

ISSN 1644-0749

# **ACTA SCIENTIARUM POLONORUM**

Scientific journal (quarterly), issued since 2002,  
whose founder and advocate is the Conference of the Rectors of Universities  
of Life Sciences

## **Administratio Locorum** **Gospodarka Przestrzenna**

Land Administration

22(2) 2023

kwiecień – czerwiec

April – June



Bydgoszcz Kraków Lublin Olsztyn  
Poznań Siedlce Szczecin Warszawa Wrocław

ACTA Scientiarum Polonorum Administratio Locorum was founded by all Polish Agricultural Universities in 2001 and it is published by University of Warmia and Mazury Publishing House.

### **Program Board of Acta Scientiarum Polonorum**

Mariusz Kulik (Lublin), Tomasz Okruszko (Warszawa), Julita Reguła (Poznań), Roman Rolbiecki (Bydgoszcz), Wiesław Skrzypczak (Szczecin), Józef Sowiński (Wrocław), Barbara Symanowicz (Siedlce), Andrzej Wałęga (Kraków), Ryszard Żróbek (Olsztyn)

Administratio Locorum is indexed in the following databases: SCOPUS, ERIH PLUS, AGRO, PolIndex, Baz Hum, Index Copernicus, Central and Eastern European Online Library, EuroPub, DOAJ

This journal is the open access and non-profit enterprise. The published papers may be collected, read and downloaded free of charge – with Author's rights reserved. We have adopted a Creative Commons licence CC BY-NC-ND (Attribution-NonCommercial-NoDerivatives).



### **Aim and scope**

Series „Administratio Locorum” is concerned with the social, economic, geographic, legal, environmental and planning aspects of land administration. The aim of the journal is to provide an interdisciplinary platform for the exchange of ideas and information among scientists representing various disciplines, whose ideas and discoveries tribute to effective land administration. Thus, journal publishes both reviews and empirical studies presenting the results of surveys and laboratory works. Topics covered by our Authors include, i.e.: land administration, technical and social infrastructure, spatial economics, social-economic geography, land management, real estate management, rural areas, environmental protection, protection of historical buildings, spatial planning, local and regional development, sustainable development, urban studies, real estate market, transport systems, legal regulations for the land administration, and spatial management. The primary aim of the journal and its mission are to spread information and guidance relevant both for authorities responsible for the effective land administration (local, regional and central), scientists and teachers.

Four issues are published every year.

**The journal received financial support from the Ministry of Education and Science pursuant to agreement No. RCN/SP/0265/2021/1 of 1 November 2022; value of the grant awarded as part of the „Development of scientific journals” program – PLN 61 000.**

ISSN 1644-0749 (print) eISSN 2450-0771 (online)

Cover design Daniel Morzyński

Text editor Aneta Maciejewska

Computer typesetting Marzanna Modzelewska

© Copyright by Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie

ul. Jana Heweliusza 14, 10-718 Olsztyn, Poland

e-mail: wydawca@uwm.edu.pl, [www.uwm.edu.pl/wydawnictwo/](http://www.uwm.edu.pl/wydawnictwo/)

Edition 35 copies; publisher's sheets 23,5; number of printed sheets 22,5

Print: Zakład Poligraficzny UWM w Olsztynie, order number 481

# Editorial and Scientific Board of Acta Scientiarum Polonorum Administratio Locorum

## Editorial Board

Chairman of Scientific Board, Chief Editor of the series Administratio Locorum

**Assoc. Prof. Agnieszka Dawidowicz** – University of Warmia and Mazury in Olsztyn (Poland)

Secretary of the scientific and editorial board

**Ph.D. Anna Klimach** – University of Warmia and Mazury in Olsztyn (Poland)

**Ph.D. Marta Czaplicka** – University of Warmia and Mazury in Olsztyn (Poland)

**MSc Mateusz Ciski** – University of Warmia and Mazury in Olsztyn (Poland)

## Thematic editors of Administratio Locorum series

*Economics* – **Ph.D. Alina Źróbek-Róžańska** – University of Warmia and Mazury in Olsztyn (Poland)

*Environment and nature sciences* – **Ph.D. Anna Źróbek-Sokolnik** – University of Warmia and Mazury in Olsztyn (Poland)

*Geography* – **Assoc. Prof. Adam Senetra** – University of Warmia and Mazury in Olsztyn (Poland)

*Geography* – **Ph.D. Cezary Kowalczyk** – University of Warmia and Mazury in Olsztyn (Poland)

*Geography* – **Ph.D. Katarzyna Pawlewicz** – University of Warmia and Mazury in Olsztyn (Poland)

*Geoinformation systems* – **Ph.D. Marta Czaplicka** – University of Warmia and Mazury in Olsztyn (Poland)

*Geography, urban planning* – **Assoc. Prof. Agnieszka Szczepańska** – University of Warmia and Mazury in Olsztyn (Poland)

*Law* – **Ph.D. Michał Pietkiewicz** – University of Warmia and Mazury in Olsztyn (Poland)

*Property management* – **Ph.D. Andrzej Muczyński** – University of Warmia and Mazury in Olsztyn (Poland)

## Scientific Board

**Fabio Bittencourt** – Spatineo, Helsinki (Finland)

**Olga Buzu** – Technical University of Moldova (Republic of Moldova)

**Lê Thị Giang** – Hanoi University of Agriculture (Vietnam)

**Igor Ivan** – VŠB-Technical University of Ostrava (Czech Republic)

**Arturas Kaklauskas** – Vilnius Gediminas Technical University (Lithuania)

**Ozan Koseoglu** – University of Wollongong in Dubai (United Arab Emirates)

**Urszula Myga-Piątek** – University of Silesia in Katowice (Poland), Chairman of Polish Geographical Society

**Alina Maciejewska** – Warsaw University of Technology (Poland)

**Tadeusz Markowski** – University of Lodz (Poland)

**Mirelys Torres-Pérez** – University of Las Tunas (Cuba)

**Nguyen Khac Thoi** – Vietnam National University of Agriculture in Hanoi (Vietnam)

**Jan Růžička** – Technical University of Ostrava (Czech Republic)

**Rachida Senouci** – Mostaganem University (Algeria)

**Ivančica Dvoržak Schrunk** – University of Minnesota (USA)

**Ewa Siemińska** – Nicolaus Copernicus University in Torun (Poland)

**Katarzyna Siła-Nowicka** – University of Glasgow (United Kingdom)

**Nikolai Siniak** – University for Information Science and Technology “St. Paul the Apostle” (Republic of North Macedonia)

**Rodica Sirbu** – State Agrarian University of Moldova (Republic of Moldova)

**Daniela Špírková** – University of Technology in Bratislava (Slovakia)

**Stefania Środa-Murawska** – Nicolaus Copernicus University in Torun (Poland)

**Ana Claudia Teodoro** – University of Porto (Portugal)

**Maria Trojanek** – Poznan University of Economics (Poland)

**Dariusz Veteikis** – Vilnius University (Lithuania)





ORIGINAL PAPER

Received: 27.05.2022

Accepted: 19.12.2022

## AN ANALYSIS OF THE PERCEIVED LIVEABILITY INDEX WITH THE USE OF ADJUSTED AND WEIGHTED ASPECTS BASED ON A MULTI-STAKEHOLDER PERSPECTIVE IN THE INDONESIAN CITY OF BALIKPAPAN

Saiful Khozi<sup>1✉</sup>, Ida Bagus Dharmawan<sup>2✉</sup>, Dessy Handa Sari<sup>3✉</sup>, Tizar M. Bijaksana<sup>4✉</sup>, Suheriah M. Devi<sup>5✉</sup>

<sup>1</sup> ORCID: 0000-0001-8841-0044

<sup>2</sup> ORCID: 0009-0007-5690-119X

<sup>3</sup> ORCID: 0000-0001-5904-9309

<sup>4</sup> ORCID: 0000-0003-1783-7184

<sup>1</sup> Brawijaya University

Veteran Street 16, Malang, East Java, **Indonesia**

<sup>1,2,3</sup> Balikpapan State Polytechnic

Soekarno Hatta Street KM 08, Balikpapan, East Kalimantan, **Indonesia**

<sup>4</sup> Institut Teknologi Bandung

Ganesha Street 10, Bandung, West Java, **Indonesia**

<sup>5</sup> Balikpapan University

Pupuk Raya Street 01, Balikpapan, East Kalimantan, **Indonesia**

### ABSTRACT

**Motives:** Dynamic strategic issues have raised concerns about perceived liveability measurements to maintain a high quality of life that affects the residents' wellbeing. Liveability aspects and indicators should be adjusted to accurately identify local issues and living conditions, and to promote community participation. Rigorous research methods with more representative samples are required to improve the accuracy of perceived liveability analyses in a specific context.

**Aim:** The aim of this study was to measure the perceived liveability index in the Indonesian city of Balikpapan. The economic development of Balikpapan relies heavily on natural resources, and the city will be affected by the government's plan to relocate the Indonesian capital. A survey involving both quantitative and qualitative methods was conducted to analyse perceived liveability in Balikpapan. The aspects and indicators of perceived liveability were adjusted and weighted based on a multi-stakeholder perspective to accurately represent the interests of all stakeholders when calculating the perceived liveability index using the Analytic Hierarchy Process (AHP). A content analysis of open-ended responses was carried out to analyse the feedback and the problems experienced by Balikpapan residents. The developed approach contributed to a better understanding of the residents' opinions regarding the quality of life in the city.

**Results:** Eight aspects of perceived liveability consisting of 51-item indicators were defined in this study. These aspects were arranged in the following descending order based on the values of the

✉saiful.khozi@poltekba.ac.id, ✉ida.bagus.dharmawan@poltekba.ac.id, ✉dessy.handa@poltekba.ac.id,

✉tizar@office.itb.ac.id, ✉suheria@uniba-bpn.ac.id

assigned weights: (1) access to basic utilities, (2) environment and health, (3) social development and security, (4) economy, (5) utility, (6) transport, (7) spatial development, and (8) recreation, culture, and public spaces. The analysis revealed that industrial and urban development in the eastern part of the city is inversely proportional to the perceived liveability index. In turn, urban development plans in the northern part of the city offer better prospects for new urban residents, economic actors, and stakeholders in the future residential design. The two major factors of perceived liveability, namely cleanliness and safety, indicate that the city effectively accommodates the needs of the existing residents, as well as potential migrants. Floods and poor road quality were identified as the most pressing problems in the city. According to the residents, economic problems and job insecurity were the main consequences of the COVID-19 pandemic. The results of this study can assist the local authorities in enhancing the capacity of urban policies or levels of policy implementation to meet the needs of local residents.

**Keywords:** perceived liveability index, Balikpapan, Analytic Hierarchy Process

## INTRODUCTION

Liveability measurement is essential in guiding toward appropriate directive policy. It assists the government in ensuring that the direction of the development policies is in line with the resident's aspiration globally in creating the liveable cities (Lowe et al., 2020). Various approaches have been employed in measuring liveability index from physical aspects and facility access to the shifting trend towards the socio-impact and environment dimension of rising urbanization. In the last study concerns of liveability, there is a significant role of participation and intervention community in urban governance to best improve the community wellbeing (Zhan et al., 2018; Paul & Sen, 2020; Sep & Kyong, 2020); with emphasizing on the significant impact of the Coronavirus pandemic on the quality of life in almost all cities around the world (Nieuwenhuijsen, 2021). However, the study on perceived liveability with a multi-stakeholder community perspective in weighting aspects, particularly in Indonesia, is still lacking. Drawing on a more rigorous method of survey-based study with transparently justifying the weight of aspects in stakeholder participatory practice, this study investigates perceived liveability of Balikpapan City, Indonesia – a natural resource-based city that faces the potential effect of the relocation of Indonesian capital policy.

There are various references in assessing the liveability of the city which are globally trusted

as a valid, reliable, and knowledgeable index, e.g., The Economist Intelligence Unit (EIU) Global Liveability Index, Mercer Quality of Living (QoL) Survey, Better Life Index (BLI) conducted by Economic Co-operation and Development (OECD), Numbeo's Quality of Life Index, and Monocle's Quality of Life Survey (Paul & Sen, 2020). The liveability indexes were calculated based on objective-secondary data and were reviewed from the researcher's perspective. The indices are mostly based on measurable and reproducible factors to compare various area's situations and their development objectively. While the perceived liveability addresses the subjective nature of people assessments of areas condition (Namazi-Rad et al., 2015).

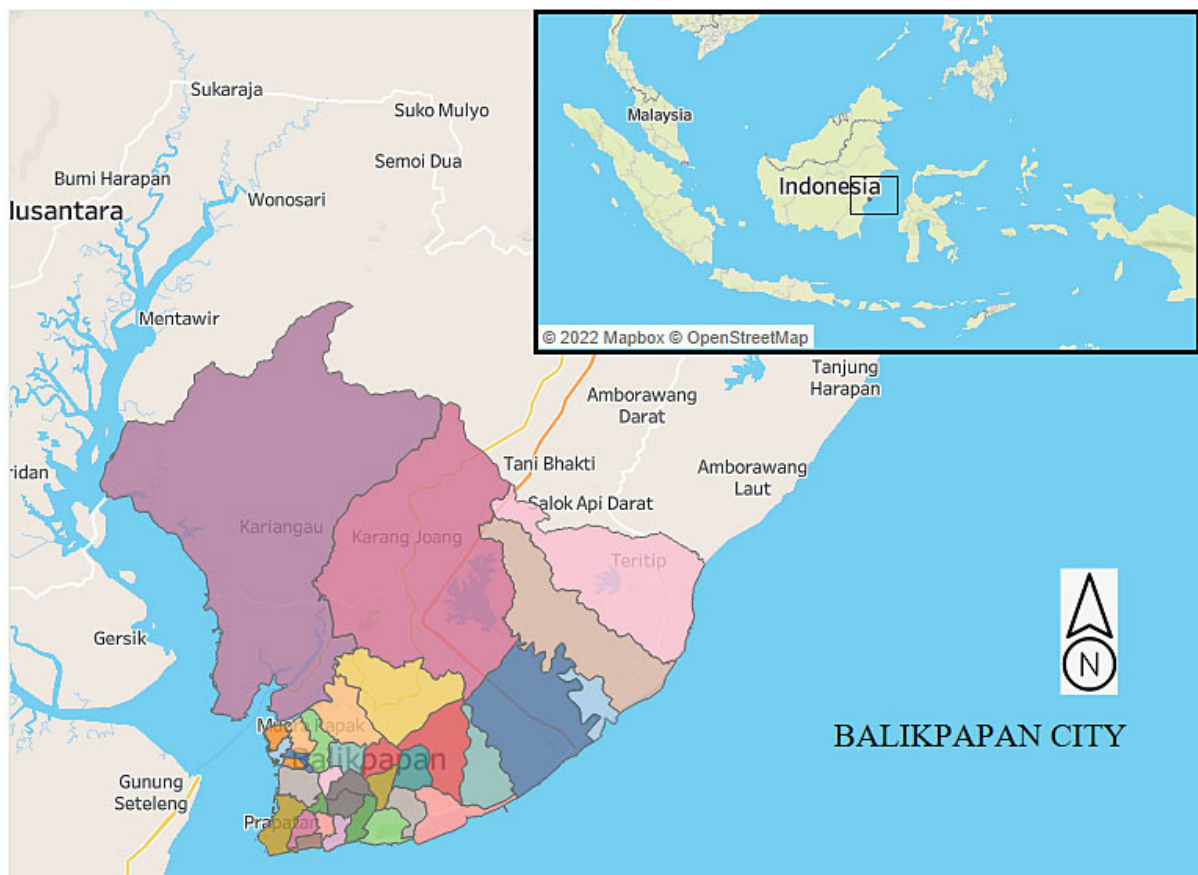
In Indonesian context, the Indonesian Association of Planners (IAP) developed a perceived-based survey of liveability, i.e., "Indonesian Most Liveable City Index (MLCI)", as an attempt to recognize the liveability level of the city in Indonesia. It portrayed the level of city's comfortable environment and atmosphere as a place to live and work, as seen both physically (infrastructure, urban facilities, spatial planning, and so on) and non-physically (social and economic factors) (Indonesian Association of Planners (IAP), 2021). The building aspects of the MLCI index included seven availabilities, namely, (a) basic needs, (b) public and social facilities, (c) public space, (d) safety and security, (e) environmental quality, (f) social-economic and cultural infrastructures, and (e) community participation. As noticeable shifting

trend in the existing liveability approaches (Paul & Sen, 2020), particularly in the East country, MLCI aspects and indicators were also considering the socio-economic impacts of rising urbanization within cities. The MLCI index became a benchmark for the quality of life of city residents in Indonesia and has been widely used as a reference in assessing liveability and formulating local government policies (Surjono et al., 2021; Hardiansyah, 2014; Titisari Danielaini et al., 2019). It resulted in the list of most perceived-liveable cities in Indonesia in 2009, 2011, 2014, and 2017.

Though the index is considered quite effective for comparing several cities as its consistency in technical analysis, however, due to the small sample size in the MLCI survey (i.e., about 100 samples in every city-targeted of the survey), the MLCI survey is not deep enough to capture the liveability of a specific city.

Whereas the liveability is multi-stakeholder in determining aspects priority as well as depending on resident perspective (Paul & Sen, 2020; Sep & Kyong, 2020; Onnom et al., 2018). Therefore, adjustment of aspects and indicators was necessary to obtain more specific aspects regarding local issues, contemporary conditions, and better multi-stakeholder community participation. A more rigorous method of survey with better sample representativeness is required to get a better understanding of perceived liveability in the specific context.

In the developing urban city, the transformation challenges and other strategic issues have led to a growing concern regarding the problems of the future and for the well-being of dwellers (Tannerfeldt & Ljung, 2006; Loorbach & Shiroyama, 2016; Ekhaese & Asinobi, 2022). Balikpapan City, an urban city



**Fig. 1.** The Map of Balikpapan City which consists of thirty-four urban villages  
 Source: own preparation based on Author (2021).

located in East Kalimantan of Indonesia (as shown in Figure 1), is an example of an urban city that is facing a transformation issue toward a post-natural resource industry era in the future (Tarigan et al., 2017). In addition, in the current issue, the city will become a buffer zone and a city-gateway into Indonesia's new capital in East Kalimantan (Bloomberg, 2021). Indonesia's national strategic policy regarding the relocation of the capital city of Indonesia from Java island to East Kalimantan, located nearly 70 km from the Balikpapan City (as shown in Figure 2), could impact on increasingly issues related quality of life of Balikpapan residents as well as on the resilience of the city community in the future (Van Leynseele & Bontje, 2019; Wardhana, 2021).

In this study, a survey-based study would be conducted to measure the perceived liveability index based on transparently justifying the weight of aspects with related stakeholder participatory practice, i.e., the Analytical Hierarchy Process (AHP). A quantitative content analysis of open-ended responses would be undertaken to analyse the feedback and the problem experienced by resident while living in Balikpapan City. The two such works of analysis are arguably able to provide a more comprehensive understanding

of the population's feedback to their life quality related the current issues. The subjective nature of liveability in this study will complement the perspective of urban development in the previous study such as Tarigan et al. (2017), which based on qualitative-objective data, in the context of Balikpapan City. It is argued that none of the previous studies considers the liveability of the city in the setting of facing the issue of transformation toward the post-natural resource industry era and getting the impact of strategic policy such as relocation of the capital city. Thus, using Balikpapan City-Indonesia as a case study, this study developed aspects and indicators of liveability, with weighing each aspect based on a multi-stakeholder perspective, representing all parties' interests in calculating the perceived liveability index. Analytical Hierarchy Process (AHP) (Saaty, 1980; Saaty, 2002) is potentially employed in this study as a decision support system to get the weight of value of each defined aspect in measuring the liveability index. It is widely used as a systematic approach in defining stakeholder goals and preferences in the solution process of multi-criteria and multi-stakeholder decision problems (Harker & Vargas, 1987).



Fig. 2. Balikpapan and New Indonesia Capital Location

Source: own compilation based on the document of <http://chinadialogue.net>.



## THE STUDY AREA

Balikpapan city has been supported by the oil and coal mining industry for many decades. It has resulted in the growth of labor demand, and migration of people from across the regions (Tarigan et al., 2017; Afkarina et al., 2019; Karim et. al, 2019). The oil refinery of the Indonesia state-owned oil company (i.e., *PT Pertamina*) situated in the city (as shown in Figure 3) has a capacity of 260 million barrels per day, which is equivalent to 25% of the national capacity – as the second largest refinery in Indonesia (BP, 2019). While coal mining industry in East Kalimantan contributed at least 65% from total coal industry in Indonesia (Afkarina et al., 2019). The presence of several large

companies related to the oil and mining industry in the city has increased the number of middle and upper-class people living there. Therefore, Balikpapan has transformed into an urban city as well as a center for the service industry (Kozłowski et al., 2021) which has improved the quality of infrastructure and investments in various strategic projects as a result of the natural resource-based business in East Kalimantan. However, as the natural-based city, Balikpapan faces its own challenges in adapting its economic activities to the post-oil industry era in the future.

As discussed in previous empirical studies (Moser et al., 2015; Woodworth, 2015; Deng et al., 2018; Su & Qian, 2020), the natural resource-based cities, after going rapidly in their economy, will one day

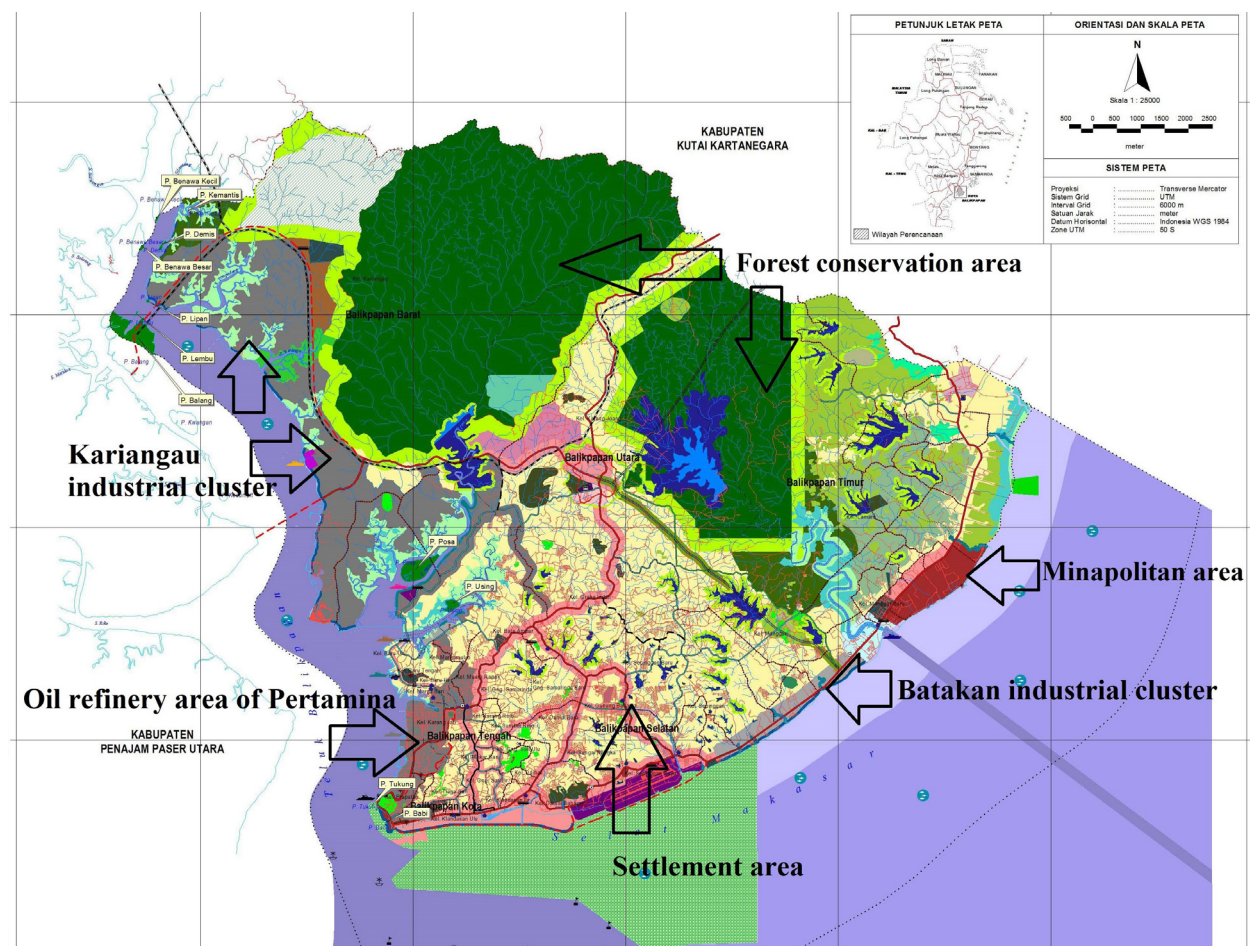


Fig. 3. Balikpapan's land use 2012–2023

Source: own compilation based on the document of Regional Development Planning Board of Balikpapan City (2012).

experience a period of peak business and then decline in line with the decrease of their limited natural resources. A study on the readiness of transformation towards the post-natural resources industry era of the resources-based city was carried out by Tarigan et al. (2017) in the context of the Balikpapan City. Several recommendations from such study resulted from qualitative methods that focused solidly on three main factors underlying transformation, namely public policies and regulations, urban infrastructure, and knowledge creation and utilization (Tarigan et al., 2017). However, the life quality of residents has never been discussed regarding the issue.

Meanwhile, the relocation of Indonesia's capital to East Kalimantan is an issue that needs to be anticipated regarding that Balikpapan is expected to be a buffer zones for big relocation project. It is known that Balikpapan will be the nearest city and the gateway for people, goods, and services to build the capital city (Wardhana, 2021). The strategic policy of relocating Indonesia's capital to East Kalimantan increases the complexity of the variables in the study of the life quality of the city. Therefore, this study contributes to the empirical study of city-profile experiencing the transformation toward the post-oil industry era and getting the effect of relocation of capital city through resident's perspective.

## METHODOLOGY

### Data collection

The study was designed as a survey-based study. It used the Open Data Kit (ODK) app, which was installed on the enumerators' mobile devices and connected directly to ONA's server service (<http://ona.io>, date of access: May–September 2021), to collect data. The sample was taken randomly from all registered households in Balikpapan City by an on-site survey with a self-administered questionnaire to obtain both quantitative and qualitative data. The quantitative data, in the form of 51-items of close-ended responses, was collected from a close-ended questionnaire. While the qualitative one, in the form of 3-items of open-ended responses, was collected from an

open-ended questionnaire. Other complementary data, like how long it took to fill out the questionnaire, the respondent's geolocation, and the respondent-surveyor of selfie photos, were also collected and analyzed to make sure the data was valid. The spatial distribution of respondents was ensured with the geotagged sample provided by the technology in this study (El-Shamaa & Biradar, 2018). The survey was carried out for four months, from May 2021 to August 2021, involving twenty-five trained enumerators.

### Instrument development

In developing the questionnaire to measure perceived liveability index, a Focus Group Discussion (FGD) was conducted involving representation of related expertise and practitioners as participants, i.e., academics, Regional Development Planning Board of Balikpapan City (*BAPPEDA Kota Balikpapan*), and Regional People's Representative Council. It used purposive sampling in selecting participant representative of FGD. The 28-item indicators of Most Livable City Index (MLCI) compiled by the Indonesian Association of Planners/IAP (2021) was proposed as a base-point of in-dept discussion. Guided by the rule of discussion shown in Appendix A, the aforementioned representatives discussed liveability indices, initially related to MLCI and then its relevancy to the context of Balikpapan City. The discussion was intended to know the extent to which the MLCI scale can represent all residents' interests related to local issues and contemporary conditions within the city, as well as to uncover the liveability aspects and indicators that were not accommodated in the scale. All opinions from participants were tabulated and subjectively reviewed using note-base analysis (Krueger & Casey, 2014), leading to the new, detailed, and improved aspects/indicators, as presented in Appendix B. Eight aspects consisting of 51-item indicators were finally defined as final questionnaire, namely, (a) economy, (b) spatial, (c) environment and health, (d) transportation, (e) social and security, (f) utility, (g) recreation, culture, and public space, and (h) basic need access, as presented its indicators in detail in Appendix A.

The questionnaire, which took approximately 20 minutes to complete, consisted of three question segments: (a) the demographic data of respondents, (b) a 51-item close-ended attributes of liveability, and (c) a 3-item open-ended questions. The positive sentences were presented in close-ended attributes, for example “I am satisfied with the quality of government administration services”. The instrument used a five-point Likert scale to measure the liveability index. Its scale ranged from 1 which represented strongly disagree to 5 for strongly agree. The 3-item open-ended questions, which were intended to obtain opinions and problems faced by respondents in a snapshot manner, were as follows:

Q1: what make you comfortable living in Balikpapan City;

Q2: what problems did you experience while living in Balikpapan City;

Q3: what is the impact of the Covid-19 pandemic on your life while living in Balikpapan City.

Questionnaires created and installed in the ODK application were first piloted to ten FGD participants representatives to get feedback regarding the ease of data collection and the content validity of all item attributes. Based on FGD and piloted instrument, several editorial improvements were made to ensure the visibility of the application in data collection and the content validity of the questionnaire.

## Population and sampling

Balikpapan city had a population of 672,878 as of 2021, which comprised 236,25 households (BPS-Statistics Indonesia, 2021). It was divided into six districts and thirty-four urban villages. The sample was designed to be representative of all households in Balikpapan City and in many ways resembled the general characteristics of population. Whereas respondents were taken proportionally from all urban villages area in Balikpapan City, or near proportionally, where every household was represented by one respondent only. The eligibility of respondents in this study met several criteria, i.e.:

1. Balikpapan City residents who were 17 years old minimum.

2. High school diploma or equivalent minimum.

3. Not a state civil apparatus.

Lived or settled in Balikpapan City for at least two years.

## Data Analysis

Descriptive analysis and its visualization were carried out first to present the analysis of sample representation. A one-sample chi-square test utilizing SPSS would be carried out in an attempt to ensure the representativeness of the sample statistically in terms of the distribution of respondents across thirty-four urban villages. Both quantitative and qualitative methods were included in the data analysis in this study. In the quantitative method, close-ended responses were analyzed by calculating the liveability index with a weighting aspect based on stakeholder perspective, utilizing the Analytical Hierarchy Process (AHP) (Saaty, 1980). The technique is a common support system that countenances and quantifies an authority's or expert's opinions in the configuration of weights (Onnom et al., 2018). It can be used to define stakeholder preferences and directly measure inconsistencies in a participant's judgments. Arguably, weighting aspects based on AHP would be able to provide recommendations that were more accommodating to various stakeholder.

The involved participants of AHP in the participatory process were consisting of various related stakeholder representatives, i.e., Regional People's Representative Council, Regional Government Agencies, Balikpapan Representative Office of The Central Bank of Indonesia, Regional-own Enterprise, Departmental Police, Military District Command, and Academic Institution. The AHP questionnaires were officially administered to all said institutions to get representative's view in determining the level of contribution of each aspect in measuring the liveability index. The Pairwise Comparison Matrixes (PMC) were then resulted from all participants. The calculation of weight from each PMC was assisted by a AHP calculation software (a web system software, i.e., <http://www.isc.senshu-u.ac.jp/~thc0456/EAHP/AHPweb.html>, accessed at 8 December 2021).



Only Consistency Ratio (CR) of greater than 0.1 would be accepted to be further used (Saaty, 2002). Next, all resulted weights from participants would be averaged to unify determination making. The perceived liveability index was then calculated in formula as follow.

$$\text{Perceived Liveability Index} = \frac{(\sum_{k=1}^8 [\bar{S}_k \cdot W_k])}{5} \times 100\%. \quad (1)$$

Where:  $\bar{S}_k$  an average score of each aspect, and  $W_k$ : weight of each aspect.

One-way ANOVA was used to test whether there were any significant differences between the liveability indexes in thirty-four urban villages. We presented the distribution of index values of each urban village in the Balikpapan City in the form of geospatial visualization to be analyzed in the spatial perspective.

In the qualitative method, the qualitative data in the form of open-ended responses, after being translated from the Indonesian language into English, were analysed by identifying main keywords and searching for code references using NVivo 12 software. With summative content analysis approach, code references were sought by interpreting the underlining context (Hsieh & Shannon, 2005). As it was argued, it is the most suitable approach as responses data were in short sentence formats (Feng & Behar-Horenstein, 2019). The two analysis findings, emerging from quantitative and qualitative methods, were then elaborated to present further discussion.

## RESULTS AND DISCUSSION

### Representation of Sample

Of the 1,435 collected respondents, 1,256 met the quality control criteria of samples and were further used in data analysis. The quality control was carried out through several filtering stages, i.e.,

1. The duration of filling out the questionnaire is > 10 minutes.
2. The variance of the scores for each item-attribute was not zero.
3. Surveyor-respondent selfie data was validated.

The number of samples had a margin error of 2.76 with a confidence level of 95% (Krejcie & Morgan, 1970). A comparison summary of the sample and population demographic is presented in Table 1, showing that the sample is relatively proportional to the demographic of the population.

**Table 1.** Summery analysis of the sample and 2020 Indonesian Census Data

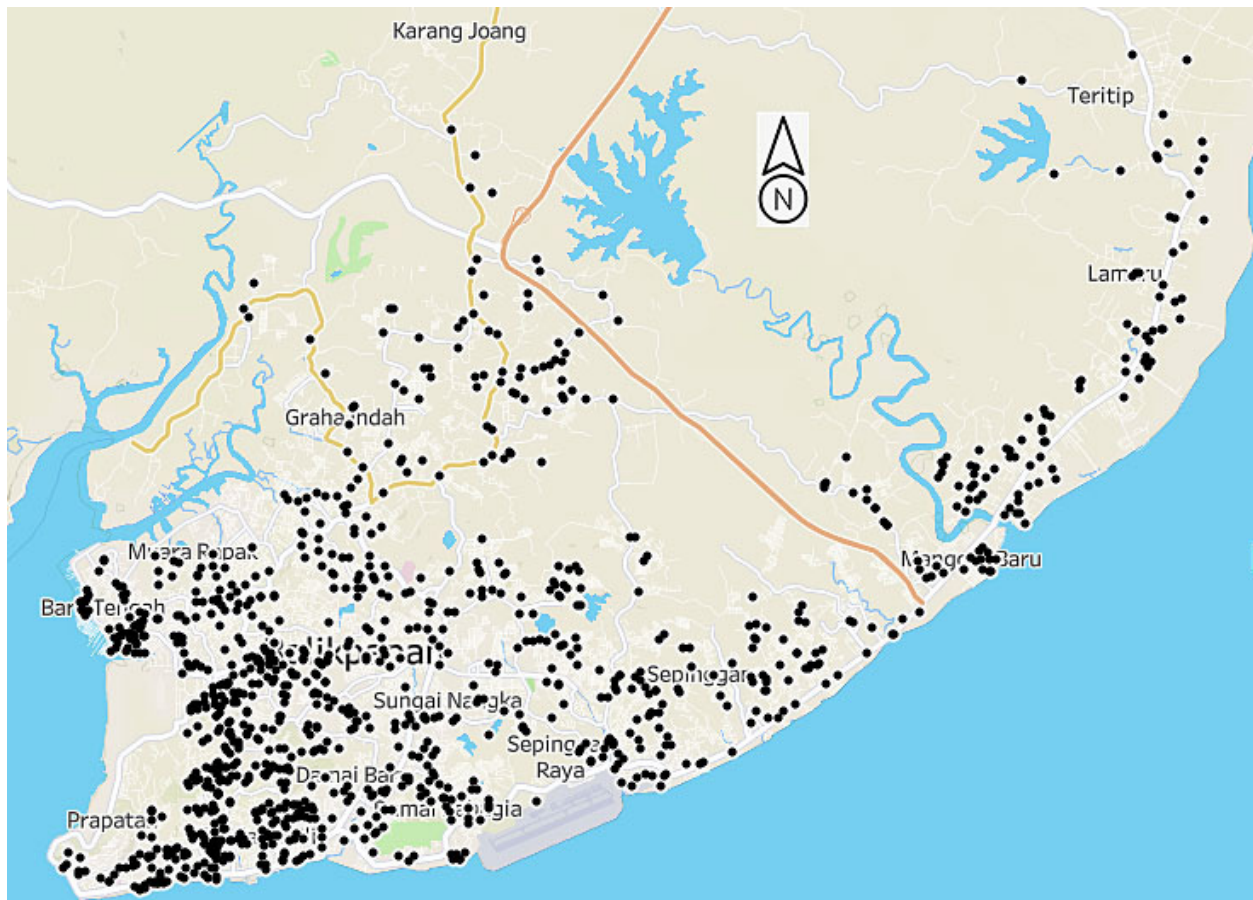
Sample of Study		Census 2020*	
Sex			
Male	624 (50.3%)	Male	352,802 (51.3%)
Female	632 (49.7%)	Female	335,516 (48.7%)
Age			
17–20	67 (5.3%)	17–20	56,485 (10.9%)
20–29	328 (26.1%)	20–29	118,614 (23.0%)
30–39	322 (25.6%)	30–39	114,652 (22.2%)
40–49	245 (19.5%)	40–49	98,745 (19.1%)
50–59	196 (15.6%)	50–59	69,123 (13.4%)
>60	98 (7.8%)	>60	59,158 (11.4%)
Education level			
Senior high school	1,045 (83.2%)	Senior high school	222,670 (73%)
D1/D2 Diploma	21 (1.7%)	College	83,333 (27%)
Bachelor's degree	182 (14.5%)		
Master's degree	7 (0.6%)		
Doctor Degree	1 (0.1%)		
Employment			
Working	793 (63.1%)	Working	282,258 (57.2%)
Unemployment	19 (1.5%)	Unemployment	27,911 (5.7%)
Attending school/ college	96 (7.6%)	Attending school/ college	40,531 (8.2%)
Housekeeping/ family worker	313 (24.9%)	Housekeeping/ family worker	123,153 (24.9%)
Others	35 (2.8%)	Others	19,227 (3.9%)

Note: \*2020 Census Data of Balikpapan City (BPS-Statistics Indonesia, 2021).

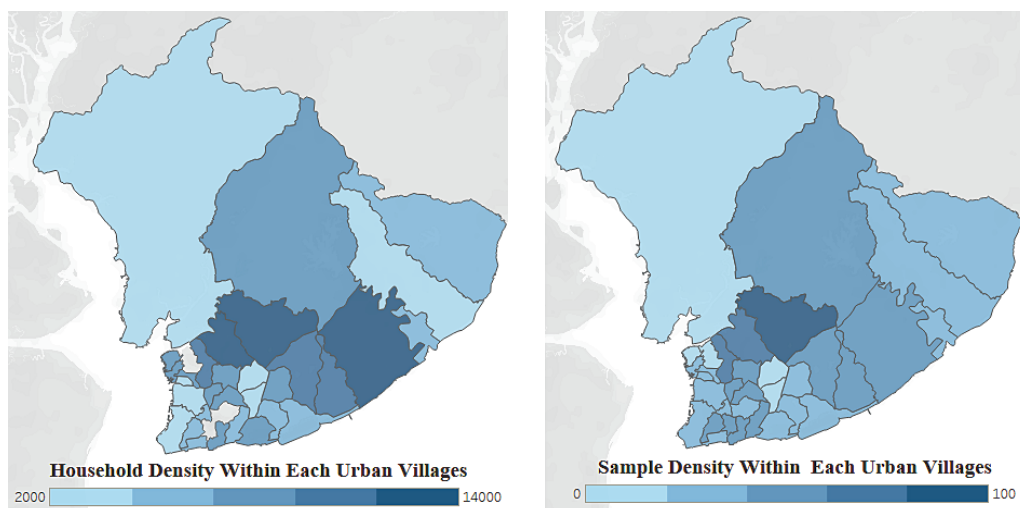
Source: own preparation based on Author (2021).

The geolocation distribution of respondents presented in Figure 4 shows that the sample overview is evenly, or near to evenly, spread over the settlement area of Balikpapan City. While Figure 5 illustrates the





**Fig. 4.** The 1,256 geotagged respondent of survey (served in <http://ona.io>)  
 Source: own preparation based on Author (2021).



**Fig. 5.** The density maps of household (left) and number of sample (right) at Balikpapan City  
 Source: own preparation based on Author (2021).

sample and household density maps of the study area of Balikpapan City. It shows that numbers sampled in the areas with lower numbers of households are relatively less than those sampled in the areas with higher numbers of households, which mean that the samples are proportional to all households. The representativeness of the sample (n=1,256) to the population (N=672,878) in terms of the distribution of

respondents across thirty-four urban villages was tested using one-sample chi square test. The result indicated that the sample proportion of respondents by urban villages were not significantly different from the proportion of population by urban villages at p-value = 0.01 ( $\chi^2(df=33) = 54.345, p = 0.223$ ). Overall, the sample represented the population in this survey-based study.

**Table 2.** Recapitulation of aspect weighting based on AHP questionnaire

No.	Representatives	Aspect weighting (%)								CR [%]
		1	2	3	4	5	6	7	8	
1	Balikpapan regional people's representative council	6	6	12	8	15	10	19	24	10
2	Regional government agencies	10	20	20	11	7	17	5	10	10
3	Balikpapan regional people's representative council	12	11	16	13	7	12	12	15	8
4	Regional-own Enterprise Institution	12	9	18	9	9	10	7	25	7
5	Departmental police	12	10	13	9	20	14	9	14	7
6	Regional government agency	9	9	13	16	12	12	15	15	7
7	Regional government agency	13	7	22	14	14	6	6	18	7
8	Regional government agency	9	11	15	9	7	15	6	28	6
9	Regional government agency	13	12	15	8	12	13	9	18	6
10	Regional government agency	9	8	10	12	12	13	12	25	6
11	Regional government agencies	11	13	18	6	17	8	8	18	5
12	Departmental police	21	10	15	7	18	7	7	14	4
13	Regional-Own Enterprise Institution	11	17	21	12	12	11	5	11	4
14	Regional-own Enterprise Institution	12	13	17	15	11	13	9	10	4
15	Regional government agency	10	8	18	12	15	9	9	20	4
16	Regional government agency	16	8	12	12	17	13	7	16	3
17	Military District Command	17	13	15	6	23	10	10	8	3
18	Regional government agency	21	11	17	12	11	10	9	9	3
19	Regional government agency	12	7	14	9	19	14	9	15	3
20	Academic institution	17	13	16	10	13	11	9	9	2
21	Balikpapan Representative Office of The Central Bank of Indonesia	9	9	8	16	9	15	23	12	2
22	Academic institution	18	12	14	10	15	9	6	15	1
23	Regional government agency	9	15	15	8	20	8	8	16	1
24	Regional government agency	13	13	13	13	13	13	13	13	0
Averages		12.5	11	15.3	10.8	13.8	11.3	9.6	15.7	

Note: 1 = Economy, 2 = Spatial, 3 = Environment and Health, 4 = Transportation, 5 = Social and Security, 6 = Utility, 7 = Recreation, Culture, and Public Space, 8 = Basic Needs Access, CR = Consistency Ratio.

Source: own preparation based on Author (2021).

## Aspect Weighting using The Analytical Hierarchy Process (AHP)

The Analytical Hierarchy Process (AHP) was employed in aspect weighting in calculating the liveability index. Fifty-three participants were involved purposively in filling out the AHP (Analytical Hierarchical Process) questionnaire, which consisted of a representative of several parties, as presented in Table 2. A website-based software then processed completed questionnaire responses to calculate the weight of eight aspects from each PMC in AHP models. Of the 53 administered questionnaires, 24 were valid and further processed for weighting recapitulation, as presented in Table 2. The rest was invalid due to uncompleted answers and a Consistency Ratio (CR) greater than 10 (Saaty, 2002).

It can be seen from Table 2 that there are eight aspects of perceived liveability in the descending order of weight value, namely, basic needs access (0.157); environment and health (0.153); social and security (0.138); economy (0.125); utility (0.113); transportation (0.108); spatial (0.11); and recreation, culture, and public space (0.96). The most important aspect considered by stakeholders is “Basic needs access”, which is directly related to the daily activities and community dependence of city residents (Zeng-Xian & Tak-Kee, 2016). This finding suggests that adjusting aspects in measuring liveability results in more specific attention regarding strategic issues and current conditions in the context of Balikpapan City.

## The distribution of Perceived Liveability Index

The calculation of the perceived liveability index is carried out for each aspect and then for the total weighted score, as presented in Table 3. The economic aspect obtains the lowest index, i.e., 75.57, while the environmental and health obtained the highest index, i.e., 80.15. It can be seen that the perceived liveability index of Balikpapan City in 2021 is 78.48. Highlighting the index value in the spatial analysis perspective will give more meaning to a comparative analysis geographically. As such, the distribution

of the perceived liveability index in each urban village is then spatially visualized in this study, as presented in Figure 6.

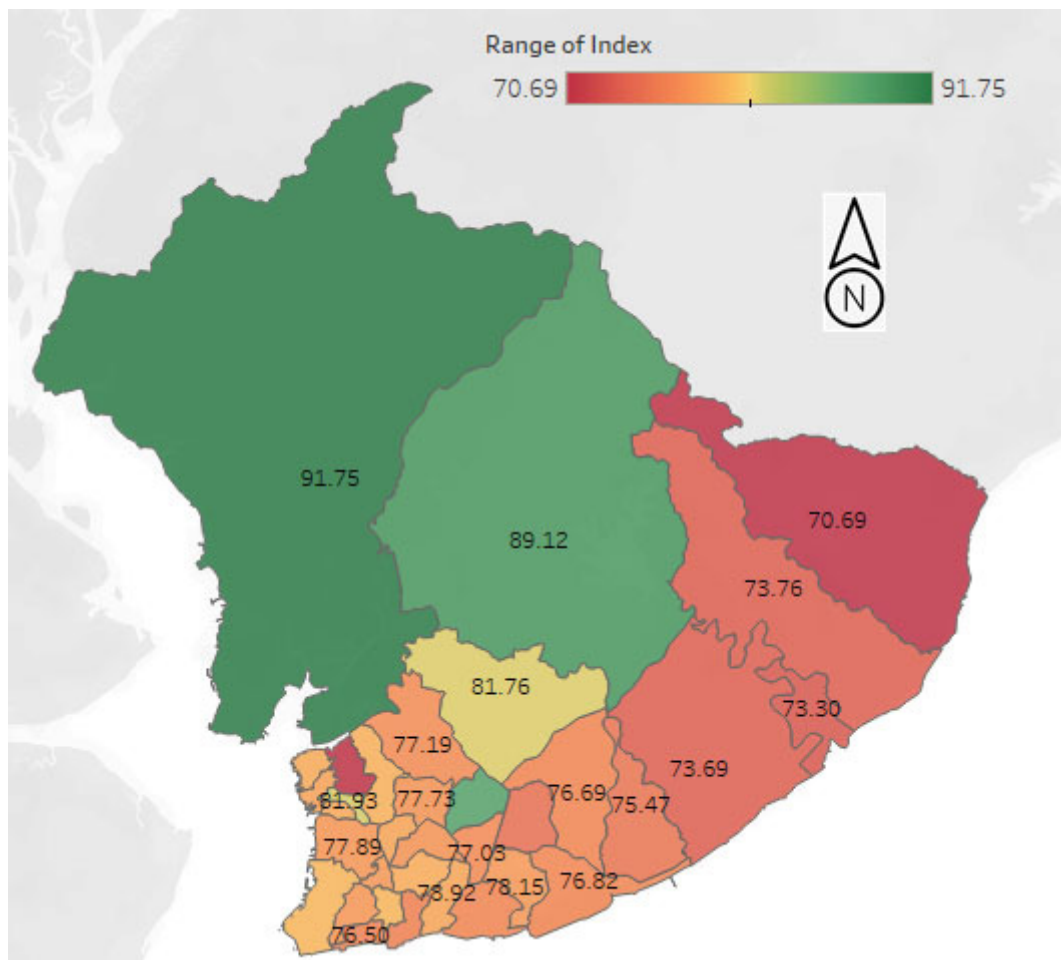
**Table 3.** Construction of liveability index of Balikpapan City

Aspects	Score (S)	Weight (%) (W)	Weighted score (W*S)
Economy	3.776	12.5	0.472
Spatial	3.900	11	0.429
Environment and Health	4.007	15.3	0.613
Transportation,	3.946	10.8	0.426
Social and Security	3.958	13.8	0.546
Utility	3.835	11.3	0.433
Recreation, culture, and public space	3.971	9.6	0.381
Basic needs access	3.962	15.7	0.622
Total weighted score			3.923
Perceived Liveability Index			78.48

Source: own preparation based on Author (2021).

From the spatial analysis perspective, it can be seen in Figure 6 that there is a decreasing tendency of perceived liveability index toward the city's east region, getting the index value of 70.69, and an increasing trend toward the north, reaching the index value of 91.75. The result of difference test using one-way ANOVA indicates that there are statistically significant differences of index value between thirty-four villages with P-value < 0.05.

Based on Balikpapan's land-use plan for 2012–2032, as presented in Figure 3, it can be seen that part of the city's eastern area is an industrial area, namely the “Batakan Industry Area”, as well as a minapolitan area in another part. Several large companies related to the oil and mining industries were situated there. While the industrial area and urbanization development lead to the city's east region (Irawanti et al., 2015), the declining index value has notably an in-line direction. That is, the industrial and urban development in the eastern region of Balikpapan City is inversely proportional to the perceived liveability index of the residents. It is important to further discuss if there is unaligned between the development of industrial areas, urbanization, and liveability. While



**Fig. 6.** The spatial difference of the Perceived Liveability Index among Urban Villages in Balikpapan City  
*Source:* own preparation based on Author (2021).

the northern region, adjacent to green open space, is perceived as more livable and cleaner in air quality and environment.

This result reveals that the northern area of Balikpapan City provides a new hope for prospective urban residents, economic actor and stakeholders in the future residential designs. The Ministry of National Development Planning of Indonesia (*Kementerian Perencanaan Pembangunan Nasional Republik Indonesia/Bappenas*) stated that in the next few years, more than 235,000 army personnel and civil servants, including their families, will be relocated to the new Indonesian capital (Wardhana, 2021). An estimated 1.5 million residents, including economic actors,

will occupy the new Indonesian capital, which is only about 70 kilometers from the northern region of Balikpapan City (Cahyani, 2019). With the potential increasing number of settlements and possible economic development in the area, achieving a better-coordinated growth between sustainable development and high-index liveability has become particularly important (Marans, 2015; Yi, Jue, & Huan, 2021). In this regard, the spatial regulations regarding sustainable development and multi-stakeholder criteria of liveability should already be established and maintained such that the misalignment between the development of the area and its liveability can be avoided.



## The Quantitative Content Analysis of Open-Ended Responses

In the quantitative content analysis of three open-ended responses, keywords of three or more letters with a weighted percentage of more than 5%, served as code in the coding reference. We visualized the result in a word cloud, and in a chart of the top five code references expressed by >70% of respondents, as shown in Figures 7–12.



**Fig. 7.** Word cloud of the 100-words most mentioned resulted from open-ended responses of Q1  
Source: own preparation based on Author (2021).

