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INNOVATIONS IN RESEARCH METHODOLOGY

Set-jetting during the COVID-19 pandemic on the example of the economic value of railway bridge over Pilchowice Lake

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Manuscript Preparation
E Funds Collection

Zbigniew Piepiora [1ABCDE], **Paweł Piepiora** [2ABCDE], **Justyna Bagińska** [3ABCDE]

[1] Faculty of Environmental Engineering and Geodesy, Wrocław University of Environmental and Life Sciences, Wrocław, Poland
[2] Faculty of Physical Education and Sports, Wroclaw University of Health and Sport Sciences, Wrocław, Poland
[3] Wrocław Business University of Applied Sciences, Wrocław, Poland

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Abstract

Background & Study Aim: Set-jetting' is also known as 'movie tourism', 'film tourism', 'screen tourism' or 'movie-induced tourism'. It can be defined as the phenomenon of visiting places known from the screen. None of the existing set-jetting researches has applied the contingent valuation method yet. The existing research on set-jetting consists mostly of studies concerning on mapping the phenomenon. The aim of this paper is the knowledge about the economic value of railway bridge over Pilchowice Lake which is a part of the Bóbr Valley Railway 'Bobertalbahn'.

Material & Methods: The object of the research was a railroad bridge over the Pilchowice Lake located in Poland, in Lower Silesia province, Lwówecki district, Wleń commune (the examined bridge was a shooting location of many films). The paper uses a contingent valuation method (CVM) with willingness to pay (WTP) option, supported by literature studies conducted by the authors. Data was collected with a questionnaire prepared by the authors in an online form in connection with the Covid-19 pandemic. The search was conducted from August to December 2020.

Results: The economic value of the railway bridge over the Pilchowice Lake totalled almost PLN 2.6 million (EUR 0.6 million) in 2019 and PLN 111.4 million (EUR 24 million) in 2020, during the Covid-19 pandemic.

Conclusions: Set-jetting increased tourist traffic 3 times, as well as the economic value of the Bóbr Valley Railway including the railroad bridge over Pilchowice Lake. In addition, it was found that increased WTP does not depend on age, education level or income level. Authors' contribution is the first ever study during the Covid-19 pandemic of an unused railway bridge gathering the knowledge about its economic value.

Keywords: Bóbr Valley Railway 'Bobertalbahn' • contingent valuation method (CVM) • movie tourism • willingness to pay (WTP)

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Author's address: Paweł Piepiora, Faculty of Physical Education and Sports, Wroclaw University of Health and Sport Sciences, I. J. Paderewskiego 35 street, Multipurpose Sports Hall room 75, 51-612 Wroclaw, Poland; e-mail: pawel.piepiora@awf.wroc.pl

INTRODUCTION

Tourism – one of the five areas of physical culture sciences, along with physical education, physiotherapy, sports, and recreation [53].

Tourism – activities of visitors who undertake a trip to a main destination located outside their usual environment (for a period of less than a year) for any main purpose: business, leisure or other personal purpose (other than employment by an entity local to the place visited) [54].

As – the coefficient of asymmetry (also known as the coefficient of skewness) is used to determine what the distribution looks like, i.e. whether the data is fairly evenly distributed on both sides of the mean/median, or whether observations lie further from the mean on one side. Ferguson and Takane denote skewness with the symbol "g_1" [55].

Set-jetting' is also known as 'movie tourism', 'film tourism', 'screen tourism' or 'movie-induced tourism'. It can be defined as the phenomenon of visiting places known from the screen [1-4]. None of the existing set-jetting researches has applied the contingent valuation method yet. The existing research on set-jetting consists mostly of studies concerning mapping the phenomenon [5-16].

Bolan and Williams [17] verified the role that image plays in service promotion and consumer choice in the context of set-jetting. They stated that many regions throughout Great Britain had seen their consumer appeal improve because of their links with respective film and television productions. Although they had benefited tourism-wise from this, in many cases there still had not been enough real support from tourist authorities to this phenomenon.

Bolan et al. [18] investigated displacement theory within film-induced tourism and presented a clearer understanding of its inherent implications and opportunities for economic development. They indicated the needs to greater recognition and acceptance of film-induced tourism, closer collaboration between tourist authorities and film bodies, greater efforts to develop and promote the film locations, retention or re-creation of film sets and greater use of qualitative research, especially through new and innovative means such as the blog techniques.

The relevance of the willingness to pay (WTP) adopting the contingent valuation method (CVM) was confirmed by Andrade et al. [19] who carried out a research during the COVID-19 pandemic in which they examined the trend towards an 'authentic cultural' tourism experience in Hawaii and evaluated whether U.S. visitors will be willing to pay for a deeper integration and representation.

