Article

Post-Industrial Tourism as a Driver of Sustainable Development

Aleksandra Kuzior [1][iD], **Oleksii Lyulyov** [2][iD], **Tetyana Pimonenko** [2][iD], **Aleksy Kwilinski** [2,3,*][iD] **and Dariusz Krawczyk** [4][iD]

1   Department of Applied Social Sciences, Faculty of Organization and Management, Silesian University of Technology, 41-800 Zabrze, Poland; aleksandra.kuzior@polsl.pl
2   Department of Marketing, Sumy State University, 40007 Sumy, Ukraine; alex_lyulev@econ.sumdu.edu.ua (O.L.); tetyana_pimonenko@econ.sumdu.edu.ua (T.P.)
3   The London Academy of Science and Business, London W1U 6TU, UK
4   City Hall Zabrze, 1 Religa Street, 41-800 Zabrze, Poland; dkrawczyk@um.zabrze.pl
*   Correspondence: a.kwilinski@london-asb.co.uk

Abstract: The accepted Sustainable Development Goals aim at reorienting the tourism industry to sustainable tourism and enhancing post-industrial tourism. In this case, it is necessary to identify the statistically significant determinants which affect post-industrial tourism development. In this paper, we aim to analyse: (1) the impact of economic and environmental dimensions, and of digital marketing on supporting post-industrial tourism development and (2) the difference between attitude to post-industrial tourism on the gender, age, and education dimensions and digital channels on post-industrial tourism development. The data was collected from questioning 2334 respondents during April–November 2020. The study applied the following methods: frequencies, percentages, *t*-test, and one-way ANOVA and multiple regression analysis. The findings confirmed the statistically significant impact of the economic and environmental dimensions, as well as digital marketing on post-industrial tourism development. The results of the analysis justified that digital marketing was a catalysator of post-industrial tourism development. In addition, the findings confirmed that there is no difference in attitudes towards post-industrial tourism with respect to the dimensions of age, gender, and education.

Keywords: industrial heritage; industrial heritage tourism; sustainable tourism; post-industrial tourism

1. Introduction

Tourism is one of the catalysts of the EU regional development, particularly of the less developed regions and areas with declining industries. On the one hand, globalisation and industrial revolutions provoked an increase in competitiveness in the market, which has required changing business model paradigms. On the other hand, not all industrial companies were ready for such transformations, and therefore they became bankrupt. Consequently, the industrial regions turned into depressed areas. In this case, reorientation of developing these regions into cities with post-industrial heritage helped to recover their economic growth. Development of the tourism industry creates new workplaces, generates local trade opportunities, and attracts additional financial and intellectual capital to the region, etc.

Furthermore, the updated Sustainable Development Goals (SDGs) aim to reorient the tourism industry to sustainable tourism [1–3]. Thus, considering the 8.9 SDG goal, the countries should enforce their policies to enhance sustainable tourism. The 11.4 SDG goal focuses on developing sustainable cities and enforcing actions to protect and safeguard the world's cultural and natural heritage [1–3]. Furthermore, the 12b.1 SDG goal emphasises implementing the controlling instruments of sustainable tourism development, which allows creating jobs and promoting local culture and craft products [1–3], noting that for

declining industrial areas, post-industrial tourism development is one way to strengthen the region's sustainable development. These trends and challenges in the world are actualized to estimate society's perception related to post-industrial tourism on the way to achieving the region's sustainable development.

The spread of information technologies has provoked transforming marketing instruments in tourism development from traditional to digital. Despite the popularity of digital marketing, not all tourism companies understand their efficiency in promotion, especially in post-industrial tourism. In this case, it is necessary to identify the digital instruments for promoting post-industrial tourism as a core determinant of the region's sustainable development. In this paper, we aim to analyse: (1) the impact of economic and environmental dimensions, and of digital marketing on supporting post-industrial tourism development and (2) the difference between attitudes towards post-industrial tourism with respect to gender, age and education dimensions and digital channels on post-industrial tourism development.

The paper is structured as follows: In Section 2, we present a literature review and bibliometric analysis of the current publications on tourism development with the purpose to identify the core determinants of post-industrial tourism development; in Section 3, we explain the methodology (model, tests, and variables) applied to test the research hypothesis; in Section 4, we describe the core findings of the research; and in Section 5, we discuss the research findings and conclude with recommendations.
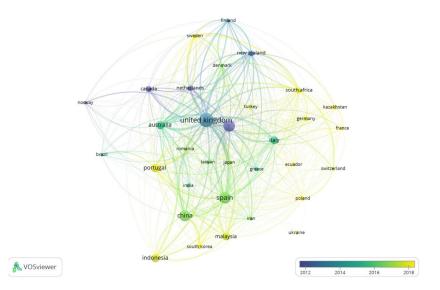
2. Literature Review

It should be noted that tourism development has favoured boosting a region's sustainable development with economic, social, and environmental benefits. Consequently, tourism development has led to creating new jobs for workers who lost their job due to the bankruptcy of industrial companies. This has contributed to fighting unemployment and overcoming poverty in regions. Furthermore, development of sustainable tourism reduces the negative impact on the environment. Developing sustainable cities and transport infrastructure attracts new tourists to a region and provides appropriate conditions for a region's economic growth.

Studies [4–8] have confirmed a casual relationships between the efficiency of the tourism sector, social, economic, and ecological development of a region. In [9,10], the authors argue that COVID-19 had a direct negative effect (increasing death rate) and also provoked a vast range of social and economic consequences, including a decline in tourism development. The authors of [11,12] proved that countries' high values of green competitiveness attracted new tourists who preferred sustainable tourism. In addition, a study by [13] analysed the creative industry and demonstrated that boosting the creative industry had a positive impact on tourism development. At the same time, [14] analysed 102 countries and proved that tourism development had a significant impact on increasing income inequality in developing countries and an insignificant impact in developed countries. In [15], the negative impact of tourism visitors on CO_2 emissions was confirmed. Moreover, by means of a multiple regression analysis, the authors of [16] empirically justified that the environmental and economic dimensions had significant impacts on sport tourism but insignificant impacts on the social dimension. The findings of [17] confirmed that tourism development negatively affected the health of society in the short term, however, had a positive effect in the long term.