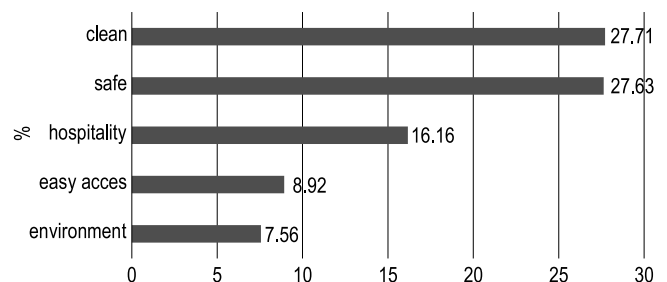


**Fig. 9.** Word cloud of the 100-words most mentioned resulted from open-ended responses of Q2  
Source: own preparation based on Author (2021).

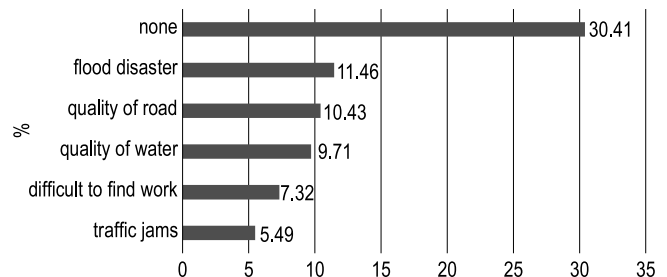


**Fig. 11.** Word cloud of the 100-words most mentioned resulted from open-ended responses of Q3  
Source: own preparation based on Author (2021).

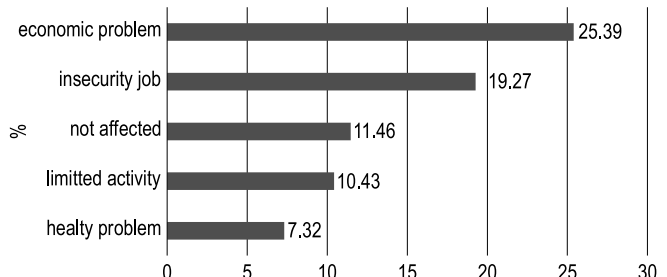
The word “clean” was the most frequently mentioned, i.e., 348 times when respondents were asked what makes for comfortable living in Balikpapan City (Q1). While the word “safe” had a frequency that was not much different, i.e., 347 times mentioned by respondents. The others such as “easy” 112, “friendly” 103, “people” 100, “environment” 95, “family” 92, and “job” 89 were not much different in number. When respondents were asked what problems they experienced while living in Balikpapan



**Fig. 8.** Chart of top five code references from open-ended responses of Q1, expressed by >70% of respondents  
Source: own preparation based on Author (2021).



**Fig. 10.** Chart of top five code references from open-ended responses of Q2, expressed by >70% of respondents  
Source: own preparation based on Author (2021).



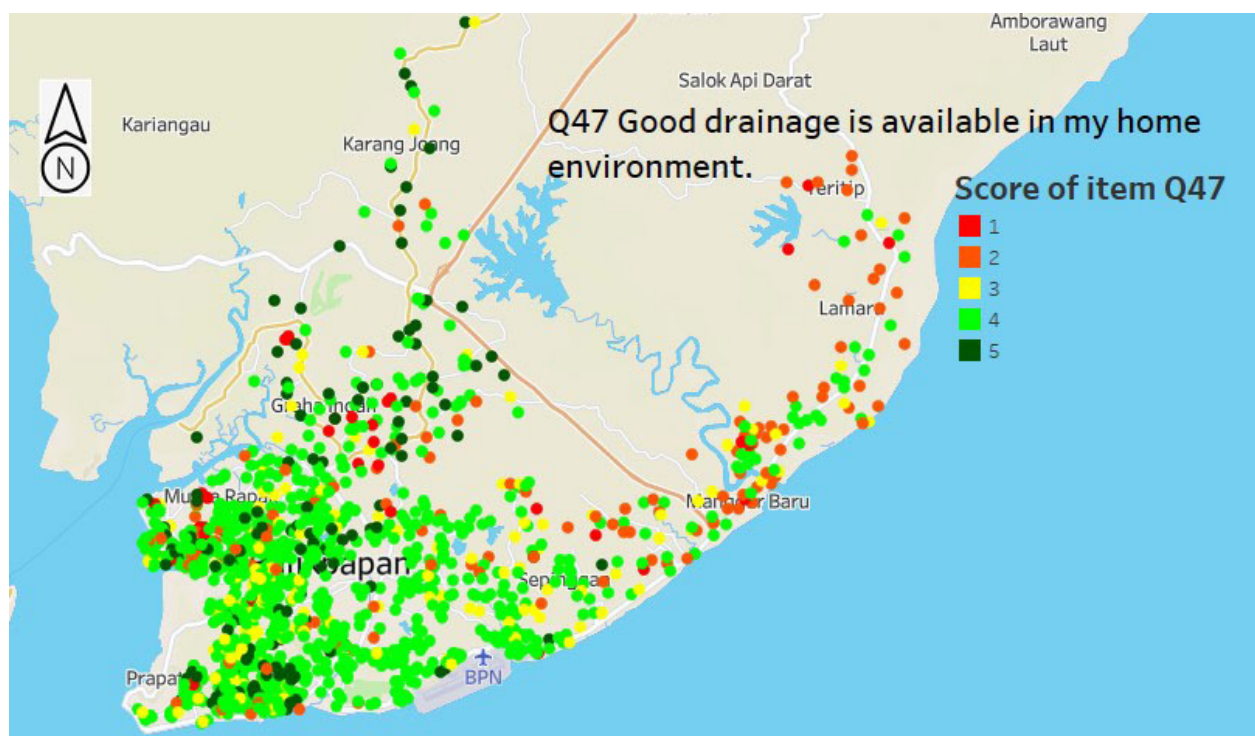
**Fig. 12.** Chart of top five code references from open-ended responses of Q3, expressed by >70% of respondents  
Source: own preparation based on Author (2021).

City (Q2), the word “none” was the most frequently mentioned, i.e., 382 times. The word “flood” was mentioned 144 times, reflecting the most problems experienced by respondents. Some more mentioned were “water” 131, “roads” 122, “job” 92, and “jams” 69. When respondents were asked about the coronavirus pandemic’s impact on their live in Balikpapan City (Q3), “economy/economic” was the most frequently mentioned, i.e., 319 times. Though the word “none” was mentioned 167 times by respondents, the other words were emerged such as “activity” 146, “work” 122, “income” 120, “job” 65, and “health” 64. The 100-words most mentioned from 3-item open-ended responses are visualized in a word cloud, as shown respectively in Figure 7, 9, and 11. While the charts shown in Figure 8, 10, and 12 reflect the top five code references from each open-ended response, expressed by >70% of respondents.

Regarding the factors that affect the comfortability of Balikpapan City resident, two major factors of perceived comfortability, i.e., cleanliness and safety,

lead to a positive signal that the city provides good hospitality, not only for the existing residents but also for new potential migrants (Magnini & Zehrer, 2021). In the perspective of dynamical urban living environment, the information of perceived liveability regarding the living environment comfortability will permit the policy maker in driving and evaluating the perspective plans improvement on more empirical bases (Polyakova et al., 2019; Kraff et al., 2020). However, since this empirical finding is based on the subjective nature of people’s assessments, it was not recommended that the condition that is not actually worthwhile attempt to bolster their perceived worth. The factual situation should be the main concern in improving perceptions towards a better level of satisfaction.

People perceive the drainage system as bad, particularly in the East Balikpapan area, as shown in Figure 10. Looking at the topography or contours of Balikpapan City, it can be found that the relief of the land surface in Balikpapan City tends to be wavy



**Fig. 13.** One of the geotagged responses to the question related to the perceived drainage quality in Balikpapan City  
Source: own preparation based on Author (2021).

where there are basins in the middle of the city (BPS-Statistics Indonesia, 2021). Such conditions create a great potential for waterlogging when access to water from the basins in the middle of the city toward the sea is clogged. Besides that, population growth, land-use change, climate change, and urbanization are notably the key drivers of the flood vulnerability in Balikpapan city (Ariyaningsih et al., 2022). As a buffer zone for Indonesia's future capital city, Balikpapan's flood risk, which is the most common problem, should be taken very seriously by everyone who has a stake in the area.

Meanwhile, the top five perceived impacts of the COVID-19 pandemic felt by Balikpapan City residents are as follows: the economic problem; insecurity of jobs; not affected; limited activity; and health problems. This finding is in line with the significant change in the critical factors of residential sustainability regarding such a pandemic effect that there is a significant shift from environmental impact towards emphasizing on social and health aspects. The limited activity period due to the lockdown has also changed how the people and communities live, interact, and work, including how they address economic challenges such as insecurity of jobs, and built-environment challenges such as public space setting (Mohammed Salih & Hussein, 2021; Das et al., 2022). The ability of the local governments to respond to the aforementioned challenges will determine their success in building capacity towards sustainable urban transformation.

## CONCLUSIONS

In an attempt to enhance the measurement technique of perceived liveability, a more rigorous survey method with a prominent sample representativeness was conducted in this study. Justifying the weight of aspects with stakeholder participatory practices of AHP was proposed as a systematic approach to defining stakeholder goals and preferences. The AHP assisted in formulating objective justification in weighting aspects of perceived liveability with stakeholder participatory practice. While a content analysis of open-ended responses was carried out to analyse

the feedback and problems experienced by a resident while living in the city. The two such works of analysis were arguably able to provide a more comprehensive understanding of the population's feedback on their life quality related to the current issue.

Eight aspects consisting of 51-item indicators were defined in this study, in the descending order of weight value: (1) basic needs access, (2) environment and health, (3) social and security, (4) economy, (5) utility, (6) transportation, (7) spatial, and (8) recreation, culture, and public space. The result shows that, spatially, the industrial and urban development in the eastern region of Balikpapan City is inversely proportional to the perceived liveability index of the residents. While the northern area of the city provided a new hope for prospective urban residents, economic actor and stakeholders in the future residential designs. The two major factors of perceived comfortability, i.e., cleanliness and safety, lead to a positive signal that the city provides good hospitality, not only for the existing residents but also for new potential migrants. Flood disasters and poor quality of roads were the most mentioned problems that should be seriously paid attention to. While the economic problem and insecurity of jobs were the most perceived impacts of the COVID-19 pandemic felt by residents.

This study arguably provides a more holistic perspective in understanding the aspirations of the residents regarding issues that affect the liveability index in the context of Balikpapan City. The distribution of index values provides information for policymakers to pay attention not only to the priority aspects of liveability but also to the priority area geographically. The data collection technique in this study produces prosperous data with broad potential for analysis to explore the study results.

The most frequently mentioned keywords in the open-ended responses data can be viewed as a proxy representing respondents' perspectives. Besides improving analytic rigour, utilizing the count and code features of NVivo was also considered capable of decreasing bias regarding miss-weighting, particularly in a large number of samples like this study. Thus, as a solid empirical finding, the results

obtained from this qualitative data analysis can be used as material for evaluation and policy projections to improve the efficiency and effectiveness of the government's budget in serving the aspirations of its citizens.

This survey-based study also followed the trend of evaluating the socioeconomic consequences of rising urbanization within cities. It contributes to the empirical study of city-profile experiencing strategic issues, i.e., the transformation toward the post-natural resources industry era and the effect of relocation of Indonesian capital city through resident's perspective. As stated early, capturing the liveability indices assists the government in ensuring that the direction of the development policies is in line with the resident's aspiration of creating liveable cities. Thus, the result of this study assists the capacity of urban policies or levels of policy implementation enhancement in accommodating the aspiration.

This study has limitations regarding that this study relies on responses from randomly selected residents and their satisfaction levels. Many questionnaire items in this study have a potential for bias responses because respondents possibly feel tired of understanding many questions. The representation of samples in this survey is based on the proportion of the population in each urban village, not taking into account the extent of the area. That is, the urban village areas with a low population density, i.e., the small number of residents in a very large area, result in less representative survey results from the perspective of spatial analysis. The data collection technique in this study is potentially rich with valid primary data, providing opportunities for wider analytical exploration in the next empirical study.

**Author contributions:** author/authors have given approval to the final version of the article. Authors contributed to this work as follows: Saiful Ghozi developed the study design, analysed and interpreted the data, also prepared draft of article, Ida Bagus Dharmawan collected the data, as a person in charge of external communication and FGD, Dessy Handa Sari analysed and interpreted the data, Tizar M. Bijaksana developed the conceptual base theory, also

revised the article critically for important intellectual content, Suheriah M. Devi analysed and interpreted the data.

**Funding:** This research was undertaken as part of cooperation project between BAPPEDA and Balikpapan State Polytechnic, and was fully funded by the Balikpapan City Government, East Kalimantan, Indonesia (Contract Number: 027.1/342/SPK/BPD-LITBANG).

**Supplementary information:** None.

**Note:** N/A.

## ACKNOWLEDGEMENT

The authors thank all parties that have participated in this study. The authors would also like to thank anonymous reviewers for their insightful comments and suggestions to improve the readability and quality of the paper.

## REFERENCE

- Afkarina, K.I. ., Wardana, S., & Damayanti, P. (2019). Coal Mining Sector Contribution to Environmental Conditions and Human Development Index In East Kalimantan Province. *Journal of Environmental Science and Sustainable Development (JESSD)*, 2(2), 192–207. <https://doi.org/https://doi.org/10.7454/jessd.v2i2.1025>
- Ariyaningsih, Sukhwani, V., & Shaw, R. (2022). Vulnerability assessment of Balikpapan (Indonesia) for climate change-induced urban flooding. *International Journal of Disaster Resilience in the Built Environment, ahead-of-p* (ahead-of-print). <https://doi.org/10.1108/IJDRBE-08-2021-0111>
- Bloomberg (2021, November 24). Indonesia Sets 2024 Deadline to Move Its New Capital to Borneo. Retrieved from: <https://www.bloomberg.com/news/articles/2021-11-01/indonesia-sets-2024-deadline-to-move-its-new-capital-to-borneo> (22.12.2021).
- Bp.com. (2019). Statistical Review of World Energy 2019 68th edition. Retrieved from: <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2019-full-report.pdf> (04.01.2022).



- BPS-Statistics Indonesia. (2021). Balikpapan dalam Angka/Balikpapan Municipality in Figures. Retrieved from: <https://balikpapankota.bps.go.id/> (02.02.2022).
- Cahyani, D.R. (2019). Bappenas Prediksi 1,5 Juta Orang Akan Pindah ke Ibu Kota Baru (Bappenas Predicts 1.5 Million People Will Move to the New Capital). *TEMPO.CO*. Retrieved from: <https://bisnis.tempo.co/read/1249392/bappenas-prediksi-15-juta-orang-akan-pindah-ke-ibu-kota-baru>
- Das, K., Behera, R.L., & Paital, B. (2022). Socio-economic impact of COVID-19. In D. Rawtani, Ch.M. Hussain, & N. Khatri (Eds.), *COVID-19 in the Environment: Impact, Concerns, and Management of Coronavirus* (pp. 153–190). <https://doi.org/10.1016/B978-0-323-90272-4.00014-2>
- Deng, Y., Fu, B., & Sun, C. (2018). Effects of urban planning in guiding urban growth: Evidence from Shenzhen, China. *Cities*, 83, 118–128. <https://doi.org/10.1016/j.cities.2018.06.014>
- Dorst, M. van (2012). *Liveability BT – Sustainable Urban Environments: An Ecosystem Approach* (E. van Bueren, H. van Bohemen, L. Itard, & H. Visscher, Eds.). [https://doi.org/10.1007/978-94-007-1294-2\\_8](https://doi.org/10.1007/978-94-007-1294-2_8)
- Ekhaese, E.N., & Asinobi, A.A. (2022). Go-ahead urban liveability indicators (ULI) influence on residents' well-being: a case for Lekki-Lagos, Nigeria. *GeoJournal*. <https://doi.org/10.1007/s10708-022-10751-z>
- El-Shamaa, K., & Biradar, C. (2018). *Geotagging Research and Outreach Activities*. Retrieved from: <https://repo.mel.cgiar.org/handle/20.500.11766/8867> (11.01.2021).
- Feng, X., & Behar-Horenstein, L. (2019). Maximizing NVivo Utilities to Analyze Open-Ended Responses. *The Qualitative Report*, 24(3), 563–571. <https://doi.org/10.46743/2160-3715/2019.3692>
- Hardiansyah. (2014). Most Livable City Index: Pembelajaran dan Refleksi Pembangunan Kota Masa Mendatang (Learning Lessons and Reflections of Future Urban Development in Indonesia). *Buletin Ciptakarya*, 22–25.
- Harker, P.T., & Vargas, L.G. (1987). The Theory of Ratio Scale Estimation: Saaty's Analytic Hierarchy Process. *Management Science*, 33(11), 1383–1403. <https://doi.org/10.1287/mnsc.33.11.1383>
- Hsieh, H.-F., & Shannon, S.E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, 15(9), 1277–1288. <https://doi.org/10.1177/1049732305276687>
- Indonesian Association of Planners (IAP). (2021). Sekilas IAP (About IAP). Retrieved from: <https://iapindonesia.org> (24.01.2022).
- Irawanti, T., Santoso, E.B., & Sulistyarso, H. (2015). Development Concept in East Balikpapan with Minapolitan Approach. *Architecture & Environment*, 14(2), 149–162. <https://doi.org/10.12962/j2355262x.v14i2.a2936>
- Karim, S., Kusuma, B.J., & Mahfud, T. (2019). Application The Development of Balikpapan Bay Indonesia Based on Sustainable Tourism. *GeoJournal of Tourism and Geosites*, 24(1), 29–38. <https://doi.org/10.30892/gtg.24103-340>
- Kozlowski, M., Ibrahim, R., & Zaini, K.H. (2021). Evolution of cities in Borneo: a kaleidoscope of urban landscapes for planning future resilient cities. *Archnet-IJAR: International Journal of Architectural Research, ahead-of-p*(ahead-of-print). <https://doi.org/10.1108/ARCH-04-2021-0089>
- Kraff, N.J., Wurm, M., & Taubenböck, H. (2020). The dynamics of poor urban areas – analyzing morphologic transformations across the globe using Earth observation data. *Cities*, 107, 102905. <https://doi.org/10.1016/j.cities.2020.102905>
- Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607–610. <https://doi.org/10.1177/001316447003000308>
- Krueger, R.A., & Casey, M.A. (2014). *Focus Groups: A Practical Guide for Applied Research*, 5rd ed. Thousand Oaks: California: SAGE Publications Inc.
- Li, G., & Weng, Q. (2007). Measuring the quality of life in city of Indianapolis by integration of remote sensing and census data. *International Journal of Remote Sensing*, 28(2), 249–267. <https://doi.org/10.1080/01431160600735624>
- Loorbach, D., & Shiroyama, H. (2016). The Challenge of Sustainable Urban Development and Transforming Cities. In D. Loorbach, J.M. Wittmayer, H. Shiroyama, J. Fujino, & S. Mizuguchi (Eds.). *Governance of Urban Sustainability Transitions* (pp. 3–12). [https://doi.org/10.1007/978-4-431-55426-4\\_1](https://doi.org/10.1007/978-4-431-55426-4_1)
- Lowe, M., Arundel, J., Hooper, P., Rozek, J., Higgs, C., Roberts, R., & Giles-Corti, B. (2020). Liveability aspirations and realities: Implementation of urban policies designed to create healthy cities in Australia. *Social Science & Medicine*, 245, 112713. <https://doi.org/10.1016/j.socscimed.2019.112713>

- Magnini, V.P., & Zehrer, A. (2021). Subconscious influences on perceived cleanliness in hospitality settings. *International Journal of Hospitality Management*, 94, 102761. <https://doi.org/https://doi.org/10.1016/j.ijhm.2020.102761>
- Mansour, H.M. (2016). *Liveable urban areas and new housing typologies: A Case Study In Vila Nova de Famalicão, Portugal* (Unpublished Master Thesis). Porto: Faculty of Engineering of University of Porto.
- Marans, R.W. (2015). Quality of urban life & environmental sustainability studies: Future linkage opportunities. *Habitat International*, 45, 47–52. <https://doi.org/https://doi.org/10.1016/j.habitatint.2014.06.019>
- Mohammed Salih, N.M., & Hussein, S.H. (2021). Cities after pandemic: enabling social distancing as a new design standard to achieve urban immunity. *Acta Scientiarum Polonorum. Administratio Locorum*, 20(4 SE-Articles), 345–360. <https://doi.org/10.31648/aspl.6825>
- Moser, S., Swain, M., & Alkhabbaz, M.H. (2015). King Abdullah Economic City: Engineering Saudi Arabia's post-oil future. *Cities*, 45, 71–80. <https://doi.org/https://doi.org/10.1016/j.cities.2015.03.001>
- Namazi-Rad, M.-R., Perez, P., Berryman, M., & Wickramasuriya, R. (2015). A Semi-Empirical Determination of Perceived Liveability. *Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique*, 129(1), 5–24. <https://doi.org/10.1177/0759106315615510>
- Nieuwenhuijsen, M.J. (2021). New urban models for more sustainable, liveable and healthier cities post covid19; reducing air pollution, noise and heat island effects and increasing green space and physical activity. *Environment International*, 157, 106850. <https://doi.org/https://doi.org/10.1016/j.envint.2021.106850>
- Onnom, W., Tripathi, N., Nitivattananon, V., & Ninsawat, S. (2018). Development of a Liveable City Index (LCI) Using Multi Criteria Geospatial Modelling for Medium Class Cities in Developing Countries. *Sustainability*, 10. <https://doi.org/10.3390/su10020520>
- Paul, A., & Sen, J. (2020). A critical review of liveability approaches and their dimensions. *Geoforum*, 117, 90–92. <https://doi.org/https://doi.org/10.1016/j.geoforum.2020.09.008>
- Polyakova, N., Zaleshin, V., & Polyakov, V. (2019). Formation of the assessment method of the living environment comfortability in cities. *IOP Conference Series: Materials Science and Engineering*, 667(1), 12080. <https://doi.org/10.1088/1757-899x/667/1/012080>
- Saaty, T.L. (1980). *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*. Retrieved from: <https://books.google.co.id/books?id=Xxi7AAAAIAAJ>
- Saaty, T.L. (2002). Decision Making with The Analytic Hierarchy Process. *Scientia Iranica*, 9(3), 215–229. Retrieved from: <https://www.sid.ir/en/Journal/ViewPaper.aspx?ID=88399>
- Sep, C.Y., & Kyong, S.B. (2020). Understanding Contextualised Liveability from the Bottom Up: A Qualitative Analysis of the Participatory Planning Proposals in Daegu, South Korea. *Architectural Research*, 22(3), 75–84. <https://doi.org/10.5659/AIKAR.2020.22.3.75>
- Sofeska, E. (2017). Understanding the Livability in a City Through Smart Solutions and Urban Planning Toward Developing Sustainable Livable Future of the City of Skopje. *Procedia Environmental Sciences*, 37, 442–453. <https://doi.org/https://doi.org/10.1016/j.proenv.2017.03.014>
- Su, X., & Qian, Z. (2020). Neoliberal planning, master plan adjustment and overbuilding in China: The case of Ordos City. *Cities*, 105, 102748. <https://doi.org/https://doi.org/10.1016/j.cities.2020.102748>
- Surjono, Yudono, A., Setyono, D.A., & Putri, J.C. (2021). Contribution of Community Resilience to City's Livability within the Framework of Sustainable Development. *Journal of Environmental Research, Engineering and Management*, 77(4), 33–47. <https://doi.org/10.5755/j01.irem.77.4.29184>
- Tannerfeldt, G., & Ljung, P. (2006). Cities and Towns Facing Problems. In *More Urban Less Poor* (1st Editio, pp. 35–66). London: Routledge. <https://doi.org/https://doi.org/10.4324/9781849772006>
- Tarigan, A.K.M., Samsura, D.A.A., Sagala, S., & Wimbardana, R. (2017). Balikpapan: Urban planning and development in anticipation of the post-oil industry era. *Cities*, 60, 246–259. <https://doi.org/https://doi.org/10.1016/j.cities.2016.09.012>
- Tilaki, M.J.M., Abdullah, A., Bahaudin, A., & Marzbali, M. (2014). The Necessity of Increasing Livability for George Town World Heritage Site: An Analytical Review. *Modern Applied Science*, 8(1), 123–133. <https://doi.org/10.5539/mas.v8n1p123>
- Titisiari Danielaini, T., Maheshwari, B., & Hagare, D. (2019). Qualitative and quantitative analysis of perceived liveability in the context of socio-ecohydrology: evidence from the urban and peri-urban Cirebon-Indonesia. *Journal of Environmental Planning and*

- Management*, 62(12), 2026–2054. <https://doi.org/10.1080/09640568.2018.1524576>
- Van Leynseele, Y., & Bontje, M. (2019). Visionary cities or spaces of uncertainty? Satellite cities and new towns in emerging economies. *International Planning Studies*, 24(3–4), 207–217. <https://doi.org/10.1080/13563475.2019.1665270>
- Vela, J.C., Lerma, E., & Ikonopoulou, J. (2016). Evaluation of the Life Satisfaction and Subjective Happiness Scales With Mexican American High School and College Students. *Hispanic Journal of Behavioral Sciences*, 39(1), 34–45. <https://doi.org/10.1177/0739986316681298>
- Wardhana, I.G. (2021). *Enhancing Resilience in Balikpapan as Buffer Zone for the New Capital City of Indonesia* (Unpublished Master Thesis). University of Groningen and Bandung Institute of Technology. Retrieved from: <https://frw.studenttheses.ub.rug.nl/3648/>
- Yassin, H.H. (2019). Livable city: An approach to pedestrianization through tactical urbanism. *Alexandria Engineering Journal*, 58(1), 251–259. <https://doi.org/https://doi.org/10.1016/j.aej.2019.02.005>
- Yi, X., Jue, W., & Huan, H. (2021). Does economic development bring more livability? Evidence from Jiangsu Province, China. *Journal of Cleaner Production*, 293, 126187. <https://doi.org/https://doi.org/10.1016/j.jclepro.2021.126187>
- Zeng-Xian, L., & Tak-Kee, H. (2016). Daily Activities and Community Dependence of Urban Residents: The Case Of Shenzhen Overseas Chinese Town, China. *Human Geography*, 31(2), 29–35. <https://doi.org/10.13959/j.issn.1003-2398.2016.02.006>
- Zhan, D., Kwan, M.-P., Zhang, W., Fan, J., Yu, J., & Dang, Y. (2018). Assessment and determinants of satisfaction with urban livability in China. *Cities*, 79, 92–101. <https://doi.org/https://doi.org/10.1016/j.cities.2018.02.025>

## APPENDIX A

### Moderator guide of the FGD

1. Greetings and thanks to all who attended the FGD discussion.
2. Presentation of the topic: “Indonesian Most Liveable City Index (MLCI)” indicators to measure liveability index in Balikpapan City.
3. Purpose of the session: to know the extent to which MLCI indicators can represent all residents’ interest, as well as to uncover the liveability aspects and indicator that were not accommodated in such adopted scales.
4. Explain discussion rule:
  - a) to be ensured that all participants already read the MLCI indicators as a base-point discussion.
  - b) at least one expression or opinion from each representative with no correct or incorrect expression or opinion regarding the MLCI scale.
  - c) one at a time, speaking as clearly as possible.
5. Tabulation of all opinions and summarize it into final aspects and indicators.
6. Ensuring the forum’s approval of the final aspects and indicators
7. Finally, closing the forum and thank everyone who took part in FGD.

## APPENDIX B

**Table 4.** The aspects and indicators of perceived liveability index

Aspects	Indicator of MLCI	Indicators resulted from FGD	Empirical basis
1	2	3	4
Basic needs access	1. Development information and community participation 2. Worship facilities 3. Education Facility 4. Health service quality 5. Facilities and access for people with special needs 6. Security facilities 7. Government administration facilities and public services.	1. Licensing procedure 2. Legal certainty of land ownership 3. Access to be directly involved in development (*1 MLCI 4. Ease of getting development information (*1 MLCI 5. Quality of religious services (*2 MLCI 6. Ease of getting educational services (*3 MLCI 7. Educational service quality (*3 MLCI 8. Ease of getting health services (*4 MLCI 9. Health service quality (*4 MLCI 10. Facilities and access for people with special needs (*5 MLCI 11. Quality of security services from the relevant authorities (*6 MLCI 12. Market service quality (including traditional and modern market) 13. Ease of getting government administration services (*7 MLCI 14. Quality of government administration services (*7 MLCI	• Vela, Lerma, & Ikonomopoulos (2016); Lowe et al. (2020); Sep & Kyong (2020)
Economy	8. Economy facility 9. City economy 10. Food sufficiency	15. Ease of getting a job 16. Ease of establishing a business (*8 MLCI 17. Affordable cost of living (*9 MLCI 18. Ease of getting groceries (*10 MLCI 19. Ease of getting food nutrition (*10 MLCI	• (Li & Weng, 2007); Kraff et al. (2020)
Environment and health	11. City health 12. City cleanliness	20. Environmental health (*11 MLCI 21. Air quality (*11 MLCI 22. Cleanliness of river water (*12 MLCI 23. City street cleanliness (*12 MLCI	• (van Dorst, 2012); Titisari Danielaini et al. (2019); Zhan et al., (2018).
Recreation, culture, and public space	13. City park facility 14. Recreational facility 15. Sport facility 16. Facility of art and culture activities	24. Access to city parks for all residents (*13 MLCI 25. Quality of city park (*13 MLCI 26. Facility and access of recreational activities (*14 MLCI 27. Quality of recreational activities (*14 MLCI 28. Facility and access of sport activities (*15 MLCI 29. Quality of sport facilities (*5 MLCI 30. Facility of art and culture activities (*16 MLCI	• Tilaki, Abdullah, Bahauddin, & Marzbali (2014).
Social and security	17. City politics 18. City safety 19. City security	31. Stability of the city from the demonstration (*17 MLCI 32. Freedom to express political rights and opinions (*17 MLCI 33. Sense of security against natural disasters (*18 MLCI 34. Quality of disaster/epidemic early warning (*18 MLCI 35. Sense of security and crime (*19 MLCI	• Yudono et al. (2021) Ariyaningsih et al. (2022)

cont. Table 4

1	2	3	4
Spatial	20. Informal sector 21. Housing 22. City planning	36. Street vendor arrangement (*20 MLCI 37. Ease of owning a house (*21 MLCI 38. Physical quality of the house (*21 MLCI 39. City land use and utilization (*22 MLCI 40. The overall quality of city planning (*22 MLCI	• (Sofeska, 2017); Mansour, (2016)
Transportation	23. Facility of pedestrian path 24. Public transportation	41. Quality of the pedestrian path (*23 MLCI 42. City traffic quality 43. Physical quality of city roads 44. Facility and access of public transportation (*24 MLCI	• Yassin, (2019); Zhan et al. (2018)
Utility	25. Clean water management 26. Wastewater management and drainage 27. Telecommunication network 28. Electricity	45. Availability of clean water (*25 MLCI 46. Waste management of the city (*25 MLCI 47. Drainage quality (*26 MLCI 48. Availability of wastewater management (*26 MLCI 49. The quality of water resulted from wastewater management (*26 MLCI 50. Mobile phone signal quality (*27 MLCI 51. Quality of electrical resources and its services (*28 MLCI	• Titisari Danielaini et al. (2019)

Note: (\* items detailed and improved from MLCI

Source: own preparation based on Author (2021).





ORIGINAL PAPER

Received: 31.10.2022

Accepted: 15.12.2022

## WEBSITES AS A TOOL FOR COMMUNICATING WITH TOURISTS – THE EXAMPLE OF YACHT MARINAS ON THE POLISH BALTIC COAST

Ewa Hącia<sup>1</sup>✉, Aleksandra Łapko<sup>2</sup>✉

<sup>1</sup> ORCID: 0000-0003-4865-7901

<sup>2</sup> ORCID: 0000-0003-0235-6329

<sup>1,2</sup> Maritime University of Szczecin

H. Pobożnego Street 11, 70-507 Szczecin, **Poland**

### ABSTRACT

**Motives:** Businesses rely on the Internet to facilitate marketing communication, attract customers, and build customer loyalty. The Internet can be used not only as an additional channel for distributing information about the company, but also as a means of interactive communication for commercial purposes or promotional activities. This is of great importance for service providers, including tourism sector businesses such as marinas.

**Aim:** The aim of this study was to examine the content of websites owned by Baltic yacht marinas in the Polish voivodeships of West Pomerania and Pomerania. Marina websites were analysed based on their usefulness for potential tourists in 2018, 2020, and 2022, using the adopted criteria, and data for each year were compared to examine changes over time. The applied research methods included theoretical and analytical observations, website analysis, and a point ranking scale. A comparative analysis of the obtained results was performed. This is the first study to examine the extent to which marinas rely on social media for marketing and advertising purposes.

**Results:** The results of the conducted analyses provided answers to the formulated research questions. Few marinas use websites as a tool for communicating with potential customers, but their owners are beginning to recognize the potential of the Internet in this regard.

**Keywords:** communication strategies of yacht marinas, marketing tools, websites, social media, promotion, tourism management

### INTRODUCTION

According to the Polish Central Statistical Office (CSO) data, 92.4% of households in Poland had Internet access in 2021. This percentage is growing annually: it increased from 86.7% in 2019 to 90.4% in 2020. Certainly, the necessity of remote work and education due to the pandemic contributed to this dynamic growth. For many people, the Internet is not only a work tool but also a place for shopping

and the primary source of information (CSO report, 2021). Owing to the widespread use of mobile devices with Internet access (smartphones, tablets, etc.), the Internet is now widely available regardless of time and space. Enterprises from various industries are trying to take advantage of this access. The number of online stores in Poland increased by as much as 21.5% compared to the previous year, and nearly half of the enterprises (45.6%) used social media to contact customers (E-commerce in Poland, 2021).

✉ e.hacia@pm.szczecin.pl, ✉ a.lapko@pm.szczecin.pl

The widespread use of the Internet is also apparent in the tourism industry. An increasing number of people use platforms and websites for travel purposes, such as price comparison websites and route planning tools. However, there are no studies on the scale of this phenomenon in Poland. The latest report stated that the Internet was being used to plan tourist trips by 42% of users (Deloitte, 2015). It can certainly be assumed that this percentage has increased since then. Sources of knowledge when collecting information about a potential destination are not only friends' opinions, travel agency brochures, or printed guides, but also a large portion of social media, travel blogs, and specialized websites such as booking platforms.

This article aims to present the results of the analysis of the use of websites and social media by yacht harbors along the Polish Baltic coast to promote their services. The analysis was conducted by the authors cyclically every two years starting in 2018. The websites owned by the ports were assessed using specific criteria that determine the degree of a website's usefulness for tourists, taking into account the complexity of the information presented on it, validity of information, and adaptation to the needs of various user groups. In 2022, due to the growing importance of social media in the tourism sector, the analysis was extended to the aspect of the availability and use of these tools.

## THE ROLE OF INTERNET TOOLS IN TOURISM – LITERATURE REVIEW

The process of searching for information is an important factor in the decision-making process of tourists regarding the use of tourist services (Buhalis & Law, 2008). The influence of technology, social factors, and tourists' preferences regarding the sources of information used when planning trips have also changed over the years. Traditional sources are being increasingly replaced by Internet sources, which currently play an important role in the tourism economy (Buhalis & Zoge, 2007). They are a source of knowledge for tourists, a way to share

information, buy tickets, book accommodations, and discover tourist attractions. They enable service providers to obtain information about their customers, stay in touch with them, and share marketing content (Frąckiewicz, 2006; Gołąb-Andrzejak, 2016). Increasingly, it is the information transmitted via the Internet that determines the consumption decisions made by tourists (Litvin et al., 2005; Armendia-Muneta, 2014). Therefore, forms of communication and their availability must be aligned with the preferences of the customers regarding the use of tools and technology. Information must be equally accessible and legible both to customers using traditional sources (leaflet catalogs) as well as websites or mobile applications (Brumen et al., 2020). The role of social media cannot be overestimated nowadays; for many people it has become the main platform for gaining information and sharing opinions concerning destinations, tourist attractions, and tourist entities. Profiles on social media maintained by tourist entities support image creation, enable staying in touch with customers, and allow for quick responses to changing market conditions. The use of various online tools in tourism has been intensively researched by scientists all over the world for several years (Gascón et al., 2016; Zeng & Gerritsen, 2014; Živković et al., 2014; Li et al., 2021; David-Negre et al., 2018). It is generally understood that this medium plays a very important role in the tourism economy, and its role will continue to expand in the coming years. For several years, the idea of e-tourism has been in discussion, which is defined as the analysis, design, implementation, and application of IT/e-commerce solutions in the travel and tourism industry; it also entails the analysis of the impact of the respective technical/economic processes and market structures (Neidhardt & Werthner, 2018). Advanced solutions such as virtual reality (VR), data mining, or the Internet of Things (IoT) are also utilized in this industry (Castro et al., 2018; Antonio et al., 2022; Liu, 2022).

Certainly, tourism companies must be guided by the characteristics of the target group when selecting communication tools for their clients. Numerous scientific studies show that online tools are much more



effective with younger potential tourists (Parra-Lopez et al., 2018; Gössling, 2021; Hysa et al., 2021). With the natural succession of generations, numerous groups making tourist decisions now include the group of people born between the late 1980s and 1990s. This generation is sometimes referred to in scientific literature as generation Y (Gen Y), millennials, or the Tech generation (Kolnhofer-Derecskei et al., 2017). The characteristics of this generation show that they are ambitious, interesting, and impatient people. Their preferred methods of communication are e-mails, social networks, and text messengers. The Internet was launched when they were young, so it is a tool they are naturally aligned with (Gures et al., 2018). Decision makers also belong to the Z generation, i.e. people born in the first decade of the 21st century, also known as the Facebook generation. This generation does not know the world without the Internet. Their world is inseparable from the Internet, where they make friends and have hundreds of contacts. They also obtain all the information and willingly share their knowledge and opinions on various products (including tourism) on social networks (Csobanka, 2016; Reisenwitz & Fowler, 2019). Tourism companies that want to attract people from the Y and Z generations must consider these factors and adapt their marketing techniques accordingly (Bae & Han, 2020; Goenadhi & Rahadi, 2020). Properly planned websites and social media presence are the basic requirements to be noticed by representatives of the youngest generations.

## THE DEVELOPMENT OF YACHT HARBORS IN POLAND AND THE IMPORTANCE OF INTERNET TOOLS IN COMMUNICATION WITH TOURISTS

Within the last two decades, there has been rapid development in sailing tourism in Poland. This has undoubtedly been influenced by quantitative and qualitative changes in yacht harbors. Yacht harbors (sea or inland) are complexes of port basins, hydro technical port structures, onshore structures, and technical devices ensuring safe parking and servicing

of yachts, other recreational or tourist vessels, and floating devices (Mazurkiewicz, 2010). The Polish coast of the Baltic Sea administratively belongs to two provinces – West Pomeranian and Pomeranian provinces (Fig. 1). In the West Pomeranian province, the dynamic development of ports resulted from the implementation of the West Pomeranian Sailing Route project – a network of tourist ports in West Pomeranian (subsidised from the Operational Program Innovative Economy 2007–2013, measure 6.4. Investments in tourist products of supra-regional importance) (Zachodniopomorski Szlak Żeglarski, 2022). Consequently, nearly forty ports and sailing harbors in West Pomeranian, concentrated along the Odra, the Szczecin Lagoon, and the Baltic Sea, were created or underwent a thorough modernization. All yacht ports located in the West Pomeranian province that were examined for the purposes of this article belong to the West Pomeranian Sailing Route.



Fig. 1. Location of Polish provinces: West Pomeranian and Pomeranian

Source: own study.

An increase in the number of ports can also be observed in the Pomeranian province. This is where the Pętla Żuławska [Żuławska Loop] project (also covering the Warmian-Masurian Province) was implemented, due to which numerous harbors and marinas were built along the Vistula, Martwa Wisła, Szkarpa, Wisła Królewiecka, Nogat, Wisła Śmiała, Wielka Świeta – Tuga, Motława, Kanał Jagielloński, the Elbląg and Pasłęka rivers, and on the Vistula Lagoon (Pętla Żuławska, 2020; Gus-Puszczewicz, 2018). The Żuławy Loop includes the port in Piaski,

which was subject to this research. The availability of European Union (EU) funds has undoubtedly contributed to the development of the ports, making it possible to finance most of the infrastructure projects. The potential benefits for the region, which may have resulted from the development of nautical tourism, began to be noticed (Nowaczyk, 2018; Hącia, 2019). Currently, the West Pomeranian Sailing Route is one of the flagship tourist products of the West Pomeranian Province; it is undoubtedly the largest investment made for the development of sailing in Poland.

In the area of yacht ports, based on the specialist infrastructure, a number of services are being provided without which sailing would be impossible (Lukovic, 2013; Łapko, 2019). These services are provided to individuals as well as groups – including tourists (Hącia & Łapko, 2020). Knowledge about the services provided by a specific port allows sailors to consciously plan routes, increasing the safety and attractiveness of the cruise.

Regions and organizations responsible for both the West Pomeranian Sailing Route and the Żuławy Loop undertake a number of marketing activities as part of their management. However, individual ports should provide tools for independent communication with potential tourists, thus complementing the existing information.

The use of online tools for this purpose makes it possible to reach a wide audience, including the youngest users. For young sailors, digital technologies and immediate access to information hold natural appeal, which is why they show great openness to the possibility of using new applications dedicated to sailors (Report, 2016). In the website popularity rankings, Facebook ranks first (Report, 2016). This is because when planning a trip and charter, the surveyed sailors most often look for recommendations from friends on Facebook (Report, 2016). Entities responsible for the creation of nautical tourism products (both yacht ports and other entities) must use modern technologies to communicate with these tourists. Traditional printed travel guides, press advertisements, and even radio and TV broadcasts

will not reach the representatives of the Y and Z generations. These people look for information on the Internet and find it there. Additionally, the internationalization of the nautical tourism market, which requires the preparation of messages in multiple languages, should be taken into account.

Websites are the most basic and simplest tools provided by the Internet for communication with clients. There are currently over 1.17 billion websites (Siteefy, 2022) around the world, and this number is gradually growing. Therefore, their appearance, content, and design should be carefully planned. According to K.L. Keller, they should appear aesthetically attractive immediately upon being “opened” and their content should encourage people to visit them again (Keller, 2009). It is also very important to adapt the website for use by foreigners, e.g. by choosing different language versions. This is extremely important because the Internet is a global medium, so any information posted on it is potentially addressed to recipients from different countries (Wymbs, 2000). The need to ensure equal opportunities for tourism also requires adapting websites to the specific needs of people with disabilities. In 2012, The World Wide Web Consortium (W3C) developed The Web Content Accessibility Guidelines (WCAG), which sets international standards for website accessibility for people with disabilities. The guidelines are periodically updated, and the latest project comes from 2021 and is available under the name Web Content Accessibility Guidelines (WCAG) 2.2 (WCAG, 2022). It provides detailed guidelines to make websites perceivable, operable, understandable, and robust. Unfortunately, application of these guidelines is not yet common.

There is relatively less scientific research on the use of internet tools by marinas as a form of communication with customers. Researchers from Croatia were among the first to study the use of internet marketing tools by local yacht ports in 2006 (Miocic et al., 2006; Mucko et al., 2008). Later, practices of ports in other countries of the Mediterranean basin were also examined in this context (Benevolo & Spinelli, 2016; Akrivopoulos et al., 2022). Research on the use of social media by yacht ports was also conducted locally (Kolcubaşi & Akyar, 2019).

The authors of this article have already conducted research on the use of websites by Polish yacht ports in 2018 and 2020. Our results showed that these tools are still underused by the surveyed entities for customer communication, and if anything, their content is often relatively poor (Hącia & Łapko, 2018; Hącia & Łapko, 2021).

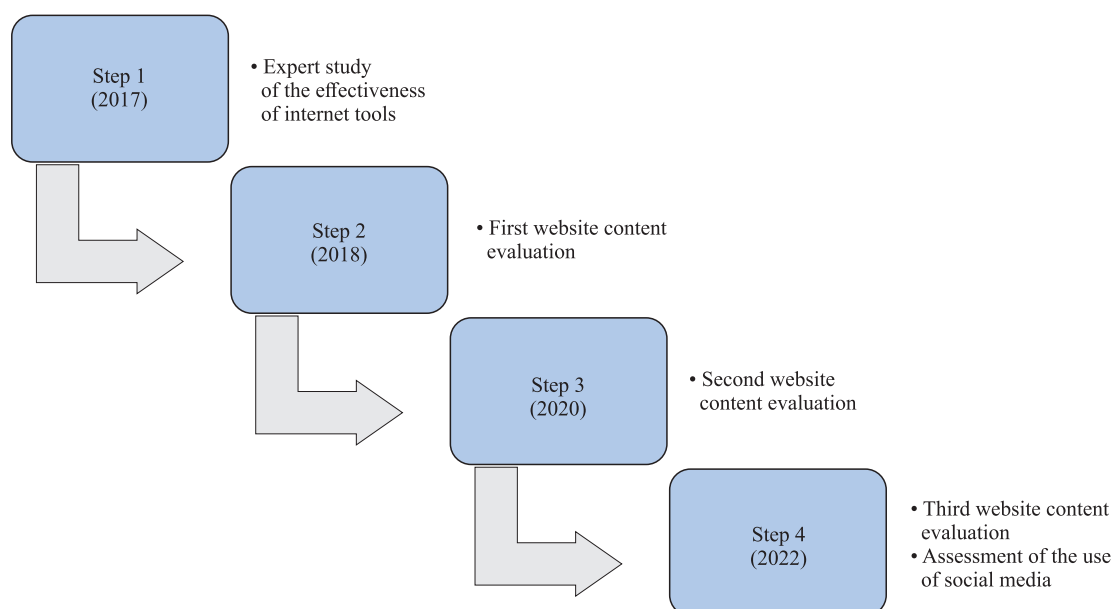
This article aims to present the results of another study that assessed the current use of websites by the Baltic yacht ports, which are key players in the development of nautical tourism. The websites are assessed on selected criteria that determine the degree of their usefulness for tourists, based on the complexity of the information provided, the validity of the information, as well as adaptability to the needs of various user groups. Additionally, an analysis was conducted regarding the fact that the examined objects had profiles on social media.

## RESEARCH METHODS

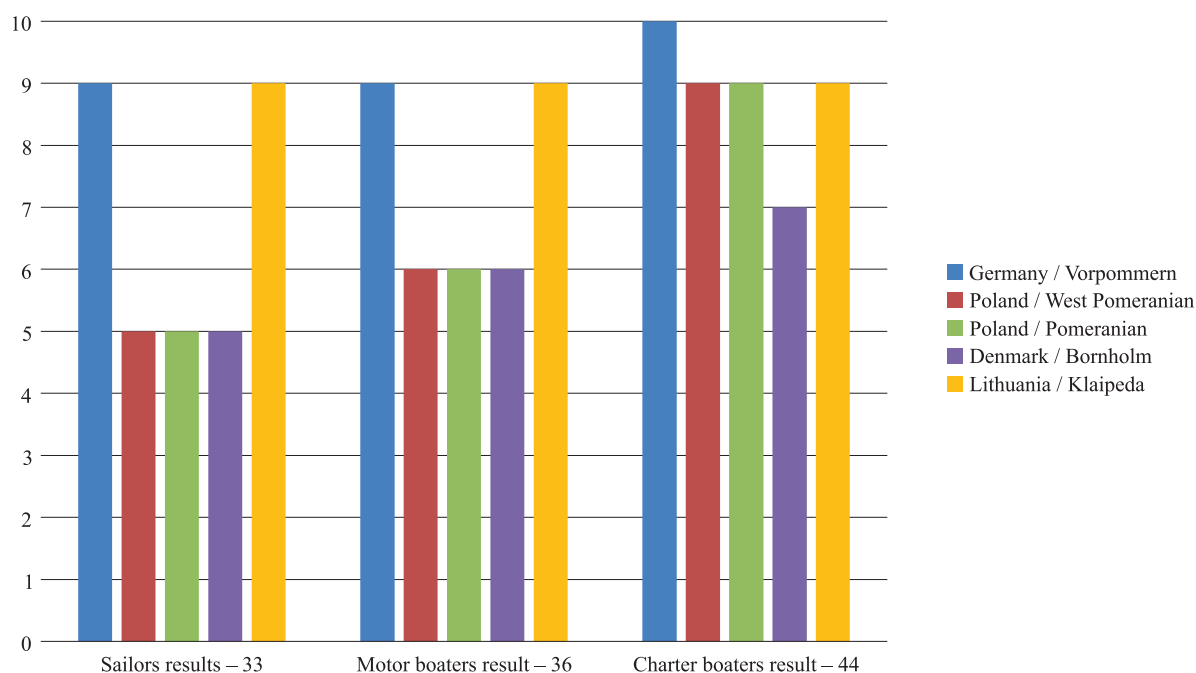
The stages of the research process (Fig. 2) and the obtained results are presented as follows.

The first step in the research process was an expert study of the effectiveness of Internet tools, conducted by representatives of the five Baltic regions. The methodology and detailed results of the study were presented in an earlier publication (Łapko & Muller, 2017). One aspect of this research has become the basis for more detailed analyses of the use of websites for communication between yacht harbors and tourists. Experts or representatives of regional yacht networks rated the effectiveness of internet tools on a scale of 1 to 10, based on their effectiveness in facilitating communication with port users. Among them, three groups were distinguished: sailors, motor boaters, and charter boaters. Figure 3 shows the results of these assessments in the form of average scores based on the regions to which the experts belonged.

The obtained results showed that Polish experts from the West Pomeranian and Pomeranian provinces assessed the effectiveness of internet tools very poorly in terms of communication with sailors (only five points out of ten) and motor boaters (six points out of ten possible). The effectiveness of communication with charter boaters was rated much higher at nine



**Fig. 2.** Research framework  
*Source:* own study.



**Fig. 3.** Regional experts' assessment of the effectiveness of Internet tools

Source: Łapko & Muller, 2017.

points (they rent yachts from charter companies, using, among others, online tools). An important question that arises from this assessment is whether or not yacht ports are able to use internet tools adeptly, or if they neglect this aspect of communication.

The designed research process allowed for answers to the following two research questions:

1. To what extent is the website tool used by marinas? (RQ1)
2. Is there any positive change in the use of websites and social media by yacht ports as a tool of communication with tourists? (RQ2)

The formulated research questions were static and dynamic. The answer to the first question allowed the determination of the status (in 2022, and earlier in 2018 and 2020) of the utilization of websites by yacht ports. The second question focused on the changes that took place with regards to the utilization of websites between 2018–2022. The research was conducted cyclically every two years starting in 2018. This allowed for a comparative analysis of the obtained results and an indication of the observed trends.