For studies on economic consequences of movie tourism development, the contingent valuation method can be used. It allows to calculate the economic value of a given property. Valuation helps to define the user's perception of a given property.

Motivation for the research was the information about the possible demolition of the railway bridge over the Pilchowice Lake as part of reactivation of the Bóbr Valley Railway 'Bobertalbahn' (Photo 1). However, this bridge attracts tourists because the scenes of many movies had been filmed there. So it could be a significant phenomenon the impact crisis phenomenon, in this case the Covid-19 pandemic [20], on the economic value this object.

The main aim of this paper is the knowledge about the economic value of railway bridge over the Pilchowice Lake which is a part of the Bóbr Valley Railway 'Bobertalbahn'.

The decomposition of the goal formulated in this way into the research question is as follows: has the economic value of railway bridge over the Pilchowice Lake during the Covid-19 pandemic increased?

MATERIAL AND METHODS

Object of the research

The railway bridge over Pilchowice Lake (Photos 1 and 2) is located in Poland, in the Dolnośląskie province, in the Lwówek district, in the Wleń commune. It is a part of the railway no. 283, connecting Żagań with Jelenia Góra. The line on the section Jelenia Góra-Lwówek Śląski, known as the Bóbr Valley Railway 'Bobertalbahn', was built in the years 1905-1909. Due to the specificity of the line, which goes through the varied terrain in the Sudeten Mountains, numerous embankments, gorges and tunnels as well as bridges and viaducts were constructed along the line, including the most spectacular engineering construction of the line: the railway bridge over Pilchowice Lake (Photo 3), erected in 1905-1906. The single-track

Photo 1. The railway bridge over Pilchowice Lake. Photo by Zbigniew Piepiora.

Photo 2. On the railway bridge over Pilchowice Lake. Photo by Zbigniew Piepiora.

Photo 3. Pilchowice Lake in the summer. Photo by Zbigniew Piepiora.

railway bridge spans over the north-eastern bay of the lake. It was erected in a truss structure consisting of a steel truss with a lower parabola, with steel spans overhanging on both sides. The structure is supported by stone pillars and abutments on the north and south sides. The passage was carried out in the upper part of the structure with a span of approx. 150 meters [21-32].

Various materials, machines and workers for the construction of the dam on Pilchowice Lake (Photo 4) were transported with the Bóbr Valley Railway (Photo 5). The line had always been a secondary one; it has never been electrified and was operated by steam and diesel engines. In April 1945, after mining action by the German troops, an attempt was made to blow up the bridge. Luckily, only the brick part of the bridgehead was damaged, therefore it did not require major repair work, and it was reopened in 1946. It continued its service until 2016, when the rail traffic on the Jelenia Góra-Lwówek Śląski line was stopped and the bridge was closed [33, 34].

In September 2020, due to increased tourist traffic in the Wleń commune, caused by the information about the alleged blowing up of the bridge over Pilchowice Lake, railway enthusiasts created a tourist attraction: the Bóbr Valley Railway was reactivated in the form of weekend trolley rides from the railway station in Wleń through the railway tunnel and back [38, 39].

Photo 4. The dam on Pilchowice Lake. Photo by Zbigniew Piepiora.

Photo 5. The 'Pilchowice Zapora' railway station. Photo by Zbigniew Piepiora.

In 2020, there was information in the media that Tom Cruise was to blow up a railway bridge over Pilchowice Lake in his new film 'Mission Impossible 7'. As a result of set-jetting, tourist traffic in Pilchowice increased threefold despite the Covid-19 pandemic. Admittedly, the bridge had attracted railway enthusiasts, history lovers and explorers before, but that year it became a well-known tourist attraction [35, 36].

In August 2020, the bridge over Pilchowice Lake was entered in the register of historical monuments in Poland, because, as it was argued, it is the most spectacular structure among the engineering structures of the line, it is a testimony of a bygone era, it has survived to this day in its original architectural form, and it is a carrier of knowledge about the state of technology and railway construction from the turn of the 19th and 20th centuries, and the structure with an inverted parabola is less and less common in world [37].

The bridge does not only attract tourists, visitors or railway architecture lovers. Ultimately, the bridge did not become an element of the action film starring Tom Cruise in 'Mission Impossible 7', yet in the summer of 2020, scenes for the movie 'Republika dzieci' were shot there. Previously, 2007 'Kocham kino' ('To each his own cinema') were filmed here, and other films were shot nearby: 'Skąpani w ogniu' war film (1963), 'Jak rozpętałem II wojnę światową' (1969) and 'Trick' (2010). The bridge was also recreated in the computer game 'The Vanishing of Ethan Carter' (2014). Moreover, a crime story 'Zapora' was set near the bridge [36, 37].