Studies [18–20] have confirmed that post-industrial tourism is the practical tool for regional restructuring. The EU countries developed program and policies for developing post-industrial tourism. In 2008, the European Route of Industrial Heritage started to work. This project aims to raise society's awareness of post-industrial heritage and to boost the economic benefits of this heritage for sustainable development [21]. Considering examples in Spain (Sabadell and Terrassa), the authors of [22] proved that cities with old factories had the opportunity to reorient their development and to become the city of service. Jóźwiak M. and Sieg P. analysed the post-industrial facilities in Bydgoszcz
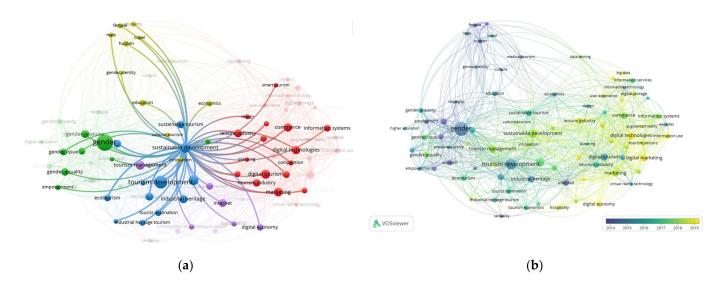
(Poland) and concluded that project TeH$_2$O Industrial Themed Trail helped to promote Bydgoszcz and increased the city's attractiveness [23]. Kyrylov et al. [19] analysed current trends and identified prospects for international tourism development in the context of increasing globalisation risks in the world. Using the German experience, the author of [24] demonstrated the positive effect of implementing project Industrial Heritage Trail on the economic development of the post-industrial region.

The findings of a bibliometric analysis of 2000 documents published in the Scopus-indexed scientific journals revealed that scientists from Canada, Norway, the Netherlands, the United Kingdom, and the United States of America were the first to start investigating the issues of post-industrial tourism (Figure 1).

Figure 1. The visualisation map of core scientific clusters in researching post-industrial tourism by a country.

The results of a meta-analysis confirmed that post-industrial tourism was investigated in view of gender and education dimensions (green and yellow cluster Figure 2a), digital marketing (red cluster Figure 2a), sustainable development, and sustainable tourism (blue cluster Figure 2a).

(a)

(b)

Figure 2. The visualisation map of core scientific clusters in researching post-industrial tourism: (**a**) Co-occurrence analysis; (**b**) overlay visualisation in time.

Furthermore, since 2018, the scientific communities have researched tourism issue with a focus on sustainable development tourism and digital marketing for tourism promotion (Figure 2b). Using the VOSviewer and CiteSpace, the authors of [25–27] outlined similar tendencies in post-industrial and sustainable tourism research.

It should be noted that the findings of [28] showed that the achievement of Sustainable Development Goals depended on the level of education in a society. In this case, enhancing sustainable tourism was related to the tourists' green awareness. In addition, the authors of [29–32], who investigated the Caribbean Region, Greece, and Armenia using questionnaires and statistical analysis, confirmed that social capital and the level of green awareness in a society influence sustainable tourism development.

In [33], the authors analysed three types of tourism using the TOPSIS method: traditional tourism, sustainable tourism, and sustainable impact tourism. The authors concluded that, while making decisions, tourists, primarily, did not consider the sustainable principles. The authors of [34] used a questionnaire to examine the attitudes of different types of tourists towards industrial heritage tourism. As a result, they identified the core motives and reasons for favouring post-industrial tourism according to gender and age dimensions. In [35], the authors confirmed a hypothesis that economic, social, political, and environmental governmental policies influence the efficiency of industrial heritage tourism development. They investigated the gold mining industrial heritage in Spain using interviews' data and regression analysis. Sharma S. [36] concluded that there were statistically significant relations between gender and sustainable tourism. The authors of [37] analysed students' attitudes towards sustainable tourism in the Slovak Republic. They indicated that, in general, students have a negative attitude to sustainable development; however, their findings showed that women had a more positive attitude to sustainable tourism than men [37]. Skanavis C. and Sakellari M. [38] tested a hypothesis that women are a key driver of sustainable tourism development and emphasised that education had a statistically significant impact on sustainable tourism development. Huang G. and Ali S. analysed Yunnan's mining and tourism areas using the ecological, social, and economic dimensions. Using the Student's t-test, they confirmed insignificant differences between mining and tourism areas regarding the changes within mining or tourism areas. In addition, they emphasised that the economic development of industrial areas was better than that in tourism areas. At the same time, tourism areas were better in social development, especially with respect to gender balance [39].

The development of information technologies furthers their penetration in all economic sectors. Studies [40–44] have proven that online marketing has replaced traditional marketing methods and has become the main channel to communicate with customers. Thus, the promotion and development of post-industrial tourism is related to the efficiency of digital marketing instruments. Using a digital marketing adoption model, [45] estimated the digital marketing instruments in tourism's promotion. Findings of this research confirmed the necessity of combining the different digital marketing instruments. Magano J. and Cunha M. N. argued that digital marketing and mobile applications were the catalysts for expanding post-industrial tourism in the case of Portugal [46]. Using multiple linear regression, this study confirmed the statistically significant impact of variable tendencies on tourism development and the low impact of "word of mouth" on tourism development. Studies [47–52] have proven that integrating different digital instruments (social media marketing, search engine optimisation, mobile applications, etc.) increased the popularity of post-industrial tourism. Penetration of online technologies furthers mobile applications' development and improves touristic websites [49,50]. The study by [51] highlighted the importance of a website for industrial heritage tourism. The authors analysed 127 websites of the touristic objects and identified the core dimensions for improving digital communication channels with tourists. Thus, the following hypothesis was formulated:

1. Post-industrial tourism development influences environmental (H1) and economic-social (H2) dimensions:

Hypothesis H1$_0$, H2$_0$. *There is a statistically significant impact of post-industrial tourism development on environmental (H1$_0$) and economic-social (H2$_0$) dimensions.*

Hypothesis H1$_A$, H2$_A$. *There is no statistically significant impact of post-industrial tourism development on environmental (H1$_A$) and economic-social (H2$_A$) dimensions.*