The research focused on Polish harbors along the Baltic coast, in areas belonging to two provinces: West Pomeranian and Pomeranian. These were the ports in Świnoujście, Dziwnów, Mrzeżyno, Dźwirzyno, Kołobrzeg, Darłowo, Ustka, Rowy, Łeba, Władysławowo, Jastarnia, Hel, Puck, Gdynia, Sopot, Gdańsk, Krynica Morska, and Piaski.

The research involved the assessment of the content of port websites according to the adopted criteria (Fig. 4), which constitute an original research tool. The criteria were proposed by the authors of this article on the basis of their own experiences with sailing. These were used to determine the usefulness of these websites for potential tourists looking for information about a given port and services available in its area. Research methods such as theoretical and analytical observation, website exploration, and scoring were used. As part of identifying the evaluation criteria, the brainstorming method and in-depth interview with experts – representatives of regional yacht port networks were used.

For the purposes of the research, a variant of the point evaluation method was used (Kaczmarek et al.,

K1	Existence of a direct website
K2	Availability of the list of services offered in the marina
K3	Availability of the port plan / map
K4	Availability of a price list containing information on the prices of individual services provided on the premises of the facility
K5	Availability of news, i.e. up-to-date information on events taking place in the port area or other information that may affect the choices of potential tourists
K6	Availability of information on facilities available and provisions made for disabled people by the port
K7	Translation of the website into foreign languages enabling foreigners to get acquainted with the port's offers
K8	Information on tourist attractions available near the port that may be a decisive factor when making a cruise plan
K9	Information about the telephone number of the port, which may be important for people who want to ask for help during maneuvers in the port or for people who would like to obtain additional information about the facility itself and the services provided
K10	Additional materials, such as videos and photos, which make the descriptions contained on the website more plausible

**Fig. 4.** Criteria for assessing the content of yacht port websites  
Source: own study.

2010). According to the criteria presented in Figure 4, the ports were assessed using the binary system, i.e. 1 means they meet the criterion and 0 that they do not. The sum of the points obtained made it possible to determine the degree of usefulness of the port's website for tourists. Ratings were distributed across different levels, namely: very low (1–2), low (3–4),

medium (5–6), high (7–8), and very high (9–10), and the ports were categorized on the basis of these ratings. In addition, the criteria were used to analyze the number of ports meeting them.

In addition, in 2022, the study was expanded to include the analysis of the use of the most popular social media platforms by yacht ports. Considering

the number of active users in 2022, the world leader is Facebook (2.74 billion users), followed closely by YouTube (2.29 billion users) (Dreamgrow, 2022). In Poland, as many as 92.8% of internet users aged 16 to 64 regularly use YouTube, and 89.2% are registered on the Facebook platform (DIGITAL, 2021). Therefore, these two social media platforms were considered in the analysis performed. In addition, it was checked whether the ports have profiles on other social media.

## RESULTS AND DISCUSSION

Based on the results obtained by the scoring method for selected yacht ports, they were classified according to the level of usefulness of their websites for tourists in 2018, 2020, and 2022 (Table 1). The typologies obtained indicate relevant changes that have taken place over the course of four years.

The ports for which the total number of points have changed with respect to the previous survey are marked in italics in the table.

In 2018, four ports (Mrzeżyno, Dźwirzyno, Rowy, Władysławowo) had a total score of zero, hence they were not classified into any group. In 2020, however, there were only two ports (Mrzeżyno and Rowy) and in 2022 only one (Rowy) with a total score of zero.

The most populated classes in 2018 were the second and third, i.e. low and medium level of website usefulness, while only four ports were classified in the fourth and fifth classes. The situation in 2020 had changed favorably in this respect. Both the second and third classes were still highly populated. Władysławowo Port had not scored any points in 2018, but appeared second in 2020. On the other hand, the fourth class, i.e. with a high level of usefulness, had gained as many as three ports, becoming the most populous. The rating of Yacht Harbor Dziwnów,

**Table 1.** Classification of yacht ports according to the website usability level for tourists in 2018–2022

Class	Website usability level for tourists	Port name		
		2018	2020	2022
1.	very low (1–2)	Piaski Harbour (1) Yacht Harbour Dziwnów (2)	<i>Piaski Harbour (2)</i> <i>Dźwirzyno Port (2)</i>	Piaski Harbour (2) Dźwirzyno Port (2)
2.	low (3–4)	Ustka Port (3) Jastarnia Port (3) Yacht Port North Basin Świnoujście (4) Krynica Morska Port (4)	Ustka Port (3) <i>Władysławowo Port (3)</i> Yacht Port North Basin Świnoujście (4) Krynica Morska Port (4) <i>Yacht Harbour Marina Gdańsk (4)</i>	Ustka Port (3) Władysławowo Port (3) Yacht Port North Basin Świnoujście (4) Yacht Harbour Marina Gdańsk (4)
3.	medium (5–6)	Darłowo Port (5) Puck (6) Sopot Yacht Marina (6) Yacht Harbour Marina Gdańsk (6)	<i>Jastarnia Port (5)</i> Darłowo Port (5) Puck (6)	<i>Port Mrzeżyno (5)</i> Jastarnia Port (5) Puck (6) <i>Krynica Morska Port (6)</i>
4.	high (7–8)	Hel Marina (7) Gdynia Marina (7) Łeba Port (8)	<i>Sopot Yacht Marina (7)</i> Hel Marina (7) Gdynia Marina (7) Łeba Port (8) <i>Yacht Harbour Dziwnów (8)</i> <i>Marina Yacht Park Gdynia (8)*</i>	Hel Marina (7) Gdynia Marina (7) Yacht Harbour Dziwnów (8) Łeba Port (8) Marina Yacht Park Gdynia (8) <i>Sopot Yacht Marina (8)</i> <i>Darłowo Port (8)</i>
5.	very high (9–10)	Marina Solna Kołobrzeg (9)	Marina Solna Kołobrzeg (9)	Marina Solna Kołobrzeg (9)

\* Marina Yacht Park in Gdynia as a separate yacht port was added to the survey in 2020, as it opened in 2019.

Source: own study.



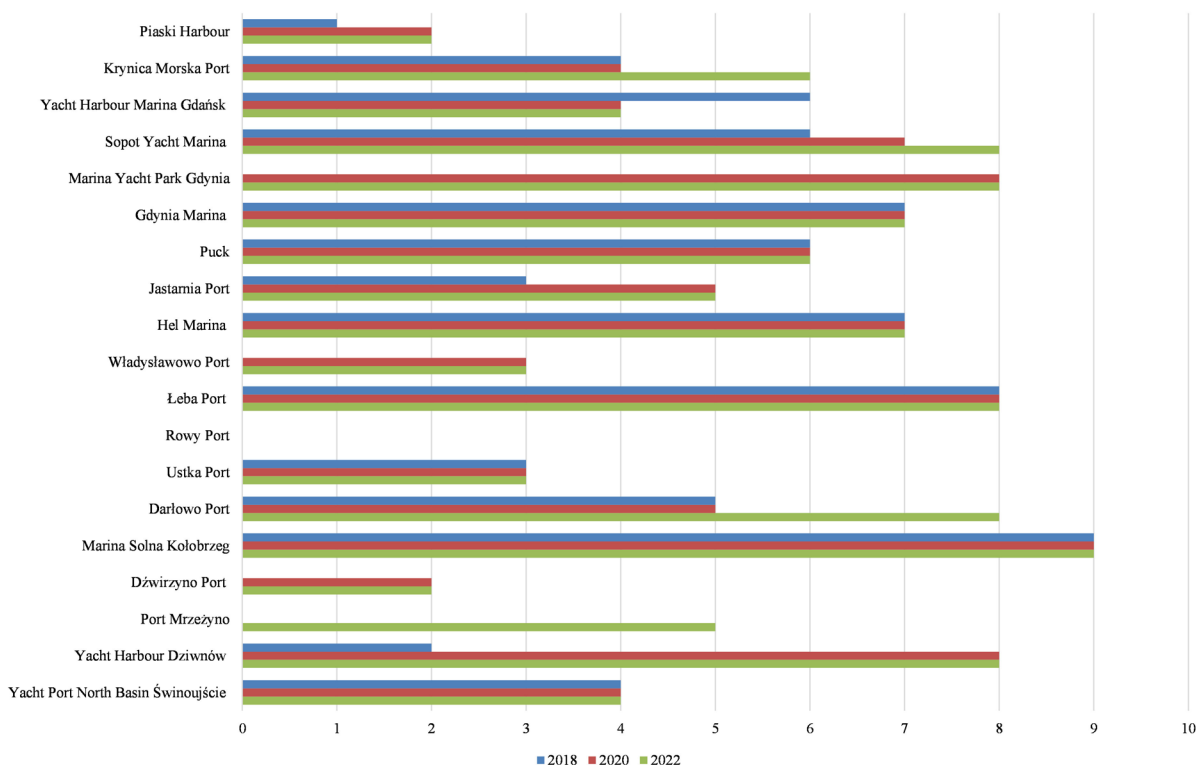
one of the ports in the fourth class, increased by the most (6 points). It is also worth mentioning that these changes are also related to the opening of the main website of this harbor (criterion K1). These changes are in line with the standard set by K.L. Keller as mentioned earlier: the website (as well as the port itself) should be useful enough to encourage users to visit it again. The same group (the fourth class) also includes Marina Yacht Park Gdynia, which was not subject to examination in 2018. It is an investment that was completed in 2019 and the port's website was created right away.

According to the latest survey, there have been further positive developments in 2022. The fourth class is still the most populous, with the harbors' websites rated high in terms of usefulness for tourists. This class gained one port (Darłowo Port), which moved from the third class, and currently accounts for almost 40% of all surveyed ports.

The highest rank was achieved by Marina Solna Kołobrzeg (West Pomeranian province). The class with a high level of suitability mainly includes ports located in the Pomeranian province: all three in 2018, five (out of six) in 2020, and five (out of seven) in 2022. Analyzing changes over time, this group has grown and has consumed ports from the West Pomeranian province.

The only negative change was observed in the case of Yacht Harbor Marina Gdańsk, whose total number of points fell by two. However, the website assessed in 2020 is a direct party and operates parallelly with the one surveyed in 2018. In 2022, nothing has changed in this respect.

In the study conducted in 2022, the highest increase in points was observed for Port Mrzeżyno. In the two previous surveys, this port did not receive any points as it had no website. Eight ports (42%) scored the same number of points in all three



**Fig. 5.** The results of the scoring of the content of yacht port websites in 2018–2022

Source: own study.

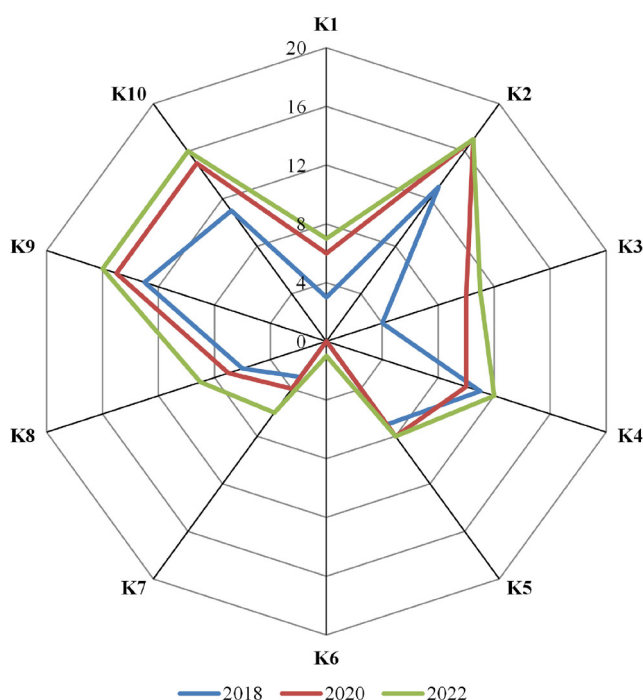
rankings. It is worth noting that half of them were classified as having at least a high degree of website usability. The results of the research conducted in 2018–2022 are presented in Figure 5.

Figure 6 shows the total number of points scored by all ports under each criterion separately. It is worth noting that the only criterion that was not met in the analyzed ports in the first two studies, including the port with the highest score, was the availability of information on facilities for disabled people. This can be regarded as an oversight, owing to the aging of European societies, because of which there is an increase in the average age of people who practice sailing. In Germany, the average age it was already 60 years old in 2016 (GA-MA, 2018), and in Poland there is a growing tendency in this respect. Older adults often have reduced physical fitness, which entails the need to use special amenities in ports. Additionally, a large and growing group of disabled sailors should be taken into account, whose members are guided by the safety and convenience

features of yacht ports when planning a cruise route. Information on the availability of facilities, or at least a declaration that the port is adapted for use by people with various disabilities, could contribute to increasing interest in the facilities. Without in-depth research, it is difficult to determine whether the lack of such information is due to mere oversight, or if there are other factors involved. The more so, as there is a tendency to provide information about facilities for the disabled, e.g. on Google maps markings of facilities friendly to the disabled are introduced (Grodecka, 2020). Unfortunately, this has not yet been established in Poland, but it is likely only a matter of time. The results obtained in 2022 confirm this because the first port appeared (Darłowo Port), which informs tourists on its website about adapting the infrastructure to the needs of elderly and disabled people. According to the information posted, Darłowo Port has three-wheeled bikes with a shopping trolley, steps/gangways to facilitate descent and boarding, and loading/unloading trolleys (Darłowo Port, 2022).

The criteria that were met by almost all ports in 2018 were the availability of the list of services (K2) and information about the telephone number to the port (K9). The telephone number was usually placed together with the address under the contact details tab. It was similar in 2020. The popularity of placing additional materials on websites, such as films and photos, has increased (K10). The results from 2022 confirm this. In addition to the three indicated criteria, those related to the availability of the port plan (K3), price list (K4), and information about attractions (K8) were also met in at least half of the examined ports.

Regarding the list of services, different ways of presenting it have been observed at different ports. Most often, the selected services were listed on the main page or subpage of the port, constituting part of the description of the facility; the rest could be found in the price lists. Such solutions were adopted, among others in Świnoujście and Łeba. In the case of Kołobrzeg, active icons with photos have been placed on the port's main page. Tourists need to click them to find a detailed description of selected services, such as yacht charter or diving schools.



**Fig. 6.** The number of ports meeting individual criteria (K1-K10) in the research in 2018–2022

Source: own study.



The dominant lack of translations of port websites into foreign languages is surprising (K7). However, positive changes regarding this have been observed. Translations were only available on three websites in 2018 and four in 2020 (for ports with high and very high relevance). As of 2022, there are already six ports that address this communication aspect, including Port Mrzeżyno that was classified for the first time. Darłowo Port also added this functionality, which happened simultaneously with the creation of a new direct website that was rated highly useful. However, the lack of translations for most websites of the analyzed ports can be considered a large oversight, since they are ports located on the Baltic coast that is adjacent to the transboundary basin. These facilities have excellent conditions for attracting foreign tourists, e.g. from Germany, Sweden, or Russia.

The result of the research on the first criterion (K1), i.e. the existence of one's own (direct) website, is very interesting. It might seem that in the era of universal Internet access, having websites by service facilities is already a generally accepted standard. In this case, however, only three of the surveyed facilities had their own website in 2018. Most often, the information was posted in tabs on the websites of individual communes, centers, or commercial ports that are operators of the surveyed yacht ports. Therefore, finding them is not easy for potentially interested people. Tourists looking for yacht ports usually do not recognize the operator of a particular port is and search for direct websites. Unfortunately, this also applies to large ports with considerable tourist traffic, e.g. in Świnoujście. In this case, the situation improved, because already six ports had their own website in 2020. However, in 2022 this number increased by one – the already mentioned Darłowo Port.

The criterion that has “improved the most” in two years is the availability of the port plan/map (K3). In 2020, this information was posted by more than half of the ports surveyed. Contrastingly, in 2022, in relation to the previous study, the greatest increase was observed in the criteria related to the availability of the price list (K4), translation into foreign languages

(K7), and information about attractions (K8). In all three cases, it was an increase of two ports.

In 2022, the degree of social media usage as a communication tool for yacht ports with tourists was additionally examined. As indicated in the description of the research methodology, it was checked whether the analyzed ports have a profile on Facebook and a YouTube channel. More than half of the ports have active profiles on the former media. This mainly applies to ports that have obtained at least a high degree of usefulness of the website. By contrast, only three ports use the YouTube channel. These ports scored at least eight points in the website rating. One of them additionally has a profile on Instagram and another one on Twitter. It can be concluded that these facilities appreciate information technologies in communication with tourists and want to develop in this area to expand the group of customers.

## CONCLUSIONS

The research results presented in the article allowed us to answer our research questions. Yacht ports make little use of websites as a communication tool with potential customers; however, positive changes in this respect are observed. Research conducted at two-year intervals (in 2018, 2020, and 2022) allows us to conclude that the number of yacht harbors whose website usability was considered medium or high increased from seven (in 2018) to 11 (in 2022). Over the years, the website usability of only one port has been defined at a very high level (Marina Solna Kołobrzeg). Still, many ports do not use the Internet to communicate with tourists. It is puzzling because the utilization of this tool is already common; for many people, it is the basic and obvious source of information and time management when planning tourist trips or during them (including cruises). At the same time, it should be noted that the criteria for evaluating websites referred only to the existence of individual content. The form of their presentation was not assessed, which is also important due to the marketing message, positioning of websites in Internet resources, ease, and intuitiveness of use and appearance.

The conducted research allowed stating that:

1. Only a few ports have their own website.
2. The websites assessed were not very functional for users from outside Poland, as most of them were not translated into foreign languages. This should be considered a serious flaw. Due to their location, all researched yacht ports have a great potential for servicing foreign sailors.
3. In 2022, for the first time one of the surveyed websites (Darłowo Port) published information about facilities for disabled people that are available in the port area.
4. There has been progress in graphical content such as plans/port maps as well as videos and photos. This should be considered a very positive change. Certainly, these elements facilitate making tourist decisions and the subsequent usage of the services of a given port.
5. More than half of the ports (10 out of 19) have active social media profiles and the Facebook is the most commonly used by them. YouTube was used only by a few ports and those with websites rated eight or more points, which lead to the conclusion that these facilities appreciate information technologies in communicating with tourists and want to develop in this area to expand the group of customers.

It should be noted that only websites directly related to a given port were analyzed in the research. However, some of the ports surveyed belong to the West Pomeranian Sailing Route or the Żuławy Loop and (as most of the surveyed ports were covered by one or the other project), information about the ports is available on the Route or Loop websites. In addition, ports are promoted on the Internet thanks to various initiatives implemented as part of international cooperation in the cross-border, transnational, and interregional dimensions. This should not, however, replace own initiatives. Individual port websites are their showpieces. It can be expected that potential tourists, wishing to find information about a given unit, will look for the direct website rather than search for information through project websites. The increasingly complex websites of marinas can also play an important role in the process of managing them.

The importance of having websites by yacht ports may be confirmed by the fact that keeping a website updated on an ongoing basis is one of the evaluation criteria in both international and regional port categorization systems. A website is usually required from ports seeking higher than average categories, examples include international categorization systems such as IMCI Blue Stars and The Gold Anchor Scheme (Blue Star Marina, 2022; Gold Anchor, 2017) or the regional system of Amber Anchors used to categorize ports belonging to the West Pomeranian Sailing Route (Marinas, 2022).

The study on the utilization of websites by Polish Baltic yacht ports will be continued in 2024. An in-depth study on the use of social media by ports is also planned, including an analysis of the content posted.

**Author contributions:** authors have given approval to the final version of the article. Authors contributed to this work as follows: E.H. and A.Ł. developed the concept and designed the study, E.H. collected the data, E.H. and A.Ł. analysed and interpreted the data, E.H. and A.Ł. prepared draft of article, E.H. and A.Ł. revised the article critically for important intellectual content.

## REFERENCES

- Akrivopoulos, O., Amaxilatis, D., Tsironis, N., Karadimas, D., Konstantopoulos, N., & Panaretou, I. (2022). Modernizing Marinas in the Mediterranean Sea using SMaTY: Methodologies and Lessons learned. In *IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events* (PerCom Workshops), pp. 472–477.
- Antonio, N., De Almeida, A., & Nunes, L. (2022). Data Mining and Predictive Analytics for E-tourism. In *Handbook of e-Tourism* (pp. 1–25). Cham: Springer International Publishing.
- Armendia-Muneta, M.E. (2014). An Overview of the Main Innovations in E-Marketing. In R.H. Tsiotsou, & R.E. Goldsmith (Eds.). *Strategic Marketing in Tourism Services*. Emerald, United Kingdom.
- Bae, S.Y., & Han, J.H. (2020). Considering cultural consonance in trustworthiness of online hotel reviews

- among generation Y for sustainable tourism: An extended TAM model. *Sustainability*, 12(7), 2942. <https://doi.org/10.3390/su12072942>
- Benevolo, C., & Spinelli, R. (2016). Web communication by Italian tourist ports: a websites quality assessment exercise, ICOT2016, New Challenges and Boundaries in Tourism: Policies, Innovations and Strategies, Naples, 29-6/2-7-2016.
- Blue Star Marina. (2022). <http://www.bluestarmarina.org/en/certification> (19.06.2022).
- Brumen, B., Planinc, P., Špindler, T., Gorenak, M. & Štuhec, T. L. (2020). Use of Mobile Technologies in Tourism: Natural Health Resorts Study. *Mediterranean Journal of Social Sciences*, 11(4), 1–18. <https://doi.org/10.36941/mjss-2020-0036>
- Buhalis, D., & Law, R. (2008). Progress in information technology and tourism management: 20 years on and 10 years after the Internet. The state of eTourism research. *Tourism Management*, 29(4), 609–623. <https://doi.org/10.1016/j.tourman.2008.01.005>
- Buhalis, D., & Zoge, M. (2007). The Strategic Impact of the Internet on the Tourism Industry. In M. Sigala, L. Mich, & J. Murphy (Eds.). *Information and Communication Technologies in Tourism* (pp. 481–492). Vienna: Springer.
- Castro, J.C., Quisimalin, M., Córdova, V.H., Quevedo, W.X., Gallardo, C., Santana, J., & Andaluz, V.H. (2018). *Virtual reality on e-Tourism. In IT Convergence and Security 2017*. Singapore: Springer.
- CSO report. (2021). Information society in Poland in 2021. <https://stat.gov.pl/> (17.06.2022)
- Csobanka, Z.E. (2016). The Z Generation. *Acta Technologica Dubnicae*, 6(2), 66. <https://doi.org/10.1515/atd-2016-0012>
- Darłowo Port. (2022). <http://www.marina.darlowo.pl/> (15.06.2022).
- David-Negre, T., Almedida-Santana, A., Hernández, J.M., & Moreno-Gil, S. (2018). Understanding European tourists' use of e-tourism platforms. Analysis of networks. *Information Technology & Tourism*, 20(1), 131–152. <https://doi.org/10.1007/s40558-018-0113-z>
- Deloitte. (2015). *Internet zmienia branżę turystyczną*. Retrieved from: [www.polskaszerokopasmowa.pl/trendy/artykuly/interent-zmienia-branze-turystyczna.html](http://www.polskaszerokopasmowa.pl/trendy/artykuly/interent-zmienia-branze-turystyczna.html) (03.06.2018).
- DIGITAL. (2021). *Poland*. Retrieved from: <https://datareportal.com/reports/digital-2021-poland> (15.06.2022).
- Dreamgrow. (2022). *The 15 Biggest Social Media Sites and Apps* [2022]. Retrieved from: [https://www.dreamgrow.com/top-15-most-popular-social-networking-sites/#1\\_Facebook\\_-\\_274\\_Billion\\_Active\\_Users](https://www.dreamgrow.com/top-15-most-popular-social-networking-sites/#1_Facebook_-_274_Billion_Active_Users) (19.06.2022).
- Frąckiewicz, E. (2006). *Marketing internetowy*. Warszawa: Wydawnictwo Naukowe PWN.
- GA-MA Consulting GmbH. (2018). Raport: *Marinas for „Best Agers”-Requirements as a result of the demographic change – a baseline study*.
- Gascón, J.F.F., Mir-Bernal, P., Muñoz, M., & Berbel, G. (2016). Social media and tourism: a case study in Catalonia. *Revista Científica Hermes*, 16, 115–131.
- Goenadhi, F., & Rahadi, D.R. (2020). Who Is The Target Market Of Digital Tourism 4.0?. *FIRM Journal of Management Studies*, 5(1), 50–61. <https://doi.org/10.33021/FIRM.V5I1.793>
- Gołąb-Andrzejak, E. (2016). Konsumenci pokolenia Y – nowe wyzwanie dla komunikacji marketingowej. *Handel Wewnętrzny*, 2(361), 140–151.
- Gold Anchor. (2017). *Global Marina Accreditation 2017*. Retrieved from: <https://eclass.unipi.gr/modules/document/file.php/NAS309/Gold%20Anchor%20Detailed%20Criteria%20V1-2017FinalDraft%20%281%29.pdf> (19.06.2022).
- Gössling, S. (2021). Tourism, technology and ICT: a critical review of affordances and concessions. *Journal of Sustainable Tourism*, 29(5), 733–750. <https://doi.org/10.1080/09669582.2021.1873353>
- Grodecka, M. (2020). *Mała ikonka, a zmienia wiele. Mapy Google wyraźniej oznaczają miejsca przyjazne dla użytkowników na wózkach*. Retrieved from: <https://www.spidersweb.pl/2020/05/google-maps-niepelnosprawni.html> (28.05.2020).
- Gures, N., Inan, H., & Arslan, S. (2018). Assessing the self service technology usage of Y-Generation in airline services. *Journal of Air Transport Management*, 71, 215. <https://doi.org/10.1016/j.jairtraman.2018.04.008>
- Gus-Puszczewicz, A. (2018). Potencjał turystyczny śródlądowych dróg wodnych województwa pomorskiego. *Studia i Prace Kolegium Zarządzania i Finansów*, 170, 91–103. <https://doi.org/10.33119/SIP.2018.170.6>
- Hącia, E. (2019). The role of tourism in the development of the city. *Transportation Research Procedia*, 39, 104–111. <https://doi.org/10.1016/j.trpro.2019.06.012>
- Hącia, E., & Łapko, A. (2018). Ocena stron internetowych wybranych polskich portów jachtowych. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 535, 72–78. <https://doi.org/10.15611/pn.2018.535.06>

- Hacia, E., & Łapko, A. (2020). Analysis of the marina service offer in the southern Baltic region. *European Research Studies Journal*, XXIII(Special Issue 2), 804–819. <https://doi.org/10.35808/ersj/1899>
- Hącia E., & Łapko, A. (2021). Wykorzystanie stron internetowych jako narzędzia komunikacji z turystami przez nadbałtyckie porty jachtowe. In S. Kopera (Ed.). *E-management: Digitalizacja procesów biznesowych* (pp. 44–55). Kraków: Uniwersytet Jagielloński Instytut Przedsiębiorczości.
- Hysa, B., Karasek, A., & Zdonek, I. (2021). Social media usage by different generations as a tool for sustainable tourism marketing in society 5.0 idea. *Sustainability*, 13(3), 1018. <https://doi.org/10.3390/su13031018>
- Kaczmarek, J., Stasiak, A., & Włodarczyk, B. (2010). *Produkt turystyczny – pomysł, organizacja, zarządzanie*. Warszawa: PWE.
- Keller, K.L. (2009). Building strong brands in a modern marketing communications environment. *Journal of Marketing Communications*, 15(2–3), 139–155. <https://doi.org/10.1080/13527260902757530>
- Kolcubaşi, G.Y., & Akyar, D.A. (2019). *Evaluation of social media usage in marina businesses*. Ulusal Liman Kongresi, Izmir. <https://doi.org/10.18872/0.2019.25>
- Kolnhofer-Derecskei, A., Reicher, R.Zs., & Szeghegyi, A. (2017). The X and Y Generations' Characteristics Comparison. *Acta Polytechnica Hungarica*, 14(8), 107. doi:10.12700/APH.14.8.2017.8.6
- Li, X., Law, R., Xie, G., & Wang, S. (2021). Review of tourism forecasting research with internet data. *Tourism Management*, 83, 104245. <https://doi.org/10.1016/j.tourman.2020.104245>
- Litvin, S.W., Bloise, J.E., & Laird, S.T. (2005). Tourists' use of restaurant webpages: Is the internet a critical marketing tool? *Journal of Vacation Marketing*, 11(2), 155–161.
- Liu, H. (2022). Intelligent Tourism Information Service Model considering Tourist Experience in the Environment of Internet of Things. *Computational Intelligence and Neuroscience*. <https://doi.org/10.1155/2022/5252218>
- Lukovic, T. (Ed.). (2013). *Nautical tourism*. Boston: Cabi.
- Łapko, A. (2019). Wodowanie i slipowanie jachtów jako wyzwanie logistyczne w portach jachtowych. *Przedsiębiorczość i Zarządzanie*, 20(7), 97–107.
- Łapko, A., & Muller, M. (2017). Destination branding process exemplified by the South Coast Baltic Region. *International Journal of Contemporary Management*, 16(1), 283–301. <https://doi.org/10.4467/24498939IJCM.18.047.10033>
- Marinas. (2022). *System certyfikacji Bursztynowe Kotwice*. Retrieved from: <https://marinas.pl/bursztynowe-kotwice/system-certyfikacji/> (19.06.2022).
- Mazurkiewicz, B.K. (2010). *Porty jachtowe i mariny. Projektowanie*. Gdańsk: Fundacja Promocji Przemysłu Okrętowego i Gospodarki Morskiej.
- Miocic, B.K., Zekanovic, L.K., & Bojcic, N. (2006). Internet marketing of the Croatian marinas. In *An Enterprise Odyssey*. International Conference Proceedings. University of Zagreb, Faculty of Economics and Business, 1565.
- Mucko, S.M., Miocic, B.K., & Zekanovic, L.K. (2008). Symbols in visual presentation of Croatian marinas on the Internet. In *An Enterprise Odyssey*. International Conference Proceedings. University of Zagreb, Faculty of Economics and Business, 941.
- Neidhardt, J., & Werthner, H. (2018). IT and tourism: still a hot topic, but do not forget IT. *Information Technology & Tourism*, 20(4), 1–7. <https://doi.org/10.1007/s40558-018-0115-x>
- Nowaczyk, P. (2018). Direct and indirect impact of nautical tourism on the development of local economy in West Pomerania on the example of Darłowo municipality. *Acta Scientiarum Polonorum. Oeconomia*, 17(2), 79–88.
- Parra-Lopez, E., Martínez-González, J.A., & Chinea-Martin, A. (2018). Drivers of the formation of e-loyalty towards tourism destinations. *European Journal of Management and Business Economics*, 27(1), 66–82.
- Pętle Żuławska. (2020). Retrieved from: <https://petlazulawska.pl/> (26.05.2020).
- Reisenwitz, T.H., & Fowler, J.G. (2019). Information sources and the tourism decision-making process: An examination of Generation X and Generation Y consumers. *Global Business Review*, 20(6), 1372–1392. <https://doi.org/10.1177/0972150919848938>
- Report. (2016). *Polski rynek żeglarski*. Retrieved from: [http://portalzeglarski.com/news\\_sailportal,6699.html](http://portalzeglarski.com/news_sailportal,6699.html) (26.05.2020).
- Siteefy. (2022). Retrieved from: <https://siteefy.com> (19.06.2022).
- Web Content Accessibility Guidelines. (2022). Retrieved from: <https://www.w3.org/TR/WCAG22/> (19.06.2022).
- WH. (2021). *E-commerce in Poland 2021*. Retrieved from: <https://www.wiadomoscihandlowe.pl/arttykul/e-commerce-w-polsce-koronawirus-zwiekszyliczbe-sklepow-internetowych-o-ponad-20-proc> (19.06.2022).

- Wymbs, C. (2000). How e-commerce is transforming and internationalizing service industries. *Journal of Services Marketing*, 14(6), 463–478. <https://doi.org/10.1108/08876040010347598>
- Zachodniopomorski Szlak Żeglarski. (2022). Retrieved from: <http://www.zrot.pl/2-uncategorised/264-zachodniopomorski-szlak-zezlarski-siec-portow-turystycznych-pomorza-zachodniego> (19.06.2022).
- Zeng, B., & Gerritsen, R. (2014). What do we know about social media in tourism? A review. *Tourism Management Perspectives*, 10, 27–36. <https://doi.org/10.1016/j.tmp.2014.01.001>
- Živković, R., Gajić, J., & Brdar, I. (2014). The impact of social media on tourism. *Singidunum Journal of Applied Sciences*, 758–761. <https://doi.org/10.15308/sinteza-2014-758-761>





ORIGINAL PAPER

Received: 28.11.2022

Accepted: 09.03.2023

## A SMART AGE-FRIENDLY CITY IN THE CONTEXT OF THE SEASONAL MIGRATION OF SENIOR RESIDENTS. THE CASE OF BENIDORM

Agnieszka Labus✉

ORCID: 0000-0003-0997-3178

Silesian University of Technology

Akademicka Street 7, 44-100 Gliwice, Poland

### ABSTRACT

Benidorm is one of the most popular Spanish destinations for seasonal migrants, especially seniors, in the winter season. This article discusses the evolution of age-friendly smart cities in the context of the seasonal migration of the elderly on the example of Benidorm. Benidorm is one of the global leaders in implementing the concept of a smart city and a smart destination (SD) (Coban & Aydın, 2020). The aim of the article was to confront the urban renewal programs implemented in Benidorm with the concept of an age-friendly city according to the definition proposed by the WHO (2007). The concept of an age-friendly city and a smart destination was defined, and the presented results can assist European tourist destinations in targeting their urban renewable policies at seasonal migrants in response to the progressive aging of the population.

**Keywords:** age friendly cities, urban renewal, smart destination (SD), smart city, seasonal migration, Benidorm

### INTRODUCTION

In the 21st century, two demographic phenomena intensified strongly. The first is the aging of the population, and the second is migration (Marois et al., 2020). Both the number of migrants and people in retirement age is growing. Ptak (2012) states that currently the number of international migrants over 65 in the world is at the level of 27 million, which is almost 13% of all participating in international movements. Local authorities should prepare for the increase in the number of retirees in their municipalities, not only due to the aging of the population, but also due to the possibility of an influx of older people to their municipalities. This influx may apply to permanent but also temporary relocation, e.g. to warm countries from areas with colder climates.

The phenomenon of migration of the elderly is quite complicated due to the fact that the decision to move is influenced by many social, psychological and economic factors, which operate with different intensity and depend on the age, health condition and financial capacity of elderly people. Pensioners are reluctant to migrate, because changing the place of residence requires a lot of effort – especially forced migration, which is associated with the need to provide care for a senior in deteriorating health. However, after all, there is no region in the world from which pensioners would not emigrate and to. In Western Europe and the USA, migration of seniors has been recognized as an important factor in local and regional development. Research conducted there shows that retirees who arrived in given places generate new jobs in the local economy, mainly in

✉agnieszka.labus@polsl.pl

services provided for retirees and related to health care, finance and entertainment. Many governments have already recognized the benefits of the influx of seniors and facilitate their admission, especially as we now face a massive retirement of the post-war baby boom generation, which accounts for two-thirds of the world's population (Pytel, 2017). According to the report of the United Nations Economic Commission for Europe (2016, July), labor migration is the most common motivation for migration in working age, there are several reasons for older migration, which differ and include: return migration of immigrants to the country of origin, economic migration, return to children or other relatives living abroad and the so-called lifestyle-related migration, often to countries with warmer climates. Nevertheless, it should be remembered that older migrants constitute a heterogeneous group, and therefore all suggested policies must be adapted to the specific national and local context and to the specificity of the subgroups at which they are addressed.

### **SEASONAL MIGRATION OF OLDER PEOPLE – CHALLENGES AND OPPORTUNITIES**

Many studies show that older people live longer and have better physical health than ever before, which does not necessarily mean that they enjoy a good quality of life and happiness. Problems of isolation, loneliness and depression mean that many elderly people live with low levels of life satisfaction (Allen, 2008). Research has shown that holidays later in life have positive physical, psychological, social and spiritual effects; they provide opportunities for activity, social interaction, self-reflection and self-improvement, thus improving the well-being of seniors (Dolnicar et al., 2012; Hagger & Murray, 2013; Hunter-Jones & Blackburn, 2007; Sanz et al., 2013). Sanz, Ferrandis and Garces (2013) conducted a study on the relationship between participation in tourism and the health, autonomy and social inclusion of older people. The study found a positive relationship between vacation and health and independence, and

that older people who went on vacation had to use less welfare and health systems.

The number of older people in the EU has increased in recent years, while the tourism industry has focused on the market potential of richer and healthier older people, despite the fact that many people are not traveling or unable to travel for various reasons, e.g. lack of transport, poor health, family and caring responsibilities and the lack of travel companions (Steptoe et al., 2015; Anderson & Langmeyer, 1982; Blazey, 1986; Guinn, 1980; McGuire, 1984; Romsa & Blenman, 1989; Shoemaker, 2000; Zimmer et al., 1995). Only 41% of seniors in the EU travel (compared to 55% between the ages of 25 and 44), and seven out of ten seniors only travel within their own country (European Commission, 2015).

A noteworthy phenomenon in the area of mobility of older people is international retirement migration (IRM), which is an essential feature of the changing map of Europe (Williams et al., 1997). Little in-depth research has been done on the IRM. Warnes (1994) used secondary data to show the growing importance of Southern Europe as a place of residence for Northern Europeans in the 1980s. Detailed studies of the IRM processes and their implications for expatriates or host communities have been very sparse. One notable exception is the study by Jurdao and Sánchez (1990) on Mijas (Costa del Sol), an analysis of the cultural and economic consequences of immigration from Northern Europe (including retirees) to one of the most “colonized” municipalities in Spain. Seasonal migrants are a diverse group that may spend different periods of the year in their countries of origin. For example, in Mijas, Jurdao and Sánchez (1990), they found that 44% of the surveyed seasonal migrants among the elderly lived outside Spain more than three months a year. Such seasonal migrants can be ‘snowbirds’ fleeing northern European winters. Seasonal migrants often become owners of their second homes. Although much research has been done on second home ownership in another country, this issue is relatively poorly understood. Valenzuela (1991) estimates that there are over 500,000 second homes owned by foreign owners on the Costa del Sol and

Costa Blanca, more than half of which are British or German. On the other hand, there is little in-depth research on foreign landlords in Southern Europe. The authors, Steinnes, Hogan (1992) confirmed the hypothesis that seasonal migration of older people may be partly the result of economic benefits achieved in inaccessible housing markets in their home countries. What is more, a stronger correlation regarding seasonal migrations suggests that older people do not want to invest in housing in local markets, but still “spend” profits on seasonal migrations. This behavior is rational if housing is viewed as an investment and expectations of future returns are greater in markets that they cannot afford. An important aspect of seasonal migration of older people is also access to social and medical care in countries to which they migrate seasonally, as McHugh, and Mings (1994) write about it, using the example of urban environments in the United States. The results show that the use of healthcare among seasonal migrants is significant and varies according to citizenship, age, number of winter visits and length of winter stays. The authors argue that the use of healthcare is a symptom of social and emotional attachment to a winter residence that develops and deepens over the years.

There are many Mediterranean towns that have attracted millions of Europeans, including the elderly, since the 1960s, mainly because of their climate and lifestyle. The most important region for the migration of seasonal pensioners in Europe is the Costa del Sol. Research conducted by Rodriguez, Fernandez-Mayoralas and Rojo (1998) indicate that the reason for such a high interest in a place is a specific configuration of economic, social and environmental conditions. Its accessibility to northern European countries also plays an important role. This combination of natural and cultural attractions and well-developed infrastructure attracts tourists to the Costa del Sol who, after retirement, come back to settle here permanently. Similar conditions are found on other Mediterranean coasts of Spain, such as Costa Brava, Alicante, Murcia, the Balearic Islands and the Canary Islands. Among others, Paunero (1988), Myklebost (1989), Montiel (1990), Diaz (1991), Serrano (1991).

In the context of the articles in question, seasonal migrations are rather treated as a trend that for many years concerned mainly seniors and seniors from Western Europe who, after retiring, could use their time and money to travel and enjoy life. Migration of older people on the one hand is a contradiction of the concept of “aging in place” and the saying that “old trees do not replant”, on the other hand, as emphasized by the authors of the article *Migration and older age: Older migrants and migrant careworkers* (United Nations Economic Commission for Europe [UNECE], 2016), the elderly are a very diverse social group, with different needs, also related to mobility and changing the place of residence, as well as the vision of spending their retirement age or material status. In previous studies, much attention has been paid to the issues of seasonal migration of older people from the point of view of tourism, including social tourism, where the elderly are one of the recipient groups, and to a lesser extent to aspects of city management. In order to fill the research gap, the aim of this article is to try to confront the 8 components of an age-friendly city (World Health Organization, 2005) with the urban renewal activities of Benidorm in Spain, which during the winter season is visited by seasonal migrants, especially the elderly and is at the forefront of European cities implementing the smart city concept in terms of “smart destinations” (SD), to highlight the important aspects of the urban renewal policy of smart age-friendly destinations.

## **AGE-FRIENDLY CITY IN THE CONTEXT OF SMART DESTINATION (SD) – METHOD AND DATA**

Currently, both among researchers (van Staalduinen et al., 2018) and local government authorities smart city and age-friendly city concepts are acquiring importance that point to new ways of working, planning, implementing and assessing progress and impacts, which may include traditional approaches for urban renewal and can be a remedy to the challenges that urban centers are currently facing. Two bottom-up initiatives have been launched in Europe

for several years to address the challenges of urbanization and aging. European Innovation Partnerships have been created, one for Smart Cities and Communities (EIP SCC) and the other for active and healthy aging (EIPonAHA). EIPonAHA, Action Group D4 Buildings, cities and environments friendly for older people want to connect to EIP SCC in terms of smart cities and communities, which requires the creation of smart environments friendly to aging, embedded in concepts, theory and practice, an example of which may be the research conducted in this article.

EIP SCC defines smart cities as systems of people interacting with flows of energy, materials, services and financing, resulting in sustainable economic development and high quality of life for inhabitants of all ages. Flows and interactions become intelligent through the strategic use of ICT infrastructure and services in a process of transparent urban planning and management that responds to the social and economic needs of society. The objectives of the EIP SCC focus on 3 areas:

1. Sustainable urban mobility (multimodality of urban transport, electric vehicles).
2. Sustainable neighborhoods and the built-up environment (reduced energy consumption, zero-energy neighborhoods and buildings).
3. Integrated infrastructures and processes (data exchange).

As part of EIP SCC activities, it is recommended to pay more attention to the changing population of cities and the involvement of (older) citizens in the development of smart cities and communities. An important aspect is also the inclusion of social and health services in cities in the development of smart age-friendly cities. Involvement in mobility plans could bring great benefits to both social and health services: older people can find the best ways to reach the closest available services. One of the elements of implementing the smart city concept is the development of the tourism function, which then becomes known as smart tourism (smart tourism concept). There is no clear distinction between a smart city and a smart destination (SD). A smart destination can be defined as a destination that adopts

an interactive/participatory management style and aims to improve the quality of life of residents and tourists by using modern technologies to collect, store, exchange and process data.

The concept of Smart Destinations (SD) focuses on the efficient and effective use of resources, a cleaner environment and ultimately sustainable development (Coban & Aydın, 2020). Some authors describe the need of further synergy between the smartness and sustainability, as those two concepts share common elements and could support each other (González-Reverté, 2019; Perles-Ribes & Ivars-Baidal, 2018). Perles-Ribes and Ivars-Baidal (2018) assign the SD elements, obtained with the use of technology, like planning and long-term perspective, monitoring systems, public-private cooperations, customization of tourist services, and more, to the effects of lower consumption of resources, encrease of public commitment, better tourism marketing and more competitiveness, which are Sustainable Tourism Destinations assumptions. According to SEGITTUR Smart Destination should “guarantee the sustainable development of the tourist area, accessible to everyone, which facilitates the visitors’ interaction with and integration into their surroundings, increases the quality of the experience at the destination, while also improving the quality of life of its residents” (SEGITTUR, 2015). This definition corresponds with the World Tourist Organisation principles of Sustainable Tourism Destinations, which contain among others “social equity and the generation of quality employment; a satisfactory experience for visitors without gender, racial or disability discrimination; the control and local planning of tourism processes and the maintenance of local well-being levels” (UNWTO, 2013). Smart Destinations (SD) have gained momentum primarily in tourism research, while spatial issues and their impact on urban renewal of smart destinations is insufficiently researched. The actual implementation of the two main SD objectives, i.e. improving the experience of tourists, in particular the elderly and improving the management of destinations, is within the area of strategic actions, while structural measures in the



area of urban structure analysis remain largely poorly explored. Nolasco-Cirugeda, Martí and Ponce (2020) write about it, analyzing the urban plans of the city of Benidorm over the years, which has turned from a fishing town into a smart tourist destination. Spain is one of the countries where the idea has penetrated to a large extent in both public institutions and business strategies (Femenia-Serra & Ivars-Baidal, 2018; Ivars-Baidal et al., 2017). Smart Destination Policies aim to create better experiences and improve marketing and management processes in cities (destination) from the public point of view (Buhalis & Amaranggana, 2014; Gretzel et al., 2015; Wang et al., 2016).

Smart destinations (SD) should be defined as part of specific, accessible and valuable solutions, focused on the needs of a diverse society, i.e. as “intelligent solutions”. Following Ivars-Baidal et al. (2017) intelligent solutions can be understood as technology-based applications and tools that an intelligent target facility can use to achieve its goals of enriching the visitor experience and its own management processes. Based on the holistic perspective provided by the authors: Femenia-Serra, Perles-Ribes and Ivars-Baidal (2019), Gretzel, Reino, Kopera and Koo (2015), Gretzel, Zhong and Koo (2016), Huang, Goo, Nam and Yoo (2017), intelligent solutions used in smart destinations include: public ubiquitous Wi-Fi, big data analysis tools, intelligent dashboards, advanced DMO websites and blogs, QR codes and geotags, beacon technology, virtual and augmented reality, chatbots, social media activities, target applications, drones, etc. The combination of all these technologies builds a “smart city” that can result in a better experience and optimized destination management.

Older people should have access to information about infrastructure in order to be motivated to spend time in their neighborhood and to reduce the risk of isolation. Many people already have wearable devices, such as smart watches, to help monitor and manage their health and physical activity. These personal devices can also be used to better connect older people with public data about urban environments. For example, an elderly-friendly Smart City “layer” can be linked to a smart watch to locate

amenities such as public restrooms, fountains, and shaded seating along exercise routes, etc.

The concept of age-friendly cities was introduced as a program by the World Health Organization (2007) in response to contemporary demographic changes, including the aging of the population. According to WHO, age-friendly environments promote the health and well-being and participation of older people. They are accessible, fair, inclusive and supportive. They promote health, prevent or delay disease and motor deterioration. They provide people-centered services and support to help them recover or compensate for motor loss so that people can continue to do the things that are important to them. The goal of age-friendly environments is the health and well-being of all, regardless of age, gender, cultural or ethnic origin, wealth or health. As part of the concept, 8 areas important from the point of view of defining an age-friendly city were enumerated, including:

1. transport (mobility);
2. public spaces and buildings;
3. housing development;
4. social and medical care;
5. location and accessibility of services;
6. communication and use of modern technologies;
7. participation in social life and multi-generational integration through joint use of urban space;
8. social participation.

This concept is discussed in many scientific articles (Plouffe & Kalache, 2010; Buffel et al., 2012; Green, 2013), while the intersection of age-friendly and smart cities has been gaining importance in recent years in the publications of many authors (Klimczuk & Tomczyk, 2016; Loredana et al., 2020). There are no scientific studies in the literature that would investigate the age-friendly city approach according to WHO (2007) in the context of smart destinations, taking into account the seasonal migration of older people. Taking these research gaps into account, the aim of this article is to discover what the concept of an age-friendly city in smart destinations – smart cities in the context of seasonal migration of older people – is about. To achieve this goal, the Spanish city of Benidorm, known as the “Mecca of seniors”,

and one of the best performing cities implementing the concept of Smart Destinations (SD), was adopted as the relevant case study. Benidorm is recognized as the first national urban center to have a tourist information system. The aim of this article is also to draw attention to the aspect of a smart city defined not only through the prism of modern technologies, but as an age-friendly city in terms of access to basic services, public spaces and buildings designed in accordance with the principles of universal design, sense of comfort, legibility of the structure, urban spaces, etc.

The research in this article was conducted under the grant from October 1, 2019 until August 31, 2021 based on a literature analysis, urban analysis with the use of available googlemaps, *in situ* research (5-day visit to Benidorm from November 8 – November 14, 2019 – before COVID-19 pandemic), including photo inventory and interviews with representatives of the city office and tourist information in the city of Benidorm, who indicated important issues for the development of research within the framework of the article.

The obtained results are important for research on ways of renewing cities with tourism potential, but also directing their renewal policy to seasonal migrants among the elderly. One of such methods may be the use of the concept of smart destinations – SD. Due to its novelty and originality, SD may constitute a new research area from the perspective of a spatial planner, town planner and architect, but also an inspiration for the city authorities, organizations and the business sector as a method of public-private cooperation in city management in the context of its renewal.

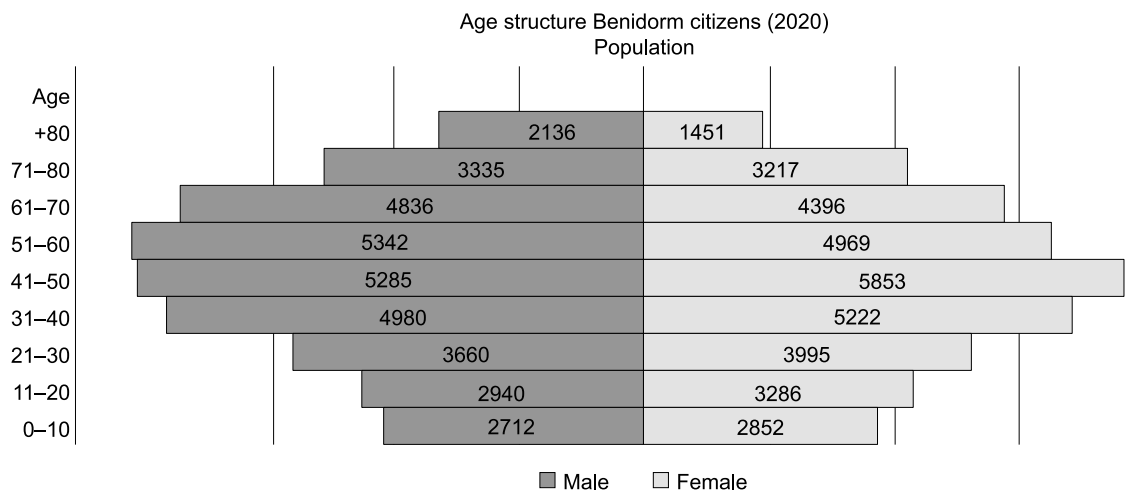
## SMART AGE FRIENDLY CITY ON THE CASE OF BENIDORM

Benidorm is a 38.51 km<sup>2</sup> holiday resort located in the province of Alicante, on the south-eastern Mediterranean coast of Spain in the Costa Blanca region, with an exceptionally mild climate. It is inhabited by 70,450 inhabitants (2020), and their number has been systematically increasing in recent

years, with a slight decrease between 2014–2017. The evolution of Benidorm's population has been increasing since its inception, and in 2013 it peaked at 73,768 inhabitants. The city was founded in the 1960s as the main international and national seaside resort and is characterized by intensive land use (skyscrapers), long stays and increased occupancy throughout the year in hotels. Moreover, it is the fourth place in Spain in terms of all-year hotel stays after Barcelona, Madrid and San Bartolomé de Tirajana (National Statistics Institute [INE], 2017).