Method

The contingent valuation method (CVM) was used (the so-called method of declared preferences). The foundation for the valuation is determination, with the use of surveys, what amount of money the respondents are willing to pay (WTP) for using the environment, for some natural goods, or the amount of money they are willing to accept as a compensation for not being able to use environment.

A hypothetical market is created in which two things can be determined: 1) the respondents' willingness to pay for an environmental good or service or for the achievement of an environmental objective; 2) the respondents' willingness to accept compensation for the loss of use of an environmental good or service or for the deterioration of ecological conditions (quality of the natural environment). The WTP indicates the maximum amount that a respondent would be willing to pay in order to receive a particular environmental good [40-46].

The formula for the annual stream of WTP benefits has been described with the following equation no. 1 [37].

$$YWTP = M_{WTP} \cdot L \quad \text{(Eq. 1)}$$

YWTP – annual willingness-to-pay benefit WTP
M_{WTP} – median of WTP value
L – number of visitors

Formula for perpetual annuity has been described with the following equation no. 2. [47, 48].

$$PV = \frac{YWTP}{i} \quad \text{(Eq. 2)}$$

PV – perpetual annuity of WTP
YWTP – annual willingness-to-pay WTP
i – interest rate

The following study assumption were adopted: minimum size of the statistical sample was 261 respondents, maximum statistical error was set at 6% with confidence interval at 95 % and fraction size was set at 0.5. Moreover, interest rate was defined as matching the National Bank of Poland reference interest rate (1.5% in 2019 and 0.1% in 2020); and conversion rate was set at 1 Euro = 4.68 PLN [49-52].

Procedure

The questionnaire of own authorship was available in the period of August to December 2020 through: a website concerning the tourism, culture and history of the Sudeten Mountains; 'Na szlaku', a travelling and sightseeing on-line journal; and though social media accounts and mailing groups of Sudeten Mountains enthusiasts.

In order to assess the number of visitors, the authors asked: *How many visitors did you meet in Pilchowice in the Wleń commune (excluding those who came with you) during your last stay?* (in the analysis of the results "question A").

To obtain WTP, the authors asked: *If a fund was created to renovate and protect the railway bridge over Pilchowice Lake against damage, what amount*

(in PLN) could you pass on to this fund annually? (in the analysis of the results "question B").

The respondents were asked to declare the province in which they live, their gender, age group, education level, and the average monthly net income ("on hand"). The questions were developed after consultations with experts on tourism, recreation and spatial management from several Polish universities.

The respondents were also asked about the monthly household income.

Statistical analysis

The results is based on the following indicators: frequency (N); aspect indicator (%)skewness (As). In order to determine whether respondents age, level of education or income level influence the respondents' willingness to pay more, the Pearson's linear WTP correlation coefficients were calculated. The age and income level were quantitative variables while the level of education was the categorical variable but we changed it to a quantitative variable by coding the levels of education: (1) primary school and lower secondary school; vocational education (2); secondary school and post-secondary college (3); higher education (4).

RESULTS

Respondents from Dolnośląskie province prevailed (75.73%) and were followed by the residents of: Śląskie, Opolskie, Łódzkie and Wielkopolskie provinces. Males were slightly more numerous in the research – a little over 51%. The respondents were mainly young people of 18-24 years of age: almost 60%, and were followed by respondents aged 35-44 and 45-54. Regarding education, the respondents with higher education prevailed (73.65%), while over 23% of the respondents had secondary and post-secondary college education (Table 1).

Table 1. Summary of survey results (basic information).

Variable		
specific identification	**absolute value (N persons)**	**relative value (%)**
Province		
Dolnośląskie	181	75.73
Śląskie	14	5.86
Opolskie	12	5.02
Łódzkie	8	3.35
Wielkopolskie	8	3.35
Lubelskie	4	1.67
Lubuskie	3	1.26
Świętokrzyskie	2	0.84
Kujawsko-pomorskie	1	0.42
Małopolskie	1	0.42
Mazowieckie	1	0.42
Podkarpackie	1	0.42
Podlaskie	1	0.42
Pomorskie	1	0.42
Warmińsko-mazurskie	1	0.42
Zachodniopomorskie	0	0.00