2.   Difference among attitudes towards post-industrial tourism with respect to the gender factor (H3A), due to age (H3B), and the education factor (H3C):

Hypothesis H3A$_0$, H3B$_0$, H3C$_0$. *There is no statistically significant difference among attitudes towards post-industrial tourism on the gender factor (H3A$_0$), due to age (H3B$_0$), and on the education factor (H3C$_0$).*

Hypothesis H3A$_A$, H3B$_A$, H3C$_A$. *There is a statistically significant difference among attitudes towards post-industrial tourism on the gender factor (H3A$_A$), due to age (H3B$_A$), and on the education factor (H3C$_A$).*

3.   Digital marketing has an impact on supporting post-industrial tourism development (H4):

Hypothesis H4$_0$. *There is a statistically significant impact of digital marketing on supporting post-industrial tourism development.*

Hypothesis H4$_A$. *There is no statistically significant impact of digital marketing on supporting post-industrial tourism development.*

3. Materials and Methods

3.1. Data Collection

The data for analyses was obtained from the questionnaires. The survey was conducted using the Google platforms from April to November 2020. The target group of questionnaires covered 234 respondents from Polish and Ukrainian Universities (students and academic staff). The demographic characteristics of respondents are listed in Table 1.

Table 1. The demographic characteristics of respondents.

Demographic Parameters	Scale	Frequency	Percentage, %	Maximum	Minimum
Age	18–30 years old	133	56.84	40	19
	over 30 years old	101	43.16		
Gender	male	109	46.58	1	2
	female	125	53.42		
Education	Bachelor's degree	101	43.16	1	3
	Master's degree	69	29.49		
	PhD or DSc	64	27.35		

Number of respondents = 234.

The respondents included students and academic staff from Ukrainian and Polish Universities. The average age of the respondents was 29 years; 56.84% of respondents were 18–30 years old and 43.16% of respondents were over 30 years old. The gender structure of the respondent sample was balanced (46.58% males and 53.42% females). In addition, 43.16% of respondents had a Bachelor's degree, 29.49% had a Master's degree, and 27.35% had a PhD or DSc degree.

The respondents answered the questions using a Likert scale (from 0—strongly disagree to 5—strongly agree). The study collected 2334 validated questionnaires and analysed

them using the statistical analysis software Stata. Table 2 summarizes the respondents' descriptive statistics on the second part of the questionnaires (quantitative estimation of independent and dependent variables). An estimation of each indicator (environmental impacts, economic impacts, digital marketing, tourism development (post-industrial vector)) was done using the average value of all dimensions' components.

Table 2. The descriptive statistics of the second part of the questionnaires.

Variables	Dimensions	Mean	SD	Ske	Kur	JB	DM
Environmental impacts (En)	Post-industrial tourism stimulates the creation of green zones and other recreational areas (En1)	3.96	1.18	−1.18	4.37	72.25	3.92
	The infrastructure of post-industrial tourism does not have a negative impact on the natural environment (En2)	3.82	1.23	−1.27	4.68	90.14	
	Post-industrial tourism stimulates the restoration of industrial heritage and conservation of natural resources (En3)	3.97	1.38	−1.58	4.94	134.02	
Cronbach alpha		0.73					
Economic and social impacts (E)	Post-industrial tourism could become the source of income for cultural institutions (E1)	4.17	1.28	−2.01	6.80	298.59	4.14
	Post-industrial tourism allows creating additional workplaces for local people (E2)	3.98	1.38	−1.59	4.94	135.05	
	Post-industrial tourism could generate economic benefits to small and medium businesses (E3)	4.15	1.27	−1.86	6.14	231.43	
	Post-industrial tourism allows improving the quality of life in the region (E4)	4.25	1.25	−2.09	7.10	334.92	
Cronbach alpha		0.77					
Digital marketing (M)	A virtual museum, a guide to post-industrial items and the collections, allows attracting potential tourists (M1)	4.02	1.35	−1.61	5.10	143.94	4.00
	Advertising campaigns in the social networks encourage visits to industrial heritage sites (M2)	4.02	1.24	−1.70	5.90	194.50	
	Marketing-mix could be an effective strategy for promoting post-industrial tourism (M3)	3.75	1.43	−1.36	4.29	88.80	
	Applications (accessible after the registration at the website) could be one of the instruments for promoting industrial heritage (M4)	3.81	1.16	−1.06	4.25	59.39	
Cronbach alpha		0.74					
Tourism development (post-industrial vector) (TD)	Post-industrial tourism could increase the number of visitors to industrial heritage sites (TD1)	4.15	1.15	−1.72	6.16	212.88	3.96
	Post-industrial tourism enhances the public awareness of industrial heritage sites, the technological and technical process of regional development (TD2)	3.97	1.38	−1.58	4.94	134.02	
	Post-industrial tourism contributes to the growth of national identity and consciousness of the population (TD3)	3.75	1.45	−1.37	4.24	88.63	
Cronbach alpha		0.79					

Note: SD—standard deviation; Ske—skewness test; Kur—Kurtosis test; JB—Jarque–Bera test; DM—dimension mean.

Considering [52,53], the Cronbach alpha in the social science is the most appropriate measures for evaluating the consistency of the respondent's answers. The findings of Cronbach alpha were high (0.71) in the interval 0.73–0.79. It confirmed the high consistency of the respondent's answers.

The average values of the following indicators E1, E3, E4, M1, M2, and TD are the closest to the maximum (max. 5). Those indicators emphasis the high level of post-industrial tourism implementation.

3.2. Data Analysis

According to [53,54], the multivariate statistical analysis (Pearson correlation [55] and principal components analysis (PCA) [56]) was used to check the relationships among the respondents' perceptions on digital marketing; environmental, economic and social dimension; and post-industrial tourism as a driver for region's sustainable development.

To test out H1 and H2, we used the original variables for the regression analysis. For H1 and H2, the dependent variable was environmental, economic, and social dimensions, and the independent variable was post-industrial tourism development:

$$Y_i = \phi + \alpha TD + \mu \qquad (1)$$

where ϕ is constant; Y_i is a dependent variable; i is dimensions (environmental (En), economic and social (E)); *TD* is an independent variable (post-industrial tourism development); μ means errors.