Benidorm has attracted the attention of scholars due to its success, with a clear focus on the competitiveness of Claver-Cortés, Molina-Azorín, and Pereira-Moliner (2007), degree of innovation (Perles-Ribes et al., 2015), evolution of urban plan over the years and focus on urban renewal targeting seasonal migrants, in particular the elderly (Ivars-Baidal et al., 2013; Soares et al., 2015). In recent years, Benidorm has attracted the attention of the media and politics as it has become “the first intelligent certified tourist destination” in the world.

In the literature Benidorm is mainly written about in terms of tourism (Sánchez-Galiano et al., 2017; Ivars-Baidal et al., 2014), how Benidorm evolved from a village into a world-famous city of skyscrapers, economic considerations are described, as well as the environmental problems of the city are discussed. Benidorm's resources are described, including more than five kilometers of beaches and 2,800 hours of sunshine per year, the fact that Benidorm has become the prime destination for organized (package) holidays (Nogues-Pedregal, 2012). Benidorm has a policy of urban renewal aimed at continuous efforts to adapt the city to the needs of its occupants, and to make it smart with regard to the greater comfort of groups with special needs, including elderly and disabled people. This is important not only for seniors visiting Benidorm, but also for the elderly and their daily needs. Currently, a group of residents over the age of 65 who constitute 20% of the entire city's population (Fig. 1), and demographic forecasts predict that this social group will constitute an increasing part of the entire Spanish society in the coming years.



**Fig. 1.** Analysis of age structure of Benidorm inhabitants in 2020  
*Source:* own study based on the National Statistics Institute [INE].

## Process of development of the City of Benidorm

From the 1950s onwards, domestic tourism in Spain spurred the creation of the first tourist settlement in Benidorm, on the seafront along Levante Beach. The first master plan, from 1956, was intended to create a double city: the original urban area for the local population; and a new town, which would be designed according to the Howards' garden city model in terms of low density of buildings. This new urban development was to be erected along two beaches, Levante and Poniente, to promote a healthy lifestyle, offering bustling public spaces, wide road axes with plenty of parking spaces and tree-lined avenues (Martí Ciriquián & Oliva Meyer, 2002). Benidorm, known worldwide as the "Mediterranean Manhattan", has largely guided the development of its urban structure towards an attractive and productive tourist city. While the city has not always been considered a successful model in terms of sustainable development, Benidorm's city plans are considered very effective for the development of urban tourism.

The 1956 Benidorm master plan, which was in effect for 34 years, achieved such a high level of detail that no additional planning tools were needed to facilitate the great urban expansion in 1967–1973. The strategic criteria applied to the intensive land

occupation on the coastal fringes favored the creation of a compact urban center. Although the seascapes were devastated by the striking urban image of the skyscrapers along the coast, the inland landscape has been preserved so far. The modification of the land use criteria in the 1990s marked a complete change, resulting in less sustainable development in the hinterland with the creation of vast areas with a variety of recreational and accommodation infrastructure and low-density residential areas, similar to the existing ones.

The experiences of Benidorm form a worthwhile spectacle (Iribas, 2000). Relevant scholars from various fields such as Henri Lefebvre, J.G. Ballard or Mario Gaviria considered Benidorm a peculiar urban phenomenon (Ballard, 2013; Gaviria, 1977; Lefebvre, 1974; Lefebvre, 2014; Mazón et al., 2012; Maas et al., 2000). Benidorm has been recognized as an urban laboratory for contemporary research from the perspectives of such areas as tourism development and competitiveness (Claver-Cortés et al., 2007; Ivars-Baidal et al., 2013); recreational architecture (Martí Ciriquián & Oliva Meyer, 2002; Martínez-Medina, 2016); sociology (Mantecón, 2008; Mazón et al., 2012; Obrador, 2012); and informal cities (Mesa del Castillo, 2015; Oliver, 2015). The diversified implementation of new tourism products has widened the visitor profile in recent years, including foreigners who

chose Benidorm for their second home (Arnstberg & Ergstrom, 2007; Domínguez Martínez et al., 2016). The renewal of the available recreational infrastructure has enabled Benidorm to compete in very different tourism markets with positive results (Clavé et al., 2011; García Sánchez & López Siles, 2015; Ivars-Baidal et al., 2013). For example, investments in the construction of amusement parks, golf courses and the construction of new four- and five-star hotels have significantly improved the quality of short-term holiday accommodation.

Despite recognizing Benidorm as a sustainable example of urban development in the context of a tourist town on the Mediterranean coast (Arnaiz Burne & César Arnaiz, 2017; Mazón, 2010), Benidorm's urban plan has been criticized in recent decades. This is mainly due to the contrast between the skyscrapers, emerging from afar as a massive barrier, and the natural coastal landscapes. Nevertheless, lively, diverse and friendly spaces have been created between the buildings, and from the strict structure of the city, one can enjoy beautiful views of the sea from the upper floors of the buildings, thanks to the vertical construction. In fact, Benidorm has the highest per capita rate of skyscrapers in Spain, indicating the high density of the city (Skyscraper Source Media Inc., 2018) and positively influencing the sustainable development of cities (Tan & Lu, 2019). The results of the research from 2020 (Nolasco-Cirugeda et al., 2020) suggest that the city's land management strategy (vertical building), the design of diverse public spaces, and the diverse leisure and accommodation offer have a beneficial effect on the optimization of the city's resources, creating a successful tourist destination.

The question arises whether, in view of this sustainable urban model and a successful tourist destination – Benidorm can be considered an age-friendly city and what the elements of a smart city based on the features of smart destinations are?

Eight areas of an age-friendly city based on the WHO program (2007) are analyzed below: 1) transport (mobility), 2) public spaces and buildings, 3) housing development, 4) social and medical care, 5) location and availability of services, 6) communication and use

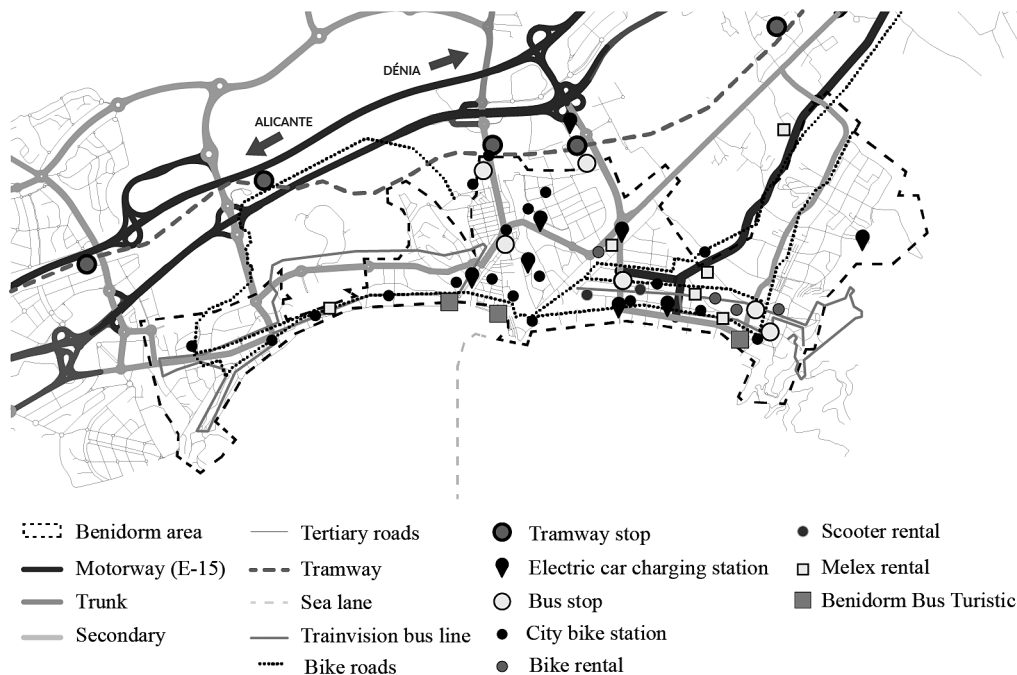
of modern technologies, 7) participation in social life and multigenerational integration through the joint use of urban space, 8) social participation, within which attention was paid in particular to activities and solutions resulting from shaping an aging-friendly smart city based on the elements mentioned by European Innovation Partnership for Smart Cities and Communities (EIP SCC), i.e. mobility (multimodality in transport, electric vehicles), built environment (energy reduction, buildings and zero energy districts), integrated infrastructure (data exchange).

#### 1) transport and mobility

The city of Benidorm is well connected by the E-15 motorway, which allows you to reach the surrounding cities (Alicante, Denia). In Benidorm itself, a policy of reducing car traffic and ecological solutions is promoted through the use of electric cars. There are 10 electric car chargers in the city. Most of the streets are pedestrianized. Due to the high density of high-rise buildings, the urban plan gives the structure of the city the features of a compact city, which results in reaching on foot the basic functions in the city. All sidewalks and pedestrian crossings have lowered curbs and are made of surfaces that minimize the risk of falling (non-slip, without pronounced contrasts).

There are many bus stops in the city, covering all inhabited zones (Fig. 2). There is a wide selection of transport tickets depending on the needs, from a single or season ticket to tourist cards – for specific groups (including seniors and people with disabilities) for which lower prices were envisaged. Basic bus stops are located at distances of 750 m or 1 km (distances reachable for an elderly person in 11/15 min on foot), however, Benidorm offers many transport companies (e.g. Benidorm Bus Turistic) organizing tours of the city and the surrounding area. This makes it possible for the elderly to travel in a comfortable and uncomplicated way. In addition to buses, the city offers a tram and a city bike which has many stations around the city center, also in further parts, mainly around the beach. In the city there is a city bike rental, including electric bikes (Bicidorm system), which is promoted by the city authorities as an efficient and health-friendly





**Fig. 2.** Analysis of the Benidorm transport network  
Source: own study.

means of transport. Using it is also ensured by a well-developed 11 km network of bicycle paths throughout the city. There are 6 places in Benidorm where you can rent an electric wheelchair, especially in the south-eastern part of Benidorm. Trolleys ensure safe and efficient movement on bicycle paths, they have a basket that allows one to transport, for example, shopping. Electric wheelchairs in the city are used especially by the elderly and people with disabilities.

## 2) public spaces and buildings

In Benidorm, the area of public space accounts for 27% of the urban seed center (Table 1). Regulations approved in zoning plans favored the creation of external land on plots (61% of built-up area), which are often privately managed. These spaces are often used by the private community (63.45% of the land in plots) and contribute to recreation and enjoyment of the urban environment, for example as hotel facilities or housing complexes. Only 16.80% of the land is devoted to private open spaces as part of a secondary low-density residential plot.

Many places in Benidorm can be reached on foot due to the short distances between the functions (Fig. 3). Thanks to the marked isolines of the central zone, many areas of the city can be reached within 5 minutes' walk, which is important especially for the mobility of elderly people)

Tall buildings take up relatively little territory, and the ones holding a large number of residential premises make the city compact with easy access to public spaces at the same time. There are no height restrictions on buildings in Benidorm, which guarantees a high level of urban compactness; low occupancy of buildings on the plots. There are also regulations regarding the preservation of sea views. On the ground floors of buildings, there are usually services and recreational spaces that can extend functional and spatial programs and related outdoor activities. Newly designed buildings promote ecological solutions in the form of using renewable sources, which make up about 25%, and are also designed in accordance with the principles of universal design.



**Table 1.** Analysis of components of an age-friendly city according to WHO traditional approach (Age Friendly Cities) and smart approach (Smart Age-Friendly Cities)

Components of an age-friendly city according to WHO	Age-Friendly Cities (AFC)	Smart Age-Friendly Cities (SAFC)
1	2	3
transport and mobility	<ul style="list-style-type: none"> <li>– streets closed to car traffic;</li> <li>– basic functions in the city can be reached on foot;</li> <li>– elimination of architectural barriers;</li> <li>– developed network and access to public transport stops;</li> <li>– multimodality (public transport, bikes, electric carts);</li> </ul>	<ul style="list-style-type: none"> <li>– surveillance in the field of municipal resources management, including traffic control, cameras monitoring the traffic light network;</li> <li>– promotion and use of electric cars by residents;</li> </ul>
public spaces and buildings	<ul style="list-style-type: none"> <li>– buildings and urban spaces designed according to universal design standards;</li> <li>– a large number of privately managed outdoor spaces;</li> <li>– easy access to public spaces by building upwards, occupying a small amount of space by buildings;</li> <li>– Rules for the preservation of sea views;</li> <li>– Building ground floors for recreational services and functions related to outdoor activity spaces;</li> <li>– Inclusion of accessible beaches for people with disabilities as part of the urban environment equipped with adequate and accessible infrastructure;</li> <li>– Landmarks in the city;</li> </ul>	<ul style="list-style-type: none"> <li>– newly designed buildings promote ecological solutions in the form of using renewable sources;</li> <li>– public wifi zone;</li> <li>– information boards in public spaces with the option of Braille reading, as well as with the use of a QR code;</li> <li>– a network of beacons in strategic points of the city, for better interaction and communication with city users (the ability to collect data in real time and identify the needs of public space users);</li> </ul>
residential development	<ul style="list-style-type: none"> <li>– residential buildings usually have gardens and open spaces for public and private use;</li> <li>– many places to rest in the vicinity of residential buildings (avenues, squares);</li> <li>– hotels and accommodation, tailored to the needs of people with disabilities;</li> <li>– building high-rise buildings enables better illumination of apartments with daylight and provision of sea views;</li> </ul>	<ul style="list-style-type: none"> <li>– newly designed buildings promote ecological solutions in the form of using renewable sources;</li> </ul>
social and medical care	<ul style="list-style-type: none"> <li>– private health care, many spas and wellness centers, in particular dedicated to the elderly and people with disabilities;</li> </ul>	<ul style="list-style-type: none"> <li>– free home telecare service;</li> </ul>
location and availability of services	<ul style="list-style-type: none"> <li>– diverse service offer, located in different parts of the city, also with access to the sea;</li> <li>– many shopping arcades, services work like a large open-air “shopping mall”;</li> <li>– providing access to services for people with special needs, e.g. by creating woonerfs, as well as an extensive network of bicycle and pedestrian paths, thanks to which people using, for example, wheelchairs, electric carts or prams have free access;</li> </ul>	<ul style="list-style-type: none"> <li>– Audioplaya service ensuring autonomy, safety and the possibility of bathing for visually impaired and blind people;</li> <li>– introduction of proximity sensors in various industries;</li> <li>– introduction of beacons for data delivery (offline) in strategic points of the city – where information about culture, nature, sports, events and recreation is displayed;</li> <li>– using modern technologies to support orientation in the field;</li> </ul>

cont. Table 1

1	2	3
communication and use of modern technologies	<ul style="list-style-type: none"> <li>– creating clear, simple understandable messages;</li> </ul>	<ul style="list-style-type: none"> <li>– establishment of the Technical Office for Innovation and Intelligent Development</li> <li>– the creation of the ‘Visit Benidorm’ platform as a public-private partnership responsible for the marketing and management of the destination;</li> <li>– technology in the city understood as a means and not an end capable of transforming the entire functioning of the city;</li> <li>– careful planning of investments in the city, paying attention to the risk of technology obsolescence, legal constraints and planning difficulties in the long term;</li> </ul>
participation in social life and multi-generational integration through the joint use of urban space	<ul style="list-style-type: none"> <li>– a wide range of cultural and sports events;</li> </ul>	<ul style="list-style-type: none"> <li>– combination of intelligence and marketing tools to obtain optimal knowledge about the needs of city users;</li> </ul>
social participation	<ul style="list-style-type: none"> <li>– inclusion of residents in shaping the city;</li> <li>– Establishment of the Citizen Participation Council;</li> <li>– participatory budget;</li> <li>– functioning Neighborhood Councils;</li> </ul>	<ul style="list-style-type: none"> <li>– creation of the “Portal Citizen Participation” platform as a tool for the interaction of residents with the city authorities, as well as an information channel;</li> </ul>

Source: own study.

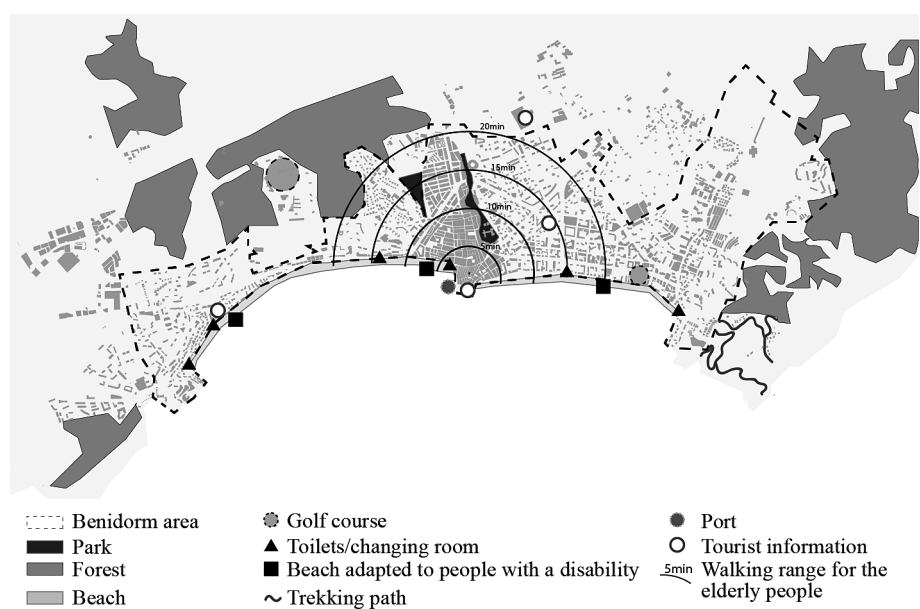


Fig. 3. Analysis of public spaces in Benidorm  
Source: own study.

Outdoor spaces greatly influence the perception and enjoyment of a city, and are key places for the success of solar, sand and nautical tourism models. In particular, Benidorm's coastal attractions along Levante and Poniente beaches have been recognized in the literature as projects of exceptional quality for the public space (Ferrater, 2005). An important element in shaping the public spaces in Benidorm is the inclusion of beaches as part of the urban environment with high-quality seaside promenades, 5 km in total, which contain many restaurants, cafes and bars. The numerous beaches adjacent to them offer many services and the rental of recreational equipment. The Benidorm for All strategy provides accessible beaches for people with disabilities, which, thanks to the appropriate urban infrastructure and the necessary human resources, enable people with disabilities to access both sandy beaches and the sea. The beaches are equipped with wooden platforms, toilets, help points, and exercise areas for the elderly. The equipment of the available beach includes: an access ramp adapted to move around in electric vehicles or wheelchairs, but also for families with prams; 1 footbridge that connects to the access ramp leading to the sea; 1 cupboard adapted to people with disabilities; 1 toilet adapted for disabled people; spaces providing shade; 3 amphibious chairs for adults and 1 child; 3 sets of water walking balls of various sizes; rescuers as support staff; in the bathroom (depending

on the season) – buoys limiting the bathing area; WIFI zone.

The ease and legibility of moving around the city results from many landmarks in the city (in the form of monuments, elements of street furniture and high-rise buildings). Public spaces are designed as accessible not only physically, devoid of spatial barriers (Fig. 4) accessible to all pavement or pavement for people with visual impairment, but also in terms of information boards with the possibility of reading Braille or using a QR code that allows you to obtain information on a specific topic using a smartphone. An important integration space in the city is also the city market and the antiques market, located by the national road and the campsite.

It is worth adding that the city has a special microclimate, characterized by mild air temperatures throughout the year. In Benidorm, private green spaces are promoted that contribute to the perception of Benidorm as an environmentally friendly city. The most important natural places within green areas include:

- Aiguera Park, also known as the “green lungs” of Benidorm, is a long neoclassical park that separates the old part of the city from the new. There are two amphitheatres in it, which are used to organize cultural shows, especially in the summer. The park ends in a yard prepared for fairs celebrated at various events;



**Fig. 4.** Pedestrian walkway accessible for all users  
*Source:* author's photograph.

- Mediterranean Sea Balcony – a vantage point, situated on the remains of the castle walls;
  - Serra Gelada Nature Park – trails (also for amateurs) along the cliffs;
  - Mountain Chains of Bernia and Piug Campana – offering a view from the city and walking trails.
- 3) residential development (accommodation offer + activities)

The residential buildings in Benidorm are mainly located in high-rise buildings. Each building is usually equipped with gardens, free spaces for public or private use. In the immediate vicinity, there are many places to rest in the form of alleys, squares, and basic services.

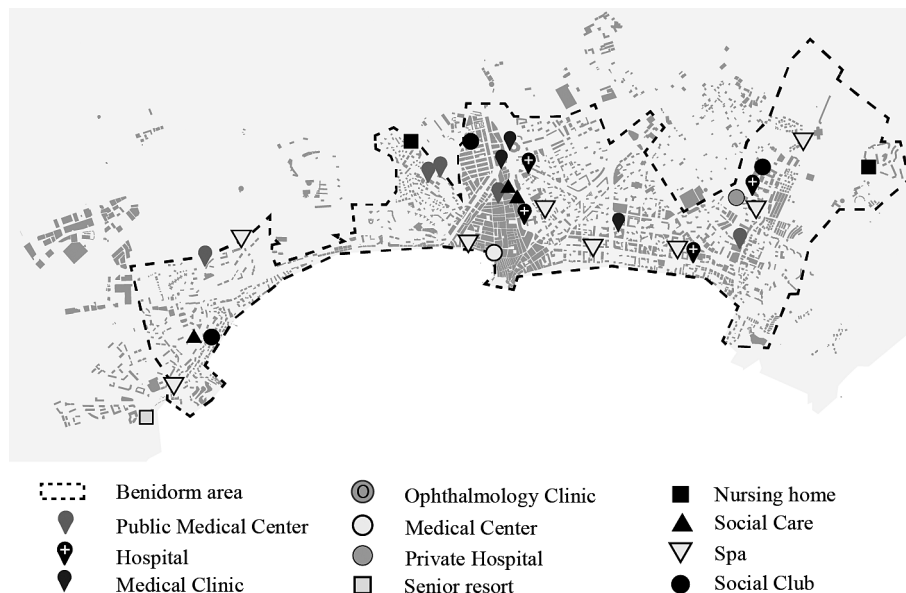
In Benidorm, a tourist resort, an important element of the development is the accommodation offer in the form of hotels and places for seasonal accommodation. The assessment of the number and type of accommodation varies from secondary houses in different types of buildings to a variety of short-term accommodation facilities. In particular, the largest hotel accommodation offer is mainly in the historic center and in the two main tourist areas: in the Levante Beach area, evenly spread along the coastline and main road axis, Mediterraneo avenue;

and Poniente Beach, located in close proximity to the historic center. Although the predominant types are two-, three- and four-star hotels exist, there are several five-star inland hotels that offer other accommodation facilities, which is attractive to tourists with greater purchasing power. As part of the hotel offer, there are many marked hotels available and adapted to the needs of people with disabilities.

#### 4) social and medical care

There are 4 hospitals in Benidorm, including: Benidorm Clinical Hospital, which offers private health care of a team with over 25 years of experience in the field of: prevention, hospitalization and home care, and the IMED Levante Hospital (private healthcare). There are also many spas and wellness centers offering services for patients suffering from rheumatism, asthma, osteoporosis, stress and anxiety. Social and medical services are evenly distributed in the city and combine several types of services together (Fig. 5).

In addition, Benidorm City Council offers a free home telecare service which is provided indirectly through the Red Cross. The aim of this service is to promote a better quality of life for beneficiaries who



**Fig. 5.** Analysis of social and medical care services in Benidorm  
Source: own study.

are disadvantaged due to their age because they live in a situation of social isolation or because of a disability or health problems, increasing their autonomy and making it easier for them to stay at home for as long as possible. The telecare service is dedicated to those registered in Benidorm who are at risk and vulnerable, are over 70 years old or 18 years old and have a recognized or total or severe disability. Applicants must live alone or with people of similar age or characteristics. As for the economic criteria, the annual gross income of a person or unit of housing must not exceed 2.5 times. Thanks to this service, one can receive specialist support 24 hours a day, 365 days a year in case of an emergency, but also loneliness or isolation, which became very visible during the COVID-19 pandemic. In order to regulate the service, regulations have been developed, which establish the operation of telecare, as well as the requirements that must be met by the beneficiaries, how and where to conduct the application process, etc. Users receive a terminal by means of which they can immediately contact the staff of the entity responsible for contact with the user. This included key care services that allow a team of authorized professionals to access one's home in the event of a fall or emergency, speeding up care and minimizing possible injuries. Importantly, the home telecare service is compatible with others that are provided by the same Department under the home care programs, "Menjar a Casa" or "Major a Casa", as well as with other public and private resources that allow beneficiaries to stay their place of residence as long as possible.

The Municipality of Benidorm has created a "Care Laboratory" to position itself in the segment of senior tourism focused on healthy ageing. The "Care Laboratory" aims to monitor activities, as well as study the profiles and needs of users in order to gradually modify activities and events, both in terms of content and timing. The creation of a "Care Laboratory" is one of the activities included in the "Benidorm Vision 360" project. as part of the strategy of attracting and positioning in this tourist segment "outlined activities, activities and even health-promoting events will focus on periods of low and medium season".

The city is aware that current senior tourists, or those who will be so in a few years, have new motivations when choosing a holiday destination and in many cases different from those that this profile had a long time ago. In particular, recent research confirms an increase in the number of elderly tourists interested in physical and mental well-being who also try to stay active and maintain healthy lifestyle habits while on vacation. In the face of this market trend, the city is aware of anticipating demand that responds to new needs related to lifestyle, preferences, health, cultural and linguistic diversity of the senior group, positioning itself as a place conducive to healthy tourism, and especially active aging. The goal is not only to increase the healthy offer, which is to contribute to increased senior tourism, but also to build awareness, educate and develop the healthy lifestyle segment also among younger people.

Benidorm has a privileged climate to offer outdoor activities all year round, as well as public spaces that are suitable or even designed for this practice, including beaches, but also green and recreational areas such as l'Aigüera, Foietes or Séquia Mare parks, or the area of Serra Gelada and El Moralet Natural Park, where work has already begun to improve the quality of these urban spaces. Benidorm also has over 100 km of cycle paths, many pedestrian zones, as well as sports facilities.

In its quest to be a healthy tourist city, Benidorm also uses public-private partnerships, active tourism companies, health and well-being-oriented accommodation and sports centres. Benidorm has great potential to be a contemporary, attractive and healthy and ageing-friendly tourist destination, thanks to its exceptional weather conditions, with complementary and recreational offers, with appropriate spaces for the development of economic activities and with tools for research and tourist intelligence in to diversify markets and products.

##### 5) location and availability of services

Benidorm has over 2,000 stores spread across all neighborhoods that operate as a large outdoor or seafront shopping mall. In summer, many facilities are open throughout the week (also on Sundays),



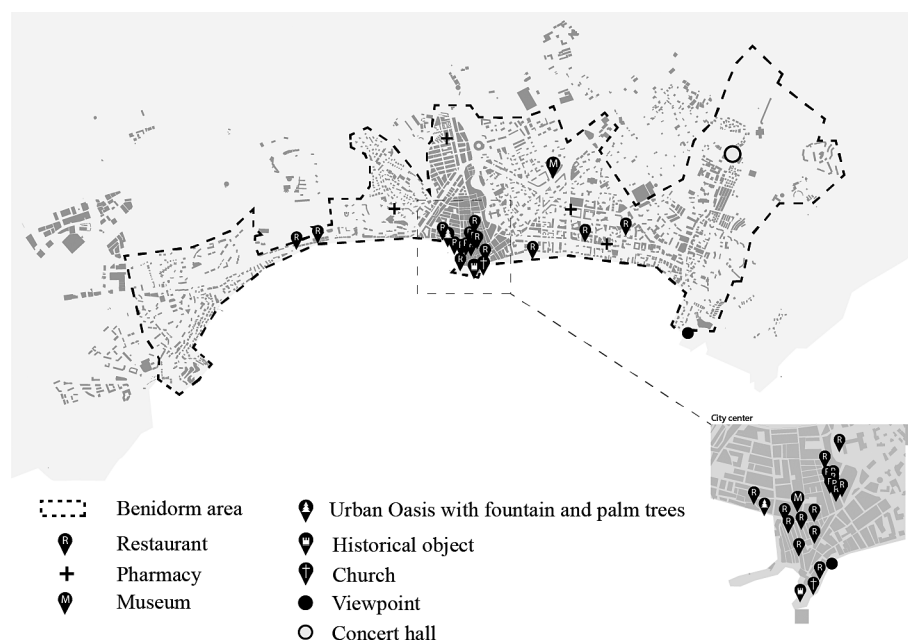
and opening hours are extended to meet the needs of residents and tourists. There are franchises of famous textile, cosmetic and gift brands, shoe and clothing stores, jewelers, opticians, sports and decorative stores, bookstores and toy stores. Thanks to its structure, Benidorm makes it possible to provide an appropriate number of basic services within a small range to people with special needs.

The greatest concentration and rich variety of economic activities are found in the historic center (around 45–50 enterprises per hectare, with 14–16 different types per hectare); and lower values are in the Levante Beach area (15 to 40 enterprises per hectare with 4 to 12 different types per hectare). Figure 6 shows which services and where they are located. The offer of services includes, among others, pharmacies, museums, and a church, however, restaurants dominate here. One of the main streets in the structure of Benidorm is the Carrer de la Palma street, rich in catering offer. It is free from car traffic, thus creating a woonerf, which makes the atmosphere intimate, and restaurants can run gardens without disturbing the traffic, ensuring freedom and safety

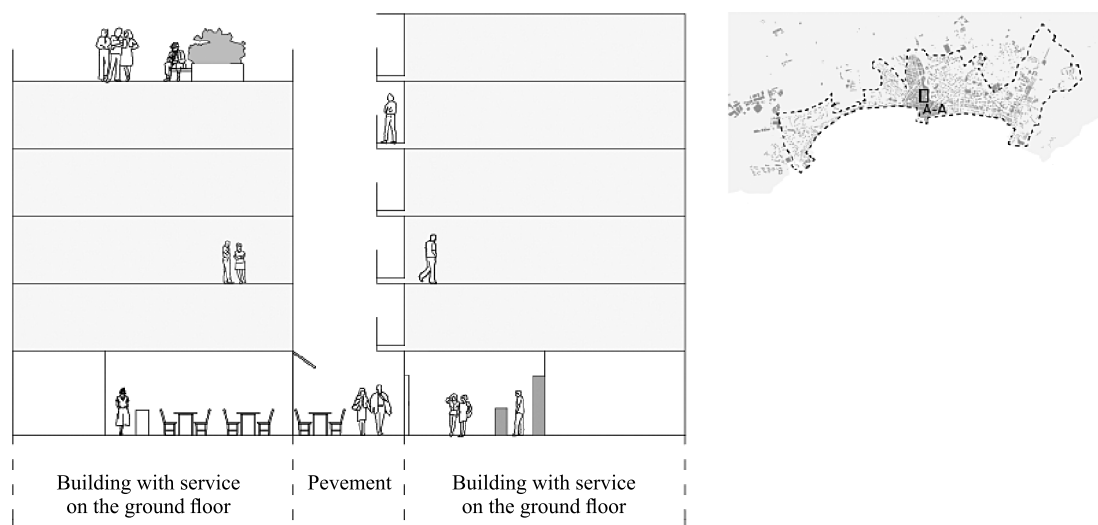
for pedestrians and users of catering establishments (Fig. 7). In other tourist areas, the amount and variety of economic activities is small. The ground floors in the buildings are used as services, shops, and catering establishments. Access to services is ensured thanks to the fact that the city is equipped with bicycle paths, pavements accessible to all, and access to the beach along the ramp by the promenade. Communication is efficient, tailored for each user moving around the city (Fig. 8).

#### 6) communication and the use of modern technologies

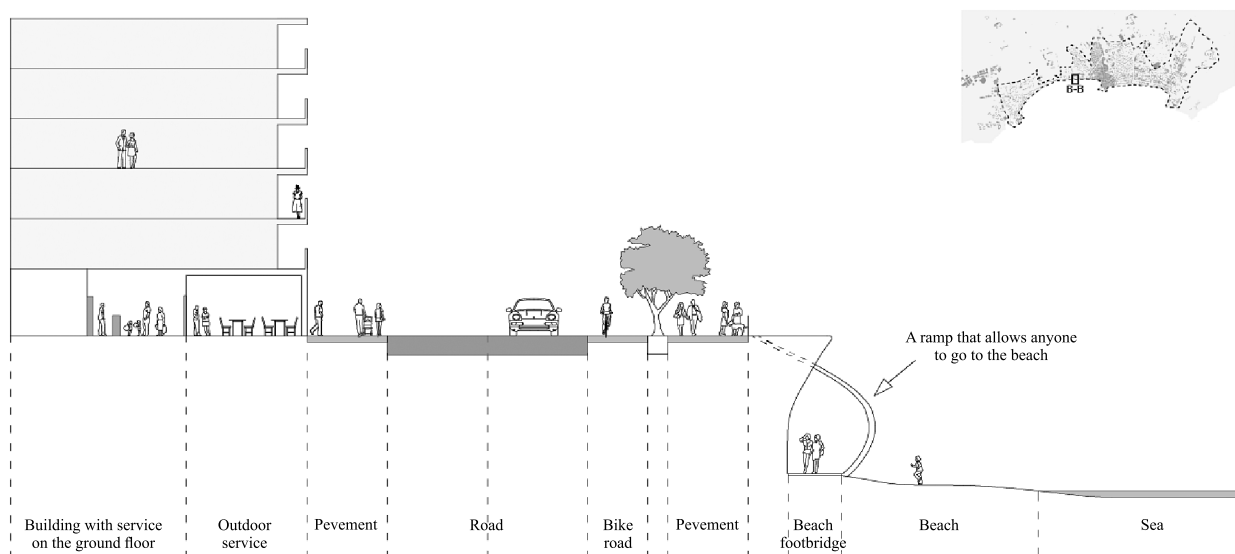
In Benidorm, there is the platform “Visit Benidorm”, a public-private partnership responsible for the marketing and management of the destination from a public point of view, and it lobbies for the competitiveness of Benidorm and the protection of the interests of all its members. Benidorm uses intelligent solutions for various purposes, including in the field of intelligent management and marketing of destinations. As part of communication, including orientation in the field, conventional information and communication technologies were used, but also more advanced ones, such as intelligent services and tools:



**Fig. 6.** Analysis of location of services and economic activity in Benidorm  
Source: own study.



**Fig. 7.** Section A-A. Sections of selected street in Benidorm, 3-6 storey buildings  
*Source:* own study.



**Fig. 8.** Section B-B. Sections of selected street in Benidorm, 5-6 storey buildings  
*Source:* own study.

public Wi-Fi, traffic lights, applications, solutions using social media, etc. The rules that guide the city in the implementation of these solutions are “close cooperation with private companies” (mainly start-ups), “limited expenses for each solution”, “design based on current needs” and the need to obtain data from each solution. Technology is clearly understood by project leaders as a means, not an end, capable

of transforming the entire functioning of the city in order to be competitive (Benidorm City Council, 2018).

In Benidorm, the Technical Office for Innovation and Smart Development uses many methods to renew the city using modern technologies, including:

- real-time monitoring of city resources management data such as traffic control, surveillance cameras,

traffic light network and public building cleaning service. Also of interest is an intelligent water management system, controlled from the Dinapsis laboratory, which allows one to verify water quality, improve the adaptability of water supply in terms of demand, and create network renewal plans that ensure efficient use;

- free Wi-Fi is available on the Poniente and Levante beach promenades and in the Old Town. It can be accessed in public places, allowing tourists to connect to the internet and make it easier to get around the city, and post travel photos and videos on social media;
- proximity sensors that are used in a variety of industries, from retail to shopping malls, events, airports, stadiums, and in hospitality and tourism, among others. They can provide information to travel sites, generate new revenue opportunities for local entrepreneurs and help to distribute hiking trails. One of the activities to improve understanding, accessibility and orientation in space is the interpretation panel located on el Paseo de Poniente, a la altura del manantial de Les Fontanelles, which also provide information to blind people;
- a network of beacons, which have been placed at “strategic points” in the urban and natural environment of Benidorm, which display information about culture, nature, beaches, history, sports, events and recreation.

#### 7) participation in social life and multi-generational integration through joint use of urban space

The Department of Culture in Benidorm organizes many events throughout the year, aimed at different age groups, including: Skyline Benidorm – various types of exhibitions and vernissages: paintings, sculptures, photography, local community festivals, weekends with regional festivities. The city also offers a variety of sports spaces: outdoor gyms, 3 golf courses, water sports, tennis courts, squash etc., There are also organized excursions on electric scooters, dances for seniors, Club Hipico Benidorm: horse riding shows, also rides and courses, antiques fairs, amusement parks for active people, casino. City users with different needs can find a rich offer personalized to their preferences

and requirements. Benidorm offers also an educational program for elderly. The José Llorca Linares Social Center in Benidorm organizes twice in tobacco the educational project “Experience Rooms” launched in 1999 as part of the UMH Comprehensive Program for the Elderly, the aim of which is to meet the educational needs and promote culture and improve the quality of life of people over 55 years of age, through an educational program led by university professors. The project is coordinated by the Social Welfare Department. The only entry requirement is age 55 and no prior studies are required. The academic year consists of seven subjects of 15 hours each and ends with a series of supplementary seminars on topics related to the natural environment, sociology, history, chemistry, criminology, political economy and law.

#### 8) social participation

The inclusion of the people of Benidorm in the participatory process is visible in shaping the city, especially in terms of making it more accessible. In 2021, the Benidorm Citizen Participation Council adopted the 5th Benidorm Participatory Budget, which gives citizens a say in deciding which projects or activities should take place in the city. Among the activities carried out in the last five years are, for example, the renovation of the access ramp to Levante Beach in the area of Torrej6 Square, the construction of a pedestrian walkway linking the Ells Tolls district with the Palau d’esports, the implementation of traffic lights for the blind, a playground for children and many activities to make the city’s neighborhoods more accessible. In addition, in Benidorm, the City Council launched the platform called “Portal Citizen Participation” as a new tool “to increase interaction with citizens, facilitating their participation through feedback and proposals as well as specific consultations”. The platform also serves as an information channel between the City Council and its residents, providing a variety of interesting city information, such as official announcements, transparency, proposals and ongoing processes, thematically grouped news, agenda, utilities, and websites of various City Hall and Administration departments. There are also Neighborhood Councils in Benidorm, which

are subsidized by the mayor of Benidorm's Civic Participation, obtaining funds for social needs, including also resulting from the COVID-19 crisis.

### **DISCUSSION: WHAT DOES THE CONCEPT OF SMART AGE-FRIENDLY CITIES MEAN AND WHAT COMPONENTS ARE IMPORTANT IN THE URBAN RENEWAL?**

Research by Sanz, Ferrandis and Garces (2013) shows that there are strong links between the participation of older people in tourism and their health, independence and social integration, which also translates into reduced social and medical care costs. The number of elderly people in cities is increasing, not only as aging inhabitants, but also as seasonal migrants, which is particularly true for Western Europeans (the reason may be better quality of life for less money) (UNECE, 2016). This trend influences the implementation of renewal policies by cities, especially tourist destinations such as the city of Benidorm, directing its urban renewal policy towards the needs of seasonal migrants being older people. The article focuses on verifying whether the city considered a "Mecca for seniors" takes actions aimed at the concept of an age-friendly city (WHO) as part of 8 elements that were also confronted with the areas important from the point of view of building the concept of a smart city according to the European Innovation Partnership for Smart Cities and Communities (EIP SCC). Such a view on the subject shows the perspective of future development of aging cities which will have to respond to many problems and challenges using modern technologies, and paying attention to aspects that so far have not been paid attention to.

While there are, of course, certain standards that determine the development of smart cities, in practice there is no single smart city model. In the case of Benidorm, the first designs using modern technology are related to tourism, but it should be remembered that technology allows the inclusion of other sectors as well, which could be an example of further research in this field.

In order to summarize the research, the table below analyzes 8 components of an age-friendly city, extracting from them the aspects that determine being an age-friendly city (WHO) in the traditional sense (AFC) and in the "smart" approach (SAFC) based on smart city areas formulated by EIP SCC.

As part of the above collective analysis (Table 1), in all 8 components it is possible to find actions and solutions that allow the city to run for the title of a smart city according to the European Innovation Partnership for Smart Cities and Communities (EIP SCC), which defines a smart city in relation to 3 areas: mobility (multimodality of transport, electric vehicles) – transport and mobility (WHO), built environment (reduction of energy consumption, buildings and zero energy districts) – public spaces and buildings (WHO), integrated infrastructure (data exchange) – communication and use of modern technology (WHO).

### **CONCLUSIONS: PRACTICAL DEVELOPMENT AND POLICY RECOMMENDATIONS**

Although Benidorm is an example of a tourist city with a certain specificity and approach to its renewal, the presented research results are so universal that their implementation in relation to the policies of city renewal with a similar specificity seems to be possible.

The research showed how Benidorm, from a fishing village, became one of the main destinations for the elderly, especially from Western European countries. Benidorm is visited in particular by generations of older people, but also by other vulnerable groups such as people with disabilities or parents with young children. Many of them have purchased real estate, the so-called "second home", and come to Benidorm for the entire season, e.g. fall and winter. An important element attracting the above-mentioned social groups is the climate, access to public spaces, including beaches, a high-quality seaside promenade, a diverse offer of services, service functions on the ground floor, which contribute to the extension of outdoor activities, social and medical care

(McHugh & Mings, 1994), as well as mainly high-rise residential buildings due to the lack of restrictions on the height of the buildings, hence many apartments have windows facing the sea, giving the possibility of contact with the surroundings without leaving the place of residence. Assuming that the buildings are equipped with elevators, from the point of view of the needs of older people, they provide the possibility of better daylight illumination of the rooms, which is extremely important for people staying in apartments for a long time, and a better view of the city (in the case of Benidorm, many buildings have windows facing the sea), this additionally increases the area of the immediate vicinity of the building for public spaces serving the integration of residents, which by some researchers has been considered an effective land management strategy in the city (Ciriquián et al., 2018), yet criticized by certain others (Arnaiz Burne & César Arnaiz, 2017; Mazón, 2010).

What is noteworthy is the variety of accommodation and service activities in Benidorm accessible to people with special needs, offering a wide range of recreational products, which not only increases the city's competitiveness, but also increases its ability to attract different user profiles (Crouch, 2011). Benidorm is an example of a city that comprehensively pursues its urban renewal policy and can be an example for other tourist destinations in terms of what aspects one should pay attention to in urban renewal activities to make the city age-friendly in an intelligent way.

The present research focuses on the perspective of older people as seasonal migrants, using the city of Benidorm for a specific period of the year (season), although it would be interesting to conduct research in relation to Benidorm residents, because they are also recipients of the changes introduced alongside the incoming users. The research carried out in the article constitutes a new contribution of knowledge to the analysis of the spatial structure of the city, so far not analyzed through the prism of an age-friendly city from the perspective of an urban planner/architect. This research may also be the basis for their wider use in further research (social, spatial, cultural) conducted by other scientists.

## REFERENCES

- Age UK Policy and Research Department. (2017). *A summary of Age UK's Index of Wellbeing in Later Life*. Retrieved from: <https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/health--wellbeing/ageuk-wellbeing-index-summary-web.pdf> (15.04.2023).
- Allen, J. (2008). *Older people and wellbeing*. Retrieved from: [https://www.ippr.org/files/images/media/files/publication/2011/05/older\\_people\\_and\\_wellbeing\\_1651.pdf](https://www.ippr.org/files/images/media/files/publication/2011/05/older_people_and_wellbeing_1651.pdf) (15.04.2023).
- Anderson, B., & Langmeyer, L. (1982). The Under-50 and Over-50 Travellers: A Profile of Similarities and Differences. *Journal of Travel Research*, (20), 20–24. <https://doi.org/10.1177%2F004728758202000405>
- Arnaiz Burne, S.M., & César Arnaiz, F. (2017). Ciudades turísticas y desarrollo sustentable: Benidorm, España – Cancún, México [Tourist cities and sustainable development: Benidorm, Spain – Cancun, Mexico]. *Anais Brasileiros de Estudos Turísticos – ABET*, 7(3), 20–28. Retrieved from: <https://periodicos.ufjf.br/index.php/abet/article/download/3198/1173> (15.04.2023).
- Arnstberg, K.O., & Ergstrom, I. (2007). No place like a second home: Weekends, holidays, retirement and urban sprawl. In C. Couch, L. Leontidou, & G. Petschel-Held (Eds.). *Urban Sprawl in Europe: Landscapes, Land-use Change and Policy* (pp. 163–180). Wiley-Blackwell.
- Ballard, J.G. (2013). What I believe. *Interzone*, (8), Summer 1984. In D. Riche (Ed.). *A prose poem, originally published in French in Science Fiction* (1). Retrieved from: [http://www.jgballard.ca/uncollected\\_work/what\\_i\\_believe.html](http://www.jgballard.ca/uncollected_work/what_i_believe.html) (20.11.2022).
- Benidorm City Council. (2018). *El pleno aprueba el proyecto con el que Benidorm concurrirá al programa*. Retrieved from: <https://benidorm.org/es/noticias/el-pleno-aprueba-el-proyecto-con-el-que-benidorm-concurrira-al-programa-redes> (15.04.2023).
- Blazey, M.A. (1986). Research breathes new life into senior travel programs. *Parks and Recreation*, 21(10), 54–56.
- Buffel, T., Phillipson, C., & Scharf, T. (2012). Ageing in urban environments: Developing 'age-friendly' cities. *Critical Social Policy*, 32(4), 597–617, <https://doi.org/10.1177/0261018311430457>
- Buhalis, D., & Amaranggana, A. (2014). Smart tourism destinations. In Z. Xiang, & I. Tussyadiah (Eds.).



