.

The given correlation coefficient is considered to be very accurate. The value of the correlation coefficient of the polychoric correlation is -0.0766, which is also a trivial correlation with a p -value of 0.251 for $N = 226$. According to the p -values of all four correlation coefficients used, there was no reason to reject the statistical null hypothesis. The visualized results of the correlation analysis can be seen in Figure 4, within Spearman's correlation coefficient.

On the diagonal are histograms of correlated variables. Above the diagonal is the value of Spearman's correlation coefficient $\rho = 0.00$. Below the diagonal is a scatterplot with a local regression line that does not pass through the outliers and is slightly decreasing, indicating a negative correlation. Two of the four applied correlation coefficients are negative - Kendall's tau_b and Wilcox's pbcor. The p -values of all four correlation coefficients used are higher than the established significance level of the $\alpha = 0.05$ test. Therefore, the statistical null hypothesis should not be rejected. It is evident that the use of several methods of verification of the research hypothesis makes sense, because it allows to assess the result of the analysis better, especially in cases where the p -value of the tests largely depends on the size of the research sample, as is the case with correlation analysis. Based on the results obtained, H2 was not confirmed.

CONCLUSIONS

As the pandemic began to fade, travel gradually resumed in the countries. Therefore, tourism is more open to new ideas and ways of learning how to be more efficient. One way to be more efficient is an implementation of digital tool into the operation of heritage object and their services.

The interest of the study was to find out the differences in the perception of importance based on selected characteristics of the participants of the tourism industry as well as visitors of heritage and objects in connection with the implementation of modern digital tools. The results of the conducted research both confirmed and reversed the differences in the perception of the mentioned phenomenon. Despite the fact that it was expected that the gender of the respondents may not play a role in the differences in interest in modern technologies. It turned out that modern technologies and their tools are not equally attractive to both genders, and therefore to both men and women. The foundation of this finding can be used when creating products of heritage objects for specific segments and types of events in them. The result of second hypothesis focused to the age of respondents expected the differences among the age groups. The data evaluation indicates that the visitation of historical monuments under the influence of the implementation of digital tools and their quantities in the Slovak Republic is not significantly influenced by the age of individual respondents. Based on the above result, we can conclude that cultural heritage has a similar value and appeal for different age groups in the Slovak Republic, regardless of the level of innovation with digital tools.

Monuments and historical sites can be interesting and accessible to people of all ages, regardless of age. They perceive this as a central value on which they base their decision-making. The stated result has important implications for policy makers, managers of cultural institutions and tourism organizations. He points out that there is no need to focus exclusively on certain age groups when planning and implementing programs and events to promote visitation and the protection of cultural heritage, and on the other hand, it is necessary to go with the modern digital age, but digital tools are not urgent at the moment. The above findings can serve as a basis for creating inclusive and interesting experiences that appeal not only to men, but also to women and adapt to their individual interests and preferences.

This differentiated approach can help to increase the number of visitors to heritage objects and at the same time to strengthen their value and importance in the eyes of the public.

Limitations of the study

The limitations of the study provide an opportunity for further research in this issue. In addition to gender and age, other selected characteristics of the respondents can also be monitored (size of the residence where they come from, social status, etc.). Another option for the future is to explore individual cultural and historical objects separately. Here would be an opportunity to find out if there are differences in the perception of the need to implement digital tools in museums, galleries, castles, chateaux and others. Following on from the above, it will be necessary to specify digital tools and their attractiveness in the mentioned objects. All this has the potential to be a starting point for future research.

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