As in [16,57–59], we applied the *t*-test and one-way ANOVA to measure differences among attitudes to post-industrial tourism depending on the age, gender, and education factors. The education factor was measured by the interval scale differences. In this case, one-way ANOVA was applied to measure the differences among attitudes to post-industrial tourism depending on the education factor. As the age and gender were measured by a dichotomous scale, the study used the *t*-test for testing the hypotheses H3A and H3B.

H4 was checked by using the regression analysis of the original variables. In this case, the dependent variable is post-industrial tourism development, and the independent variable is digital marketing:

$$TD = \phi + \alpha M + \mu \qquad (2)$$

where ϕ is const; *TD* is a dependent variable (post-industrial tourism development); *M* is an independent variable (digital marketing); *i* is dimensions (environmental, economic and social); μ means errors.

4. Results

Considering the methodology mentioned above at the first step, the correlation analysis was carried out. The findings confirmed that the values of the correlation coefficient among respondents' answers was in the interval 0.4–1.0. The average correlation amounted to 0.7 (Table 3).

Table 3. The findings of the Pearson correlation matrix of the variables.

	En1	En2	En3	E1	E2	E3	E4	M1	M2	M3	M4	TD1	TD2	TD3
En1	1.000	0.701	0.513	0.416	0.537	0.476	0.454	0.537	0.527	0.467	0.739	0.549	0.513	0.441
En2	0.701	1.000	0.494	0.467	0.536	0.523	0.468	0.449	0.485	0.412	0.769	0.601	0.494	0.470
En3	0.513	0.494	1.000	0.479	0.594	0.450	0.435	0.486	0.770	0.591	0.514	0.549	1.000	0.592
E1	0.416	0.467	0.479	1.000	0.534	0.834	0.835	0.471	0.454	0.407	0.560	0.518	0.479	0.600
E2	0.537	0.536	0.594	0.534	1.000	0.522	0.503	0.693	0.536	0.524	0.534	0.740	0.594	0.502
E3	0.476	0.523	0.450	0.834	0.522	1.000	0.868	0.434	0.485	0.417	0.585	0.569	0.450	0.577
E4	0.454	0.468	0.435	0.835	0.503	0.868	1.000	0.456	0.484	0.396	0.554	0.528	0.435	0.575
M1	0.537	0.449	0.486	0.471	0.693	0.434	0.456	1.000	0.455	0.408	0.507	0.674	0.486	0.441
M2	0.527	0.485	0.770	0.454	0.536	0.485	0.484	0.455	1.000	0.652	0.505	0.624	0.770	0.589
M3	0.467	0.412	0.591	0.407	0.524	0.417	0.396	0.408	0.652	1.000	0.478	0.489	0.591	0.535
M4	0.739	0.769	0.514	0.560	0.534	0.585	0.554	0.507	0.505	0.478	1.000	0.597	0.514	0.547
TD1	0.549	0.601	0.549	0.518	0.740	0.569	0.528	0.674	0.624	0.489	0.597	1.000	0.549	0.514
TD2	0.513	0.494	1.000	0.479	0.594	0.450	0.435	0.486	0.770	0.591	0.514	0.549	1.000	0.592
TD3	0.441	0.470	0.592	0.600	0.502	0.577	0.575	0.441	0.589	0.535	0.547	0.514	0.592	1.000

Note: Statistical significance (*p*-value) for outputs was <0.01.

The high value of correlation between En1 and M4 (0.74), En2 and M4 (0.77), En3 and M2 (0.77), and M2 and TD2 (0.77) confirms that quality digital marketing instruments play the core role in post-industrial tourism promotion considering the current ecological and economic features of the region's development. In addition, a strong correlation is observed between En2 and TD1 (0.6), En3 and TD2 (1.0), and E2 and TD1 (0.74). This illustrates the dynamic development of post-industrial tourism as a core catalyst of ecological, economic, social, and cultural regional development, and consequently, its impact on improving the level and quality of life in the region. Furthermore, the statistical relations among the indicators analyzed prove that the focus of public authorities and economic entities has shifted from exclusively economic gains to achieving environmental and social goals in tourism development.

The findings of the principal components analysis (Table 4) confirm that the first component explains 57.93% of the variances of the individual components and the second component explain 9.98%. In total (cumulative proportion, %), both components explained 67.91% of the total variation, indicating a high degree of factorisation.

Table 4. The findings of the principal components analysis.

Eigenvalues					
Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	8.111	6.713	0.579	8.111	0.579
2	1.397	0.320	0.100	9.508	0.679
3	1.077	0.260	0.077	10.585	0.756
4	0.817	0.280	0.058	11.402	0.815
5	0.538	0.109	0.038	11.940	0.853
Eigenvectors (loadings)					
Variable	PC 1	PC 2	PC 3	PC 4	PC 5
E1	0.265	0.407	−0.262	0.031	−0.096
E2	0.276	−0.059	0.146	0.460	0.018
E3	0.270	0.430	−0.195	−0.043	−0.032
E4	0.263	0.441	−0.235	−0.002	−0.040
EN1	0.259	−0.034	0.431	−0.271	0.000
EN2	0.259	0.050	0.419	−0.340	−0.109
EN3	0.281	−0.379	−0.237	−0.071	−0.380
M1	0.246	−0.021	0.256	0.568	−0.036
M2	0.276	−0.294	−0.199	−0.081	0.072
M3	0.242	−0.249	−0.146	−0.073	0.793
M4	0.277	0.105	0.337	−0.337	0.019
TD1	0.281	−0.013	0.200	0.354	0.052
TD2	0.281	−0.379	−0.237	−0.071	−0.380
TD3	0.263	0.024	−0.251	−0.115	0.222

The findings of the principal components analysis allowed us to conclude that all components are roughly equal linear combinations in PC 1. The positive value of factors loading identified principal components (Table 4) confirm the well-structured analysed data. The first principal component PC 1 had similar loadings on all fourteen variables. The results of the statistical analysis of the variables allowed us to identify the modern scenario of post-industrial tourism development and the sequence of respondents' views.

The findings of testing H1 and H2 are showed in Table 5.

Table 5. Results of the regression analysis of the impact of post-industrial tourism development on environmental and economic-social dimensions.