- Information and Communication Technologies in Tourism 2014* (pp. 553–564). Cham: Springer.
- Coban, G., & Aydın, S. (2020). A New Concept in Tourism: Smart Tourism Destinations. In E. Çeltek (Ed.). *Handbook of Research on Smart Technology Applications in the Tourism Industry* (pp. 414–429). Hershey, PA: IGI Global.
- Clavé, A.S., Salamanca, R.O., & Vera Rebollo, J.F. (2011). Mass tourism development on the Mediterranean Coast. *Tourism Geographies*, 13(3), 459–501. <https://doi.org/10.1080/14616688.2011.575171>
- Claver-Cortés, E., Molina-Azorín, J.F., & Pereira-Moliner, J. (2007). Competitiveness in mass tourism. *Annals of Tourism Research*, 34(3), 727–745. <https://doi.org/10.1016/j.annals.2007.03.010>
- Ciriquián, M.P., Nolasco-Cirugeda, A., & Serrano-Estrada, L. (2018). Estrategias de ocupación territorial en áreas turísticas consolidadas de la Costa Blanca (España) [Territorial occupation strategies in consolidated tourist areas of the Costa Blanca (Spain)]. *Boletín de la Asociación de Geógrafos Españoles [Bulletin of the Spanish association of geography]*, (76), 430–454. <https://doi.org/10.21138/bage.2529>
- Ciriquián, M.P., & Oliva Meyer, J. (2002). Algunas intervenciones en la costa mediterránea de Alicante: tres propuestas, tres ideologías, tres actitudes. In Valencia (Ed.). *Arquitectura moderna y turismo: 1925–1965* (pp. 225–230). Barcelona: Fundación Docomomo Ibérico.
- Crouch, G.I. (2011). Destination Competitiveness: An Analysis of Determinant Attributes. *Journal of Travel Research*, 50(1), 27–45. <https://doi.org/10.1177/0047287510362776>
- Díaz, R. (1991). La inmigración de extranjeros en las Canarias Orientales: Una valoración global. *Jornadas de la Población Española*, 37–44.
- Dolnicar, S., Yanamandram, V., & Cliff, K. (2012). The contribution of vacations to quality of life. *Annals of Tourism Research*, 39(1), 59–83. <https://doi.org/10.1016/j.annals.2011.04.015>
- Domínguez Martínez, L., Martí Ciriquián, P., & Nolasco-Cirugeda, A. (2016). Turismo residencial de noreuropeos en la Costa Blanca: su manifestación territorial y estudio de casos representativos [Residential tourism of northern Europeans on the Costa Blanca: its territorial manifestation and study of representative cases]. *Scripta Nova, Revista electrónica de Geografía y Ciencias Sociales*, 20(547). Retrieved from: <http://www.ub.edu/geocrit/sn/sn-547.pdf> (16.04.2023).
- European Commission. (2015). *Calypso means tourism for all*. Retrieved from: <https://op.europa.eu/en/publication-detail/-/publication/a1887a07-91be-4ac5-b190-6360523180bc> (20.11.2022).
- Family Holiday Association. (2015). *Impact report 2015*. Family Holiday Association. Retrieved from: [http://www.familyholidayassociation.org.uk/wp-content/uploads/2015/09/AnnualSummary2014-WebCopy\\_0.52MB.pdf](http://www.familyholidayassociation.org.uk/wp-content/uploads/2015/09/AnnualSummary2014-WebCopy_0.52MB.pdf) (16.04.2023).
- Femenia-Serra, F., & Ivars-Baidal, J.A. (2018). Smart tourism: Implicaciones para la gestión de ciudades y destinos turísticos. In M.T. Cantó López, J.A. Ivars Baidal, & R. Martínez Gutiérrez (Eds.). *Gestión inteligente y sostenible de las ciudades: Gobernanza, smart cities y turismo* (pp. 129–151). Valencia: Tirant Lo Blanch.
- Femenia-Serra, F., Perles-Ribes, J.F., & Ivars-Baidal, J.A. (2019). Smart destinations and tech-savvy millennial tourists: hype versus reality. *Tourism Review*, 74(1), 63–81. <https://doi.org/10.1108/TR-02-2018-0018>
- Ferrater, C. (2005). *Maritime avenue of the playa de Poniente* (Vol. 125, 88–91). Spain: Lotus International.
- García Sánchez, A., & López Siles, D. (2015). Tourism destination competitiveness: The Spanish Mediterranean case. *Tourism Economics*, 21(6), 1235–1254. <https://doi.org/10.5367/2Fte.2014.0405>
- Gaviria, M. (1977). *Benidorm: ciudad nueva* (Vol. 2). Madrid: Editora Nacional.
- Goicochea, E. (2016). *Moca turns Benidorm into a smart city through beacon technology*. Retrieved from: <https://www.mocaplatform.com/blog/moca-turns-benidorm-into-a-smart-city-through-beacon-technology?fbclid=IwAR2e-p7NXWBsJsPYc0XZhQLppixtipKB7CojJOhl48ZvSB-AHBIW6AvWmM> (16.04.2023).
- González-Reverté, F. (2019). Building Sustainable Smart Destinations: An Approach Based on the Development of Spanish Smart Tourism Plans. *Sustainability*, 11(23), 68–74. <https://doi.org/10.3390/su11236874>
- Green, G. (2013). Age-Friendly Cities of Europe. *Journal of Urban Health*, 90(S1), 116–128. <https://doi.org/10.1093/heapro/dav039>
- Gretzel, U., Reino, S., Kopera, S., & Koo, C. (2015). Smart Tourism Challenges. *Journal of Tourism*, 16(1), 41–47. Retrieved from: [https://www.researchgate.net/publication/301295363\\_Smart\\_Tourism\\_Challenges](https://www.researchgate.net/publication/301295363_Smart_Tourism_Challenges) (16.04.2023).
- Gretzel, U., Werthner, H., Koo, C., & Lamsfus, C. (2015). Conceptual foundations for understanding smart

- tourism ecosystems. *Computers in Human Behavior*, 50, 558–563. <https://doi.org/10.1016/j.chb.2015.03.043>
- Gretzel, U., Zhong, L., & Koo, C. (2016). Application of smart tourism to cities. *International Journal of Tourism Cities*, 2(2). <http://dx.doi.org/10.1108/IJTC-04-2016-0007>
- Guinn, R. (1980). Elderly recreational vehicle tourists: Motivations for leisure. *Journal of Travel Research*, 19, 9–12. <https://doi.org/10.1177%2F004728758001900102>
- Hagger, C., & Murray, D. (2013). Anticipating a flourishing future with tourism experiences. In S. Filep, & P. Pearce (Eds.). *Tourist Experience and Fulfilment: Insights from Positive Psychology* (pp. 186–201). London: Taylor and Francis.
- Huang, C.D., Goo, J., Nam, K., & Yoo, C.W. (2017). Smart tourism technologies in travel planning: the role of exploration and exploitation. *Information & Management*, 54(6), 757–770. <https://doi.org/10.1016/j.im.2016.11.010>
- Hunter-Jones, P., & Blackburn, A. (2007). Understanding the relationship between holiday taking and self-assessed health: An exploratory study of senior tourism. *International Journal of Consumer Studies*, 31(5), 509–516. <https://doi.org/10.1111/j.1470-6431.2007.00607.x>
- Iribas, J.M. (2000). Urbanismo turístico. In MVRDV (Ed.). *Costa Ibérica. Hacia la ciudad del ocio* (pp. 106–119). Barcelona: Actar. Retrieved from: <https://internationalliving.com/> (20.11.2022).
- Ivars-Baidal, J., Rodriguez-Sanchez, I., & Vera-Rebollo, J.F. (2013). The evolution of mass tourism destinations: New approaches beyond deterministic models in Benidorm (Spain). *Tourism Management*, 34, 184–195. <https://doi.org/10.1016/j.tourman.2012.04.009>
- Ivars-Baidal, J.A., Celdrán-Bernabeu, M.A., Mazón, J.-N., & Perles-Ivars, Á.F. (2017). Smart destinations and the evolution of ICTs: a new scenario for destination management? *Current Issues in Tourism*, 22(13), 1581–1600. <https://doi.org/10.1080/13683500.2017.1388771>
- Jurdao, A.F., & Sánchez, E.M. (1990). *España: Asilo de Europa*. Barcelona: Planeta.
- Klimczuk, A., & Tomczyk, Ł. (2016). Smart, Age-friendly Cities and Communities: the Emergence of Sociotechnological Solutions in the Central and Eastern Europe. In F. Flórez-Revuelta, & A.A. Chaaraoui (Eds.). *Active and Assisted Living: Technologies and Applications* (pp. 335–359). Kingston upon Thames: Kingston University.
- Lefebvre, H. (1974). *The production of space*. Oxford: Blackwell Ltd.
- Lefebvre, H. (2014). *Toward an architecture of enjoyment*. In L. Stanek (Ed.). London: University of Minnesota Press.
- Loredana, I., Beu, D., & van Hoof, J. (2020). Smart and Age-Friendly Cities in Romania: An Overview of Public Policy and Practice. *International Journal of Environmental Research and Public Health*, 17(14). <https://doi.org/10.3390/ijerph17145202>
- Maas, W., van Rijs, J., & de Vries, N. (2000). *Costa Ibérica. Hacia la ciudad del ocio*. Barcelona: Actar.
- Mantecón, A. (2008). *La experiencia del turismo: Un estudio sociológico sobre el proceso turístico-residencial*. Barcelona: Editorial Icaria.
- Marois, G., Bélanger, A., & Lutz, W. (2020). Population aging, migration, and productivity in Europe. *Proceedings of the National Academy of Sciences*, 117(14), 7690–7695. <http://doi.org/10.1073/pnas.1918988117>
- Martínez-Medina, A. (2016). Arquitectura del boom turístico (1953–1979). *Canelobre*, 66, 167–185.
- Mazón, T. (2010). Benidorm: Un destino turístico de altura [Benidorm. A high-altitude tourist destination]. *Gran Tour: Revista de Investigaciones Turísticas*, 2, 8–22. Retrieved from: <http://hdl.handle.net/10045/1669> (16.04.2023).
- Mazón, T., Delgado, E., & Hurtado, J.A. (2012). El éxito de un destino turístico: el Benidorm de Mario Gaviria [The success of a tourist destination: Benidorm by Mario Gaviria]. *Revista da Casa da Geografia de Sobral*, 14(1), 81–95. Retrieved from: <http://hdl.handle.net/10045/36228> (16.04.2023).
- McGuire, F.A. (1984). A factor analytic study of leisure constraints in advanced adulthood. *Leisure Sciences*, 6(3), 313–326. <https://doi.org/10.1080/01490408409513038>
- McHugh, K.E., & Mings, R.C. (1994). Seasonal migration and health care. *Journal of Aging and Health*, 6(1), 111–132. <https://doi.org/10.1177%2F089826439400600107>
- Mesa del Castillo. (2015). Benidorm. Esplanades and Ordinary Urbanities. In J. Almazán (Ed.). *Post-Souvenir City: Mediterranean Urban Intensity and New Tourism Practices in Alicante* (pp. 46–57). Tokyo: IKI (International Keio Institute) + flick studio co., ltd.
- Montiel, C. (1990). Desarrollo turístico, promoción inmobiliaria y degradación medioambiental en el municipio de Benitachell (Comarca de la Marina) [Tourist

- development, real estate promotion and environmental degradation in the municipality of Benitachell (Comarca de la Marina)]. *Investigaciones Geográficas*, 8, 113–129. <https://doi.org/10.14198/INGEO1990.08.05>
- Myklebost, H. (2008). Migration of elderly Norwegians. *Norsk Geografisk Tidsskrift*, 43, 191–213. <https://doi.org/10.1080/00291958908552236>
- Nogues-Pedregal, A.M. (Ed.). (2012). Culture and society in tourism contexts. *Emerald Group Publishing*. Retrieved from: [https://www.researchgate.net/profile/Antonio-Nogues-Pedregal/publication/292561026\\_When\\_the\\_desirable\\_and\\_the\\_feasible\\_converge\\_through\\_tourism\\_space/links/56c1bdaa08aedba05673a40/When-the-desirable-and-the-feasible-converge-through-tourism-space.pdf](https://www.researchgate.net/profile/Antonio-Nogues-Pedregal/publication/292561026_When_the_desirable_and_the_feasible_converge_through_tourism_space/links/56c1bdaa08aedba05673a40/When-the-desirable-and-the-feasible-converge-through-tourism-space.pdf) (12.05.2020).
- Nolasco-Cirugeda, A., Martí, P., & Ponce, G. (2020). Keeping mass tourism destinations sustainable via urban design: The case of Benidorm. *Sustainable Development*, 28, 1289–1303. Retrieved from: <http://hdl.handle.net/10045/109705> (16.04.2023).
- Obrador, P. (2012). The place of the family in tourism research: Domesticity and thick sociality by the pool. *Annals of Tourism Research*, 39(1), 401–420. <https://doi.org/10.1016/j.annals.2011.07.006>
- Oliver, J.L. (2015). Tourism, territory, identity. In J. Almazán (Ed.). *Post-Souvenir City. Mediterranean Urban Intensity and New Tourism Practices in Alicante* (pp. 26–35). Tokyo: IKI (International Keio Institute) + flick studio co., ltd.
- Paunero, X. (1988). Els estrangers residents a la Costa Brava. *Revista de Girona*, 131, 76–82. Retrieved from: [http://www.revistadegirona.cat/recursos/1988/0131\\_076.pdf](http://www.revistadegirona.cat/recursos/1988/0131_076.pdf) (16.04.2023).
- Perles Ribes, J.F., & Ivars Baidal, J. (2018). Smart sustainability: a new perspective in the sustainable tourism debate. *Investigaciones Regionales – Journal of Regional Research, Asociación Española de Ciencia Regional*, 42, 151–170. Retrieved from: <https://investigacionesregionales.org/wp-content/uploads/sites/3/2019/01/09-PERLES.pdf> (16.04.2023).
- Perles Ribes, J.F., Rodríguez-Sánchez, I., & Ramón-Rodríguez, A.B. (2015). Is a cluster a necessary condition for success? The case of Benidorm. *Current Issues in Tourism*, 20(15), 1575–1603. <https://doi.org/10.1080/13683500.2015.1043247>
- Plouffe, L., & Kalache, A. (2010). Towards global age-friendly cities: determining urban features that promote active aging. *Journal of Urban Health*, 87(5), 733–739. <https://doi.org/10.1007/s11524-010-9466-0>
- Ptak, E. (2012). Migracje międzynarodowe seniorów [International migrations of seniors]. *Polityka Społeczna*, 10(463), 21–26. Retrieved from: <http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-86db6c89-d2b3-4548-a75c-258c283c787c> (16.04.2023).
- Pytel, S.P. (2017). Kierunki migracji emerytów w Polsce [Migration trends of senior citizens in Poland]. *Acta Universitatis Lodzianensis. Folia Oeconomica*, 2(328), 135–150. <http://dx.doi.org/10.18778/0208-6018.328.09>
- Rodríguez, V., Fernandez-Mayoralas, G., & Rojo, F. (1998). European Retirees on the Costa del Sol: A Cross-National Comparison. *International Journal of Population Geography*, 4, 183–200. [https://doi.org/10.1002/\(sici\)1099-1220\(199806\)4:2%3C183::aid-ijpg101%3E3.0.co;2-8](https://doi.org/10.1002/(sici)1099-1220(199806)4:2%3C183::aid-ijpg101%3E3.0.co;2-8)
- Romsa, G., & Blenman, M. (1989). Vacation patterns of the elderly German. *Annals of Tourism Research*, 16, 178–188. [https://doi.org/10.1016/0160-7383\(89\)90066-2](https://doi.org/10.1016/0160-7383(89)90066-2)
- Sánchez-Galiano, J.C., Martí-Ciriquián, P., & Fernández-Aracil, P. (2017). Temporary population estimates of mass tourism destinations: The case of Benidorm. *Tourism Management*, 62, 234–240. <http://doi.org/10.1016/j.tourman.2017.04.012>
- Sanz, M.F., Ferrandis, E.D., & Garcés, J. (2013). Functional health benefits for elderly people related to social tourism policy promotion. *International Journal of Multidisciplinary Social Sciences*, 1, 1–8. Retrieved from: [https://www.researchgate.net/publication/271839847\\_Functional\\_Health\\_Benefits\\_for\\_Elderly\\_People\\_Related\\_to\\_Social\\_Tourism\\_Policy\\_Promotion](https://www.researchgate.net/publication/271839847_Functional_Health_Benefits_for_Elderly_People_Related_to_Social_Tourism_Policy_Promotion) (16.04.2023).
- Segittur. (2015). *Informe destinos turísticos inteligentes: construyendo el futuro*. Retrieved from: <https://www.thinktur.org/media/Libro-Blanco-Destinos-Turisticos-Inteligentes-construyendo-el-futuro.pdf> (20.11.2022).
- Serrano, J.M. (1991). Residentes extranjeros en la región de Murcia: aproximación inicial a su estudio [Foreign residents in the Murcia region: initial approach to their study]. *Papeles de Geografía*, 17, 227–253. Retrieved from: <https://revistas.um.es/geografia/article/view/43821> (16.04.2023).
- Shoemaker, S. (2000). Segmenting the mature market: 10 years later. *Journal of Travel Research*, 39, 11–26. <https://doi.org/10.1177%2F004728750003900103>

- Skyscraper Source Media Inc. (2018). Retrieved from: <https://skyscraperpage.com/database/country/13> (16.04.2023).
- Soares, J.C., Ivars-Baidal, J., Gândara, & J.M. (2015). La evolución de destinos turísticos litorales consolidados. Análisis comparado de Balneario Camboriú (Brasil) y Benidorm (España) [The evolution of consolidated coastal tourist destinations. Comparative analysis of Balneário Camboriú (Brazil) and Benidorm (Spain)]. *Anales de Geografía de la Universidad Complutense*, 35(2), 143–166. [http://dx.doi.org/10.5209/rev\\_AGUC.2015.v35.n2.50118](http://dx.doi.org/10.5209/rev_AGUC.2015.v35.n2.50118)
- Steinnes, D.N., & Hogan, T.D. (1992). Take the Money and Sun: Elderly Migration As a Consequence of Gains in Unaffordable Housing Markets. *Journal of Gerontology*, 47(4), S197–203. <https://doi.org/10.1093/geronj/47.4>
- Steptoe, A., Deaton, A., & Stone, A.A. (2015). Subjective well-being, health and ageing. *The Lancet*, 385(9968), 640–648. [https://doi.org/10.1016/s0140-6736\(13\)61489-0](https://doi.org/10.1016/s0140-6736(13)61489-0)
- Tan, F., & Lu, Z. (2019). The impact of urban compactness on urban sustainable development in China: The case of Nanjing. *Sustainable Development*, 27(3), 270–280. <https://doi.org/10.1002/sd.1874>
- Tung, V., & Brent Ritchie, J.R. (2011). Investigating the memorable experiences of the senior travel market: An examination of the reminiscence bump. *Journal of Travel and Tourism Marketing*, 28, 331–343. <https://doi.org/10.1080/10548408.2011.563168>
- United Nations Economic Commission for Europe. (2016). Migration and older age: Older migrants and migrant care workers. *UNECE Policy Brief on Ageing*, 16. Retrieved from: [https://unece.org/DAM/pau/age/Policy\\_briefs/ECE-WG.1-24.pdf](https://unece.org/DAM/pau/age/Policy_briefs/ECE-WG.1-24.pdf) (16.04.2023).
- United Nations World Tourism Organisation. (2013). *Sustainable Tourism for Development Guidebook. Enhancing capacities for Sustainable Tourism for development in developing countries*. <https://doi.org/10.18111/9789284415496>
- Van Staalduinen, W., Bond, R., Dantas, C., & Jegundo, A.L. (2018). *Smart Age-friendly Cities / Age-friendly Smart Cities*. Retrieved from: [https://ec.europa.eu/eip/ageing/file/2624/download\\_en%3Ftoken=1Em\\_qTx7](https://ec.europa.eu/eip/ageing/file/2624/download_en%3Ftoken=1Em_qTx7) (16.04.2023).
- Valenzuela, M. (1991). Spain: The Phenomenon of Mass Tourism. In A.M. Williams, & G. Shaw (Eds.). *Tourism and Economic Development: Western European Experiences* (pp. 40–60). London: Belhaven Press.
- Wang, X., Li, X. R., Zhen, F., & Zhang, J. (2016). How smart is your tourist attraction?: Measuring tourist preferences of smart tourism attractions via a FCEM-AHP and IPA approach. *Tourism Management*, 54, 309–320. <https://doi.org/10.1016/j.tourman.2015.12.003>
- Warnes, A.M. (1994). Permanent and Seasonal International Retirement Migration: The Prospects for Europe. *Netherlands Geographical Studies*, 173, 69–81.
- Williams, A.M., King, R., & Warnes, T. (1997). A place in the Sun: International Retirement Migration from Northern to Southern Europe. *European Urban and Regional Studies*, 4(2), 115–134. <http://dx.doi.org/10.1177/096977649700400202>
- World Health Organization. (2007). *Global Age-friendly Cities: A Guide*. Retrieved from: [https://apps.who.int/iris/bitstream/handle/10665/43755/9789241547307\\_eng.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/43755/9789241547307_eng.pdf?sequence=1&isAllowed=y) (16.04.2023).
- Zimmer, Z., Brayley, R.E., & Searle, M.S. (1995). Whether to go and where to go: Identification of important influences on seniors' decisions to travel. *Journal of Travel Research*, 33, 3–10. <https://doi.org/10.1177/004728759503300302>





ORIGINAL PAPER

Received: 26.09.2022

Accepted: 20.12.2022

## AN ANALYSIS OF BAGHDAD'S MASTERPLANS BASED ON THE DEVELOPMENT OF GREEN AREAS

Firas Majeed<sup>1</sup>✉, Zaynab Abaas<sup>2</sup>✉

<sup>1</sup> ORCID: 0000-0002-9215-3316

<sup>2</sup> ORCID: 0000-0003-4173-250X

<sup>1</sup> University of Baghdad

Jadriya street, 00647905410909

10001, Baghdad, Iraq

Al-Farabi University College

Aldawra street, 00647905410909

10001, Baghdad, Iraq

<sup>2</sup> University of Baghdad

Jadriya street, 009647712929294

10001, Baghdad, Iraq

### ABSTRACT

**Motives:** Baghdad is the capital city and an important political, administrative, social, cultural and economic centre of Iraq. Baghdad's growth and development has been significantly influenced by efforts to accommodate various needs of its steadily growing population. Uncontrolled population and urban growth have exerted negative effects in numerous dimensions, including environmental sustainability because urban expansion occurred in green spaces within the city and the surrounding areas.

**Aim:** The aim of this study was to examine the planning solutions in Baghdad's green areas in the past and at present, and to identify the key changes in the city's green areas, including changes in the ratio of green urban spaces to the total area of the city. Comprehensive urban development plans for Baghdad were analysed; the main solutions addressing urban green spaces were discussed; the advantages and disadvantages of previous and present urban development plans were examined, and the percentage of green urban spaces in Baghdad was investigated based on drafts of the city's comprehensive development plans.

**Results:** Baghdad's Masterplan pays considerable attention to the development and preservation of urban green spaces which exert profound effects on the climate, the local environment, the city's aesthetic and recreational value, and its social and economic development. The previous and present masterplans share numerous priorities with the aim of improving the city's environmental and ecological health.

**Keywords:** green areas, comprehensive development plans, Baghdad city plans

✉ f.majeed1304d@coeng.uobaghdad.edu.iq, mrfirasali1987@alfarabiuc.edu.iq,

✉ dr.zaynabr.a@coeng.uobaghdad.edu.iq

## INTRODUCTION

Over the past decades, the city of Baghdad has witnessed planning attempts known as masterplans or comprehensive development plans, the aim of which was to control and organize the expansion witnessed by the city. These plans dealt with many important aspects and laws in the city, but only the obstacles that these plans faced, they only some small paragraphs that did not have a clear role in the expansions witnessed by the city were applied on the ground.

At the present time, as a result of the large urban and population expansion witnessed by the city of Baghdad, which came instead of green areas and open areas located within the city limits, it has become obligatory for specialists to find planning solutions (especially with regard to green areas) and mechanisms to increase them within the city limits and within the boundaries of the built-up areas, to reduce the environmental and ecological problems that the city suffers from in previous years.

**Table 1.** Studies that dealt with masterplans and green areas for the city of Baghdad

Research title	Date Issued	Summary about it
The city of Baghdad between the reality of rapid growth and the relay of masterplans and lack of integration of the planning process	2012	The study then discussed the reality of Baghdad and its Master Plan, which was created in 1969 and updated in accordance with the legislation that followed, analyzing the changes and shifts in the city's use. It then focused on a transgressor and random housing by examining statistics and information on the topic. The study comes to a conclusion by identifying certain fundamental and significant characteristics of Baghdad city's reality, as well as its issues and potential solutions
The Effect of Urban Land Use Changing on Green Area Neighborhoods No. 336 & 338 in Baghdad – Case Study	2018	In light of the strategy to provide green spaces in random neighborhoods at multiple levels, beginning with residential clusters, moving through streets and roads pedestrians, and ending at the level of neighborhoods, the research presented its vision regarding the treatment of the adverse effects that were diagnosed
Developing Green Infrastructure for Baghdad City (Iraq)	2018	This study used this innovative strategy for planning to address the issue of green spaces in Baghdad. Baghdad's open green spaces will grow, become more accessible, and foster greater social cohesion as a result of additional areas that have been planned in various parts of the city to be connected to the existing green spaces. Additionally, by lowering air pollution and high summertime temperatures, this interconnection will help to improve the city's environment
The Analysis of Green Areas' Accessibility in Comparison with Statistical Data in Poland	2020	The research addresses the issue of citizens of Poland's big cities having access to public green spaces. The goal of the study is to determine if it is feasible to use the British Accessible Natural Greenspace Standard (ANGSt) approach to estimate the quantity of natural green space
The effectiveness of urban green infrastructure in reducing surface urban heat island	2022	The purpose of this study is to assess the effectiveness of UGI in reducing SUHI in Baghdad city. Risafa municipality was selected as a case study, as it suffers from a high level of SUHI risk. Using a computer climatic simulation program; ENVI-met, the temperature of different surfaces in the study area was assessed, and two typical models were selected. And urban green infrastructure (UGI) represents a vital sustainable strategy that can achieve climate change 'adaptation and mitigation' simultaneously

Source: The researcher (2022).

Therefore, the research will analyze all the previous and current comprehensive masterplans and development plans for the city of Baghdad, especially with regard to green areas and the proposed scenarios for increasing these areas and the extent to which they achieve the international standard regarding the percentage of green areas for one person, in order to build a preliminary idea about the possibilities of future development and the possibility of add these scenarios to the development of the city of Baghdad.

Where the research assumes that green areas are the basis for solving many of the environmental and ecological problems that cities suffer from at the present time.

Many studies that dealt with green areas, as well as the masterplans of the city of Baghdad, including:

So the aim of this study is to follow up and analyse all the masterplans for the city of Baghdad to clarify the most important scenarios that it put forward in order to increase the percentage of green spaces within the city, as well as to clarify the percentage of green spaces for each person for each master plan.

## THE RESEARCH PROBLEM

The shortage of green areas within the city of Baghdad at the present time, as well as the ratio of green areas to one person, despite the proposed development scenarios in the previous comprehensive development plans for the city of Baghdad.

## MATERIALS AND METHODS

This research will depend on the analysis of the drafts of the previous comprehensive development plans for the city of Baghdad by adopting the indicator of the green areas proposed by these drafts for the future plans of the city of Baghdad, and the extent of their achievement of the approved international standard, and an attempt to clarify the most important scenarios adopted in these drafts to increase the green areas within the city of Baghdad, to benefit from them in the developments future.

## GREEN AREAS IN THE CITY OF BAGHDAD

Baghdad, Iraq's capital and largest metropolis, is the country's largest city. It is located on both sides of the Tigris River and divides it into two parts: Rusafa on the Tigris' eastern shore and Karkh on the Tigris' western shore. And it is in an astronomical site at which latitude (°33 36 18) intersects in the north and longitude (°44 23") to the east, and as for the province of Baghdad, it represents a percentage of (1.11%) of the total area of Iraq

Its location is in the centre of Iraq. Its climate is semi-continental, hot, dry in summer, cold and rainy in winter, with short spring and summer seasons. It does not differ from the general climate prevailing in Iraq. The height of the Baghdad region is about 32 m above sea level, and the area of Baghdad Governorate is (4555 km<sup>2</sup>). The city of Baghdad constitutes 20% of the area of the province, and the area of the city is (929 km<sup>2</sup>). It borders the province of Baghdad from the north (Salah al-Din) and from the east (Diyala and Wasit) and from the south (Babil and Wasit) and from the west (Anbar) (Al-Sheikhly & Al-Taie, 2018).

The green areas required to be available in the city of Baghdad depends on its population, so the population census in 1956 represented (612,000 people), and the population of Baghdad reached (1.5 million people) in 1966, and more than (6 million people) in 2010, with the total population predicted to reach (11.4 million people) by 2030 (Khatib & Alami, 2014).

Since Baghdad's founding, it has developed a strong interest in recreational facilities, open spaces, and parks, with the term Baghdad being linked with the word's paradise, garden, and orchard (Salih & Ismail, 2017).

The types of green areas in the city of Baghdad can be divided into:

1. Public Green Areas: They are designated for public use. However, Baghdad's modern parks, can be divided into three periods depending on the highlights that changed the role and proportions of green areas within the city:
  - a. First Period: The interest in green areas and afforestation in the city of Baghdad goes back

to previous of the twentieth century, as the beginning of the establishment of gardens in the city dates back to the 1920s, when the first public garden with the features of modern gardens was established, during this period, a lot of parks, gardens, and squares were built in Baghdad. Also, the foundation of the Parks Directorate, which is an agency concerned with the building of public spaces and parks in order to improve the environment and provide opportunities for recreation and relaxation for people (Salih & Ismail, 2017).

- b. Second Period: As a result of the horizontal expansion that took place in Baghdad and the establishment of many new residential neighbourhoods during that time period, and the increase in the area of tiling, the Capital Mayorality found itself facing many problems, including the lack of green space. In order to protect the residents of Baghdad, from the harsh climatic conditions, and to compensate for the lost orchards as a result of the expansion, there was great and growing interest in afforestation of neighbourhoods and streets (Hamdan, 2017).
- c. Third Period: It is the period of wide change of gardens in Baghdad. Three large parks were built (Al-Shula, Al-Zafaraniya and Al-Thawra) and large areas were planted in these areas, providing all amenities for the citizens (Abdul Raheem & Abdul Razzaq, 2018).
2. Private Gardens: their area is distributed according to the area of the residential plot. There are large gardens whose area of the residential plot reaches 1000 m, while the areas of old Baghdad are devoid of gardens due to the small area of the residential plots (Al-Zubaidi, 2013). Even these large private gardens are becoming rare.
3. Agricultural Areas: Orchards: There are several areas in the city of Baghdad that are planted as orchards, including:
  - a. In the northern part of Baghdad on both banks of the Tigris River.
  - b. In the southeast of the city along the Diyala River.

c. In the southern part of the city, on the fringes of the Al-Khair River, which was buried.

d. In the western part of the city (Akerkov). These are agricultural lands scattered inside and outside the city.

The agricultural lands within and outside the borders of the Mayorality of Baghdad are of importance to the city of Baghdad. In addition to providing Baghdad with agricultural crops, it works to improve the climate and is a resource that can be exploited for entertainment purposes (Hamdan, 2017).

4. The Green Belts: It was proposed to establish a green protective belt in the comprehensive development plan for Baghdad approved in 1973 in the area between the end of urban borders and the borders of the Mayorality of Baghdad to form an isolation area between the city and its neighbourhoods that includes activities with low-intensity building uses on the one hand and to create green open areas and serve as windbreaks. No real interest was found during the previous stages in this project, not to mention the cutting down of many existing trees as a result of the difficult economic conditions (Municipality, 2010).

From all of the above it is clear that the green areas in the city of Baghdad did not come according to a prior planning commensurate with the size of the population on the one hand and with the size of the city on the other hand, but came according to random choices or relying on parts of the proposals of some development plans and neglecting other proposals, as well as the disappearance of and the removal of many of these areas, especially the orchards and the green belt area, as a result of the expansion of the city and the uncontrolled increase in the population.

## PLANNING GREEN AREAS IN THE CITY OF BAGHDAD

Several comprehensive development masterplans and designs were relied upon to develop the urban environment of the city of Baghdad. Open lands and green areas had an abundant share of them, and the most important of these designs are:

## **1. Master Plan for Minobrio & Associates for The City of Baghdad 1956**

The IDB (Iraqi Development Board) and the mayor of Baghdad contracted the town planning firm Minobrio & Associates in 1954 to prepare a study of the old urban centres and to develop a master plan for the city of Baghdad.

The design envisions a twenty-kilometre north-south extension and a fourteen-and-a-half-kilometre east-west extension of the city, “with the entire ovoid-shaped metropolis encircled by a rural belt” (AL-Taie, 2019)

Adoption of the master plan good design criteria for green areas, as well as giving special importance to the Tigris River and attention to the need to create open spaces and movement paths along the banks of the river in Baghdad.

As well as the establishment of the green belt for the city of Baghdad, and attention to the hierarchy of green areas within the city. In addition to all this, the masterplan is characterized by flexibility and is subject to change according to any emerging circumstances (Jaafer, 2019).

Also, the planning criteria proposed by the master plan are that the percentage of green spaces amounting to 9.7% of the total urban area, which is not considered a high percentage because it does not include the area that will be occupied by the green belt (Albadri, 2013).

## **2. Doxiadis Associates Master Plan for The City of Baghdad 1959**

The Doxiadis Foundation was commissioned by the Reconstruction Council to prepare a Basic Design for Baghdad around the year 1956, taking into account the design prepared by (Minobrio & Associates).

Where the subsequent consultant presented a completely different design from the previous one and covers an area of (500) square kilometres, which is equivalent to two and a half times the area proposed by the previous design, and represents a rectangle with dimensions of (18x31) square kilometres. The scheme can accommodate (3) million people. Giving clear

attention to the Tigris River basin and its vicinity (AL-Taie, 2019).

The Basic Design contains five main sectors whose borders are clear natural or artificial beams such as rivers or main highways. Each sector accommodates half a million people, and contains (14) small independent housing units, each with a capacity of (50–100) thousand people.

The plan suggested preserving the existing orchards and keeping them in the form of open spaces and making them areas for meeting and recreation, as well as paying attention to the green spaces adjacent to the Tigris River. The plan also suggested the possibility of horizontal expansion away from the course of the Tigris River. Among the most important planning proposals made by the presented design, is the proposal of three irrigation canals parallel to the Tigris River. One of them was implemented in the early sixties of the last century and was called (The Army Canal) (Jaafer, 2019).

The plan also suggested that the percentage of green areas be 3 square meters per person, and this includes parks and recreational areas, as well as 2 square meters per person of playgrounds and kindergartens, in addition to 12 square meters per person of private gardens (Albadri, 2013).

## **3. Comprehensive Development Plan for Law 156 Of 1971**

Comprehensive Development Plan prepared by the Polish institution of Polservice and it is in two phases, the first in 1967 and its target year 1990, while the second phase was prepared in 1973 and its target year 2000, and this design expected that the population of the city of Baghdad in the target year would reach (6–6.5) million people This design represents the first urban planning in the history of Iraq that is characterized by the strength of legal obligation, and it has worked to achieve two goals: (Ismael, 2015).

1. The first goal is to increase the amusement areas and parks from (3) square meters per person to (14) square meters per person. Except for the green areas in sports stadiums and children's play parks –



which he determined with the standard (2 square meters per person) – and the standard of private home gardens that he assumed with the standard (12 square meters per person), which in total is (28 square meters per person) as shown in Table (2) (Jaafer, 2019).

2. The second goal is to create a coordinated system for forests and protective belts in the north western part of the city and orchards – and open gardens, while providing easy access to them.

**Table 2.** Clarifies the standard for green areas according to the comprehensive development plan – Polservice

Dedicated Green Areas	Specific Standard (Square Meters Per Person)
Central parks and squares	4.00
Neighbourhood and local parks	8.00
City Edge Gardens	2.00
Sports playgrounds and children's playgrounds	2.00
Private home gardens	12.00

Source: The researcher (2022).

The urban plan included the allocation of approximately (4,180) hectares for the use of open land and green areas that include park areas, suburban amusement centres, playgrounds, preserves and picnic sites outside the city. Accordingly, the master plan for the city of Baghdad allocated the following structure for entertainment and leisure areas according to the type of use and its intensity (Al-Zubaidi, 2013).

1. Recreational areas in residential neighbourhoods.
2. Recreational areas in residential sectors are designated for playgrounds Central entertainment areas in two locations, the first west of the Tigris for (Um Al-khanazir) Island, and the second east of the Tigris for the area between the Highway and Army Canal.
3. Outdoor recreation areas located within the green belt.

The plan also addressed the city's economic foundation by identifying three agricultural production zones: palm and citrus orchards, seasonal agricultural production zones, and nurseries. And the Tigris River was divided into three sections in the urban plan:

1. The northern section, which is represented by the green areas north of the city, which include orchards, gardens, forests, and entertainment areas.
2. The central section, which is the area in which the business and activities associated with it are focused.
3. The southern section, which is the area in which the industrial and storage activities are located, which is surrounded by a belt of open green areas (Hamdan, 2017).

It appears that the comprehensive development plan paid special attention to allocating adequate areas for open green areas that are directly related to the city's social and urban progress, as well as its ecological aspects, taking into account the social, economic, and environmental impacts of these areas.

#### 4. Integrated Development Plan for The City of Baghdad 2001 – JCCF Japan in 1987

After the failures that accompanied the comprehensive development Masterplan for the year 1973, neglecting the implementation of any of the (home gardens standard, hierarchy, construction of sports fields, green belt, river banks development), After the matter was rectified, the Baghdad Mayorality called for the need to prepare a new Masterplan that would overcome the defect in the previous Masterplan and correct its course.

It commissioned the Japanese consultative group JCCF in the year 1987 to prepare a new planning study for the city of Baghdad. However, it was not able to be completed due to the country's passing through the conditions of wars and siege at that time (Jaafer, 2019).

The integrated development plan for the city of Baghdad 2001 is the first study presented at the level of the region, it does not stop at the city of Baghdad only, but also extends to the surrounding areas of Greater Baghdad as it is directly affected by the urban development process. He gave extensive analyses of the sites of open spaces, including green areas, and highlighted their aesthetic and environmental importance, and tried to nature and the urban

environment to form the character of the city. It was scheduled to adopt the standard per capita share of open spaces and green areas (11 square meters per person) (Hamdan, 2017).

This study remained in its initial stages, but it laid down important lines with regard to green areas. The most important statement in this regard is the following:

1. Reducing the planning standard for green areas from its predecessor in the comprehensive development plan of the Pulse Service Corporation in 1973, from (28 square meters per person) to (11 square meters per person), excluding sports playgrounds and children's and youth playgrounds, as shown in Table (3–2). As the integrated development plan (ICDP) seeks to reduce the standard for green space to be more achievable, it assumes an area of (3 square meters per person) instead of (4 square meters per person) for local parks, and an area of (6 square meters per person) instead of (8 meters). square person) for neighbourhood and sector parks, while maintaining the city edge park standard as it is (2 square meters per person). It excludes sports playgrounds and children's playgrounds, which it set with the standard (3 square meters per person), and neglects the home gardens standard – which remained illusory and unfulfilled – and thus the total has been reduced from (28 square meters per person) to (14 square meters per person) (Jaafer, 2019).

**Table 3.** A comparison of green areas between the 1973 development plan and the 1987 integrated plan

Dedicated Green Areas	Specific Standard (1973 – CDP) [m <sup>2</sup> ]	Specific Standard (1987 – ICDP) [m <sup>2</sup> ]
Central parks and squares	4.00	3.00
Neighbourhood and local parks	8.00	6.00
City Edge Gardens	2.00	2.00
Sports playgrounds and children's playgrounds	2.00	–
Private home gardens	12.00	–
Total	28.00	11.00

Source: The researcher (2022).

2. Dividing the spatial space of the green areas in the city into (Hamdan, 2017):

- a. The city centre/ includes attention to parks, forming a link between the river and the land, establishing the principle of long spaces parallel to traffic axes such as Airport Street, and taking care of wide squares.
- b. City edges/To limit outward expansion of the city, it has been proposed to remove urban areas towards the city edges, creating urban strip corridors to isolate urban areas from noise and pollution as the Army Canal axis.
- c. Tigris River/Dividing the area of the river into five secondary areas, ranging between recreational and functional, and the establishment of recreational areas on the two banks of the river in the Mayoralty of Kadhimiya and Al-Aras Island. The river provides water transport and can be used for recreational purposes.

However, the plan stopped working, and no paragraphs were implemented. It is clear from this that the integrated development plan gave extensive analyses of the locations of the open spaces, including the green areas, and highlighted their aesthetic and environmental importance, and tried to combine nature and the urban environment to form the character of the city at a time when it was scheduled to adopt a standard of 11 for a person from the green and open areas, it is acceptable at the local level if it is assumed that the majority of the population owns or owns open spaces of their own (Dawood, 2020).

## 5. The Comprehensive Urban Development Project for the City of Baghdad 2015

A working team was formed from the Mayoralty of Baghdad/Design Department and professors from the College of Engineering/University of Baghdad, to prepare a base plan for the city in its target year 2015.

1. The first phase began in 1998, which is the phase of collecting information and diagnosing problems and priorities.
2. The second phase was aimed at developing suggestions, alternatives, planning solutions and the

formation of strategies to be agreed upon with various parties.

3. The third and final phase is devoted to developing detailed urban designs for each job and using the Basic Design to become in an executive form on the basis of which construction and reconstruction permits can be granted (Hamdan, 2017).

Two alternatives were adopted for the proposed strategy, based on the following factors: (Jaafer, 2019).

1. The First Factor: The Principle of Development.
2. The Second Factor: Dealing with The Tigris River.
3. The Third Factor: The Adoption of Standards.
4. The Fourth Factor: The Concept of Paths (Connecting Elements).
5. The Fifth Factor: Dealing with The Phenomenon of Uncontrolled Growth.
6. The Sixth Factor: Dealing with The Concept of The Environment.
7. The Seventh Factor: Dealing with Abuse

The proposed standards for green and open areas in the urban development plan is (17 square meters per person). The alternative that was proposed by the urban development plan is to develop green and open areas (Al-Zubaidi, 2013).

This proposal was based on the following aspects: (Hamdan, 2017)

1. Agricultural Areas
2. Public Parks
3. Private Gardens
4. The Belt of The City

The urban development plan has put in place important strategies in the field of development for open areas as well as dealing with the Tigris River and its dependence on standards up to (28 square meters per person), and this is what was not developed by any previous plan for the city of Baghdad. However, this comprehensive plan was not implemented (Al-Zubaidi, 2013).

## **6. Baghdad City Comprehensive Development Plan 2030 / Khatib and Alami**

In 2007, the Baghdad Mayorality referred the project for preparing the masterplan for the city of Baghdad 2030, to the Lebanese office of Al-Khatib and Alami. And the project was divided into four phases (Khatib & Alami, 2008; Khatib & Alami, 2011; Khatib & Alami, 2014):

1. The First Phase / Basic Report (review of past experiences, status quo, and trends) 2010.
2. The Second Phase / Development blueprint alternatives and strategies outline 2012.
3. The Third Phase / Detailed preparation of the comprehensive development plan for the city of Baghdad and review of action plans 2012.
4. The Fourth Phase / Final versions preparation of the comprehensive development plan and preparing for implementation 2014.

The master plan came with a set of objectives that deal with major problems that would affect the environmental aspect of the city of Baghdad directly or indirectly, including:

1. Measures to Plan for Continued Population Growth: There is a need for long-term strategies to manage growth, given that the city is attracting high population growth, and to develop sound policies to accommodate informal settlements.
2. Inadequate Social and Public Infrastructure: public spaces, health and educational institutions, community centres, and so on. There is a need to maintain public parks and existing parks, as well as to construct additional green areas in and around the city and its surroundings.
3. Deterioration of The Urban Environment: The environmental sustainability of the urban environment and the levels of different types of pollution can now be seen as a decisive factor in the quality of life for the residents of Baghdad. As there are no tangible general indicators that accurately measure environmental sustainability in Baghdad and its surrounding areas.

The comprehensive development plan sets the desire for a future vision for the city of Baghdad inspired by the ecological and environmental spirit of the place. And to be a green capital and a sustainable city, by reframing the scenes and green spaces for Baghdad in 2030 to restore its natural heritage as a city of gardens on the Tigris River, and the capital of Iraq.

### 6-1 Planning and methodology of green and open spaces

The population of the city of Baghdad in 2010 was estimated to be about 6 million, in addition to approximately 3 million others in nearby cities within the greater Baghdad area, where many people commute daily to the city. It is likely that the population of the city and its surrounding area will nearly double between the project base year 2007 and the year 2030.

The preliminary report of the third phase indicated that until 2004 (60%) of the Basic Design area of 1967 was in the form of an urban area. Meaning that the remaining areas are in the form of vacant lands, green or non-green open spaces or unused spaces, but adding to that in 2011 Significant violations of these areas became (80%) of the total area allocated for the Basic Design of 1971 in the form of urban areas. Transformed a group of fragmented pieces, which made it unable to perform the purpose of its establishment. and the green belt has been bypassed by rapid and uncontrolled urbanization, and what remains of it today are only fragmented plots, which makes it useless and unable to fulfil the purpose of its establishment.

Where the development plan presented a set of recommended measures in the draft for the strategy of land use, planning and growth management, which aims to achieve control over the increasing population growth in order to increase the green and open spaces within the city. In order to increase in the percentage of green spaces and improve the environmental and ecological aspects of the city (Khatib & Alami, 2008; Khatib & Alami, 2011; Khatib & Alami, 2014):

1. Removing the current fragmented green belt and moving it west to the new area outside the current borders of the Baghdad Mayorality.

2. Establishing new growth poles or satellite centres to accommodate future growth and reduce pressures on the central business area and prevent encroachment on green and open areas within the borders of the Mayorality.
3. Establishment of new high to medium density residential areas on the edges around the “growth poles” to rationalize the uncontrolled urban expansion that occurred in these areas, and with a view to absorbing part of the population increase in the future
4. Establishment of new low- to medium-density residential areas in the new areas surrounding Mayorality of Baghdad in order to accommodate the remaining population increases in the future.
5. Construction of 4 large industrial zones in the new area.
6. Transferring harmful industrial uses from within the Mayorality of Baghdad to these areas, and transforming the vacated lands into central parks and green areas.
7. Construction of two large suburban parks in the north and south in areas of outstanding natural beauty.
8. Dividing the remaining lands in the new area into agricultural lands/green and open spaces.
9. Protection of the remaining agricultural lands within the boundaries of the Mayorality of Baghdad.
10. Acquisition of the maximum amount of remaining vacant land and its allocation as local municipal parks.
11. Benefiting from the large vacant plots that will be vacated within the Central Business District (Al-Muthanna and Al-Shaljah), for the purpose of implementing prestigious, large-scale and first-class projects, in order to improve the image of the Central Business District of the city of Baghdad.
12. Re-signing the planned ring railway line and proposing an external fifth ring road to contain the new city and reduce the penetration of transit traffic (especially trucks) to urban residential areas, which is considered to have a negative environmental impact on the city and an increase



in pollution rates within the city, which reduces the ecological aspects of the whole city of Baghdad. As well as completing the implementation of the Baghdad Marina river transport project, especially in areas that suffer from traffic jams and high population density, such as the centre of the capital, Baghdad.

However, among the negatives that are recorded on the comprehensive development plan, especially at the present time, that is, more than 7 years after the completion of the fourth phase, with regard to the environmental and ecological aspects of the city are:

1. The plan did not give a clear criterion for the percentage of green and open areas for one person, and the way they are distributed within the city.
2. The plan confirmed the assimilation of the population within the master plan and in nearby cities within a radius of 30 km from the city centre, but the methodology changed to increase the horizontal expansion of the current plan and absorb the overpopulation in the newly expanded areas horizontally, which is one of the negative things (horizontal expansion) due to the increase in costs Foundation structures and consumption of agricultural land and green/open areas around the city.
3. The plan adopting the plan on the reality of the city of Baghdad for the years 2010–2011 to analyse the uses of the land and give its suggestions, which makes it unimplementable at the present time in many paragraphs and proposals due to the great change that occurred throughout the city and the change in the proportions of different land uses.
4. The plan failed to clarify the risks assessment, possibilities, and difficulties in achieving each of the developed scenarios and the specialization of green areas and the increase of their percentage within the city of Baghdad.
5. The plan did not give a clear weight to the proposed spaces to increase green areas in increasing their percentage within the city.

Through the analysis presented of the drafts of the comprehensive development plans in all its phases, it can be said that the plan came to solve the problem

of the city of Baghdad by focusing on a set of scenarios, especially with regard to the environmental and ecological aspects of the city. These scenarios and suggestions are presented in Table 4.

## RESULTS

From the above review of the Baghdad's masterplans, it turns out that it pays great attention to green areas, their development and preservation, because of their many effects in terms of climatic, ecological, aesthetic, recreational, social and economic terms. And there is a set of priorities and main points that all previous masterplans for the city of Baghdad share, which in turn work to increase and improve the environmental and ecological aspect of the city, including:

1. The necessity of dealing with the population increase and urban sprawl on green areas, as it is one of the most important reasons for the city's loss of ecological aspects and the increase in pollution rates, which was clearly reflected on life in the city of Baghdad.
2. Dealing with the Tigris River and its banks, starting from dividing it into a group of sectors and focusing on turning it into green areas, especially in the northern and southern parts of the Tigris River.
3. Preserving orchards as green areas within the city of Baghdad and preventing encroachment on them, for their great role in improving the ecological and environmental aspect of the city.
4. Most of the masterplans stressed the need to establish a protective green belt for the city of Baghdad, with the possibility of using it as recreational areas and open green areas for rest.
5. Most of the masterplans emphasized dealing with the main axes of movement and the necessity of afforestation of the sides and median islands to raise the ecological aspect of the city.
6. The need to deal with the hierarchy of green areas within the city.
7. It is necessary to surround the industrial areas and polluted activities with a belt of green areas and orchards, which reduces the amount of environmental pollutants produced by these areas.



**Table 4.** the outlines the previous masterplans for Baghdad's city and the most essential aspects of them in terms of green areas

No.	Masterplans	Name of The Design Firm	Year of Preparation	Green Area Standards	The Important Points Related to Green Areas
1	2	3	4	5	6
1	Master Plan for Minobrio & Associates	Town Planning Firm Minobrio & Associates	1956	–	<ul style="list-style-type: none"> <li>• The Tigris River is given special attention, with focus on the necessity to create open areas and movement corridors along the Tigris river banks in Baghdad</li> <li>• Establishment of the green belt for the city of Baghdad</li> <li>• Attention to the city's green space hierarchy</li> </ul>
2	Doxiadis Associates Master Plan	The Doxiadis Foundation	1959	17 m <sup>2</sup>	<ul style="list-style-type: none"> <li>• Conserving existing orchards and turning them into open spaces that can be used for meetings and relaxation</li> <li>• Paying attention to the green spaces adjacent to the Tigris river</li> <li>• Three irrigation canals proposed parallel to the Tigris River One of them, known as, was adopted in the early 1960s of the previous of the twentieth century (The Army Canal)</li> <li>• Neglecting the hierarchy of green spaces at the city level, but only at the neighbourhood level</li> </ul>
3	Comprehensive Development Plan for Law 156	The Polish institution of Polservice	The first phase 1967 The second phase 1973	28 m <sup>2</sup>	<ul style="list-style-type: none"> <li>• Suggesting a hierarchy of green spaces within the city of Baghdad</li> <li>• Reducing the increasing population densities in some areas by providing green areas within the same area in order to reduce the building mass</li> <li>• Create a coordinated system for forests and protective belts in the city's north western side, as well as orchards and open gardens</li> <li>• Benefiting from the Army Canal Road axis through afforestation of unoccupied places on both sides of the road and its prohibitions, as it is a huge axis that positively influences the ecosystem's work when afforestation occurs</li> <li>• Creating Al-Zawraa Park as the city's major park, as well as a second park in the Rusafa district</li> <li>• Considering the hierarchy in the design of green areas based on their gradation (city, sector, neighbourhood, locality)</li> </ul>
4	Integrated Development Plan	The Japanese consultative group JCCF	1987	11 m <sup>2</sup>	<ul style="list-style-type: none"> <li>• Opening up the riverbank to provide leisure opportunities for the general public and to develop open green spaces</li> <li>• Existence of a buffer zone for industrial regions and fields, which uses green squares to limit noise, visual, and environmental pollution from entering the city</li> <li>• Interest in the rivers and their banks and the promotion of direct communication with them, within the city of Baghdad (Tigris River, Diyala River and Nahr al-Khair)</li> <li>• Preservation of palm groves on both sides of the river banks</li> <li>• Reinforcement of pedestrian paths on the banks of the river through fencing to provide shade and by preventing the construction of buildings separating the river</li> <li>• Preserving the hierarchy of green areas in a more integrated and interconnected form for the city</li> <li>• In order to reach an achievable standard and to overcome the failure of the previous proposal, this study suggested reducing the planning standard for green space, from (28 m<sup>2</sup> per person) to (11 m<sup>2</sup> per person)</li> <li>• Creating urban strip corridors to isolate urban areas from noise and pollution as the Army Canal axis</li> <li>• Dividing the area of the river into five secondary areas, ranging between recreational and functional</li> </ul>

cont. Table 4

1	2	3	4	5	6
4	Integrated Development Plan	The Japanese consultative group JCCF	1987	11 m <sup>2</sup>	<ul style="list-style-type: none"> <li>• Interest in the rivers and their banks and the promotion of direct communication with them, within the city of Baghdad (Tigris River, Diyala River and Nahr al-Khair)</li> <li>• Preservation of palm groves on both sides of the river banks</li> <li>• Preserving the hierarchy of green areas in a more integrated and interconnected form for the city</li> <li>• In order to reach an achievable standard and to overcome the failure of the previous proposal, this study suggested reducing the planning standard for green space, from (28 m<sup>2</sup> per person) to (11 m<sup>2</sup> per person)</li> <li>• Develop a proposal to take advantage of the historical sites in the city as open green areas</li> <li>• Creating urban strip corridors to isolate urban areas from noise and pollution as the Army Canal axis</li> <li>• Dividing the area of the river into five secondary areas, ranging between recreational and functional</li> </ul>
5	The comprehensive urban development project	Working team from the Mayoralty of Baghdad and professors from University of Baghdad	1998	17 m <sup>2</sup>	<ul style="list-style-type: none"> <li>• Studying historical and archaeological sites for their development and investment in tourism and the exploitation of their open spaces within the network of green spaces in the city</li> <li>• Stop cases of encroachment on green areas</li> <li>• Adopting a connection method using tapes connected to green areas and protected parks extending through all residential and working areas</li> <li>• Dividing the Tigris belt region into secondary regions, ranging between fully rural and very urban</li> <li>• Increasing the planning standards of green areas through the development of new parks, especially in areas with high population densities</li> <li>• Proposing the establishment of green areas within the outer belt, in which it is not permissible to build, consisting of farms and forests, around the proposed city boundaries</li> <li>• Dealing with the natural and urban environments as they interact to produce the city's identity, and the quality of life enjoyed by the city's population is mainly defined</li> <li>• Preventing the conversion of the gender of agricultural land use to any other urban use and the direct cultivation of it, and stopping the random urban expansion on it</li> </ul>
6	Baghdad Comprehensive City Development Plan 2030	The Lebanese Office Of Al-Khatib And Alami	2007	–	<ul style="list-style-type: none"> <li>• Attention to the Tigris River and its banks and the mechanisms of dealing with them</li> <li>• Establishing a protective and limiting green belt for urban expansion</li> <li>• Establishing new growth centres in order to accommodate the expected population increase for the city of Baghdad</li> <li>• Preserving agricultural orchards and palm orchards within the boundaries of the Mayoralty</li> <li>• Preserving the hierarchy of green areas in a more integrated and interconnected form for the city</li> <li>• Working to increase green areas within the city and based on the hierarchy of green areas</li> <li>• Transferring heavy industries and some light industries harmful to the city's environment to the new areas and industrial contracts proposed within the draft development plan</li> <li>• Proposing a set of transportation solutions in order to reduce the use of cars and the adoption of public transportation to reduce environmental pollution, noise and the negative effects of cars on the city</li> </ul>

Source: The researcher (2022).