Variable		
specific identification	absolute value (N persons)	relative value (%)
Gender		
female	133	48.7
male	140	51.3
Age (in years)		
18-24	162	59.12
25-34	25	9.12
35-44	31	11.31
45-54	29	10.58
55-64	18	6.57
65 and more	9	3.28
Education		
primary school and lower secondary school (1)	6	2.17
vocational education (2)	3	1.08
secondary school and post-secondary college (3)	64	23.10
higher education (4)	204	73.65

Aggregated data on the monthly income in the respondent's household was as follows: median was PLN 3000, mean value was PLN 3097.64, mode was PLN 4512.41 and As = 3097.64 − 4512.41. Skewness of the distribution was PLN −1414.77, thus the distribution of monthly income per person in the respondent's household shows left-hand skewness.

The answer to the "question A": in 2019 it was 3,893 people; in 2020 the number of visitors totalled 11,139.

The answer to the "question B": the mode for WTP was PLN 0, the median for WTP was PLN 10 and the mean value for WTP was PLN 4 315 289.7; As = PLN 4 315 289.78 − PLN 0 = PLN 4 315 289.78. The WTP distribution turned out to be right-skewed, thus the median WTP was used for further calculations.

The following relations between the items were as follows: WTP and respondent's age: 0.072; WTP and the respondent's level of education: 0.035; WTP and respondent's income level: −0.011. This means that respondents are not willing to pay more, regardless of their age, education level or income level.

The annual willingness-to-pay benefit stream for 2019 and 2020 (the formula $YWTP = M_{WTP} \cdot L$): YWTP2019 = PLN 10 • 3893 = PLN 38 930; YWTP2020 = PLN 10 • 11139 = PLN 111 390.

According to the formula $PV = \frac{YWTP}{i}$, the perpetual annuity was calculated: PV2019 = PLN 38 930 / 1.5% = PLN 2 595 333.33; that is PLN 2.6 million (EUR 554,558.41); PV2020 = PLN 111,390 / 0.1% = PLN 111,390,000; that is PLN 111.4 million (EUR 23,801,282.05).

DISCUSSION

Since the Sudeten Mountains (including the research area) are situated in the Dolnośląskie province, most of the respondents naturally were from this area. The respondents from outside Dolnośląskie province have either been to the area in question or have their families or friends there and generally know the history of the investigated bridge.

The economic value of the railway bridge over the Pilchowice Lake totalled almost PLN 2.6 million (EUR 0.6 million) in 2019 and PLN 111.4 million (EUR 24 million) in 2020, during the Covid-19

pandemic. The reason of increasing value in the period 2019-2020 of the railway bridge over the Pilchowice Lake was a 15-fold reduction in the reference rate by the National Bank of Poland at the beginning of 2020 and a 3-fold increase in the intensity of tourist traffic in Pilchowice due to set-jetting despite the Covid-19 pandemic.

Andrade et al. [19] quantified the WTP adopting the CVM during the COVID-19 pandemic, however they did not focus on set-jetting. Thus, our study was the only one, out of the current ones on set-jetting using the CVM. We used the CVM to estimate the economic value of the unused railway bridge which serves as a set-jetting destination. Similar to Bolan and Williams [17], our study was an interdisciplinary one as it regarded psychology, geography and economy. Moreover, our study focused only on destination customers. Following Bolan et al. [18], we researched implications and opportunities for economic development that set-jetting may bring to a community.

The study limitation is that the respondents were predominantly young people (18-24 years old) with higher education and residents of the Dolnośląskie province, probably due to the proximity to railway bridge over Pilchowice Lake.

In the future, authors are going to focus on calculation of the economic value of other disused railways, especially that some disused railways in Dolnośląskie province have been re-opened in recent years, for instance railway line Wrocław Psie Pole – Trzebnica (no. 326 in 2009) and Wrocław Główny – Świdnica (no. 285 in 2022), and others are scheduled for re-opening in coming years (for example no. 340 Mysłakowice – Karpacz line and no. 308 Kamienna Góra – Jelenia Góra).

CONCLUSIONS

Despite the Covid-19 pandemic, set-jetting increased the tourist traffic 3-fold (caused also by a 15-fold reduction in the reference rate by the National Bank of Poland) and boosted the economic value of Bóbr Valley Railway and the economic value of its essential part: the railway bridge over Pilchowice Lake.

There was no linear correlation between WTP and the age, level of education and income of the respondents which means that WTP more does not depend on age, level of education or level of income.

Authors' contribution is the first ever study during the Covid-19 pandemic of an unused railway bridge gathering the knowledge about its economic value.

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