Hypotheses	Coef.	Std. Err.	t-Stat.	Prob.	Hypotheses	Coef.	Std. Err.	t-Stat.	Prob.
H1	0.791	0.0352	22.466	0.000	H2	0.755	0.0439	17.188	0.000
R-squared	0.685	Mean dependent var		3.916	R-squared	0.560	Mean dependent var		4.139
Adjusted R-squared	0.684	S.D. dependent var		1.066	Adjusted R-squared	0.558	S.D. dependent var		1.125
S.E. of regression	0.599	Akaike info criterion		1.823	S.E. of regression	0.748	Akaike info criterion		2.265
Sum squared resid	83.352	Schwarz criterion		1.853	Sum squared resid	129.758	Schwarz criterion		2.295
Log likelihood	−211.259	Hannan–Quinn criter.		1.835	Log likelihood	−263.042	Hannan–Quinn criter.		2.277
F-statistic	504.702	Durbin–Watson stat		1.965	F-statistic	295.420	Durbin–Watson stat		1.880
Prob (F-statistic)	0.000				Prob(F-statistic)	0.000			

The positive value of coefficients of multiple regression model for all independent variables confirms that H1 and H2 are at a statistically significant level (*p*-value = 0.000). The coefficients of determination were 0.685 and 0.560.

The results of checking the hypotheses H3A, H3B, H3C using the *t*-test and one-way ANOVA are showed in Table 6.

Table 6. The difference in the perception of post-industrial tourism impacts on local, sustainable tourism development.

	Economic Impacts				**Environmental Impacts**			
	Mean	**SD**	**Test Statistic**	***p*-Value**	**Mean**	**SD**	**Test Statistic**	***p*-Value**
Age								
18–30 years old	4.212	0.096	*t*-test	0.2523	4.00	0.086	*t*-test	0.0834
over 30 years old	4.042	0.114	−1.147		3.805	0.115	−1.387	
Gender								
male	4.016	0.120	*t*-test	0.119	3.892	0.110	*t*-test	0.7587
female	4.246	0.089	1.564		3.936	0.089	0.307	
Education								
Bachelor's degree	4.138	1.065	ANOVA	0.017	3.871	1.075	ANOVA	0.2623
Master's degree	4.405	0.828			4.086	0.875		
PhD or DSc	3.851	1.406	4.14		3.802	1.219	1.35	
	Digital Marketing				**Tourism Development (Post-Industrial Vector)**			
	Mean	**SD**	**Test Statistic**	***p*-Value**	**Mean**	**SD**	**Test Statistic**	***p*-Value**
Age								
18–30 years old	3.957	0.861	t-test	0.327	3.982	0.097	t-test	0.676
over 30 years old	3.824	0.106	−0.981		3.921	0.112	−0.418	
Gender								
male	3.858	0.104	t-test	0.561	3.905	0.112	t-test	0.518
female	3.936	0.086	0.582		4.000	0.096	0.647	
Education								
Bachelor's degree	3.918	1.001	ANOVA	0.204	3.930	1.052	ANOVA	0.4092
Master's degree	4.036	0.832			4.096	1.021		
PhD or DSc	3.722	1.214	1.600		3.843	1.298	0.90	

The results in Table 5 do not confirm the statistically significant difference (*p*-value > 10%) in the means for all indicators excluding environmental impacts between respondents 18–30 years old and over 30 years old. It proves the differentiation in acceptance of post-industrial tourism development and its impact on the environment (water pollution, inefficient use of energy sources, destruction of biodiversity, etc.) depending on the age factor. Despite the positive impact of post-industrial tourism on the environment, the age group over 30 years old emphasised that post-industrial tourism development should be realised concerning all service sectors functioning: transportation, hotel business, etc.

The findings of ANOVA do not confirm the statistically significant difference in the mean among the three different groups (Bachelor's degree, Master's degree, PhD, or DSc) of the variables: environmental impacts, digital marketing, and tourism development (post-industrial vector). At the same time, the findings for economic impacts prove that the economic vector of post-industrial tourism is statistically less significant for PhD or DSc respondents than for other categories polled. Those results were consistent with the findings in [59]. In this case, the economic factor was a critical restricting factor of tourism development due to its possible impact or displacement of traditional business. Considering these findings, the H3A, H3B, H3C hypotheses were confirmed.

The findings of testing H4 are showed in Table 7.

Table 7. Result of regression analysis of impact of digital marketing on supporting post-industrial tourism development.

Hypothesis	Coef.	Std. Err.	t-Statistic	Prob.
H4	0.933	0.0372	25.106	0.000
R-squared	0.731	Mean dependent var		3.956
Adjusted R-squared	0.730	S.D. dependent var		1.116
S.E. of regression	0.580	Akaike info criterion		1.757
Sum squared resid	78.052	Schwarz criterion		1.787
Log likelihood	−203.571	Hannan–Quinn criter.		1.769
F-statistic	630.289	Durbin–Watson stat		1.888
Prob(F-statistic)	0.000			

The positive value of coefficients of multiple regression model for all independent variables confirms H4 at the statistical significance level (p-value = 0.000). The coefficient of determination was 0.731. Digital marketing has the most impact in the model (according to the level of the calculated coefficient). It was justified to use modern digital instruments in tourism as the most effective options in its promotion and development. At the same time, respondents, regardless of their age, gender, and level of education, paid attention to social networks when developing marketing strategies to promote post-industrial tourism.

5. Discussion

This study (based on the Polish and Ukrainian university students and academic staff) tested the hypothesis on the impact of post-industrial tourism development on the local economy, rational and careful use of natural resources, benefit for the local population through employment, and development of local crafts and handicrafts. The t-test and one-way ANOVA findings show no differences among attitudes to post-industrial tourism on the age, gender, and education factors. Such conclusions were similar as those in [36,50–52] and opposite to the conclusions in [36–38]. At the same time, despite the statistically significant relations among indicators analysed, the respondents over 30 years old emphasised the hidden impact of the post-industrial tourism development on the environment.

One of the drivers of recovering the industrial region's development is to favour heritage industrial tourism [60–62]. Its development stimulates international and domestic tourist flows [19] and leads to development of related services, which, in turn, could significantly deteriorate the environment [63–65], mainly due to an increase in transportation, wastes from restaurant and hotel business, electricity consumption, etc. The value of Cronbach alpha was high (0.71) in the interval 0.73–0.79, which confirmed the high consistency of the respondents' answers.