Despite all these priorities and main points emphasized by these masterplans, what has been implemented of them is not comparable to the population increase of the city of Baghdad, nor to the increase in urban sprawl on its green and open areas, because of the shortcomings of the legislation and laws that guarantee the preservation of green areas, the weakness of oversight in the concerned departments, the lack of environmental awareness among citizens, and the transgression of land uses designated as green areas, which certainly led to an increase in the city's pollution and the loss of many of the ecological aspects of the city, which affected Turn on the nature of life within the city of Baghdad.

## CONCLUSIONS

The research aimed to study and analyse the green areas of the city of Baghdad, and the most important proposed scenarios in the previous comprehensive development plans for the city of Baghdad, which came

to increase the percentage of green areas within the city, the main points can be summarized as follows:

1. The green areas in the city of Baghdad did not develop in accordance with a prior plan that was proportionate to the size of the population on the one hand and the size of the city on the other, but rather they developed as a result of random decisions, relying on portions of some development plans while ignoring others, as well as the disappearance and removal of many of these areas, particularly the orchards and the green belt area, as a result of the expansion of the city.
2. The urban environment of the city of Baghdad has been developed using a number of comprehensive development plans and designs. There were plenty of them in the open lands and green areas. These plans' most significant considerations in relation to green spaces are:
  - a. It turns out that the previous Baghdad masterplans put a significant focus on green areas, their growth, and preservation because of all

**Table 5.** The Strength Points of the Baghdad's Masterplans

No.	Baghdad's Masterplans	Dealing with the population increase	Dealing with the Tigris River and its banks	Preserving orchards as green areas within the city of Baghdad	Establish a protective green belt for the city of Baghdad	Dealing with roadsides and turning them into green areas	Deal with the hierarchy of green areas within the city	Surround the industrial areas with a belt of green areas	Transferring heavy industries and some light industries	Proposing a set of transportation solutions
1	Master Plan for Minobrio & Associates		●		○		○			
2	Doxiadis Associates Master Plan			○			○			
3	Comprehensive Development Plan for Law 156	●	●			○	○	●		
4	Integrated Development Plan JCCF	●	●			○	○			
5	The Comprehensive Urban Development Project	●	●	○	○					
6	Baghdad City Comprehensive Development Plan 2030	●	●	○	○	○	○		●	●

Source: The researcher (2022).

the benefits they provide in terms of climatic, ecological, aesthetic, recreational, social, and economic aspects. Additionally, there are a number of priorities and key ideas that all previous masterplans for the city of Baghdad share, all of which aim to enhance and improve the city's ecological and environmental conditions. These include:

- Dealing with the population expansion and urban sprawl on green areas is necessary because it is one of the main causes of the city's loss of ecological aspects and rise in pollution levels, which was evident in Baghdadi daily life.
- Taking care of the Tigris River and its banks requires first dividing it up into a number of places and putting the emphasis on converting them into green areas, particularly in the northern and southern parts of the Tigris River.
- preserving orchards as green spaces within Baghdad's city limits and preventing encroachment on them due to their significant contribution to the improvement of the city's ecological and environmental condition.
- The majority of the masterplans emphasized the importance of creating a protective green belt for the city of Baghdad, with the potential to use it as open green spaces for relaxation and recreation.
- The most of masterplans placed a strong emphasis on managing the main axes of transportation and the importance of reforestation on the sides and median islands to improve the city's ecological aspect.
- The requirement to address the hierarchy of green spaces in the city.
- To lessen the amount of environmental pollutants created by industrial regions and other polluting activities, a belt of orchards and green spaces must surround these locations.

Despite all of the priorities and key points emphasized by these masterplans, their implementation has not been on par with the growth in the city of Bagh-

dad's population or the expansion of the city's open spaces due to the inadequacies of the legislation and laws that guarantee the preservation of green spaces, the lack of adequate oversight in the relevant departments, the lack of environmental awareness among the general public, and the transgression of these masterplans.

It unquestionably contributed to a growth in the city's pollution and the loss of many of the ecological aspects of the city, which had an impact on Turn on the way of life in the city of Baghdad.

The Baghdad Comprehensive City Development Plan 2030 (Khatib and Alami) did not include a standard for green spaces, making it challenging to evaluate its principles absent actual figures representing standards that go along with the plans that are put into practice on the ground to realize the vision, ideas, and principles it presented. What was actually done, however, was to carry out field surveys of the current situation and anticipated outcomes for the target year, as well as research comparing the current standards in Arab and other international countries to the standard set by the World Health Organization.

- a. The Baghdad Comprehensive City Development Plan 2030 was created to address the city's issues by focusing on a variety of scenarios, particularly those that dealt with the city's ecological and environmental issues.
- b. However, the following drawbacks are listed on the comprehensive development plan with regard to the city's environmental and ecological aspects, particularly at this time, which is more than 7 years after the completion of the fourth phase:
  - The percentage of green and open areas one per person and how they are dispersed throughout the city were not clearly stated in the plan.
  - The plan confirmed the assimilation of the population within the master plan and in neighbouring cities within a 30-kilometer radius of the city centre, but the methodology changed to increase the horizontal expansion of the current plan and absorb the excess population in the newly expanded areas horizontally, which is one of the negative things

(horizontal expansion) due to the increase in costs Foundation structures and consumption of agricultural land and green/open areas were also two negative things (horizontal expansion).

- The adoption of the plan on the reality of the city of Baghdad for the years 2010–2011 to analyse land uses and offer suggestions makes it impractical at the moment in many of its paragraphs and recommendations due to the significant change that has taken place throughout the city and the change in the proportions of different land uses.
- A risk assessment, potential outcomes, and challenges associated with implementing each of the suggested scenarios, as well as the specialization of green areas and the rise in their percentage inside the city of Baghdad, were not made clear in the plan.
- The proposed spaces to enhance green areas' percentage within the city were not given a clear weight in the plan.

The creation of a green belt around the city of Baghdad, as well as the preservation of orchards and agricultural areas inside the city limits, were prioritized in the majority of comprehensive development plans due to their significant contribution to the preservation of the city's ecological and environmental features.

In addition to all of this, Baghdad Comprehensive City Development Plan 2030 (Khatib and Alami) included recommendations that would improve the environment and ecological aspects. These included moving some industrial areas outside the current city limits and implementing sustainable transportation and activation strategies within Baghdad.

## RECOMMENDATIONS

The research recommends a set of points, which are:

1. The need to preserve the green areas within the city of Baghdad by the concerned authorities.
2. Work to develop and increase the percentage of green spaces per person to get closer to the international standard.

3. The need to work on proposing development scenarios for green areas and to adopt the current reality of the city of Baghdad in proposing these scenarios.

4. Work on developing the banks of the Tigris River within the city center of Baghdad for its role in increasing the environmental aspects of the city.

5. The need to surround the city of Baghdad with a protective green belt due to its necessity in providing protection for the city from environmental influences and improving the environmental and ecological aspects of the city of Baghdad.

policy implications

“Our research shows the possibilities available to the city of Baghdad to increase its green areas, according to the development scenarios proposed in the comprehensive development plans, which brings positive aspects to the city's environment”. The statement indicates that the government should devote more attention to green areas and their preservation, but does not recommend any specific actions.

## RESEARCH LIMITATIONS

1. Difficulty obtaining drafts of previous comprehensive development plans for the city of Baghdad.
2. Difficulty obtaining realistic Baghdad city plans for previous years.
3. lack of previous research in the field.
4. As for time constraints, the city of Baghdad is witnessing a large and rapid expansion, and the solutions proposed by the master plans may not be useful after 10 years.

## RESEARCH PROSPECTIVE

In this article, we explore the idea of “the reality of green spaces in Baghdad” and the possibilities that the city of Baghdad contains in order to increase the environmental aspects by increasing the percentage of green areas according to the scenarios that came from the previous comprehensive development plans for the city.



## REFERENCES

- Abdul Raheem, M., & Abdul Razzaq, N. (2018). Developing Green Infrastructure for Baghdad City. *The Iraqi Journal of Architecture and Planning*, 12(27), 62–83.
- Albadri, M. (2013). *The Sustainability of Green open spaces in the City of Baghdad*. Baghdad: University of Baghdad – college of engineering.
- Al-Sheikhly, A., & Al-Taie, N. (2018). The reality of smart city development management in the comprehensive development plan for Baghdad 2030. *Journal of Economic and Administrative Sciences*, 109(24), 1–21.
- AL-Taie, I. (2019). *Tracking the changes of urban green areas in the city of Baghdad for the period of 2000–2018*. Estonian University of Life Sciences.
- Al-Zubaidi, M. (2013). The effect of green spaces in increasing the functional environmental efficiency of cities: A study of the experience of the city of Baghdad. *Arab Towns Organization*, 159, 21–33.
- Dawood, I. (2020). The Temporal Variation of the Change of Green Areas in Baghdad City for the Period (2011–2016). *International Journal of Innovation, Creativity and Change*, 14(10), 415–437.
- Hamdan, S. (2017). Green spaces and their role in improving the city environment (Baghdad as a model). *Journal of the College of Education*, 6, 509–532.
- Ismael, N. (2015). *Planning Towards for Urban Expansions for Metropolitan Alternatives in preparing Master Plans of Baghdad City*. Baghdad: University of Baghdad.
- Jaafer, Z. (2019). *Excessive urbanization and its effect on loss of green areas inside cities*. Baghdad: Al-Nahrain University.
- Khatib & Alami (2008). *The comprehensive development plan for the city of Baghdad: the basic report for the first phase*. Baghdad: Baghdad Mayorality.
- Khatib & Alami (2011). *The comprehensive development plan for the city of Baghdad. The second phase: Preparing alternatives to the development plan and outline strategies*. Baghdad: Baghdad Mayorality.
- Khatib & Alami (2014). *Fourth stage report, final version of the comprehensive development plan for the city of Baghdad*. Baghdad: Baghdad Municipality.
- Municipality, B. (2010). *The Green Belt Study for the City of Baghdad*. Baghdad: Design Department Committee.
- Salih, S., & Ismail, S. (2017). Means to achieve social interaction in green open space in Baghdad, Iraq. *Journal of Built Environment, Technology and Engineering*, 2, 159–167.

ORIGINAL PAPER

Received: 05.12.2022

Accepted: 12.04.2023

## A METHOD FOR EVALUATING THE IMPACT OF UNIVERSAL DESIGN ON THE ATTRACTIVENESS OF MILITARY TOURISM SITES

Tomasz Podciborski<sup>1</sup>, Anna Klimach<sup>2</sup>, Dariusz Konieczny<sup>3</sup>, Jacek Zabielski<sup>4</sup>

<sup>1</sup> ORCID: 0000-0002-8778-1879

<sup>2</sup> ORCID: 0000-0001-7930-3888

<sup>3</sup> ORCID: 0000-0001-8865-0902

<sup>4</sup> ORCID: 0000-0002-1944-968X

<sup>1,2,3,4</sup> University of Warmia and Mazury in Olsztyn

Michała Oczapowskiego Street 2, 10-719 Olsztyn, Poland

### ABSTRACT

**Motives:** The interest in military tourism has been increasing steadily around the world, especially among tourists interested in military history. Given the lack of methods and studies examining the impact of universal design on the attractiveness of public open spaces in military tourism sites, an innovative method should be developed to diagnose the accessibility of such sites for all social groups within the realm of the possibilities offered by universal design.

**Aim:** The main aim of the study was to propose a method for assessing the impact of universal design on the attractiveness of public open spaces on the example of the Wolf's Lair, a popular a military tourism site in Poland. The specific objectives were to describe the origins of tourism, with special emphasis on military tourism, and to present the unique characteristics of public space design. Public space attributes that contribute to effective design of tourist space were identified based on the results of a questionnaire survey. Indicators and measures for assessing the identified attributes were developed and presented, and the principles for their implementation were described.

**Results:** The analyses carried out in the study revealed that the assessed site has considerable appeal for tourists, especially those interested in military history. Based on the results of the assessment conducted with the use of the proposed method, it can be concluded that the examined site is characterised by a high level of tourist attractiveness. The presented findings constitute valuable information for the management of the Wolf's Lair (State Forests).

**Keywords:** universal design, military tourism, public space

### INTRODUCTION

In recent years, military tourism has become increasingly popular among tourists, especially those interested in military history and technology. The scope of the term 'military tourism' has become

increasingly broad (Venter, 2017) and has been repeatedly linked to related topics such as 'dark tourism' and 'blood tourism' (Raine, 2013; Biran & Hyde, 2013). According to Kwilecki, the main reason for military tourism is cognitive motivation, as this particular form of tourism broadens the

✉ tomasz.podciborski@uwm.edu.pl, ✉ anna.klimach@uwm.edu.pl, ✉ dkon@uwm.edu.pl,

✉ jacek.zabielski@uwm.edu.pl

mind, increases knowledge, and general culture (Kwilecki, 2011). The growing interest in military tourism forces the owners and managers of tourist facilities to adapt these sites to the users' needs (Pearn & Heritage, 2011). The principles of accessible tourism should be considered already at the design stage to ensure that people with different types of disabilities (in mobility, vision, hearing, and cognition) can function independently and with dignity in tourist space (Buhalis & Darcy, 2011). Tourist space should also be managed in a way that promotes harmonious spatial development (Ptaszycka-Jackowska, 2007).

Due to the lack of methods and studies that examine the impact of universal design on the attractiveness of public open spaces in military tourism facilities, an innovative method should be developed to diagnose the accessibility of these facilities for all social groups within the realm of the possibilities offered by universal design. The main objective of the study was to propose a method for assessing the impact of universal design on the attractiveness of public open spaces on the example of the Wolf's Lair, a popular a military tourism site in Poland. The specific objectives were to describe the origins of military tourism, and to present the unique characteristics of public space design. Public space attributes that contribute to effective design of tourist space were identified based on the results of a questionnaire survey. Indicators and measures for assessing the identified attributes were developed and presented, and the principles for their implementation were described.

## MATERIALS AND METHODS

The research was carried out in several stages. The origins of military tourism and the characteristic attributes of public space were discussed in the first stage of the study. The attributes of public space that contribute to the effective design of tourist space were identified in the second stage. In the third stage, the final list of indicators was developed. The indicators and measures for assessing public space attributes were then identified. In the final stage, the proposed

research methodology was tested in a selected site. The research methods applied in the process of developing the method for assessing the impact of universal design on the attractiveness of public open spaces in military tourism sites are presented in Table 1.

**Table 1.** Research methods applied in the process of developing a method for assessing the impact of universal design on the attractiveness of public open spaces in military tourism sites

Stage	Research Methods
Conceptual analysis	Literature analysis
Development of a preliminary list of indicators	Literature analysis
Development of a list of indicators	Diagnostic survey; Statistical analysis
Development of evaluation measures	Monographic method
Development of evaluation principles	Scoring method

Source: own elaboration.

A list of twenty (20) indicators supporting a reliable assessment of the impact of universal design on the attractiveness of public open spaces in military tourist sites was developed based on the results of a direct survey. The survey involved 100 experts in the field of universal design and tourism, and it was conducted at the beginning of February 2023. The respondents were researchers and lecturers of the Faculty of Geoengineering at the University of Warmia and Mazury in Olsztyn (specializing in construction and tourism, 86 persons), persons responsible for the organisation and management of tourist traffic in collaboration with the Tourist Promotion and Information Centre in Giżycko (6 persons), and tourist guides in Giżycko municipality, including in the Wolf's Lair (8 persons).

The questionnaire was designed by the authors of this study, and it comprised 30 attributes of public open spaces in tourist facilities that had been selected by the authors of the study during their preliminary research. The respondents were asked to rate the impact of each attribute on the attractiveness of public open spaces in tourist sites on a three-point scale, where:

- 0 points – the attribute is not essential in the development of public open spaces in tourist sites;
- 1 point – the attribute is moderately important in the development of public open spaces in tourist sites;
- 2 points – the attribute is very important in the development of public open spaces in tourist sites.

Thirty attributes of public open spaces in military tourism facilities were identified by the authors of the study during their preliminary research: vending machines with drinks and snacks; safety barriers; area cleanliness; free Wi-Fi; hotel on the site; benches (separate resting places); surveillance; rainwater drains; fencing; lighting (light poles); route signposting (for guiding visitors); disabled parking; refreshment point; tourist information point; first aid centre; souvenir shop; route surface; proximity to facilities; condition of route surface; footpath width; cycle path; litter bins; information boards (description of the site, its location and history); textured guide panels for the blind and visually impaired; toilets; vertical layout of the route (footpath slope); separate playground; range of induction loops enabling the use of audio guides; street lighting; tall and short vegetation.

The initial list of 30 attributes was reduced to 20 items that received the highest scores in the questionnaire. The impact of these attributes on the accessibility and attractiveness of the assessed facilities was determined by calculating weights. The following procedure was applied to compute weights:

1. The total number of points allocated to all 20 attributes that received the highest scores was calculated;
2. The number of points allocated to each attribute was divided by the total number of points allocated to all 20 attributes;
3. The resulting weights were applied in the evaluation based on the weighted sum method.

The list of 20 attributes of public open spaces in military tourism sites, selected based on the results of the questionnaire survey, and the accompanying weights are presented in Table 2.

In the respondents' opinion, the following attributes had a low impact on the attractiveness and accessibility of public open spaces in military tourism sites: first aid centre; cycle path; fencing; rainwater drains; free Wi-Fi; vertical layout of the route (footpath slope); vending machines with drinks and snacks; souvenir shop; separate playground; hotel on the site.

The principles for assessing the selected attributes were formulated with the use of the adopted evaluation method. The assessed attributes of public open spaces were aggregated into a single metric that comprehensively expresses the overall quality of the evaluated facility (Babicz-Zielińska, Rybowska & Obniska, 2008). Point scales combine the advantages of verbal and numerical scales. Each point on the scale is assigned a conventional number and a corresponding verbal expression (Jędryka & Kozłowski, 1986). The accuracy of the evaluation depends on the correct definition of individual quality levels, which is essential for obtaining correct results. Secondly, the assessment team has to be adequately trained to ensure that each team member has a clear understanding of the evaluated attributes.

A reliable grading scale should meet the following requirements:

- each point on the scale should represent a different level of quality that can be easily identified by the assessor;
- each point on the scale (each level of quality) should have a clear definition;
- the number of points should be limited and should not exceed 3 levels;
- all attributes should be rated on a scale with the same number of points (Baryłko-Pikielna, 1975).

Metrics were developed to build a model for assessing the impact of universal design on the attractiveness of public open spaces in military tourism facilities. Metrics were developed based on an analysis of the literature and the results of ongoing research on recent solutions in the development of public open spaces.

An evaluation sheet containing indicators, the relevant measures (which are an important part of universal design principles for developing tourist

**Table 2.** List of 20 attributes of public open spaces in military tourism sites, selected based on the results of the questionnaire survey, and the accompanying weights

No.	Attribute	A	B	C	$\Sigma = A*0 + B*1 + C*2$	Weight
		0 – non-essential	1 – moderately important	2 – very important		
1.	Information boards (description of the site, its location and history)	0	0	100	200	0.062
2.	Toilets	0	0	100	200	0.062
3.	Route signposting (for guiding visitors)	0	5	95	195	0.059
4.	Area cleanliness	5	5	90	185	0.057
5.	Safety barriers	10	5	85	175	0.054
6.	Lighting (light poles)	0	25	75	175	0.054
7.	Disabled parking	0	25	75	175	0.054
8.	Litter bins	5	20	75	170	0.052
9.	Textured guide panels for the blind and visually impaired	0	30	70	170	0.052
10.	Tourist information point	0	35	65	165	0.051
11.	Benches (separate resting places)	5	30	65	160	0.049
12.	Condition of route surface	5	30	65	160	0.049
13.	Refreshment point	5	40	55	150	0.046
14.	Tall and short vegetation	5	40	55	150	0.046
15.	Rainwater drains	10	35	55	145	0.044
16.	Route surface	15	25	60	145	0.044
17.	Footpath width	5	50	45	140	0.043
18.	Surveillance	10	45	45	135	0.041
19.	Range of induction loops enabling the use of audio guides	0	65	35	135	0.041
20.	Proximity to facilities	15	40	45	130	0.040
$\Sigma$					3260	1.000

Source: own elaboration.

space) and weights was developed to assess the impact of universal design on the attractiveness of public open spaces in military tourist facilities.

In the evaluation sheet, the assessed attributes were grouped into four tourist attractiveness classes.

However, it should be noted that the number of the examined attributes influences the accuracy of the evaluation and depends only on the person performing the assessment. The evaluation form is presented in Table 3.



**Table 3.** Scale for assessing the impact of universal design on the attractiveness of public open spaces in a military tourism site

No.	Criterion	Measure	Scale	Points	Weight	Points X Weight
1	2	3	4	5	6	7
1.	Information boards (description of site, its location and history)	Information boards available for all attractions, in many languages	2		0.062	
		Information boards available for all attractions, in Polish only	1			
		Information boards available for selected attractions or not at all	0			
2.	Toilets	Disabled toilets available	2		0.062	
		Disabled toilets not available	1			
		Toilets not available	0			
3.	Route signposting (for guiding visitors)	Route clearly signposted	2		0.059	
		Route not clearly signposted	1			
		No signposts	0			
4.	Area cleanliness	The entire site is clean	2		0.057	
		Only the footpaths are clean	1			
		The entire site is littered	0			
5.	Safety barriers	Safety barriers present in all hazardous locations	2		0.054	
		Safety barriers only in selected hazardous locations	1			
		No safety barriers	0			
6.	Lighting (light poles)	The entire site is well lit	2		0.054	
		Some parts of the site are not well lit	1			
		The site is not lit	0			
7.	Disabled parking	Adequate number of disabled parking spaces	2		0.054	
		The number of disabled parking spaces does not meet demand at peak times	1			
		No disabled parking spaces	0			
8.	Litter bins	Litter bins are evenly distributed throughout the site	2		0.052	
		Litter bins are not evenly distributed throughout the site	1			
		No litter bins	0			
9.	Textured guide panels for the blind and visually impaired	All footpaths have textured slabs for the blind and visually impaired	2		0.052	
		Only some footpaths or section have textured slabs for the blind and partially sighted	1			
		No textured guide panels for the blind and visually impaired	0			
10.	Tourist information point	Tourist information officers speak foreign languages	2		0.051	
		Tourist information officers do not speak foreign languages	1			
		No tourist information point	0			
11.	Benches (separate resting places)	Benches are evenly distributed throughout the site	2		0.049	
		Benches are not evenly distributed throughout the site	1			
		No benches	0			

cont. Table 3

1	2	3	4	5	6	7
12. Condition of route surfaces	Paved routes without potholes		2			
	Paved routes with potholes		1		0.049	
	Unpaved routes		0			
13. Refreshment point	More than one catering facility on the site		2			
	Only one catering facility on the site		1		0.046	
	No catering facilities on the site		0			
14. Tall and short vegetation	Tall and short vegetation well maintained		2			
	Tall vegetation well maintained, short vegetation not well maintained or absent		1		0.046	
	No tall vegetation or tall vegetation poses a threat to visitors		0			
15. Rainwater drains	All sections of footpaths have storm drains		2			
	Only some sections of the footpaths have storm drains		1		0.044	
	None of the footpaths have storm drains		0			
16. Route surface	Tourist routes are paved with safe bituminous materials		2			
	Tourist routes are paved with hard materials (concrete, asphalt)		1		0.044	
	Unpaved routes		0			
17. Footpath width	Footpaths are wide enough to enable smooth traffic flow		2			
	Only some footpaths/sections are wide enough to enable smooth traffic flow		1		0.043	
	Narrow footpaths compromise the visitors' safety		0			
18. Surveillance	The entire site has surveillance cameras		2			
	Only some parts of the site have surveillance cameras		1		0.041	
	No surveillance		0			
19. Range of induction loops enabling the use of audio guides	The entire tourist site is covered by an induction loop enabling the use of the audio guide		2			
	Only a part of the tourist site is covered by an induction loop enabling the use of the audio guide		1		0.041	
	No audio guide		0			
20. Proximity to facilities	Proximity to facilities enhances the site's appeal for tourists		2			
	Proximity to facilities is considered neutral		1		0.040	
	Proximity to facilities decreases the site's appeal for tourists		0			
Class I	$1.5000 \leq x \leq 2.000$	Class III	$0.500 \leq x < 1.000$			1.000
Class II	$1.000 \leq x < 1.500$	Class IV	$0.000 \leq x < 0.500$	Tourism attractiveness score		

Source: own elaboration.

## Research on military tourism

Tourism is a highly complex phenomenon involving social, cultural, economic, spatial and environmental factors. This is evidenced by a wide variety of forms and characteristics of tourism that are capable of satisfying even the most demanding visitors.

In addition, the large number of research studies dedicated to tourism and the theoretical concepts presented in the literature attest to the interdisciplinary character of tourism. In view of the above, is difficult, if not impossible to formulate a single universal definition of tourism. Selected definitions of tourism are presented in Table 4 based on a review of the literature.

**Table 4.** Definitions of tourism proposed in the literature

Year	Author	Definition
1977	Bartkowski	Tourism is related to physical activity and is synonymous with excursions or trips outside one's place of permanent residence for entertainment and relaxation, and it usually involves visits to natural sites, architectural sites, art monuments, objects of material culture, learning about other people and population groups in a given country, participation in cultural, sporting or other events, as well as the desire to come into contact with nature or undertake some form of physical activity
1998	Toczek-Werner	Tourism involves travel and excursions that are undertaken as leisure activities for the purpose of entertainment, health and gaining new experiences. Travel and excursions are accompanied by many phenomena. The term 'tourism' refers to a wide range of socio-economic and cultural phenomena and processes that contribute to the image of tourism and modify its definition
2013	Maćkowska, Podciborski	Tourism is a diverse and wide-ranging phenomenon. It is of great importance as a form of rest, relaxation, cognition, acquisition of knowledge, physical and mental regeneration. Tourism is also an important part of the economy. In some areas, tourism is a significant source of income for the residents and investors, and it contributes to the economic development of towns and regions

Source: own elaboration based on: Bartkowski, 1977; Toczek-Werner, 1998; Maćkowska & Podciborski, 2013.

In the late 1990s, a classification of tourism was proposed by Gaworecki based on the main purpose of tourist trips. The following types of tourism were identified: leisure, cultural, social, and sports tourism (Gaworecki, 1998). The classification proposed by Gaworecki became increasingly outdated over the years. The purpose of tourism trips and the travellers' preferences continue to change, and many travellers participate in several forms of tourism at the same time.

The evolution and complexity of tourism were discussed again by Kurek in 2007. According to the cited author, tourism is a phenomenon that can be analysed at various levels and realms:

- psychological, relating to individual needs, motives for traveling, personal values, purpose of travel, perceptions, behaviour, and experiences;
- social, relating to interpersonal relationships and interactions during the trip, social tangents, bonds, social stereotypes, and their impact on the interacting parties;
- spatial, because the migration (movement) of people (tourists) is a spatial phenomenon, and the development of tourist facilities that meet the visitors' needs induces profound changes in space;
- economic, because the transactions on the tourism market involve the suppliers of tourist services and consumers, and have economic consequences for both parties, as well as for market growth;

– cultural, because tourism is both an element of culture and an expression of culture (function of culture); tourism promotes the interaction of cultures and leads to their transformation (Kurek, 2007).

In 2009, Różycki identified the following types of tourism: sightseeing, biographical, active, military, sport, leisure, medical, culinary, motivational, social, business, conference and congress, maritime, commercial, profit, ethnic, religious, pilgrimage, cultural, entertainment, educational (also known as study tourism), agritourism, ecotourism, and geotourism (Różycki, 2009). A review of the literature indicates that military tourism had been first identified as a distinctive form of tourism only at the end of the first decade of the 21<sup>st</sup> century. The classification proposed by Lijewski, Mikułowski and Wyrzykowski in 2002 makes a clear distinction between sightseeing and cognitive tourism, but does not make a direct reference to military tourism (Lijewski, Mikułowski & Wyrzykowski, 2002).

The recent emergence of military tourism as a separate category of tourism can be attributed to the fact that most Polish military sites of symbolic and historical significance had been closed to the public until the early 1990s for political and security reasons (Cold War). Today, these sites are becoming important new destinations for cognitive tourism. The growing interest in this type of tourism was high-

lighted by Poczta who argued that military tourism is one of the unconventional forms of active tourism (Poczta, 2008). The development of military tourism has also been discussed by Chylińska (2006), Cynarski (2012), Stach (2013), and Zgłobicki et. al (2016). A similar observation was made by Kowalczyk who noted that military tourism is a relatively new category of tourism. In the work of Jędrysiak and Mikos von Rohrscheidt, military tourism was also referred to as military cultural tourism, war tourism, battlefield tourism, and military equipment tourism. Military tourism serves a variety functions, including historical-educational, martyrological, political-ideological, cultural-entertainment, recreational-sporting, and adventure (Kowalczyk, 2009).

The situation was different in Western European countries. According to Logan and Reeves, academics and tourists have a growing interest in the heritage associated with dark events, both national and international. These types of tourist destinations include extermination camps, massacre and genocide sites, former maximum security prisons, defence quarters, and former dictatorial headquarters (Logan & Reeves, 2009). At the beginning of the 21st century, the dynamic development of military heritage tourism was discussed by Huh (2002), and Chhabra, Healy and Sills (2003).

According to Kowalczyk (2018), historical-military tourism involves all forms of activity undertaken by tourists (as a primary or secondary objective) who have an interest in historical objects and places that are broadly associated with warfare and the military.

In the definition proposed by Zienkiewicz and Podciborski (2019), military cultural tourism involves travel that is undertaken for educational purposes and to acquire new experiences, where visits to military defence sites and facilities associated with the history of armed conflict, the army, weapons, military commanders, and soldiers are the key attractions during the tour program. The following sites attract tourists with an interest in the military: fortifications, historical battlefields, places related to famous people in military history, armament plants, museums, shelters, bunkers, war cemeteries, graves

of war victims, and important defence structures and buildings, as well as events of military significance (Zienkiewicz & Podciborski, 2019 citing Jędrysiak and Mikos von Rohrscheidt, 2011). The visited sites should be a part of public open space, i.e. they should be freely accessible to all members of the public, without any architectural barriers.

## Land-use planning and tourism

Numerous definitions of public space have been proposed in recent decades, but research on public space continues to evolve dynamically. The following factors exert the greatest influence on the quality of public space: legal regulations, construction technology, policy-making (on a macro scale), and socio-cultural factors (on a micro scale).

Wejchert defined public space as an area that is accessible to all members of the local community as well as outsiders and serves as a setting for community activities in urban life (Wejchert, 1993). The diversity of functional forms and the accessibility of public space gave rise to subsequent definitions of the concept.

Dymnicka characterised public space as space to which all citizens should have a guaranteed right of access. Public space supports the free expression of opinions and diverse behaviours (limited only by the general rules of social coexistence), and direct social interactions (Dymnicka, 2009). Jałowiecki and Szczepański define traditional public space as a zone of freedom, where every user can feel free (Jałowiecki & Szczepański, 2006). In turn, Loegler argued that public spaces should create opportunities for experiencing life and interacting with community members (Loegler, 2009). Wysocki emphasised the importance of accessibility, arguing that public space should be a place where people meet, work, and spend their free time; the local residents visit public spaces every day on their way to and from work. Public spaces attract both residents and tourists, and the social interactions and activities in public spaces promote the integration of local communities. Public spaces should be inclusive, friendly and accessible to all, and

they should promote social integration regardless of the users' mobility or cognitive ability, becoming a place where interpersonal ties are strengthened and civil society develops (Wysocki, 2009).

According to Kochanowska, public spaces in urbanised areas should be designed to meet the residents' needs (cultural, identity, social needs), attract outsiders (tourists, potential investors), create an integrated settlement with a distinct image and defined identity (place brand) (Kochanowska, 2009), while providing the users with a sense of security. The definition proposed by Szatan (2012) focuses on the 'openness' and 'universality' of public space, and posits that public and pseudo-public space should be open and accessible to all who wish to use it, and that it should be 'authentic' by responding to social needs, expectations, and preferences. Similarly to Kochanowska, Szatan notes that public space should be socially acceptable and should provide all users with a sense of security (Szatan, 2012).

According to Chmielewski, people feel threatened when they are lost in unfamiliar space. However, individuals who are familiar with urban landmarks and the street layout can easily navigate through urban space with a sense of certainty and inner peace (Chmielewski, 2016). Perceptions of insecurity in public space could be triggered by the lack of spatial order or the presence of social groups that are deemed as "dangerous" (Bierwiazzonek, 2016). Lorens and Martyniuk-Pęczek also noted that since the 1970s, public spaces in highly developed countries have been attracting homeless people, beggars, and other socially marginalised individuals, which could explain the growing safety concerns (Lorens & Martyniuk-Pęczek, 2010). Bierwiazzonek observed that access to public space does not have to be unconditional or complete. Many public spaces, such as parks and gardens, are fenced and closed at night. Physical obstacles are the most direct approach to restricting the accessibility of public space (Bierwiazzonek, 2016). According to Lorens and Martyniuk-Pęczek, physical accessibility of public space can be temporarily limited for safety or logistic reasons (Lorens & Martyniuk-Pęczek, 2010).

The process of creating safe and well-designed public spaces is complex, and it requires effective

planning and the involvement of many actors. Attractive and accessible public spaces increasingly influence people's decisions on where to live and work (Rogowska, 2016).

Public space is also closely linked with the concept of sustainable development. Well-designed public spaces significantly contribute to the competitive advantage of urbanised areas, shape the identity of small towns, and attract new residents, tourists, and investors (Sobol, 2013). Public spaces designed in accordance with the principles of sustainable development should be characterised by high quality, high functionality, a positive impact on the users' mental and physical health, safety, ability to meet the needs of different social groups, including people with disabilities, the elderly, and families with young children; ability to foster diverse interpersonal contacts, and accessibility for pedestrians and cyclists (Sobol, 2013).

The presented definitions indicate that public space design is a rapidly evolving area of urban planning. These definitions are not limited to space or a specific location, and they account for public space users and their needs.

The contemporary man, his needs, and various mobile and static approaches to satisfying those needs, are the integral attributes of a place. Individual perceptions and responses (and interactions with other elements of the urban interior) drive the evolution of public space (Gaweł & Szafranek, 2018).

The beginnings of the dynamic development of tourism space management can be traced back to the 20th century, a period that witnessed numerous socio-economic changes and promoted the emergence of tourism in various areas of social life, including cultural, psychological, spatial, social, and economic (Podciborski & Zienkiewicz, 2017).

According to Drzewiecki, tourist space is a part of geographical space which has the required characteristics for promoting various types of recreational activities that play an important role in the social and spatial dimension (Drzewiecki, 1992). Włodarczyk (2009) also observed that tourist space is a part of geographical space where tourist activities take place. Tourist traffic is an essential criterion for classifying



a part of geographical space as tourist space. Tourist space is also identified based on the presence of tourist facilities whose size and character describe the type of tourist space. According to Włodarczyk, the condition and development of tourist space are influenced by the following factors: natural heritage, cultural heritage, infrastructure and, above all, people who visit tourist destinations and undertake various activities in tourist space (Włodarczyk, 2009).

It can be argued that tourists act as entrepreneurs because tourist activities are primarily responsible for the development and management of tourist areas. Therefore, the authorities responsible for spatial planning and decisions relating to the construction, expansion, and modernization of tourist facilities should be fully aware of the consequences of their decisions, as well as the fact that tourist facilities which are available to visitors at a fee should be of adequate standard and should feature amenities for visitors with disabilities in mobility, vision, hearing, and cognition. Buhalis and Darcy (2011) also noted that authorities at different levels of public administration and the owners of tourist facilities should provide tourists with universally designed tourist products (tourist space) that are free of architectural barriers. In their opinion, universal design solutions are essential for promoting the development of accessible tourism and the construction of technical infrastructure to ensure that people with disabilities can function independently and with dignity in public space.

It should be noted that the meaning of public space has changed over the years under the influence of political, social, economic, and technical factors. The essence of the term “public space” is derived from the Latin word *publicus* which refers to the general human population and a community with shared interests. Therefore, public space is a public good and a common good intended for the general public of users (Mantey, 2019). Consequently, the aim of the social policy implemented by local governments should be to make recreational spaces available to people with mobility and cognitive impairments, including the elderly and families with young children. It should be noted that for many people, the opportunity to rest

and relax is a part of rehabilitation or social therapy. The facilities provided in recreational areas should serve all users, and should encourage them to engage in physical activity and social interactions (Benek, 2015).

The above problems can be resolved through the implementation of universal design principles at the design stage. These principles have been laid down by Article 2 of the Convention on the Rights of Persons with Disabilities which was adopted in New York on 13 December 2006. This document states that universal design means designing products, environments, programmes, and services that are accessible to all members of the public, without the need for adaptation or special design. These principles also apply to tourist space which is a specific type of public space. It should be noted that not all public spaces designed according to the principles of universal design meet the needs of all users, but specific measures can be undertaken to broaden the scope of public space users, including in tourist spaces.

According to the principles of universal design, the following basic amenities should be designed or retrofitted during public space development:

- **pedestrian routes** – to promote the independent movement of people with physical and cognitive impairments, and to ensure the safe movement of other users;
- **pedestrian amenities** – pedestrian amenities should be carefully planned and should follow a consistent pattern to provide users with easy access to litter bins, ticket machines, entrances, and information points. Such facilities include rest areas, information points, landscaping elements, lighting, drainage, temporary and mobile elements (summer cafés, advertising and information boards, stalls);
- **overcoming differences in terrain** – physical barriers along pedestrian routes should be eliminated to make tourist space more available to users. In each public space development project, optimised design solutions should be implemented to increase the accessibility of the built environment for people with physical and cognitive impairments. Differences in slope can be overcome by installing

ramps, appropriately designed external stairs or lifts (Benek, 2015 based on Johni & Thuresson, 2005).

However, despite these guidelines, public spaces still feature numerous barriers, which indicates that the needs of people with disabilities are being marginalised. According to Szołtysek, the main barriers that prevent disabled tourists from fully enjoying their experience, include:

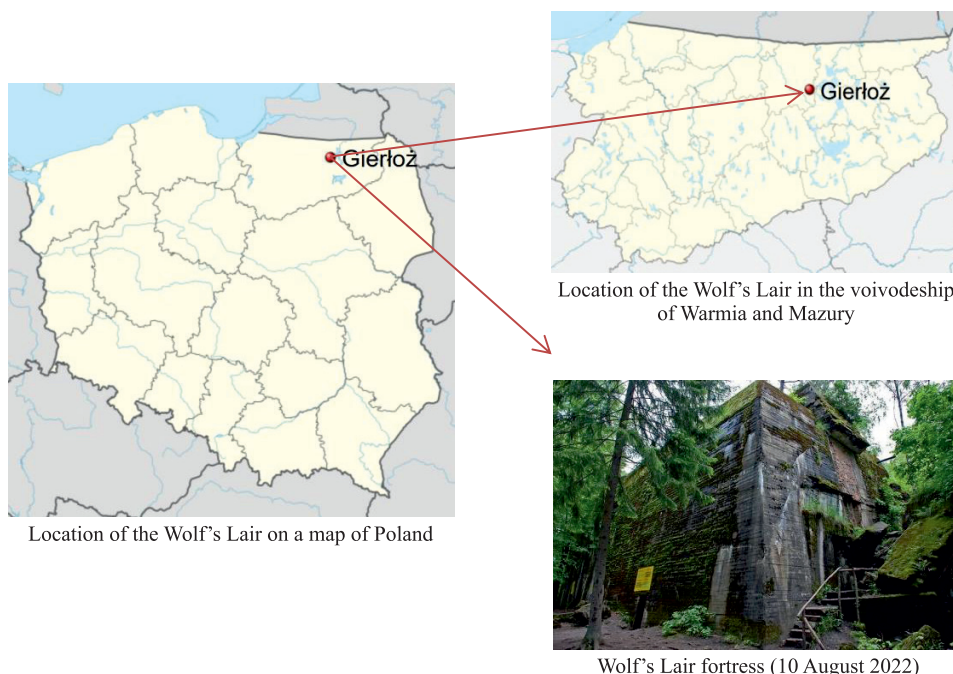
- **physical barriers** – barriers that limit mobility, in particular uneven road surfaces and pavements that restrict the use of wheelchairs or walkers;
- **architectural features** – stairs or manually opened doors which prevent disabled visitors from accessing certain locations;
- **public and private transport** – most means of public and private transport are not adapted to the needs of disabled drivers and passengers;
- **public information** – in particular traffic lights which are designed for users without visual and hearing disabilities (Szołtysek, 2013).

These observations indicate that physical barriers should be eliminated already at the stage of designing the infrastructure in public spaces.

## Verification of the proposed method on a selected test object

The Wolf's Lair is one of the most attractive tourist sites in the Polish voivodeship of Warmia and Mazury (Fig. 1).

The Wolf's Lair has been managed by Srokowo Forest District since 2017. During that time, numerous measures have been implemented to improve the site's availability to the public. New footpaths were built, various solutions were introduced to improve visitor safety, and the overgrowth obstructing the view of historic buildings was removed. A small historical exhibition was set up in one of the surviving bunkers. The site was provided with a modern entrance complex, footpaths were paved and lit, and new displays were installed. A service building and a car park were built to accommodate cars, campers, and coaches. The new service building has an area of several hundred square metres, and it houses the main hall, offices, a souvenir shop, an information point, a room for guides, a family room, a café, camper



**Fig. 1.** Location of Wolf's Lair

Source: own elaboration (photograph taken by the author on 10 August 2022).



maintenance area, as well as toilets and showers that are accessible to disabled visitors.

At present, visitors can tour the surviving parts of the concrete fortress, some of which are in a very good condition. Tourists can hire guides who speak several languages or use the audio guide service. A phone app with information about the site can be also downloaded free of charge. The app contains a detailed map of the Wolf's Lair and the main tourist facilities, including the car park, restaurant, hotel, campsite, and toilets.

Additional renovation and modernisation efforts are being implemented to increase the site's attractiveness and accessibility. Footpaths were recently resurfaced to make the site more accessible

to wheelchair users and families with young children. Information boards (multilingual), litter bins, and comfortable benches for the elderly, who are frequent visitors to the site, were installed along the paths. Footpath lighting was improved (Fig. 2).

The influence of universal design on the attractiveness of public open space in the Wolf's Lair military tourist site was assessed during a field interview on 14 February 2023. The evaluation was conducted with the use of the method presented in this study. The results of the assessment are presented in a simplified scoring sheet (Table 5).

The results of the assessment conducted with the use of the proposed method (tourism attractiveness score – class I) confirm that tourist facilities in the



**Fig. 2.** Upgraded tourist facilities in the Wolf's Lair

Source: own elaboration (photographs taken by the author on 10 August 2022).

**Table 5.** Simplified scoring sheet for assessing the impact of universal design on the attractiveness of public open space in a military tourism site

No.	Indicator	Measure	Scale	Points	Weight	Points x Weight
1.	Information boards (description of site, its location and history)	Information boards available for all attractions, in many languages	2	2	0.062	0.124
2.	Toilets	Disabled toilets available	2	2	0.062	0.124
3.	Route signposting (for guiding visitors)	Routes clearly signposted	2	2	0.059	0.118
4.	Area cleanliness	The entire site is clean	2	2	0.057	0.114
5.	Safety barriers	Safety barriers present in all hazardous locations	2	2	0.054	0.108
6.	Lighting (light poles)	The entire site is well lit	2	2	0.054	0.108
7.	Disabled parking	Adequate number of disabled parking spaces	2	2	0.054	0.108
8.	Litter bins	Litter bins are evenly distributed throughout the site	2	2	0.052	0.104
9.	Textured guide panels for the blind and visually impaired	No textured guide panels for the blind and visually impaired	0	0	0.052	0.000
10.	Tourist information point	Tourist information officers speak foreign languages	2	2	0.051	0.102
11.	Benches (separate resting places)	Benches are evenly distributed throughout the site	2	2	0.049	0.098
12.	Condition of route surfaces	Paved routes without potholes	2	2	0.049	0.098
13.	Refreshment point	More than one catering facility on the site	2	2	0.046	0.092
14.	Tall and short vegetation	Tall and short vegetation well maintained	2	2	0.046	0.092
15.	Rainwater drains	Only some sections of the footpaths have storm drains	1	1	0.044	0.044
16.	Route surface	Tourist routes are paved with hard materials (concrete, asphalt)	1	1	0.044	0.044
17.	Footpath width	Footpaths are wide enough to enable smooth traffic flow	2	2	0.043	0.086
18.	Surveillance	Only some parts of the site have surveillance cameras	1	1	0.041	0.041
19.	Range of induction loops enabling the use of audio guides	The entire tourist site is covered by an induction loop enabling the use of the audio guide	2	2	0.041	0.082
20.	Proximity to facilities	Proximity to facilities enhances the site's appeal for tourists	2	2	0.040	0.080
Class I	$1.5000 \leq x \leq 2.000$	Class III	$0.500 \leq x < 1.000$		1.000	1.767
Class II	$1.000 \leq x < 1.500$	Class IV	$0.000 \leq x < 0.500$	Tourism attractiveness score		Class I

Source: own elaboration.



Wolf's Lair meet the highest standard. A comprehensive video surveillance system should be installed in the entire site to improve the visitors' safety.

For many years, the condition of tourist facilities in Gierłoż had received considerable criticism from tourists and historians. The experts and the public argued that the Wolf's Lair is an important part of Polish and European historical heritage; therefore, the infrastructure should be brought up to modern standards, and the site should be presented in a wider historical context of World War II. At present, the Wolf's Lair is open to tourists, and it is a part of the "Great Forest Trail" which has been designed as a comprehensive sightseeing route of Polish forests.

## CONCLUSIONS

The tourist potential of the Wolf's Lair, Hitler's wartime headquarters, was evaluated with the use of the proposed method for assessing the impact of universal design on the attractiveness of public open spaces in military tourist sites.

The assessments and analyses carried out in the study revealed that the Wolf's Lair has considerable appeal for tourists, especially those interested in military history, and that the site is accessible to people with disabilities.

The developed indicators and metrics can be applied to assess the attractiveness of any military tourist site, and the results of the assessment can be used in the process of planning and implementing renovation, modernisation, and revitalisation works. The results of the assessment can be used to identify spatial development features that promote tourism, as well as features that are lacking or in poor condition. The presented findings constitute valuable information for the owners and managers of tourist facilities, and they support informed decision-making in the process of managing tourist facilities. The proposed method can also be applied in evaluations of open-air museums.

It should be emphasised that the proposed method for assessing the impact of universal design on the attractiveness of public open spaces is a universal

approach that can be applied to various types of military tourism sites. The method can be used before the site is developed and opened to the public, as well as during operation to improve its safety or attractiveness for the visitors. The developed method can be deployed in practice to identify a site's strengths as well as areas that need improvement.