The results of the multiple regression analysis to estimate the influence of the independent variable (tourism development (post-industrial vector)) on the dependent variables (environmental, economic and social dimensions) proved that the development of post-industrial tourism generated direct and indirect positive effects: (1) economic and social effects including increasing income of cultural institutions, creating additional workplaces for local people, generating economic benefits for small and medium businesses, improving the quality of life in the region, etc. an (2) environmental effects including creating green and recreational areas, stimulating the restoration of industrial heritage and conservation of natural resources, etc. These results are opposite to the findings in [14–17].

6. Conclusions

The tourism industry is one of the rapidly growing industries which generates more than 4% of the GDP in the world. In addition, the tourism sector is one of the core determinants of environmental, social, and economic development in a country. The accepted Sustainable Development Goals aim at developing sustainable tourism, particularly post-industrial tourism, which is the basis for economic and social growth for industrial regions.

Additionally, the globalisation process provokes the profound sectoral transformation of the national economy. Consequently, the separate regions feel stagnation in industrial sector development, outflow of labour capital, foreign investment from the region, etc. One of the ways to recover the investment attractiveness of a region is post-industrial tourism development. It could provide a country with stable economic and ecological development (region), reproduction of spiritual and physical forces of the society, preservation of historical heritage, development and rapprochement of cultures, creation of new jobs, and improvement of life quality. Therefore, development of post-industrial tourism could boost the achievement of the Sustainable Development Goals, particularly 8.9 SDG, 11.4 SDG, and 12b.1 SDG.

The findings confirm the necessity to implement the digital marketing tools in promotion of post-industrial tourism services. Thus, the cloud technologies and artificial intelligence would be the core drivers for individualisation of post-industrial tourism services, green awareness, computerisation, and modernisation of the tourism business.

The national and regional authorities and tourism organisations should become the core stakeholders of sustainable tourism development. In this case, the government should control and stimulate sustainable tourism development through economic and fiscal instruments.

References

1. Harfst, J.; Sandriester, J.; Fischer, W. Industrial Heritage Tourism as a Driver of Sustainable Development? A Case Study of Steirische Eisenstrasse (Austria). *Sustainability* **2021**, *13*, 3857. [CrossRef]
2. Pardo Abad, C.J. Valuation of Industrial Heritage in Terms of Sustainability: Some Cases of Tourist Reference in Spain. *Sustainability* **2020**, *12*, 9216. [CrossRef]
3. United Nations. Department of Economic and Social Affairs. Sustainable Development. Available online: https://sdgs.un.org/goals (accessed on 9 February 2021).
4. Vasilyeva, T.; Bilan, S.; Bagmet, K.; Seliga, R. Institutional Development Gap in the Social Sector: Cross-Country Analysis. *Econ. Sociol.* **2020**, *13*, 271–294. [CrossRef]
5. Didenko, I.; Paucz-Olszewska, J.; Lyeonov, S.; Ostrowska-Dankiewicz, A.; Ciekanowski, Z. Social Safety and Behavioral Aspects of Populations Financial Inclusion: A Multicountry Analysis. *J. Int. Stud.* **2020**, *13*, 347–359. [CrossRef]
6. El Amri, A.; Boutti, R.; Rodhain, F. Sustainable Finance at the Time of Institutions: Performativity through the Lens of Responsible Management in Morocco. *Financ. Mark. Inst. Risks* **2020**, *4*, 52–64. [CrossRef]
7. Didenko, I.; Volik, K.; Vasylieva, T.; Lyeonov, S.; Antoniuk, N. Environmental Migration and Country Security: Theoretical Analysis and Empirical Research. In *E3S Web of Conferences*; EDP Sciences: Les Ulis, France, 2021; p. 234. [CrossRef]
8. Samusevych, Y.; Vysochyna, A.; Vasylieva, T.; Lyeonov, S.; Pokhylko, S. Environmental, Energy and Economic Security: Assessment and Interaction. In *E3S Web of Conferences*; EDP Sciences: Les Ulis, France, 2021; p. 234. [CrossRef]
9. Smiianov, V.A.; Vasilyeva, T.A.; Chygryn, O.Y.; Rubanov, P.M.; Mayboroda, T.M. Socio-Economic Patterns of Labor Market Functioning in the Public Health: Challenges Connected with COVID-19. *Wiadomosci Lekarskie* **2020**, *73*, 2181–2187. [CrossRef]

10. Kuzmenko, O.; Vasylieva, T.; Vojtovič, S.; Chygryn, O.; Snieška, V. Why do Regions Differ in Vulnerability to Covid-19? Spatial Nonlinear Modeling of Social and Economic Patterns. *Econ. Sociol.* **2020**, *13*, 318–340. [CrossRef]

11. Chygryn, O.; Rosokhata, A.; Rybina, O.; Stoyanets, N. Green Competitiveness: The Evolution of Concept Formation. In *E3S Web of Conferences*; EDP Sciences: Les Ulis, France, 2021; p. 234. [CrossRef]

12. Chygryn, O.; Bilan, Y.; Kwilinski, A. Stakeholders of Green Competitiveness: Innovative Approaches for Creating Communicative System. *Mark. Manag. Innov.* **2020**, *3*, 356–368. [CrossRef]

13. Bilan, Y.; Vasilyeva, T.; Kryklii, O.; Shilimbetova, G. The Creative Industry as a Factor in the Development of the Economy: Dissemination of European Experience in the Countries with Economies in Transition. *Creat. Stud.* **2019**, *12*, 75–101. [CrossRef]

14. Fang, J.; Gozgor, G.; Paramati, S.R.; Wu, W. The impact of tourism growth on income inequality: Evidence from developing and developed economies. *Tour. Econ.* **2020**. [CrossRef]

15. Koçak, E.; Ulucak, R.; Ulucak, Z.Ş. The impact of tourism developments on CO2 emissions: An advanced panel data estimation. *Tour. Manag. Perspect.* **2020**, *33*, 100611. [CrossRef]

16. Nasseef, M.A.; Alshayeb, H.; Ojilat, J.; Alshafiee, M. The effect of sport tourism management on support for tourism development. *J. Manag. Strategy* **2017**, *8*, 20–34.