## REFERENCES

- Babicz-Zielińska, E., Rybowska, A., & Obniska, W. (2008). *Sensoryczna ocena jakości żywności* [Sensory evaluation of food quality]. Gdynia: Wydawnictwo Akademii Morskiej.
- Bartkowski, T. (1977). *Wypisy do geografii turystycznej* [Excerpts for tourist geography]. Poznań: Wydawnictwo AWF.
- Baryłko-Pikielna, N. (1975). *Zarys analizy sensorycznej żywności* [An outline of sensory analysis of food]. Warszawa: Wydawnictwa Naukowo-Techniczne.
- Benek, I. (2015). *Model przestrzeni publicznej dla osób starszych* [A public space model for older people]. In II Forum Przestrzenie Miejskie: Ogólnopolska konferencja naukowa pt. „Infrastruktura mieszkaniowa, kulturalna i rekreacyjno-sportowa w polskich miastach” 16 września 2015, Warszawskie Centrum EXPO XXI. Zbiór referatów.
- Bierwaczek, K. (2016). *Spoleczne znaczenie miejskich przestrzeni publicznych* [The social significance of urban public spaces]. Katowice: Wyd. Uniwersytetu Śląskiego.
- Biran, A., & Hyde, K.F. (2013). New Perspectives on Dark Tourism. *International Journal of Culture, Tourism and Hospitality Research*, 7(3), 191–198. <https://doi.org/10.1108/IJCTHR-05-2013-0032>
- Buhalis, D., & Darcy, S. (Eds.) (2011). *Accessible tourism. Concepts and Issues. Aspects of tourism*. Bristol: Channel View Publications.
- Chhabra, D., Healy, R., & Sills, E. (2003). Staged Authenticity and Heritage Tourism. *Annals of Tourism Research*, 30(3), 702–719. [https://doi.org/10.1016/S0160-7383\(03\)00044-6](https://doi.org/10.1016/S0160-7383(03)00044-6)
- Chmielewski, J.M. (2016). *Teoria i praktyka planowania przestrzennego. Urbanistyka Europy* [Theory and practice of spatial planning. Urban Planning in Europe]. Warszawa: Wyd. OWPW.
- Chylińska, D. (2006). Nowożytnie fortyfikacje stałe – wybrane problemy [Modern permanent fortifications –



- selected problems of tourist development]. *Turystyka i Rekreacja*, 2, 52–63.
- Cynarski, W. (2012). Castles as the heritage of Polish fortification art and as a tourist attraction. *Ido Movement for Culture. Journal of Martial Arts Anthropology*, 12(4), 44–55.
- Drzewiecki, M. (1992). *Wiejska przestrzeń rekreacyjna [Rural recreational space]*. Warszawa: Instytut Turystyki.
- Dymnicka, M. (2009). Przestrzeń dla obywateli. o uniwersalności helleńskiego modelu przestrzeni publicznej. In G. Gorzelak, M.S. Szczepański, & W. Ślęzak-Tazbir (Eds.). *Człowiek – miasto – region. Związki i interakcje. Księga jubileuszowa profesora Bohdana Jałowickiego* (pp. 17–28). Warszawa: Wydawnictwo Naukowe Scholar.
- Gawęł, D., & Szafranek, A. (2018). Public urban places as a space stimulating human needs. *Budownictwo i Architektura*, 17(3), 067–080. [https://doi.org/10.24358/Bud-Arch\\_18\\_173\\_05](https://doi.org/10.24358/Bud-Arch_18_173_05)
- Gaworecki, W. (1998). *Turystyka [Tourism]*. Warszawa: Polskie Wydawnictwo Ekonomiczne.
- Huh, J. (2002). *Tourist Satisfaction with Cultural/Heritage Sites: The Virginia Historic Triangle* (Master's Thesis). Blacksburg: Virginia Polytechnic Institute and State University
- Jałowicki, B., & Szczepański, M. (2006). *Miasto i przestrzeń w perspektywie socjologicznej [City and space in sociological perspective]*. Warszawa: Wydawnictwo Naukowe Scholar.
- Jędryka, T., & Kozłowski, T. (1986). *Materiały do ćwiczeń z analizy sensorycznej [Materials for sensory analysis exercises]*. Kraków: Akademia Ekonomiczna w Krakowie.
- Jędrusiak, T., & Mikos von Rohrscheidt, A. (2011). *Militarna turystyka kulturowa [Military cultural tourism]*. Warszawa: Polskie Wydawnictwo Ekonomiczne.
- Johni, P., & Thuresson, C. (2005). *Sztokholm – miasto dla wszystkich*. Warszawa: Stowarzyszenie Przyjaciół Integracji.
- Kochanowska, D. (2009). Przestrzeń publiczna: dwa pytania [Public space: two questions]. In A. Gołędzińska (Ed.). *Współczesne kształtowanie przestrzeni publicznej województwa pomorskiego*. Gdańsk: UM Województwa Pomorskiego.
- Konwencja o prawach osób niepełnosprawnych, sporządzona w Nowym Jorku dnia 13 grudnia 2006 r. [Convention on the Rights of Persons with Disabilities of December 13, 2006]. *Journal of Laws of 2012*, item 1169.
- Kowalczyk, A. (2009). *Turystyka historyczno-militarna. Współczesne formy turystyki kulturowej*, t. 1. [Historical-military tourism. Contemporary forms of cultural tourism, Vol. 1]. Poznań: Wydawnictwo AWF im. E. Piaseckiego w Poznaniu.
- Kowalczyk, A. (2018). Treść i forma map wykorzystywanych w turystyce historyczno-militarnej [Content and form of maps used in historical-military tourism]. *Turystyka Kulturowa*, 1, 95–143.
- Kurek, W. (2007). *Turystyka [Tourism]*. Warszawa: Wydawnictwo Naukowe PWN.
- Kwilecki, K. (2011). *Rozważania o czasie wolnym. Wybrane zagadnienia [Reflections on leisure time. Selected issues]*. Katowice: Wyd. WSH.
- Lijewski, T., Mikułowski, B., & Wyrzykowski, J. (2002). *Geografia turystyki Polski [Geography of Polish tourism]*. Warszawa: Polskie Wydawnictwo Ekonomiczne.
- Gehl, J., (2009). *Życie między budynkami. Użytkowanie przestrzeni publicznych [Life between buildings. The use of public spaces]*. Kraków: Wydawnictwo RAM.
- Logan, W., & Reeves, K. (2009). *Places of Pain and Shame. Dealing With Difficult Heritage*. Oxon: Routledge.
- Lorens, P., & Martyniuk-Pęczek, J. (2010). *Problemy kształtowania przestrzeni publicznych [Problems of designing public spaces]*. Gdańsk: Wyd. Urbanista.
- Maćkowska, J., & Podciborski, T. (2013). Metoda oceny stanu ładu przestrzennego ścieżek pieszo-rowerowych [Method for assessing the spatial condition of footpaths and cycle paths]. *Acta Scientiarum Polonorum. Administratio Locorum*, 12(3), 35–47.
- Mantey, D. (2019). *Wzorec miejskiej przestrzeni publicznej w konfrontacji z podmiejską rzeczywistością [Pattern of urban public space in confrontation with suburban reality]*. Warszawa: Wydawnictwa Uniwersytetu Warszawskiego.
- Pearn, M., & Heritage, S. (2011). *Attitudinal and Experimental Differences of Disabled and Able-Bodied Visitors*. In D. Buhalis, & S. Darcy (Eds.). *Accessible tourism. Concepts and Issues. Aspects of tourism*. Bristol: Channel View Publications Channel View Publications.
- Poczta, J. (2008). *Turystyka militarna jako przejaw nowej formy aktywności turystycznej w Polsce [Military tourism as a manifestation of a new form of tourist activity in Poland]*. Retrieved from: [https://www.researchgate.net/publication/306252802\\_Turystyka\\_militarna\\_jako\\_przejaw\\_nowej\\_formy\\_aktywnosci\\_turystycznej\\_w\\_Polsce/citation/download](https://www.researchgate.net/publication/306252802_Turystyka_militarna_jako_przejaw_nowej_formy_aktywnosci_turystycznej_w_Polsce/citation/download) (19.09.2022).

- Podciborski, T., & Zienkiewicz, A. (2017). *Metoda oceny atrakcyjności turystycznej muzeów na wolnym powietrzu – skansenów* [A method for assessing the tourist attractiveness of outdoor museums – open-air museums]. Olsztyn: Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie.
- Przeclawski, K. (1973). *Turystyka i wychowanie* [Tourism and education]. Warszawa: Nasza Księgarnia.
- Ptaszycka-Jackowska, D. (2007). Gospodarowanie w przestrzeni turystycznej. In W. Kurka, & M. Miki (Eds.). *Studia nad turystyką. Tradycje, stan obecny i perspektywy badawcze*, vol. 1, Kraków: IGiGP UJ.
- Raine, R. (2013). A Dark Tourist Spectrum. *International Journal of Culture, Tourism and Hospitality Research*, 7(3), 242–256. <https://doi.org/10.1108/IJCTHR-05-2012-0037>
- Rogowska, M. (2016). *Przestrzeń publiczna w mieście – zagadnienia wybrane* [Public space in the city – selected issues]. Wrocław: Studia Komitetu Przestrzennego Zagospodarowania Kraju PAN.
- Różycki, P. (2009). *Zarys wiedzy o turystyce* [An outline of knowledge on tourism]. Kraków: Wydawnictwo PROKSENIA.
- Sobol, A. (2013). Design w przestrzeni publicznej w kontekście zrównoważonego rozwoju [Design in public spaces in the context of sustainable development]. *Studia Ekonomiczne/Uniwersytet Ekonomiczny w Katowicach*, 136, 267–277.
- Stach, E. (2013). Aktualne wykorzystanie obiektów i miejsc militarnych w Polsce w aspekcie militarnej turystyki kulturowej [Current use of military sites and places in Poland in terms of military cultural tourism]. In L. Narębski (Ed.). *Fortyfikacje nowożytne w Polsce: badania, realizacje, projekty i zagospodarowanie do współczesnych funkcji*. Toruń: UM Województwa Kujawsko-Pomorskiego.
- Szatan, M. (2012). Zanikanie przestrzeni publicznej we współczesnych miastach [Disappearance of public space in modern cities]. *Palimpsest. Czasopismo Socjologiczne*, 2, 91–103.
- Szołtysek, J. (2013). Miasto dostosowane do potrzeb osób niepełnosprawnych: przykład działań Częstochowy i Gliwic [A city adapted to the needs of people with disabilities: the case of Częstochowa and Gliwice]. *Studia Ekonomiczne/Uniwersytet Ekonomiczny w Katowicach*, 175, *Demograficzne uwarunkowania logistyki społecznej*, 159–178.
- Toczek-Werner, S. (1998). *Podstawy rekreacji i turystyki* [Fundamentals of recreation and tourism]. Wrocław: Wydawnictwo Akademii Wychowania Fizycznego we Wrocławiu.
- Venter, D. (2017). Examining military heritage tourism as a niche tourism market in the South African context, *African Journal of Hospitality, Tourism and Leisure*, 6(1), 1–19.
- Wejchert, K. (1993). *Przestrzeń wokół nas* [The space around us]. Katowice: Wyd. Fibak Noma Press.
- Wilczy Szaniec (2017). Retrieved from: <https://www.money.pl/gospodarka/wiadomosci/artukul/wilczy-szaniec-komornik-skarb-panstwa-lasy,147,0,2293395.html> (17.02.2023).
- Włodarczyk, B. (2009). *Przestrzeń turystyczna, istota, koncepcja, determinanty rozwoju* [Tourism space, essence, concept, determinants of development]. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.
- Wysocki, M. (2009). *Dostępna przestrzeń publiczna. Samorząd równych szans* [Accessible public space. Equal opportunities local government]. Kraków: Wyd. Fundacja Instytut Rozwoju Regionalnego.
- Zgłobicki, W., Smyk, J., & Kabała, A. (2016). Ocena oferty wybranych obiektów militarnych na obszarze Polski dla potrzeb turystyki dzieci i młodzieży [Assessment of the selected military sites in Poland offered for the needs of children and youth tourism]. *Turystyka Kulturowa*, 2, 116–134.
- Zienkiewicz, A., Podciborski, T. (2019). The assessment of attractiveness and accessibility of history facilities utilized for the needs of tourism. *Acta Scientiarum Polonorum. Administratio Locorum*, 18(3), 335–343. <https://doi.org/10.31648/aspal.4186>

## PROPOSAL OF A POINT VALUATION METHOD FOR THE ASSESSMENT OF THE SIGHT-AESTHETIC VALUE OF THE UNDERWATER LANDSCAPES OF LAKES IN THE CONTEXT OF EXPLORATION TOURISM

Adam Senetra<sup>1</sup>✉, Anna Żróbek-Sokolnik<sup>2</sup>✉, Monika Wasilewicz-Pszczółkowska<sup>3</sup>✉, Piotr Dynowski<sup>4</sup>✉, Marta Czaplicka<sup>5</sup>✉

<sup>1</sup> ORCID: 0000-0001-5379-9600

<sup>2</sup> ORCID: 0000-0001-5472-6980

<sup>3</sup> ORCID: 0000-0003-3802-561X

<sup>4</sup> ORCID: 0000-0003-1872-5440

<sup>5</sup> ORCID: 0000-0001-8952-0675

<sup>1,2,3,4,5</sup> University of Warmia and Mazury in Olsztyn

Romana Prawocheńskiego Street 15, 10-720 Olsztyn, Poland

### ABSTRACT

**Motives:** Most research on underwater landscapes is conducted in seas and oceans. Sight-aesthetic assessments of the underwater world are very rarely conducted; the literature on the subject is scarce and does not cover inland bodies of water.

**Aim:** The aim of this study was to develop a point valuation method for assessing the sight-aesthetic value of inland bodies of water. Attractiveness maps can be generated to create and plan tourist development and to identify attractive exploration sites for divers. The proposed method can also be applied to channel underwater traffic to protect valuable areas as well as areas that are characterised by low scenic beauty, but significant ecological functions.

**Results:** A method for assessing underwater landscapes in inland water bodies was developed and an attractiveness map was generated. Measurements were performed at points randomly distributed in the measurement grid. The results of direct observations made by experienced divers were used in the analysis. The study demonstrated that a point valuation method and attractiveness maps of underwater landscapes of lakes can be developed.

**Keywords:** perception, lake, point valuation method, questionnaire surveys, Wigry National Park

### INTRODUCTION

Landscape assessment is one of the basic procedures in analyses of trends, dynamics, and potential transformation processes caused by the

forces of nature and human activity. Landscape assessments should be quantified in various contexts to ensure that the conducted analyses generate reliable results. An assessment of the sight-aesthetic value of a landscape is one of the most important trends

✉ adam.senetra@uwm.edu.pl, ✉ a.zrobeksokolnik@uwm.edu.pl, ✉ monika.wasilewicz@uwm.edu.pl,  
✉ piotr.dynowski@uwm.edu.pl, ✉ marta.czaplicka@uwm.edu.pl

in interdisciplinary research in geography, geology, sociology, and other fields (Söhngen, 1975). In most planning and development activities, the sight-aesthetic value of a landscape largely determines the purpose of a designated area and its future development. The present study on the aesthetics of the underwater landscapes of lakes is a pioneering attempt to define and develop an assessment methodology. The literature on the classification of underwater scenic attractiveness is scarce, and most research has been conducted on seascapes (Musard, 2014; Falconer et al., 2013; Pungetti, 2012).

The aim of the study was to develop an innovative method for assessing the sight-aesthetic value of the underwater landscapes of lakes, defined as freshwater inland water bodies of natural or anthropogenic origin that differ in surface area and depth, including high-mountain ponds. The generated results can be used to assess lakes that are attractive tourist sites, to promote the development of specialised tourism (scuba diving), and to channel tourist traffic with the aim of protecting the most valuable and sensitive elements of aquatic ecosystems. The maps developed with the proposed method can facilitate decision-making in this type of tourism activity, similarly to other types of planning processes, such as urban planning (Ramachandra et al., 2012). Large-scale questionnaire surveys of divers with different levels of experience and training were conducted to achieve the research objective.

## LITERATURE REVIEW

The underwater landscape of lakes needs to be defined to achieve the research objective. The concept of landscape aesthetics should be used due to similarities in the components of terrestrial and underwater landscapes. In this context, a landscape is defined as the visual representation of the current state of the geographical environment. The processes occurring in this environment create a set of characteristics specific to the type, condition, and kind of the landscape (Bajerowski et al., 2007). This approach is used in various fields of research, including sociological and economic research (for

example, to analyse the impact of landscape values on property values). Landscapes are also perceived as spatially heterogeneous areas with a mosaic of patches that differ in size, shape, content (substance), and history. The need for hierarchical perception arises (including in terms of sight-aesthetics) when spatial differentiation is evident (Wu, 2013).

Similarly to terrestrial landscapes, underwater landscapes are perceived through different senses. As a result, various landscape components and their relationships can be identified and organised. The perceived information can be synthesised to model the structure and functioning of the perceived space. The physiognomy of a landscape is a concept that has evolved in research. This concept emerged in research on urban landscapes, and it was subsequently used to examine the physiognomy of non-urbanised landscapes. In the present study, this conceptual framework was applied to analyse perceptions of underwater landscapes in lakes (Chmielewski et al., 2019).

Most research on underwater landscapes has been done on seascapes. The attractiveness of marine landscapes is determined mainly by physical features, such as landform, shape, openness, and landscape patterns, as well as perceptual attributes, including a sense of remoteness, naturalness, and the way these landscapes are experienced (Falconer et al., 2013). The underwater landscape is increasingly present in the literature and everyday life through photography, film, and the 3D mapping technology (Musard, 2014). Research into the spatial variation of coastal landscapes of Shkoto Island in the Sea of Japan led to the classification of underwater landscapes. Marine lifeforms were identified at class, subclass, type, subtype, genus and species level, and a landscape map was developed. The authors focused mainly on the geological structure and physical formation of the seabed. The influence of plant communities was also described (Ganzei et al., 2020). Although the list of elements is not exhaustive, this approach provides a valuable starting point for further research.

A number of research studies have been conducted in large lakes such as Baikal, Hovsgol, or Teletskoye. Large lakes are characterised by a highly varied



geological structure, considerable depth, and heterogeneous distribution of fauna and flora. In a pioneering study of Lake Baikal, a schematic landscape regionalisation of benthic and natural water mass assemblages was proposed (Karabanov et al., 1990). In a study of the littoral zones of Lake Baikal, the stages of the lake's development were identified, and its unique biodiversity was described (Potemkina & Saturin, 2008). However, the literature on the sight-aesthetic assessment of large water bodies is scarce. The visual appeal of large water bodies requires further research, in particular in view of the growing popularity of special interest tourism, such as scuba diving.

Valuation methods are often used to assess and classify the sight-aesthetic value of landscapes and to propose methods for assessing perceived landscape values and monitor transformation processes (Wagtendonk & Vermaat, 2014; Sang & Tveit, 2013). This approach focuses on the main components of visual analyses that determine landscape attributes such as form, colour, texture, and lines. A clear and structured form facilitates the perception of the environment (Bell, 2012). From an observer's point of view, three approaches can be adopted to measure the attractiveness of a landscape: (1) direct field inventory, (2) cartographic inventory, and (3) photographic inventory (Qiu et al., 2013; Barroso et al., 2012; Beza, 2010). In the light of the aesthetics theory, the most objective assessment is based on direct landscape observations. However, this approach is laborious because it involves measurements of many small sites. It is generally accepted that valuation methods are characterised by a high degree of subjectivity; however, no method of assessing the geographical environment offers complete objectivity. These observations suggest that the point valuation method is the only rational approach to assessing complex structures (Bartkowski, 1986), especially if the valuation principles have been well defined. Such a study was conducted among divers working in tropical tourist areas. The indicators for the aesthetic assessment of underwater landscapes, including the cleanliness and visibility of underwater landscapes, general health of dive sites, species diversity, and potential ecological damage, were identified (Lucrezi et al., 2019).

## MATERIALS AND METHODS

A point valuation method for the sight-aesthetic assessment of the underwater landscapes of lakes was developed in several stages. First, several groups of factors that affect perceptions of underwater landscapes were identified. Within these groups, detailed components were distinguished (Table 1).

The next stage of the study involved a questionnaire survey of 400 divers who were members of diving clubs across Poland. Scuba divers with varying levels of experience in tourist exploration were asked to describe the impact and hierarchy of the identified groups of factors on the sight-aesthetic value of underwater landscapes. This step was necessary to identify features that determine the sight-aesthetic value of underwater landscapes of lakes. The questionnaire relied on the direct comparison method which is widely used in psychology, pedagogy, spatial management, and landscape research. In this approach, the identified objects or components are compared in pairs. The percentage or point contribution of the identified components to the group is determined based on the results of the comparison. A detailed description of this method can be found in many studies involving questionnaire surveys (Brzeziński, 2010; Ferguson & Takane, 1989; Kendall, 1970; Senetra, 2016).

In the next stage, a point valuation table was developed based on the results of the questionnaires. Five groups of factors were ranked, and their contribution to the sight-aesthetic perception of underwater lake landscapes was determined. These groups were ranked according to the percentage of responses. The impact of the components in each group on the sight-aesthetic value of the assessed landscapes was calculated. The resulting rating scale was divided into five categories reflecting the sight-aesthetic value of underwater landscapes. The developed point valuation table was used to assess Lake Muliczne in Wigry National Park in north-eastern Poland.

The surveyed lake was divided into a regular grid of square-shaped basic fields which constituted the survey sites. Due to limited underwater visibility,



**Table 1.** Groups of factors influencing the sight-aesthetic value of the underwater landscapes of lakes

Group	Group of factors	Components
1	Animals	fish crayfish snails (mussels) insects none
2	Submerged anthropogenic objects	wooden boat metal boat plastic boat car platform deck information board fixed rope anchor line obstacle made of wood obstacle made of plastic fishing equipment obstacle made of tyres none
3	Natural obstacles	trees plants boulders none
4	Plants	compact meadows of <i>Charophyte</i> algae, 0.5 m in height plant assemblages underwater meadows, 1.5–2.0 m in height underwater plants reaching the surface single plants rushes filamentous algae none
5	Shape and appearance of the lake bed	submerged cliffs/walls slope hilly flat boulders rocky sandy muddy

Source: own elaboration.

grid squares had a side length of 50 m. Each of these primary fields was assessed during field sessions by experienced divers. The measurements were carried out during a two-day measurement session in July

2022, based on the developed point valuation table. During direct observations, divers searched for individual components in the designated primary fields and rated them directly. Each grid square received a final score based on the sum of scores assigned to all ranked components (according to the point valuation table). The final scores were used to develop a landscape attractiveness map of the entire lake.

## RESULTS

### Questionnaire survey

A comparison of all five groups of factors revealed that the lake's visual attractiveness was determined mainly by the components in the Animals group, followed by Submerged anthropogenic objects. The shape and appearance of the lake bed were regarded as least important from the aesthetic point of view (Table 2). The point valuation table was developed based on the detailed results in each group. Weights were calculated for each group of factors based on the percentage distribution of diver responses.

**Table 2.** Questionnaire results for groups of factors

Group	Percentage of points scored	Weights = (39 x %)/100	Final score in each group of factors
Animals	30	11.70	0–12
Submerged anthropogenic objects	22	8.58	0–9
Natural obstacles	19	7.41	0–7
Plants	19	7.41	0–7
Shape and appearance of the lake bed	10	3.90	0–4

Source: own elaboration.

### Development of the point valuation method

The point valuation table describing the influence of individual components on the aesthetic appeal of the underwater landscape of lakes was developed on the assumption that the maximum score was equal to the number of all observable components

(or the lack thereof, which also influences sight-aesthetic perception). A total of 39 components were assessed in the survey, and the rating scale ranged from zero to 39 points. The maximum total score was distributed according to the percentages obtained (rounded up to 1%) in each group. It was also assumed that the group with the smallest number of components (Natural obstacles – group 3) would be the determinant. Theoretically, all three components in this group (trees, plants, and boulders) could be sighted underwater. In other groups, more than three components are unlikely or impossible to be sighted.

In group 1 (Animals), four components (fish, crayfish, snails, insects) can be observed simultaneously, although such sightings are rare because visibility tends to be low in lakes. Therefore, it was assumed that three group 1 components would denote maximum diversity during a single observation. The fifth component in group 1 was the absence of animals, which automatically excludes any diversity. In group 2 there were 14 components to choose from, including the absence of anthropogenic objects. Therefore, all 13 components could not be observed simultaneously. However, three components could be sighted during the same observation if visibility was good. The same maximum number of sightings was adopted in group 3 (least numerous). Group 4 (Plants) contained eight components, and they could be missing at the observation site. It was assumed that more than three group 4 components could not be observed simultaneously. Furthermore, only three components could be sighted simultaneously in specific plant assemblages. Group 5

(shape of the lake bed) contained eight components – bed types, and they were regarded as least influential. More than one bed type can be observed only along the boundary of two or three different lake bed types. These are special cases, but they are theoretically possible.

In the next stage, the point valuation table was developed based on the number of points scored by each group of factors.

### Group 1 – Animals

The maximum score in group 1 was 12 points. The maximum score was distributed equally based on the percentage of indications for each component. The results were rounded up to the nearest integer. Aquatic insects received the lowest rating as a component that exerted the most negative impact on visual perceptions, and the corresponding score was reduced to 0 points. At the same time, fish received an additional point as the highest rated component (Table 3).

### Group 2 – Submerged anthropogenic objects

In group 2, the answers were distributed more evenly due to the high number of components (14), their similarity, and their functions during underwater observation. Divers looked for objects that were unusual in the natural environment. Foreign objects incorporated in the aquatic environment can form interesting structures, but they can be identified only if these objects have been submerged for a long time.

**Table 3.** Point valuation in group 1 – Animals

Component	Percentage of points scored	Percentage of indications after rounding	Weight x %	Score	Final score*
Fish	36.21	36	12 x 0.36	4.32	5
Crayfish	30.72	31	12 x 0.31	3.72	4
Snails (mussels)	19.18	19	12 x 0.19	2.28	2
None	7.64	8	12 x 0.08	0.96	1
Insects	6.26	6	12 x 0.06	0.72	0

\* The total score cannot exceed 12 points.

Source: own elaboration.

Most of these structures are not environmentally friendly, but from the point of view of scenic attractiveness, they could be an interesting feature of the diving programme. Based on the adopted assumptions, the total score of all group 2 components could not exceed nine points, and up to three components could be sighted simultaneously. The final scores are presented in Table 4. To obtain the maximum score, group 2 components had to be arranged in a somewhat different way than group 1 components. Group 2 was large, and percentages were not used. Three subgroups were created based on questionnaire

results and significant differences between subgroups. Each component received three points in the first subgroup, two points in the second subgroup, and one point in the third subgroup. The last item (absence of anthropogenic objects) received 0 points.

### Group 3 – Natural obstacles

The scoring procedure in group 3 was similar to that applied in group 1. The maximum score was seven points, and all of the listed obstacles could be observed simultaneously. The final scores are shown in Table 5.

**Table 4.** Point valuation in group 2 – Submerged anthropogenic objects

Component	Percentage of points scored	Percentage of indications after rounding	Subgroups	Final score*
Wooden boat	11.47	11	subgroup 1	3
Metal boat	9.55	10		3
Obstacle made of wood	9.24	9		3
Platform	9.00	9		3
Car	8.85	9		3
Fixed rope	8.08	8	subgroup 2	2
Deck	7.96	8		2
Plastic boat	7.49	7		2
Anchor line	7.20	7		2
Information board	7.20	7		2
Obstacle made of plastic	4.60	5	subgroup 3	1
Fishing equipment	3.35	3		1
Obstacle made of tyres	3.18	3		1
None	2.84	3	subgroup 4	0

\* The total score cannot exceed 9 points.

Source: own elaboration.

**Table 5.** Point valuation in group 3 – Natural obstacles

Component	Percentage of points scored	Percentage of indications after rounding	Weight x %	Score	Final score
Trees	39.83	40	7 x 0.40	2.80	3
Plants	34.19	34	7 x 0.34	2.38	2
Boulders	25.98	26	7 x 0.26	1.82	2
None	0	0	0	0	0

Source: own elaboration.

## Group 4 – Plants

Similarly to group 2, group 4 contained many components, and was divided into subgroups. The maximum score was seven points. Four subgroups were created to account for significant differences in diver responses (Table 6). The fourth subgroup contained components which, according to most respondents, significantly detracted from positive aesthetic experience. The division was based on clear percentage breaks between landscape components. It should also be noted that the absence of vegetation can be a significant asset when observing the underwater world. Divers can focus on other landscape components that may not be visible in the presence of dense vegetation cover.

## Group 5 – Shape and appearance of the lake bed

The maximum score in group 5 was four points. Group 5 components were also divided into four subgroups. Similarly to groups 2 and 4, subgroups were created based on significant differences in diver responses (Table 7).

The final aggregate score in the assessment of the sight-aesthetic value of the underwater landscapes of lakes is presented in Table 8. The final score was used to assess each grid square in the lake. In addition, the point valuation scale was divided proportionally into five attractiveness categories to differentiate the results and present their spatial distribution on a map.

**Table 6.** Point valuation in group 4 – Plants

Component	Percentage of points scored	Percentage of indications after rounding	Subgroups	Final score*
Compact meadows of <i>Charophyte</i> algae, 0.5 m in height	23.36	24	subgroup 1	4
None	16.09	16	subgroup 2	3
Single plants	15.07	15		3
Rushes	14.98	15		3
Plant assemblages	11.97	12		3
Underwater meadows, 1.5–2.0 m in height	7.88	8	subgroup 3	1
Plants reaching the surface	5.44	5	subgroup 4	0
Filamentous algae	5.22	5		0

\* The total score cannot exceed 7 points.

Source: own elaboration.

**Table 7.** Point valuation in Group 5 – Shape and appearance of the lake bed

Component	Percentage of points scored	Percentage of indications after rounding	Subgroups	Final score*
Submerged cliffs/walls	19.01	19	subgroup 1	4
Boulders	17.07	17		4
Slope	14.96	15	subgroup 2	2
Hilly	14.76	15		2
Rocky	14.01	14		2
Sandy	10.00	10	subgroup 3	1
Flat	8.97	9		1
Muddy	1.21	1	subgroup 4	0

\* The total score cannot exceed 4 points.

Source: own elaboration.

**Table 8.** Point valuation and categorisation of the sight-aesthetic value of the underwater landscapes of lakes

Groups of factors	Component	Score	Notes	Point scale in groups
1	2	3	4	5
Animals	fish	5	the total score cannot exceed 12 points	0–12 points
	crayfish	4		
	snails (mussels)	2		
	none	1		
	insects	0		
Submerged anthropogenic objects	wooden boat	3	the total score cannot exceed 9 points	0–9 points
	metal boat	3		
	obstacle made of wood	3		
	platform	3		
	car	3		
	fixed rope	2		
	deck	2		
	plastic boat	2		
	anchor line	2		
	information board	2		
	obstacle made of plastic	1		
	fishing equipment	1		
	obstacle made of tyres	1		
	none	0		
	Natural obstacles	trees		
plants		2		
boulders		2		
none		0		
Plants	compact meadows of <i>Charophyte</i> algae, 0.5 m in height	4	the total score cannot exceed 7 points	0–7 points
	none	3		
	single plants	3		
	rushes	3		
	plant assemblages	3		
	underwater meadows, 1.5-2.0 m in height	1		
	plants reaching the surface	0		
	filamentous algae	0		
Shape and appearance of the bottom	submerged cliffs/walls	4	the total score cannot exceed 4 points	0–4 points
	boulders	4		
	slope	2		
	hilly	2		
	rocky	2		
	sandy	1		
	flat	1		
	muddy	0		
Point scale in the proposed method – 0–39				



cont. Table 8

1	2	3	4	5
Categories of the sight-aesthetic value of the underwater landscapes of lakes:				
category I (highly attractive landscapes) – 32–39 points				
category II (attractive landscapes) – 24–31 points				
category III (neutral landscapes) – 16–23 points				
category IV (unattractive landscapes) – 8–15 points				
category V (highly unattractive landscapes) – 0–7 points				

Source: own elaboration.

## Implementation of the proposed method in the test site

In the study, the developed point valuation method for the sight-aesthetic assessment of the underwater landscapes of lakes was applied during the underwater inventory. The inventory was conducted by four experienced divers operating high-class underwater survey equipment. The assessment was performed in

a grid of squares in Lake Muliczne in Wigry National Park in north-eastern Poland. The lake has an area of 25.7 ha, maximum depth of 11.3 m, and average depth of 4.7 m. Lake Muliczne has the highest conservation status because it is situated in a national park, features diverse habitats and microhabitats, and has high scenic value (Choiński, 2006). The lake and the grid of primary fields where direct measurements were performed are presented in Figure 1.

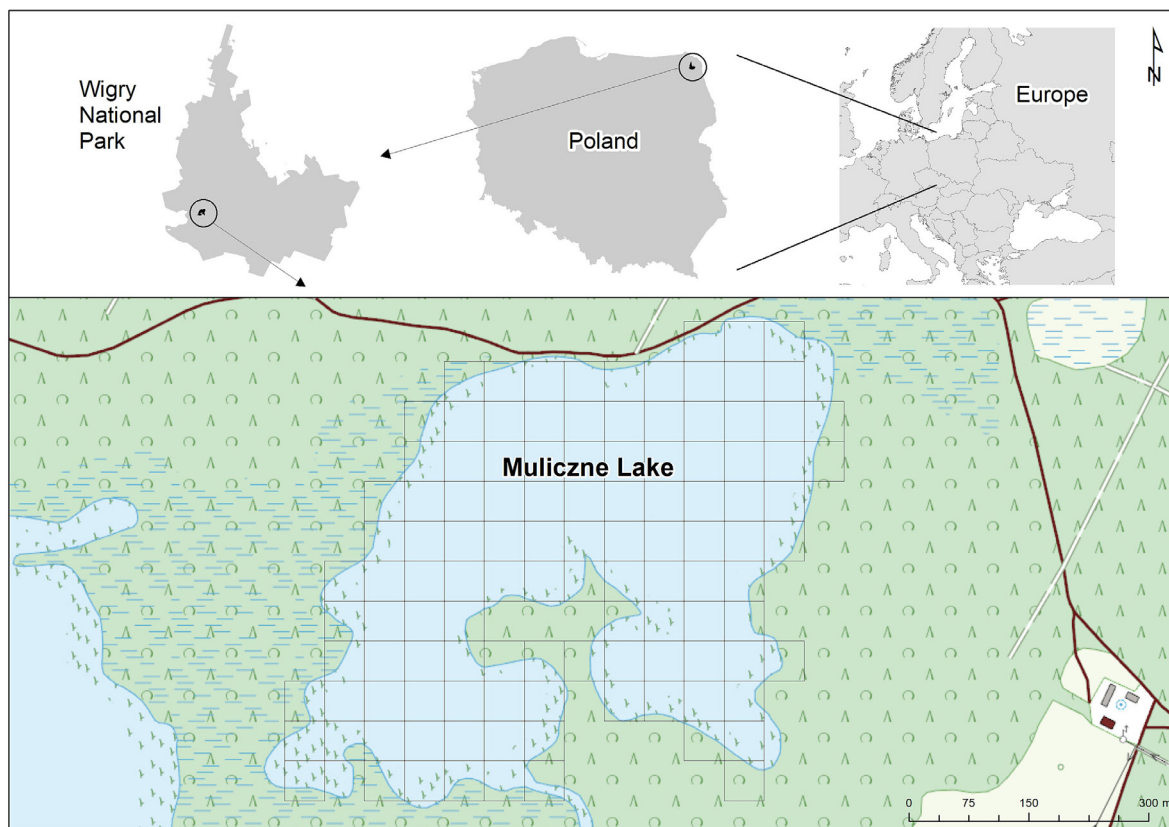


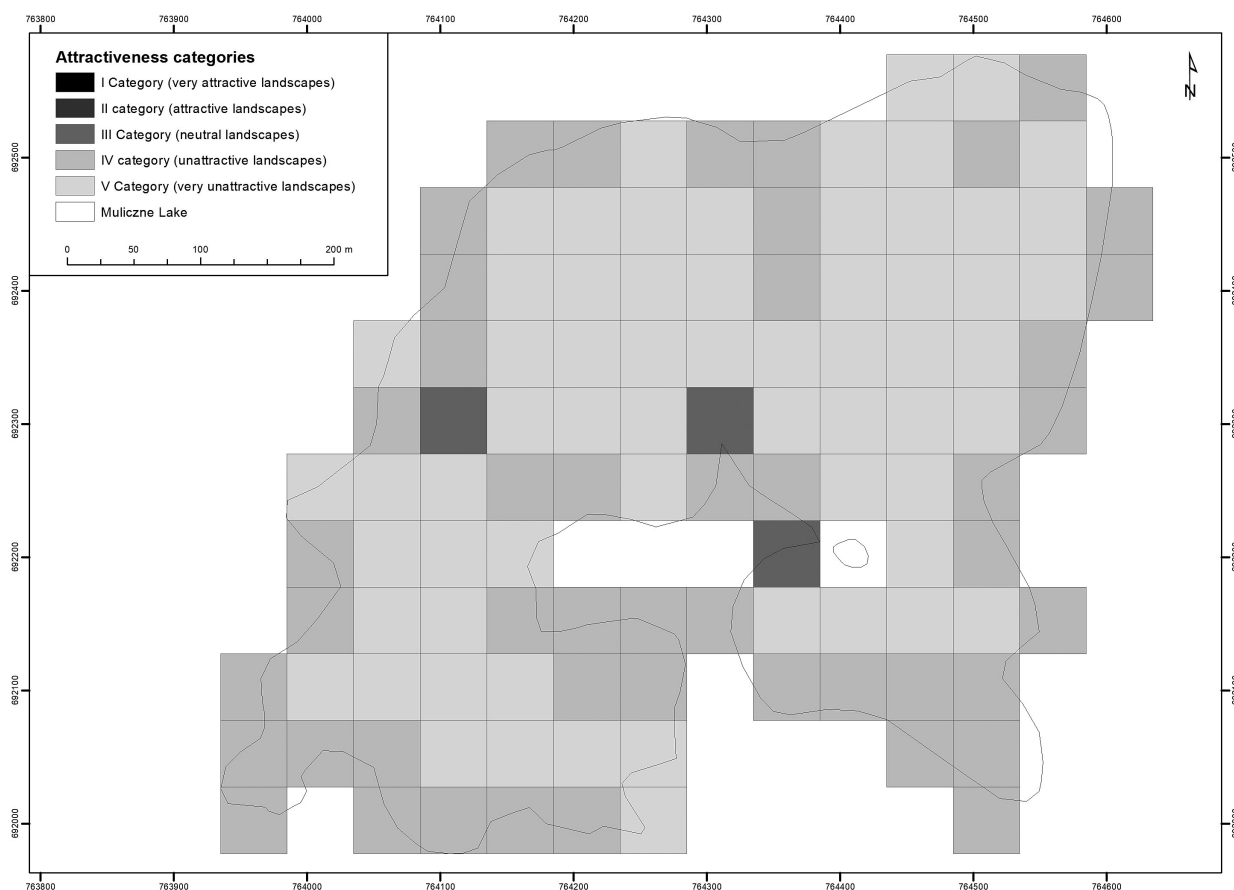
Fig. 1. Map of Lake Muliczne with the survey grid

Source: own elaboration.

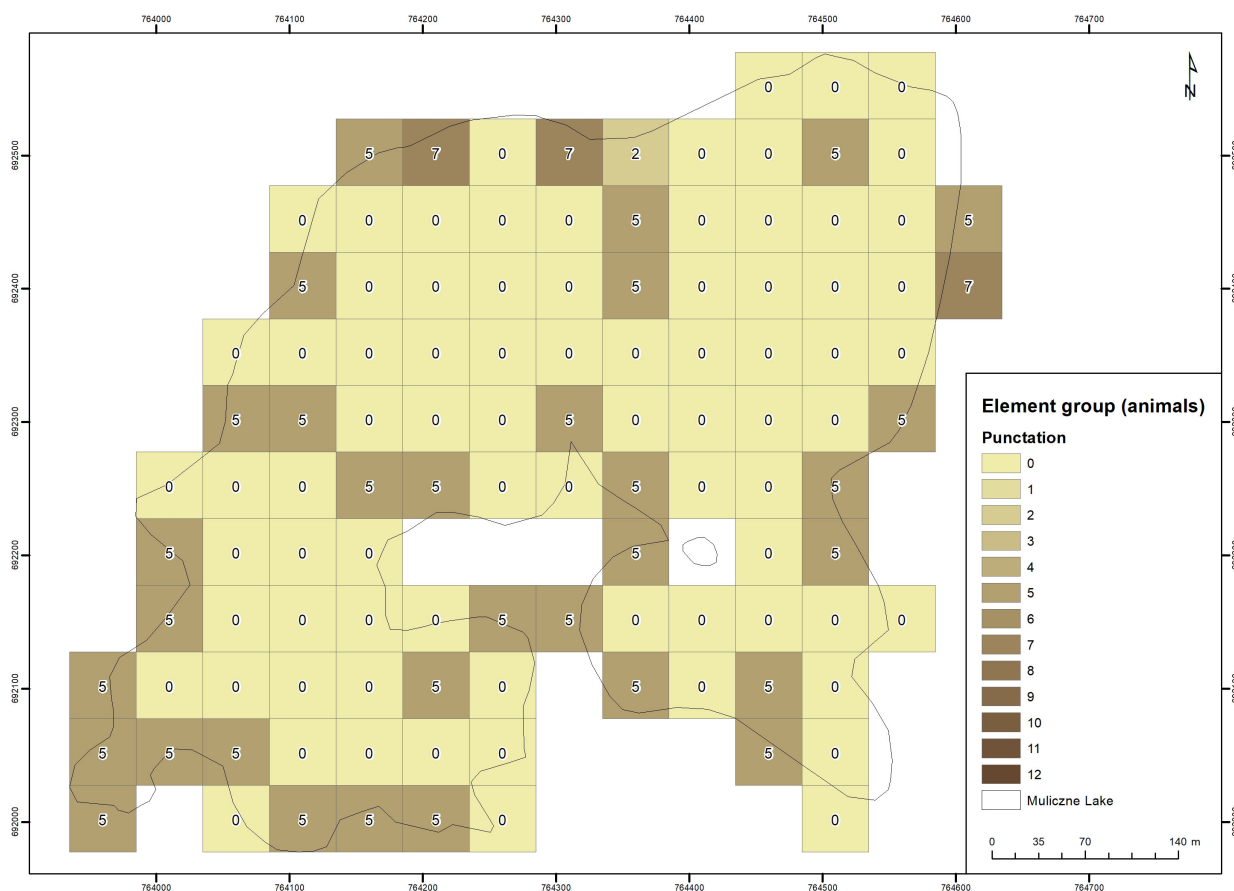
A map of the sight-aesthetic value of the studied lake, divided into five attractiveness categories, is presented in Figure 2. Measurements were conducted at 116 points (corresponding to grid squares – primary fields). The results are presented with graduated colours. The highest score was obtained in category III. The distribution of values in each of the four groups presented in the point valuation table is shown in Figures 3–6. In each primary field, the scores are presented in graduated colours based on the values obtained during underwater measurements. Submerged anthropogenic objects were not sighted in Lake Muliczne, and the relevant scores were not distributed. From the point of view of tourist exploration, these objects constitute an attraction for divers. However, Lake Muliczne is located in Wigry National

Park and has the highest conservation status, which could explain the absence of submerged anthropogenic objects. The above observation is confirmed by the results in Figure 2. The highest scores were noted in category II (three primary fields) due to the absence of objects that are attractive for underwater observers. Most primary fields were assigned to the lowest attractiveness category (V).

In the group of factors (Animals) that made the greatest contribution to scenic attractiveness, the highest score was seven points, and it was noted sporadically (Fig. 3). A certain percentage of grid squares received a score of five points. However, no animals were observed in most fields, which confirms that the sight-aesthetic value of these sites was generally low for divers looking for tourist attractions.



**Fig. 2.** A map of sight-aesthetic value of the underwater landscape of Lake Muliczne  
Source: own elaboration.



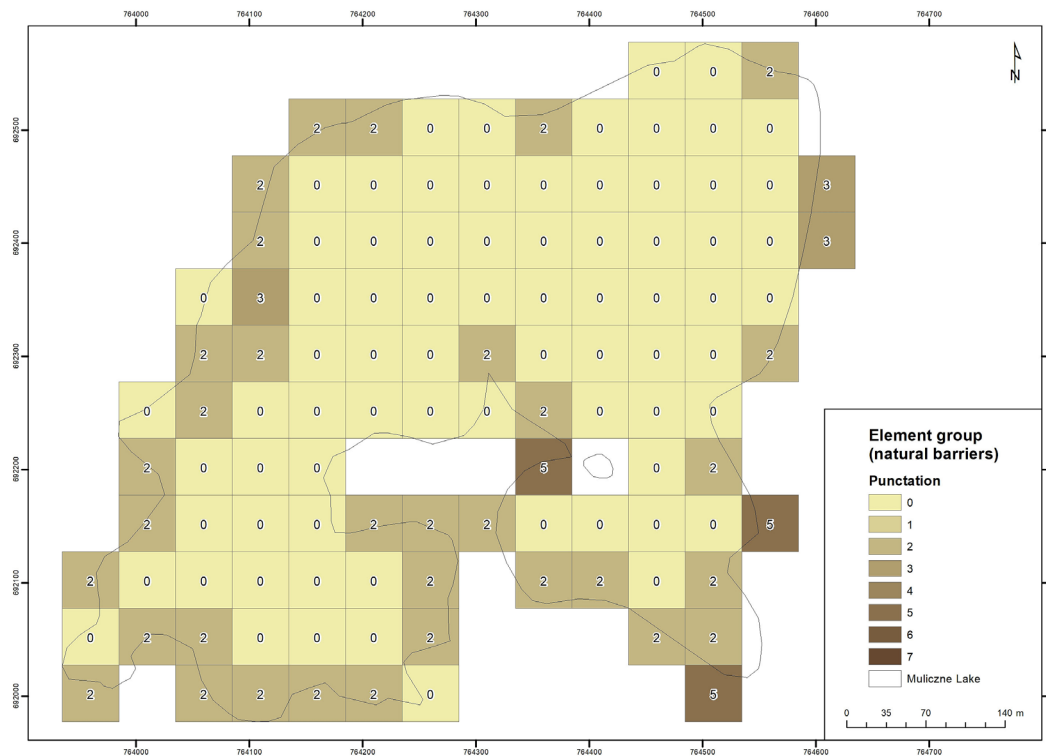
**Fig. 3.** Distribution of scores in group 1 – Animals  
Source: own elaboration.

In group 3, natural obstacles were observed mainly along lake boundaries. The highest score was five points (Fig. 4). Similarly to group 1 (Animals), most primary fields were free of natural obstacles.

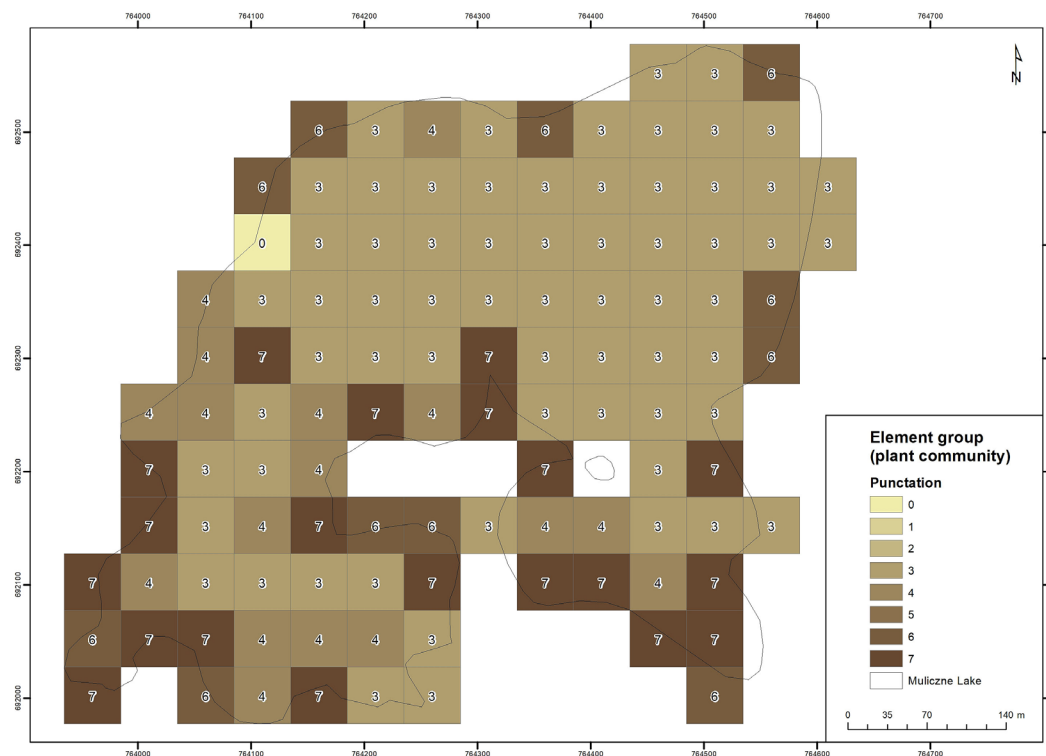
Vegetation in Lake Muliczne was also distributed mainly along the boundaries. None of the primary fields received 0 points, which could be attributed to the respondents' preferences. In addition to attractive vegetation, the surveyed divers had a preference for areas without vegetation which facilitate observations of other groups of underwater landscape components.

Most grid squares in the central part of the lake were devoid of vegetation, as expressed by the corresponding scores. Unlike in the previous groups, the maximum score in group 3 was seven points (Fig. 5).

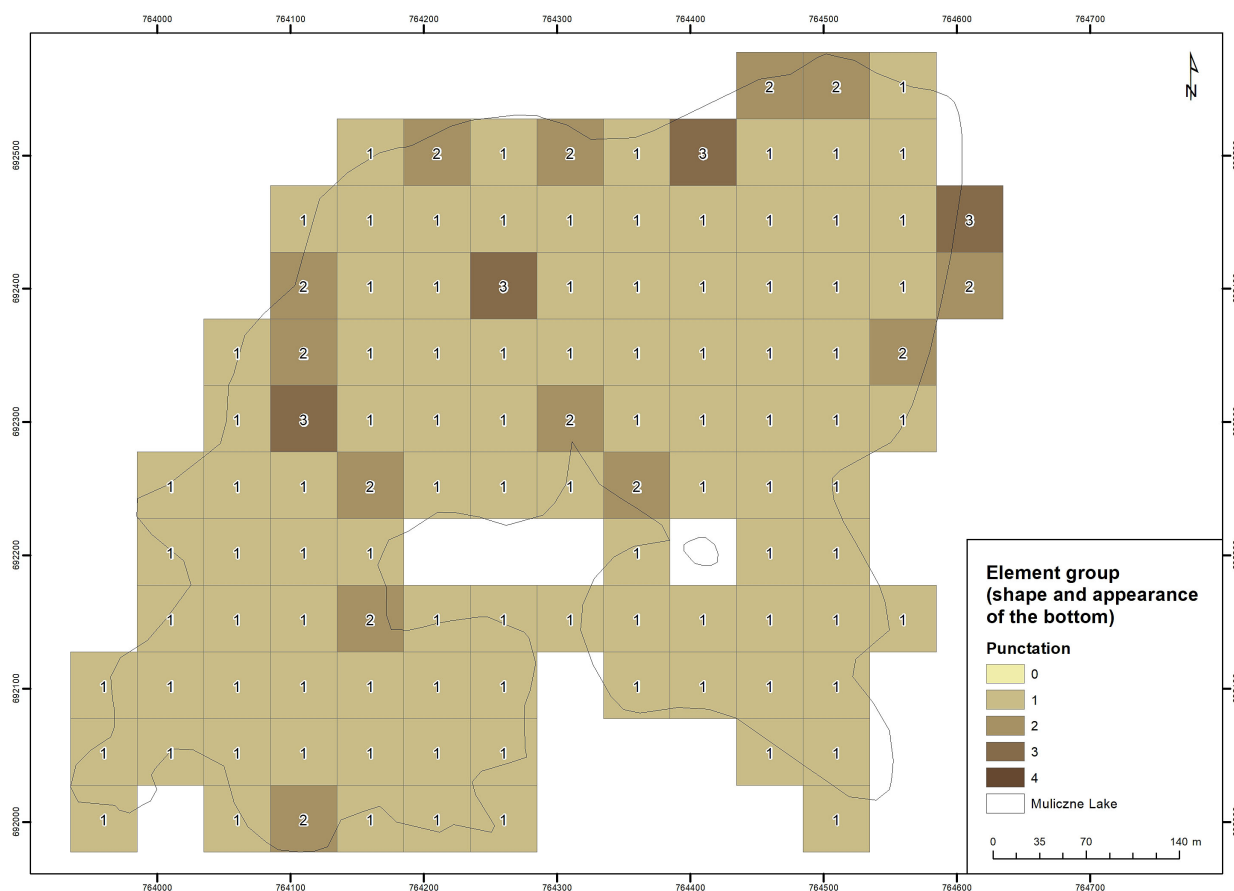
An analysis of group 4 factors revealed only minor formations on the lake bed. Muddy formations were often identified, and sandy formations were observed in the littoral zone. None of the fields received the maximum score, and scores were evenly distributed. More distinct formations were noted in the littoral zone of the studied lake (Fig. 6).



**Fig. 4.** Distribution of scores in group 3 – Natural obstacles  
Source: own elaboration.



**Fig. 5.** Distribution of scores in group 4 – Plants  
Source: own elaboration.



**Fig. 6.** Distribution of scores in group 5 – Shape and appearance of the lake bed  
Source: own preparation.

## DISCUSSION

The developed method for assessing sight-aesthetic value was tested on a lake. The results were significant and comparable with those reported in studies of terrestrial landscapes. A similar methodology has been used in many studies evaluating landscape aesthetics. Most of these studies focused on the beauty of the surroundings, attractiveness of natural assets, and the composition of landscape elements. Three main approaches to evaluating landscape attractiveness can be identified. The first approach evaluates the physical characteristics of space and its ability to fulfil specific functions. In the second approach, scenic preferences are identified based on aesthetic characteristics. The third approach evaluates the impact of environmental

features on the market value of space (Ellis et al., 2006; Kim & Kaplan, 2004; Wojciechowski, 1994). The proposed methodology makes a reference to landscape assessment methods that involve field surveys, including the Söhngen method, Wejchert Impression Curve, and the criteria for evaluating the visual amenity value of landscape (Senetra & Cieślak, 2004).