17. Godovykh, M.; Ridderstaat, J. Health outcomes of tourism development: A longitudinal study of the impact of tourism arrivals on residents' health. *J. Destin. Mark. Manag.* **2020**, *17*, 100462.

18. Hospers, G.-J. Industrial Heritage Tourism and Regional Restructuring in the European Union. *Plan. Stud.* **2002**, *10*, 397–404. [CrossRef]

19. Kyrylov, Y.; Hranovska, V.; Boiko, V.; Kwilinski, A.; Boiko, L. International Tourism Development in the Context of Increasing Globalization Risks: On the Example of Ukraine's Integration into the Global Tourism Industry. *J. Risk Financ. Manag.* **2020**, *13*, 303. [CrossRef]

20. Yang, X.S.; Xu, H.; Wall, G. Creative Destruction: The Commodification of Industrial Heritage in Nanfeng Kiln district, China. *Tour. Geogr.* **2019**, *21*, 54–77. [CrossRef]

21. European Route of Industrial Heritage. Available online: https://www.erih.net/about-erih/erihs-history-and-goals (accessed on 9 February 2021).

22. Argemí Ballbè, J. Industrial Tourism: When the Industry Becomes a Chance for Tourism. In Proceedings of the 6th Conference of the International Forum on Urbanism (IFoU): TOURBANISM, Barcelona, Spain, 25–27 January 2012.

23. Jóźwiak, M.; Sieg, P. Tourism Development in Post-Industrial Facilities as a Regional Business Model. *Sustainability* **2021**, *13*, 2028. [CrossRef]

24. Somoza-Medina, X.; Monteserín-Abella, O. The Sustainability of Industrial Heritage Tourism Far from the Axes of Economic Development in Europe: Two Case Studies. *Sustainability* **2021**, *13*, 1077. [CrossRef]

25. Zhang, J.; Cenci, J.; Becue, V.; Koutra, S.; Ioakimidis, C.S. Recent Evolution of Research on Industrial Heritage in Western Europe and China Based on Bibliometric Analysis. *Sustainability* **2020**, *12*, 5348. [CrossRef]

26. Letunovska, N.; Kwilinski, A.; Kaminska, B. Scientific Research in the Health Tourism Market: A Systematic Literature Review. *Health Econ. Manag. Rev.* **2020**, *1*, 8–19. [CrossRef]

27. Cavalcante, W.Q.D.F.; Coelho, A.; Bairrada, C.M. Sustainability and Tourism Marketing: A Bibliometric Analysis of Publications between 1997 and 2020 Using VOSviewer Software. *Sustainability* **2021**, *13*, 4987. [CrossRef]

28. Vorontsova, A.; Vasylieva, T.; Bilan, Y.; Ostasz, G.; Mayboroda, T. The Influence of State Regulation of Education for Achieving the Sustainable Development Goals: Case Study of Central and Eastern European Countries. *Adm. Si Manag. Public* **2020**, *34*, 6–26. [CrossRef]

29. George, B. Inclusive Sustainable Development in the Caribbean Region: Social Capital and the Creation of Competitive Advantage in Tourism Networks. *Bus. Ethics Leadersh.* **2020**, *4*, 119–126. [CrossRef]

30. Taliouris, E.; Trihas, N. Public Policy for Corporate Social Responsibility and Governance for Sustainable Tourism Development in Greece. *Bus. Ethics Leadersh.* **2017**, *1*, 49–57. [CrossRef]

31. Andreas Karaoulanis, A.; Vasiliki, K. Tourism in Developing Countries. The Path towards Sustainable Development and Its Interaction with the Local Communities, the Environment and the Human Factor. *Socioecon. Chall.* **2018**, *4*, 80–86. [CrossRef]

32. Tovmasyan, G. Assessing Some Indicators of Tourism Sustainability: Case Study from Armenia. *Socioecon. Chall.* **2019**, *3*, 127–136. [CrossRef]

33. Vicens-Colom, J.; Holles, J.; Liern, V. Measuring Sustainability with Unweighted TOPSIS: An Application to Sustainable Tourism in Spain. *Sustainability* **2021**, *13*, 5283. [CrossRef]

34. Kerstetter, D.; Confer, J.; Bricker, K. Industrial Heritage Attractions: Types and Tourists. *J. Travel Tour. Mark.* **1998**, *7*, 91–104. [CrossRef]

35. Caamaño-Franco, I.; Suárez, M.A. The Value Assessment and Planning of Industrial Mining Heritage as a Tourism Attraction: The Case of Las Médulas Cultural Space. *Land* **2020**, *9*, 404. [CrossRef]

36. Sharma, S. A study of Relationship between Culture, Gender and Sustainable Tourism: A Study of Bhutan. *J. Environ. Account. Manag.* **2019**, *74*, 367–379. [CrossRef]

37. Šenková, A.; Vavrek, R.; Molnárová, N.; Mitríková, J. Gender Differences in Perception on Sustainable Tourism—Case Study Applied to the Pu in Prešov. *Geoj. Tour. Geosites* **2020**, *32*, 1216–1221. [CrossRef]

38. Skanavis, C.; Sakellari, M. Gender and Sustainable Tourism: Women's Participation in the Environmental Decision-Making Process. *Eur. J. Tour. Res.* **2008**, *1*, 78–93.
39. Huang, G.; Ali, S. Local Sustainability and Gender Ratio: Evaluating the Impacts of Mining and Tourism on Sustainable Development in Yunnan, China. *Int. J. Environ. Res. Public Health* **2015**, *12*, 927–939. [CrossRef] [PubMed]
40. Bozhkova, V.V.; Ptashchenko, O.V.; Saher, L.Y.; Syhyda, L.O. Transformation of Marketing Communications Tools in the Context of Globalisation. *Mark. Manag. Innov.* **2018**, *1*, 73–82.
41. Rosokhata, A.; Rybina, O.; Derykolenko, A.; Makerska, V. Improving the Classification of Digital Marketing Tools for the Industrial Goods Promotion in the Globalization Context. *Res. World Econ.* **2020**, *11*, 42–52. [CrossRef]
42. Kharazishvili, Y.; Kwilinski, A.; Grishnova, O.; Dzwigol, H. Social Safety of Society for Developing Countries to Meet Sustainable Development Standards: Indicators, Level, Strategic Benchmarks (with Calculations Based on the Case Study of Ukraine). *Sustainability* **2020**, *12*, 8953. [CrossRef]
43. Miskiewicz, R. Internet of Things in Marketing: Bibliometric Analysis. *Mark. Manag. Innov.* **2020**, *3*, 371–381. [CrossRef]
44. Bondarenko, A.F.; Zakharkina, L.S.; Syhyda, L.O.; Saher, L.Y. The Economic and Marketing Attractiveness of Countries: Measurement and Positioning in Terms of Economic Security. *Int. J. Sustain. Dev. Plan.* **2020**, *15*, 439–449. [CrossRef]
45. El-Gohary, H.; Eid, R. DMA Model: Understanding Digital Marketing Adoption and Implementation by Islamic Tourism Organisations. *Tour. Anal.* **2012**, *17*, 523–532. [CrossRef]
46. Magano, J.; Cunha, M.N. Digital Marketing Impact on Tourism in Portugal: A Quantitative Study. *Afr. J. Hosp. Tour. Leis.* **2020**, *9*, 1–19.
47. Riyadi, S.; Susilo, D.; Sufa, S.A.; Dwi Putranto, T. Digital Marketing Strategies to Boost Tourism Economy: A Case Study of Atlantis Land Surabaya. *Humanit. Soc. Sci. Rev.* **2019**, *7*, 468–473. [CrossRef]
48. Caciora, T.; Herman, G.V.; Ilieș, A.; Baias, Ș.; Ilieș, D.C.; Josan, I.; Hodor, N. The Use of Virtual Reality to Promote Sustainable Tourism: A Case Study of Wooden Churches Historical Monuments from Romania. *Remote Sens.* **2021**, *13*, 1758. [CrossRef]
49. Bacik, R.; Kmeco, L.; Richard, F.; Olearova, M.; Rigelsky, M. Marketing Instrument of Improving Hotel Management Service: Evidence of Visegrad Group Countries. *Mark. Manag. Innov.* **2019**, *1*, 208–220. [CrossRef]
50. Gavurova, B.; Bacik, R.; Fedorko, R.; Rigelsky, M. Analytical View of Online Marketing Tools in the Dimension of Marketing Campaigns' Personalisation in Slovakia. *Mark. Manag. Innov.* **2018**, *2*, 186–200.
51. Cristobal-Fransi, E.; Daries, N.; Martin-Fuentes, E.; Montegut-Salla, Y. Industrial Heritage 2.0: Internet Presence and Development of the Electronic Commerce of Industrial Tourism. *Sustainability* **2020**, *12*, 5965. [CrossRef]
52. Shammi, M.; Bodrud-Doza, M.; Islam, A.R.M.T.; Rahman, M.M. COVID-19 pandemic, socioeconomic crisis and human stress in resource-limited settings: A case from Bangladesh. *Heliyon* **2020**, *6*, e04063. [CrossRef]
53. Islam, S.D.U.; Bodrud-Doza, M.; Khan, R.M.; Haque, M.A.; Mamun, M.A. Exploring COVID-19 stress and its factors in Bangladesh: A perception-based study. *Heliyon* **2020**, *6*, e04399. [CrossRef]
54. Mikulić, J.; Krešić, D.; Kožić, I. Critical factors of the maritime yachting tourism experience: An impact-asymmetry analysis of principal components. *J. Travel Tour. Mark.* **2015**, *32* (Suppl. 1), S30–S41. [CrossRef]
55. Benesty, J.; Chen, J.; Huang, Y.; Cohen, I. Pearson correlation coefficient. In *Noise Reduction in Speech Processing*; Springer: Berlin/Heidelberg, Germany, 2009; pp. 1–4.
56. Abdi, H.; Williams, L.J. Principal component analysis. Wiley interdisciplinary reviews. *Comput. Stat.* **2010**, *2*, 433–459. [CrossRef]
57. Pavlić, I.; Portolan, A.; Puh, B. Segmenting local residents by perceptions of tourism impacts in an urban World Heritage Site: The case of Dubrovnik. *J. Herit. Tour.* **2020**, *15*, 398–409. [CrossRef]
58. Gligor-Cimpoieru, D.C.; Munteanu, V.P.; Nițu-Antonie, R.D.; Schneider, A.; Preda, G. Perceptions of future employees toward CSR environmental practices in tourism. *Sustainability* **2017**, *9*, 1631. [CrossRef]
59. Martín Martín, J.M.; Guaita Martinez, J.M.; Salinas Fernandez, J.A. An analysis of the factors behind the citizen's attitude of rejection towards tourism in a context of overtourism and economic dependence on this activity. *Sustainability* **2018**, *10*, 2851. [CrossRef]
60. Kuzior, A.; Lobanova, A. Tools of information and communication technologies in ecological marketing under conditions of sustainable development in industrial regions (through examples of Poland and Ukraine). *J. Risk Financ. Manag.* **2020**, *13*, 238. [CrossRef]
61. Prokopenko, O.; Miśkiewicz, R. Perception of "Green Shipping" in the contemporary conditions. *Entrep. Sustain. Issues* **2020**, *8*, 269–284. [CrossRef]
62. Polcyn, J. Eco-Efficiency and Human Capital Efficiency: Example of Small- and Medium-Sized Family Farms in Selected European Countries. *Sustainability* **2021**, *13*, 6846. [CrossRef]
63. Kuzior, A. Polish and German experiences in planning and implementation of sustainable development. *Probl. Ekorozw. Probl. Sustain. Dev.* **2010**, *5*, 81–89.
64. Kwilinski, A.; Tkachenko, V.; Kuzior, A. Transparent cognitive technologies to ensure sustainable society development. *J. Secur. Sustain. Issues* **2019**, *9*, 561–570. [CrossRef]
65. Kuzior, A.; Kwilinski, A.; Tkachenko, V. Sustainable development of organizations based on the combinatorial model of artificial intelligence. *Entrep. Sustain. Issues* **2019**, *7*, 1353–1376. [CrossRef]