The obtained results confirm the observations made by divers during the questionnaire surveys. Lake Muliczne is characterised by relatively low visual attractiveness for tourist exploration. The lake is located in a national park and has the highest conservation status, which implies that it is free of anthropogenic objects that constitute an attraction in special interest tourism. Objects such as boats,



cars, or tyres are absent due to the limited use and low tourist traffic in such areas. The absence of waste pollution contributes to the ecological value of a water body, but the present study examined the lake's appeal for divers.

The proposed methodology is innovative and forward-looking, but the study had certain limitations. Assessments of aesthetic value should be performed in conditions that enable divers to clearly identify the components of the underwater world. Visibility is significantly limited in lakes, and it is determined not only by the type of lake and water purity, but also by the local environment which generates various types and quantities of pollutants. Field surveys are also limited by the seasons. Despite the above, this pioneering study has important implications for future research. Modern navigation systems and technologies which support rapid and automatic data collection can be implemented in these types of studies to promote the further development of research on the sight-aesthetic assessment of the underwater landscapes of lakes.

## CONCLUSIONS

A list of factors and components that influence the sight-aesthetic value of inland bodies of water was developed for the needs of the questionnaire survey. The validity of the proposed methodology was confirmed on a very large sample of 400 respondents who were active divers with different levels of experience. The direct comparison method was used in the survey to deliver reliable results. This method has been used extensively in studies of terrestrial landscapes.

The proposed methodology was applied to develop maps of the sight-aesthetic value of the underwater landscapes of lakes which can be used in the process of channelling tourist traffic. Such maps can be used not only to protect the most valuable aquatic ecosystems, but also to generate information for tourist guides for divers.

The methodology for assessing the underwater landscapes of lakes delivered the expected results. Scenic attributes are one of the most important

considerations in tourist exploration, as confirmed by studies that involve direct observation. Scuba divers have a preference for water bodies characterised by an abundance of animals, as well as anthropogenic objects that take on attractive forms over the years and become landscape features. The results obtained in Lake Muliczne confirm these observations. The studied lake is generally free of anthropogenic objects, and is not visually attractive for divers from the point of view of tourist exploration.

**Author contributions:** author/authors have given approval to the final version of the article. Authors contributed to this work as follows: A.S. developed the concept and designed the study; A.Ż.-S. & P.D. collected the data; A.S., A.Ż.-S., P.D., & M.C. analysed and interpreted the data; A.Ż.-S., P.D., & M.C. prepared draft of article; A.S. & M.C. revised the article critically for important intellectual content.

**Funding:** The research grant was funded by the National Science Centre, Poland. Agreement number: 2020/37/B/HS4/00231. Project title: The concept of evaluating the sight-aesthetic attractiveness of underwater landscapes of lakes in the context of tourist exploration.

## REFERENCES

- Bajerowski, T., Biłozor, A., Cieślak, I., Senetra, A., & Szczepańska, A. (2007). *Ocena i wycena krajobrazu: wybrane problemy rynkowej oceny i wyceny krajobrazu wiejskiego, miejskiego i stref przejściowych* [Landscape appraisal and valuation: selected problems of market-based appraisal and valuation of rural landscapes, urban landscapes and transition zones]. Educaterra.
- Barroso, F.L., Pinto-Correia, T., Ramos, I.L., Surova, D., & Menezes, H. (2012). Dealing with landscape fuzziness in user preference studies: Photo-based questionnaires in the Mediterranean context. *Landscape and Urban Planning*, 104(3–4), 329–342. <https://doi.org/10.1016/j.landurbplan.2011.11.005>
- Bartkowski, T. (1986). *Zastosowania geografii fizycznej* [Applications of physical geography]. Warszawa: Wydawnictwo Naukowe PWN.

- Bell, S. (2012). *Landscape. Patterns, Perception and Process. Second Edition*. London, New York: Routledge, Taylor & Francis Group.
- Beza, B.B. (2010). The aesthetic value of a mountain landscape: A study of the Mt. Everest Trek. *Landscape and Urban Planning*, 97(4), 306–317. <https://doi.org/10.1016/j.landurbplan.2010.07.003>
- Brzeziński, J. (2010). *Metodologia badań psychologicznych [Methodology of psychological research]*. Warszawa: Wydawnictwo Naukowe PWN.
- Chmielewski, T.J., Chmielewski, S., & Kułak, A. (2019). Percepcja i projekcja krajobrazu: teorie, zastosowania, oczekiwania [Perception and projection of the landscape: theories, applications, expectations]. *Przegląd Geograficzny*, 9(3), 365–384. <https://doi.org/10.7163/PrzG.2019.3.4>
- Choiński, A. (2006). *Katalog jezior Polski [Catalogue of Polish lakes]*. Poznań: Wydawnictwo Naukowe UAM.
- Ellis, C.D., Lee, S., & Kweon, B. (2006). Retail land use, neighborhood satisfaction and the urban forest: An investigation into the moderating and mediating effects of trees and shrubs. *Landscape and Urban Planning*, 74(1), 70–78. <https://doi.org/10.1016/j.landurbplan.2004.10.004>
- Falconer, L., Hunter, D.-C., Telfer, T.C., & Ross, L.G. (2013). Visual, seascape and landscape analysis to support coastal aquaculture site selection. *Land Use Policy*, 34(1), 1–10. <https://doi.org/10.1016/j.landusepol.2013.02.002>
- Ferguson, G.A., & Takane, Y. (1989). *Statistical analysis in psychology and education*. McGraw-Hill.
- Ganzei, K., Zharikov, V., Pshenichnikova, N., Lebedev, A., Kiselyova, A., & Lebedev, I. (2020). Spatial landscape differentiation of the coastal geostructure of the Shkoda Island, Sea of Japan. *Journal of Water and Land Development*, 46(VII–IX), 60–70. <https://doi.org/10.24425/jwld.2020.134198>
- Karabanov, E.B., Sideleva, V.G., & Izboldina, L.A. (1990). *Podvodnye landshafty Baikala [Subaqueous Landscapes of Baikal]*. Novosibirsk: Nauka.
- Kendall, M.G. (1970). *Rank correlation methods*. Charles Griffin and Co.
- Kim, J., & Kaplan, R. (2004). Physical and psychological factors in sense of community. New urbanist Kentlands and nearby Orchard village. *Environment and Behavior*, 36(3), 313–340. <https://doi.org/10.1177/0013916503260236>
- Lucrezi, S., Milanese, M., Cerrano, C., & Palma, M. (2019). The influence of scuba diving experience on divers' perceptions, and its implications for managing diving destinations. *PloS One*, 14(7), e0219306. <https://doi.org/10.1371/journal.pone.0219306>
- Musard, O. (2014). *Underwater seascapes: from geographical to ecological perspectives*. In o. Musard, L. le Du-Blayo, P. Francour, J.-P. Beurrier, E. Feunteun, & L. Talassinis (Eds.). *Underwater Seascapes* (pp. 17–26). Springer Science & Business Media. [https://doi.org/10.1007/978-3-319-03440-9\\_2](https://doi.org/10.1007/978-3-319-03440-9_2)
- Potemkina, T.G., & Suturin, A.N. (2008). The goals and principles of differentiation of the littoral landscapes of Lake Baikal. *Geography and Natural Resources*, 29(3), 230–236. <https://doi.org/10.1016/j.gnr.2008.09.005>
- Pungetti, G. (2012). Islands, culture, landscape and seascape. *Journal of Marine and Island Cultures*, 1(2), 51–54. <https://doi.org/10.1016/j.imic.2012.11.007>
- Qiu, L., Lindberg, S., & Nielsen, A.B. (2013). Is biodiversity attractive? – On-site perception of recreational and biodiversity values in urban green space. *Landscape and Urban Planning*, 119, 136–146. <https://doi.org/10.1016/j.landurbplan.2013.07.007>
- Ramachandra, T.V., Bharath, T.A., & Durgappa, D.S. (2012). Insights to urban dynamics through landscape spatial pattern analysis. *International Journal of Applied Earth Observation and Geoinformation*, 18, 329–343. <https://doi.org/10.1016/j.jag.2012.03.005>
- Sang, A.O., & Tveit, M.S. (2013). Perceptions of stewardship in Norwegian agricultural landscapes. *Land Use Policy*, 31, 557–564. <https://doi.org/10.1016/j.landusepol.2012.09.001>
- Senetra, A. (2016). Badania ankietowe jako element konstrukcji metody bonitacyjnej oceny wartości estetyczno-widokowych krajobrazów na przykładzie wiejskich obszarów pojeziernych [Questionnaire surveys as an element of the construction of point valuation method for the aesthetic-view value on the example of rural lake districts landscapes]. *Acta Scientiarum Polonorum. Administratio Locorum*, 15(4), 111–121. <https://doi.org/10.31648/aspal.662>
- Senetra, A., & Cieślak, I. (2004). *Kartograficzne aspekty oceny i waloryzacji przestrzeni [Cartographic aspects of spatial evaluation and valorisation]*. Olsztyn: Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie.
- Söhngen, H.H. (1975). Die Bewertung von Landschaftsbestandteilen in der Flurbereinigung [The evaluation of landscape elements in land consolidation]. *Natur und Landschaft*, 10, 6–10.

- Wagtendonk, A.J., & Vermaat, J.E. (2014). Visual perception of cluttering in landscapes: Developing a low resolution GIS-evaluation method. *Landscape and Urban Planning*, 124, 85–92. <https://doi.org/10.1016/j.landurbplan.2014.01.006>
- Wojciechowski, K.H. (1994). O przydatności badań percepcji krajobrazu [On the usefulness of landscape perception surveys]. *Zeszyty Naukowe. Polska Akademia Nauk. Komitet Naukowy przy Prezydium PAN Człowiek i Środowisko*, 9, 109–124.
- Wu, J. (2013). *Landscape Ecology*. In R. Leemans (Ed.). *Ecological Systems: Selected Entries from the Encyclopedia of Sustainability Science and Technology*. New York: Springer Science+Business Media.

## SEASONALITY OF SEASIDE TOWNS ON THE EXAMPLE OF SPATIAL PLANNING SOLUTIONS IN POLAND

Natalia Soldatke<sup>1✉</sup>, Sandra Żukowska<sup>2✉</sup>, Marcin Połom<sup>3✉</sup>

<sup>1</sup> ORCID: 0000-0001-9703-7085

<sup>2</sup> ORCID: 0000-0003-4589-4063

<sup>3</sup> ORCID: 0000-0001-7867-6236

<sup>1</sup> University of Gdansk

Bażyńskiego Street 4, 80-309 Gdansk, Poland

### ABSTRACT

**Motives:** The present research was undertaken to address the general scarcity of studies addressing tourism seasonality.

**Aim:** The main aim of the study was to identify differences in the spatial development of seaside towns during and outside the summer season based on the example of the Polish towns of Puck and Władysławowo. Specific objectives included analyses and evaluations of tourist services offered in the examined towns, permanent development solutions, tourism seasonality, the applied and applicable spatial policy tools, and the local residents' opinions on tourist traffic, seasonal development of seaside resorts, and the appeal of spatial development projects in these towns.

**Results:** The results of the study contribute to a better understanding of tourism seasonality in seaside towns from multiple perspectives.

**Keywords:** tourism development, tourism, spatial planning, seaside resorts, spatial conflict, seasonality, spatial policy

### INTRODUCTION

Tourism belongs to strategic services in seaside towns. The phenomenon of people's willingness to change place for some time, especially those looking for places with natural values, such as access to the sea, translates into economic development of these towns.

Seaside towns have an important role in the development of tourism in Poland. The Baltic coast is one of the most attractive tourist regions in the country. At the same time, it is an area distinguished by the highest intensity of land use for tourism purposes and the largest concentration of tourists

per area unit (Durydiwka & Duda-Gromada, 2014). In the vast majority, the economy of seaside towns and villages is based on the tourism industry (Nowicka, 2019). Most residents' professional activity is related to the handling of tourist traffic and activities for its benefit (Parzych, 2017).

Permanently growing tourist traffic in seaside towns, such as Puck or Władysławowo, translates into shaping their space. The number of tourists definitely affects the formation of the accommodation, gastronomic and associated base. The natural attraction of the sea appeals to tourists especially in the summer, from June to September of each year. Local

✉ natalia.soldatke@phdstud.ug.edu.pl, ✉ sandra.zukowska@ug.edu.pl, ✉ marcin.polom@ug.edu.pl

entrepreneurs try to meet the tourists' needs during holidays, which affects the special shaping of the space of seaside towns. In the case of gastronomy and associated facilities, one encounters seasonal tourism development in such places. The main objective of this study is to identify the seasonal spatial development of coastal towns in Poland. The seasonal spatial development has an uncontrollable character. It is not profitable for entrepreneurs to maintain the premises in permanent development throughout the year. They provide their services in the summer in temporary facilities, mostly to maximize profits. Yet, one of the main problems of temporary buildings is freedom in organizing them. Entrepreneurs try to build their facilities at the lowest cost in order to achieve the greatest profits from their operation.

The problem of temporary development is associated with a lack of strict legal regulations in terms of its location, guidelines for construction materials or specific parameters. For this reason, owners of temporary facilities have a wide range of possibilities for their construction. In the case of seasonal spatial development in Puck and Władysławowo, planning documents such as *Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego* [Eng. the Study of Conditions and Directions of Spatial Development] (SUiKZP) and *Miejscowe Plany Zagospodarowania Przestrzennego* [Eng. Local Spatial Development Plans] (MPZP) have been insufficiently used. These documents define how the spatial development policy should be shaped in the area to which they apply. In the face of legal inaccuracies, the space of seaside towns is chaotic and unsightly. Temporary tourism development negatively affects the quality of urban space. Therefore, a hypothesis is put forward that the local entrepreneurs' desire to maximize their profits translates into the creation of seasonal tourist buildings, which reduces the esthetics of space. Because seasonal facilities are only used periodically, outside the summer period they are mostly closed and unused, which further contributes to reducing the esthetics of urban spaces.

## LITERATURE REVIEW

Seasonality is one of the main characteristics of the tourism industry (Radlińska, 2017; Chung, 2009; Dudziak & Borzyszkowski, 2016; Borzyszkowski, 2014). Despite the fact that seasonality is one of the most prominent features of tourism, paradoxically, it is also one of the least understood (Corluka, 2019; Martín Martín et al., 2020). The problem of seasonality in tourism is addressed from various theoretical viewpoints (Borzyszkowski, 2014). However, the subject literature identifies a lack of its unambiguous definition. As a definition of the phenomenon of seasonality, BarOn (1973) indicates the incomplete and unsustainable use of funds in the economy, which consequently contributes to its imbalance. Butler (1994) talks about seasonality in tourism as a phenomenon of time imbalance. Hylleberg (1992) argues that seasonality is a systematic, although not necessarily regular, movement caused by such factors as changes in weather, calendar, dates or decisions (Borzyszkowski, 2014). Bigović (2011) generally indicates that seasonality means a special annual regularity. Radlińska (2017) defines seasonality as a method of measuring changes in the dynamics of phenomena, a regularly recurring relationship between observations separated by a constant number of periods. Martín Martín and others (2020) indicate tourism seasonality, as one of the major challenges in the tourism business. Tourism seasonality generates alternation of overcrowded periods with others periods. Fluctuations in visitors and revenues are almost universally viewed as a problem by the tourism industry (Corluka, 2019). The increase in the number of residents, temporary residents, tourists and day trippers makes marine destinations an interesting case study of overcrowding (Gon et al., 2019). The phenomenon of seasonality can also be presented as an uneven distribution of use over time, resulting in inefficient use of resources, loss of potential profits, and a social or ecological burden (Manning & Powers, 1984; Martín Martín et al., 2020). In the literature on the subject, there is a significant gap in form of a lack of a clearly accepted definition of seasonality



in relation to tourism. Tourism seasonality is a wide-ranging issue, being a multi-faceted thematic area (Koenig-Lewis & Bischoff, 2005).

The seasonality of the tourist traffic in Poland mainly results from the climate and the weather during the year. In addition, it is also conditioned by economic, legal, ecological and socio-demographic factors (Kozłowski & Michalska, 2016). Taking into consideration the share of tourists and used accommodation in northern Poland (on the Baltic Sea coast), there is a very clear increase in tourist traffic in July and August compared to individual months throughout the whole year. As a result, in the summer (June–August), there is a much larger number of tourists compared to the winter (December–February) (Kozłowski & Michalska, 2016; Dudziak & Borzyszkowski, 2016).

The negative effects of seasonality can be divided into three groups: investment, employment and the environment (Butler, 1994; Chung, 2009). The phenomenon of seasonality causes difficulties in planning and managing the development of tourism (Dudziak & Borzyszkowski, 2016). Among other things, there is a difficulty in attracting new investors who might be discouraged by having to obtain a return on investment and to plan new investments in a relatively short time (Kozłowski & Michalska, 2016; Borzyszkowski, 2014). Seasonality as a feature of the tourism sector has a significant impact on the economic situation of the local market. Under-utilization of resources outside the increased tourist period is a particularly negative effect of seasonality. This phenomenon concerns not using material, financial and human resources (Radlińska, 2017; Kozłowski & Michalska, 2016; Dudziak & Borzyszkowski, 2016). People employed during the season whose qualifications and skills are not used out of season lose motivation to work, which affects the behavior of local labor markets. During the year, there are periods of increased demand for employees and periods of higher unemployment (Radlińska, 2017). Anthropopressure is another negative effect of seasonality. Excessive development and tourist traffic in towns, accompanied by too strong adaptation of the space to meet tourists' needs, has contributed to a strong degradation of the town

landscape and environment (Kistowski et al., 2010; Chung, 2009; Durydiwka & Duda-Gromada, 2014).

Seasonality is a key problem in the development of the tourist function and the use of the existing base (Szarek-Iwaniuk, 2018). Many services provided to tourists, such as catering or accommodation, are extremely seasonal and function only in the summer (Hakuć-Błażowska et al., 2012; Belej, 2021). The issue of the impermanence of buildings in towns affected by the phenomenon of seasonality in tourist resorts (in particular seaside towns) is not sufficiently recognized yet. Therefore, there is a research gap and an urgent need to systematize knowledge about the seasonality and impermanence of spatial development of seaside towns in this context. An attempt to fill part of this research gap is the subject of this study.

## MATERIALS AND METHODS

The study is based on both qualitative and quantitative methods (Apanowicz, 2002). The first method involves a field query. The conducted field study constitutes the basic source of information. During the field research (2021), during the summer season and out of it, information on tourism-related facilities in the studied area was collected. The second method concerns analysis of the data collected in a survey and in an individualized in-depth interview. The survey was conducted among tourists and persons not being residents of Puck and Władysławowo, while the interview was conducted with a representative of the business sphere operating in the analyzed area. The third method is based on the *desk research* (Czarniawska, 2014) analysis of both statistics and materials and documents obtained at the Puck Town Hall and the Władysławowo Town Hall. Also the *case study* method of two selected seaside towns in Poland, Puck and Władysławowo, was applied in the research in order to identify the problematic situation related to seasonal tourism development and to indicate potential, universal solutions.

The data sources used in the study comprise literature on tourism, tourism traffic, the impact of tourism on the functioning and shaping of towns, changes in seaside towns, the impact of tourism on the coastal

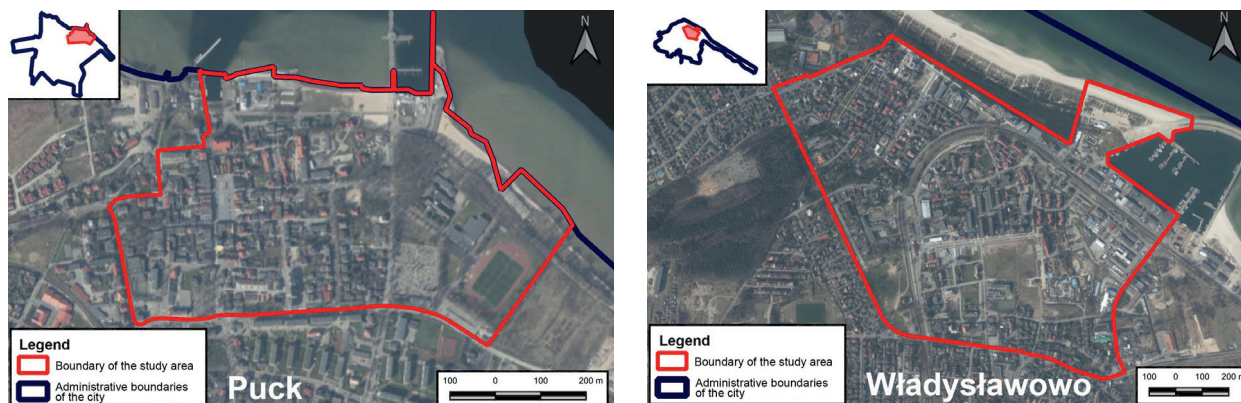


Fig. 1. Study areas in Puck and Władysławowo

Source: own study based on data from the Head Office of Geodesy and Cartography and the Geoportal (2021).

landscape and the natural environment, and literature on spatial planning. The qualitative analysis also covered documents such as the study of conditions and directions of spatial development, local spatial development plans, urban development strategies and ecophysiographic studies. Statistical data on tourism and towns were extracted from the Local Data Bank collected by Statistics Poland (BDL GUS, 2021). Cartographic studies were made with a use of the Geographic Information Systems (GIS) tools based on the resources of the Geoportal, i.e. the basic infrastructure of spatial information used in Poland (Dawidowicz & Sońta, 2014).

The study area in the paper involves fragment of towns of Puck and Władysławowo (Fig. 1). The study area in Puck is located in the northeastern part of the town. The study area in Władysławowo is the northern part of the town. The selection of the study areas in both towns is based on the predominance of tourist functions.

## CASE STUDY OF SEASIDE TOWNS: PUCK AND WŁADYSŁAWOWO

### Characteristics of towns

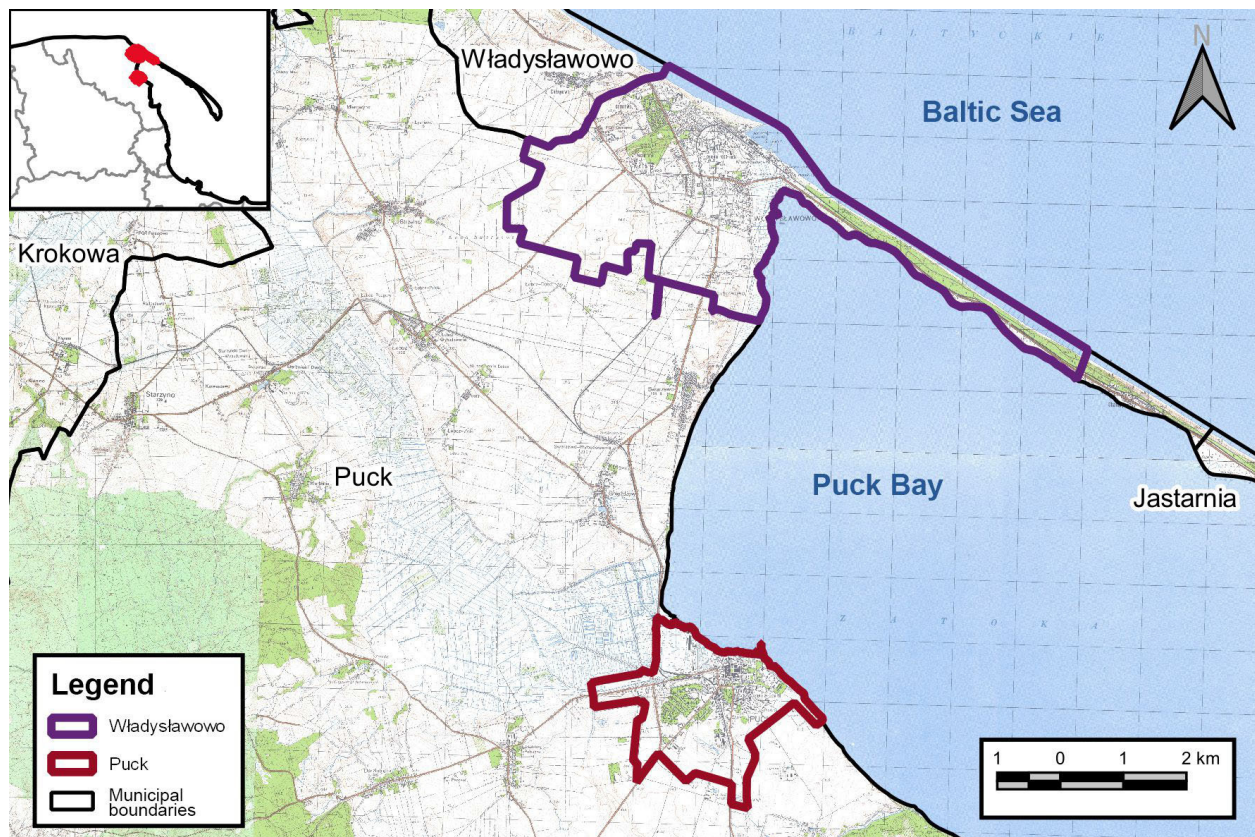
The towns of Puck and Władysławowo are administratively located in the northern part of the Pomeranian Voivodeship, in the Puck county (Soldatke et al., 2022). The town municipality of Puck

borders on the rural commune of Puck except for its northern part, where the town meets Puck Bay. On the other hand, Władysławowo is located in the town-rural commune of Władysławowo. From the north, Władysławowo borders on the Baltic Sea, from the west with the village of Chałupy on the Hel Peninsula and with Puck Bay. Puck, which is the seat of the county authorities, is a town with an area of 4.79 km<sup>2</sup>, while Władysławowo takes up an area of 13.66 km<sup>2</sup>. The location of the towns is shown in Figure 2.

Based on J. Kondracki's physical and geographical regionalization (2000), Puck and Władysławowo are located in the macro-region of the Gdańsk Coast. Puck is entirely located in the mesoregion of the Kashubian Coast, while Władysławowo includes the mesoregions of the Kashubian Coast and the Hel Peninsula. The Kashubian Coast is characterized by the area's division into a number of upland clusters, which are separated by deeply indented valleys or primordial valleys (Resolution No. XIX/120/2016, 2016). The Hel Peninsula is a sandbar made of a series of wooded dunes created by the sea current and wind (Kwiatkowska & Marks, 2016).

Both towns are distinguished by outstanding natural values. Within the administrative boundaries of the town of Puck there are forms of nature protection, such as: Nadmorski Park Krajobrazowy [Coastal Landscape Park], Nature 2000 areas "Zatoka Pucka i Półwysep Helski" ["Puck Bay and Hel Peninsula"]





**Fig. 2.** Administrative location of Puck and Władysławowo

Source: own study based on data from the Head Office of Geodesy and Cartography and the Geoportal (2021).

and “Zatoka Pucka” [“Puck Bay”], protected landscape area “Doliny Rzeki Płutnicy” [“Valleys of the Płutnica River”] and eight outstanding natural features of historic importance. In Władysławowo, there are the following forms of nature protection: nature reserve “Słone Łąki” [“Salty Meadows”], Nadmorski Park Krajobrazowy [Coastal Landscape Park], Nature 2000 areas “Zatoka Pucka i Helska” [“Puck and Hel Bay”], “Kaszubskie Klify” [“Kashubian Cliffs”], “Zatoka Pucka” [“Puck Bay”] and two outstanding natural features of historic importance (Centralny Rejestr Form Ochrony Przyrody, 2021). In addition, within the borders of Władysławowo, there are deposits of raw materials: rock salt and potassium salt (Central Geological Database, 2021).

According to data from 2020, Puck is inhabited by nearly 11,200 people, and Władysławowo by nearly 10,000 people. These towns are comparable in terms

of their population. Between 2010 and 2020, both towns experienced a decline in the population. It is particularly visible in Władysławowo in 2014–2016, due to the transformation of Władysławowo from a town municipality to a town-rural commune in 2015 (Szymytkie, 2016). In Puck, the migration balance shows a constant downward trend, while this situation does not apply to Władysławowo. Puck and Władysławowo both note a decrease in the share of the pre-working and working-age population. The growing value of the demographic dependency ratio and the decreasing natural growth testify to an ageing population, which affects social and economic processes (Kuklińska, 2014). The population dynamics and migration cause significant changes in the level of population, spatial distribution and in various population structures (Zdrojewski & Guzińska, 2011).

Puck and Władysławowo are under the influence of the dynamically developing Gdańsk–Gdynia–Sopot Metropolitan Area (OMG-G-S). In its functioning, the Metropolitan Area, among others, concentrates production activities directly and indirectly related to the sea, maritime transport and specialized services related to tourism and fisheries, as well as other supra-regional services in the core of the area – Tricity and the adjacent towns (Resolution No. XIX/120/2016, 2016).

## Outline of the functioning of tourism

### Tourism

The nature of the tourism sector in the analyzed towns can be illustrated by a number of key statistics. These include: annual revenues from the market fee at permanent and seasonal markets or the number of tourists using accommodation facilities.

In the case of analysis of annual revenues from the market fee between 2000 and 2020, there was no constant upward trend in Władysławowo (Fig. 3). The increase in revenues is visible in the years 2000–2013 and 2017–2020. The highest result, i.e. nearly PLN 650,000, was recorded in 2013. The sharp

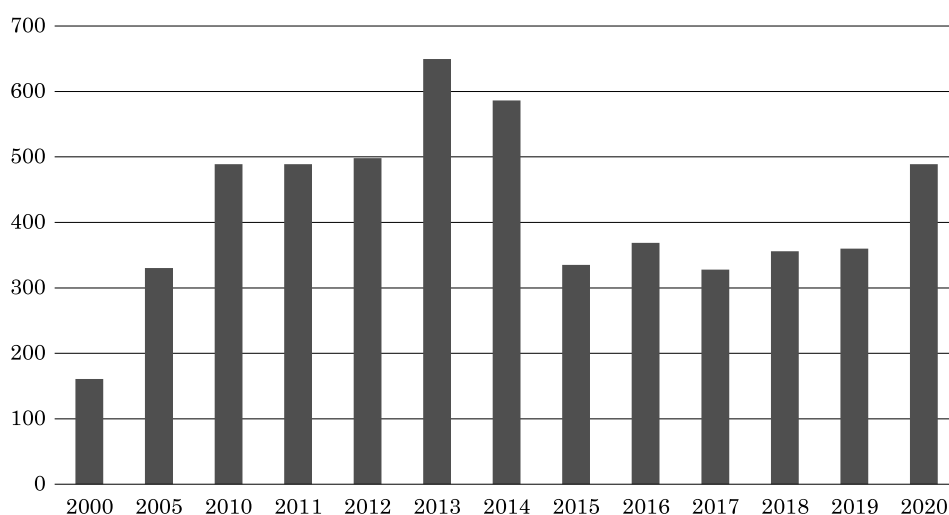
drop in revenues in 2015 results from administrative changes in the municipality.

In contrast to Władysławowo, Puck has been experiencing a steady downward trend in annual revenues from the market fee since 2005 (Fig. 4). According to BDL GUS data (2021), revenues in 2020 were nearly twenty times lower than in 2005. Until 2005, Puck recorded greater revenues from market fees than Władysławowo, and since 2010, receipts from the market fee are much higher in Władysławowo (Fig. 3).

Further statistics concern the analysis of the number of tourists using accommodation facilities. The data used in the study are only available until 2014. For Władysławowo, there is a steady upward trend between 2000 and 2014. In 2014, the number of tourists using accommodation facilities during the year was more than twice as large as in 2000 (Fig. 5).

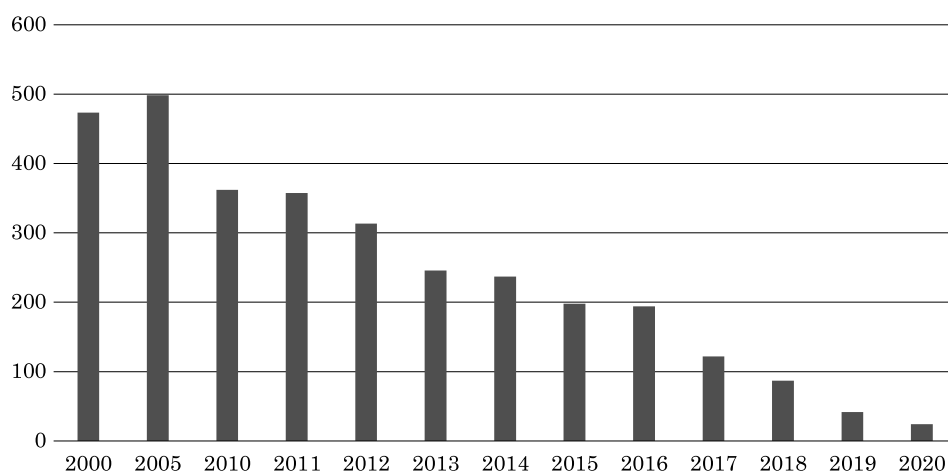
However, fluctuations occur in the case of the number of people using accommodation facilities in Puck (Fig. 6). One can distinguish the period between 2010 and 2013, when the number of tourists exceeded 5,000 people. The lowest values (less than 2,000 people) were recorded between 2006 and 2008.

The presented statistics indicate that the tourist traffic in Puck is becoming weaker year to year. However, this claim is contradicted by information



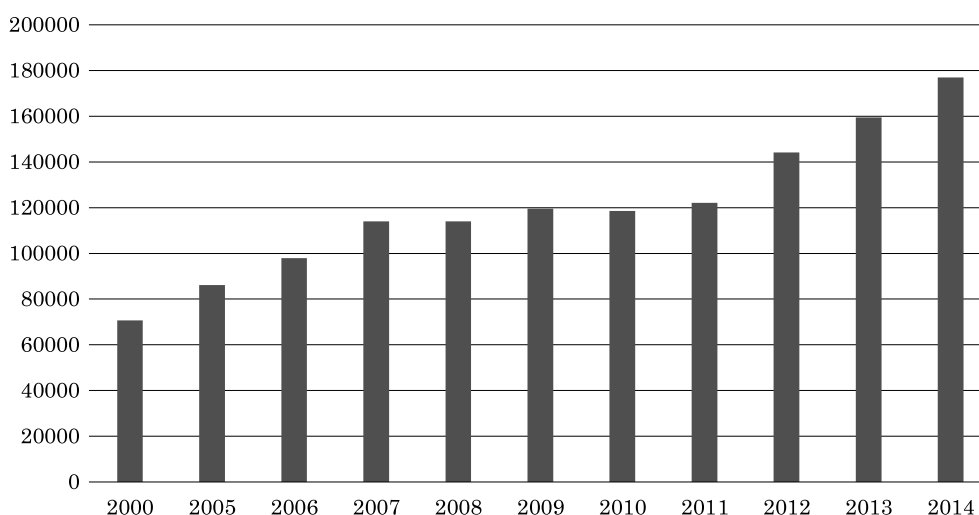
**Fig. 3.** Total annual revenues from the market fee at permanent and seasonal markets in Władysławowo for selected years (in thousand PLN)

Source: own study based on data from BDL GUS (2021).



**Fig. 4.** Total annual revenues from the market fee at permanent and seasonal markets in Puck for selected years (in thousand PLN)

*Source:* own study based on data from BDL GUS (2021).



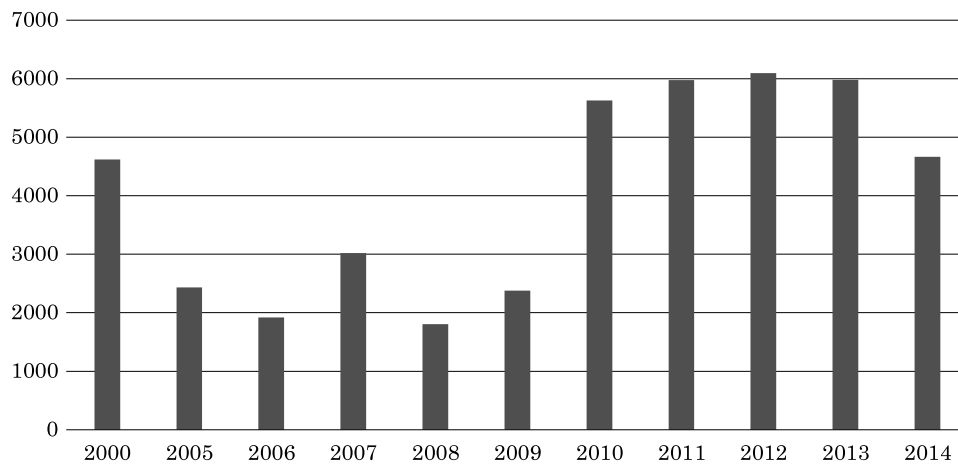
**Fig. 5.** Tourists using accommodation facilities in Władysławowo throughout the year for selected years

*Source:* own study based on data from BDL GUS (2021).

obtained from the Puck Town Hall regarding the number of tourists visiting the tourist information center. An upward trend is noticeable for the years 2016–2018 and 2020–2021. The highest values were recorded in 2021. The reason for the decrease in the number of tourists in 2020 compared to 2019 lies in the COVID-19 epidemic caused by the SARS-CoV-2

virus. Due to the spread of the pandemic, tourism is one of the industries that was the most paralyzed and affected by the implemented restrictions. Despite the less severe restrictions in force in the summer, tourists, for the sake of their own health, changed their tourist plans or abandoned trips completely (Zawadka et al., 2021).





**Fig. 6.** Tourists using accommodation facilities in Puck throughout the year for selected years  
Source: own study based on data from BDL GUS (2021).

In order to determine the degree of development of the tourist function in Puck and Władysławowo, the Schneider index was applied:

$$T_s = 100 \ T/L \quad (1)$$

where

$T$  – number of tourists (persons)

$L$  – number of local population (persons)

This index was calculated for 2021. According to the data of the Puck Town Hall, there were 5,493 tourists visiting the tourist information center in Puck, while the town had 11,139 inhabitants then, which gives an index of 49.31. In Władysławowo, based on the data of Statistics Poland (GUS), the number of tourists using accommodation facilities amounted to 176,924, and the town was inhabited at that time by 9,830 residents, which gives an index of 1799.84. For comparison, based on the data of Statistics Poland regarding tourists using accommodation facilities, in 2021, this index amounted to 959.84 for the Puck county, 84.06 for the Pomeranian Voivodeship, and 46.72 for the country. Władysławowo recorded a higher index than the town of Puck, the Puck county, the Pomeranian Voivodeship and the overall index for the country. In turn, Puck obtained a lower index than the Puck county, but a higher one than the values calculated for the Pomeranian Voivodeship and the country.

To compare the results, the tourist traffic density rate was also used:

$$G_t = T/S \quad (2)$$

where

$T$  – number of tourists (persons)

$S$  – town area (km<sup>2</sup>)

Puck takes up an area of 4.79 km<sup>2</sup>, so the tourist traffic density rate is 1146.76 persons/km<sup>2</sup>. Władysławowo takes up an area of 13.66 km<sup>2</sup>, hence the tourist traffic density rate is 12951.98 persons/km<sup>2</sup>. For comparison, based on the data of Statistics Poland regarding tourists using accommodation facilities, such rates in 2021 amounted to 1446.75 persons/km<sup>2</sup> for the Puck county, 107.65 persons/km<sup>2</sup> for the Pomeranian Voivodeship, and 57.18 persons/km<sup>2</sup> for the country. Władysławowo achieved a higher result compared to the result for the Puck county, the Pomeranian voivodeship and Poland. The town of Puck has a minimal difference in this rate compared to the Puck county, but a higher value than the Pomeranian Voivodeship and the country.

### Tourism offer

The accommodation base plays an important role in shaping tourism development. It comprises camp sites, holiday villages, private accommodation,

guesthouses, holiday resorts, training and recreation centers and hotels (Łojek, 2003). The number of group accommodation facilities registered by Statistics Poland in Puck was 10 in 2020, including 4 year-round facilities. The total number of beds was 725, including 315 year-round beds. The largest total number of accommodation facilities for selected years was registered in 2000. The most year-round facilities were recorded in 2012 and 2014. According to data from Statistics Poland, in 2020 there were half as many beds in total as in 2000.

The number of group accommodation facilities in Puck registered by Statistics Poland is imprecise. Taking into account private accommodation and other facilities, the number of beds is much higher. This is evidenced by data obtained from the Puck Town Hall. According to the register of hotel services (as of July 9, 2021), the number of seasonal beds was 1,074, and year-round ones 543, which gives a total of 1,617 places in 121 accommodation establishments during the summer season. Based on data from the Puck Town Hall, the total number of accommodation places is over twice as large as that of Statistics Poland.

According to BDL GUS data (2021), the number of group accommodation facilities in Władysławowo amounted to 152 in 2020, including 24 year-round facilities. There were 6,400 beds in total, including 1,741 year-round beds. The largest total number of accommodation places and year-round accommodation places for selected years was registered in 2014. In 2018 and 2020, similar values of the number of accommodation places were recorded.

The number of group accommodation facilities recorded by BDL GUS (2021) also does not reflect the actual state. According to the register of accommodation facilities, obtained from the Władysławowo Town Hall in 2021, 1,819 establishments providing accommodation-related services were registered, including 125 establishments providing year-round services. In total, there are 31,124 beds in the town during the summer season (including 3,787 year-round places). Analyzing data from the Władysławowo Town Hall, the total number of places is nearly five times higher in comparison to BDL GUS data (2021).

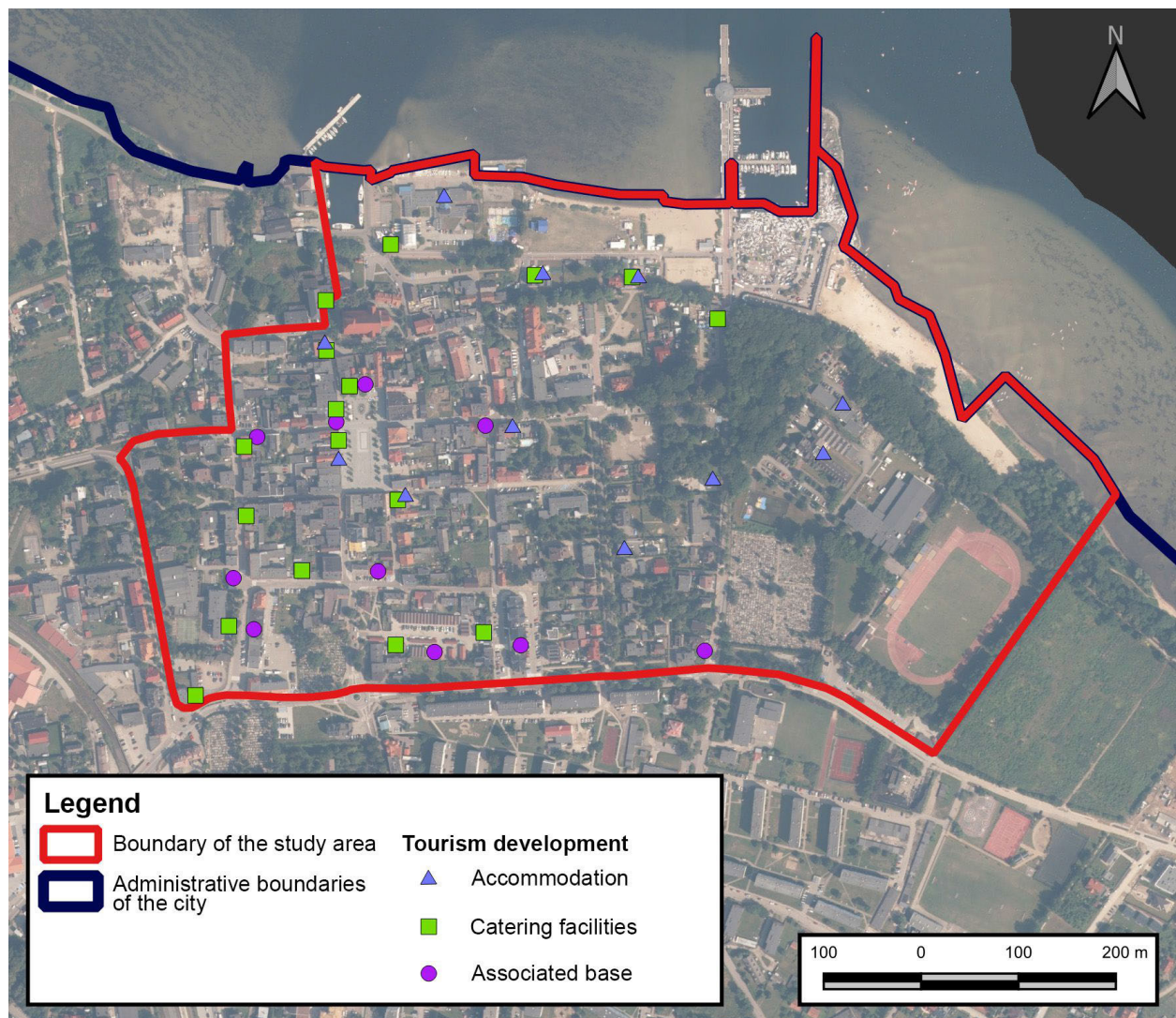
Based on data from the Puck Town Hall, the number of places per one km<sup>2</sup> in Puck in 2021 was 113.36 people/km<sup>2</sup> outside the summer season, and 337.58 people/km<sup>2</sup> in the summer season. One can note that there are almost three times more beds in the summer season than throughout the year. Based on the data of the Władysławowo Town Hall, in Władysławowo in 2021, the rate for the summer season was 2278.47, while off-season it was 277.96 people/km<sup>2</sup>. This rate is over eight times higher when comparing accommodation in the summer to the off-season.

## Spatial planning

The analysis of the spatial development of Puck and Władysławowo was divided into three groups in terms of the distribution of the accommodation, gastronomy and associated bases. The associated base includes grocery stores, souvenir shops, museums, amusement parks and theme parks. The division also includes the time of operation of the facilities. All-year-round facilities, summer facilities and off-season facilities were distinguished.

In the analyzed area in Puck, there are 11 year-round accommodation facilities (Fig. 7). They are located in the northern and central part of the area. In total, these facilities have 423 beds. The number of year-round catering facilities is 17. They are located in the northern part (close to the waters of Puck Bay) and the western part of the area. The Old Town Market Square constitutes the western part. In the case of the associated base, there are 9 grocery stores, a souvenir shop and a museum within the analyzed area. They are located next to catering facilities.

Seasonal services complement the year-round services during increased tourist traffic. Within the analyzed area, there are 17 additional accommodation facilities operating during the season. The seasonal accommodation facilities have a total of 227 beds. The particular intensity of seasonal catering facilities and the associated base is visible at Żeglarzy Str., in the northern part of the area (in season it is the most popular tourist destination). Seasonal accommodation



**Fig. 7.** Spatial identification year-round tourist base within the analyzed area in Puck  
*Source:* own study based on various materials (2021).

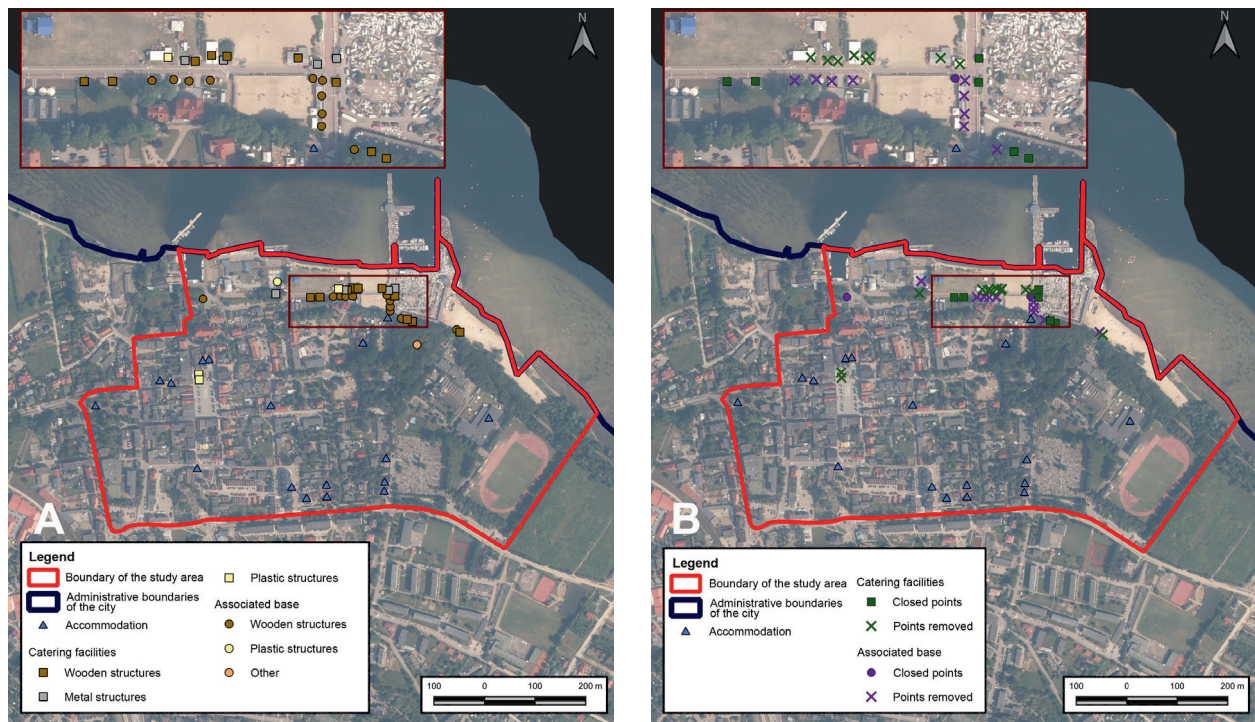
facilities, despite the fact that they only operate for a certain time during the year, are located in permanent buildings. Based on the conducted field query and own observation, seasonal facilities can be classified on the basis of the material from which they are constructed (wood, metal, plastic and others) (Fig. 8A).

Another method of classifying seasonal facilities is the nature of their functioning outside the summer season (Fig. 8B). Therefore, two groups were distinguished. The first group includes facilities

that are dismantled after the season, and the space of their functioning is empty off season. The second group consists of temporary buildings, impermanently connected with the ground, which, outside the period of their operation, are closed, secured, but remain in the same place all year round.

In the case of Władysławowo, there are 50 accommodation facilities operating year-round within the analyzed area (Fig. 9). They have a total of 1,324 beds. Their dense concentration is noticeable in the north-western part of the studied area, which





**Fig. 8.** Spatial identification seasonal tourist base (A) and the impermanence of tourist buildings (B) in the analyzed area in Puck  
*Source:* own study based on various materials (2021).

is directly due to the proximity of the sea. There are 19 year-round catering facilities. They are located in the northwestern part. The associated base consists of 14 facilities that function off season (13 shops and 1 museum). The buildings of the associated base are located in the central and western part of the area.

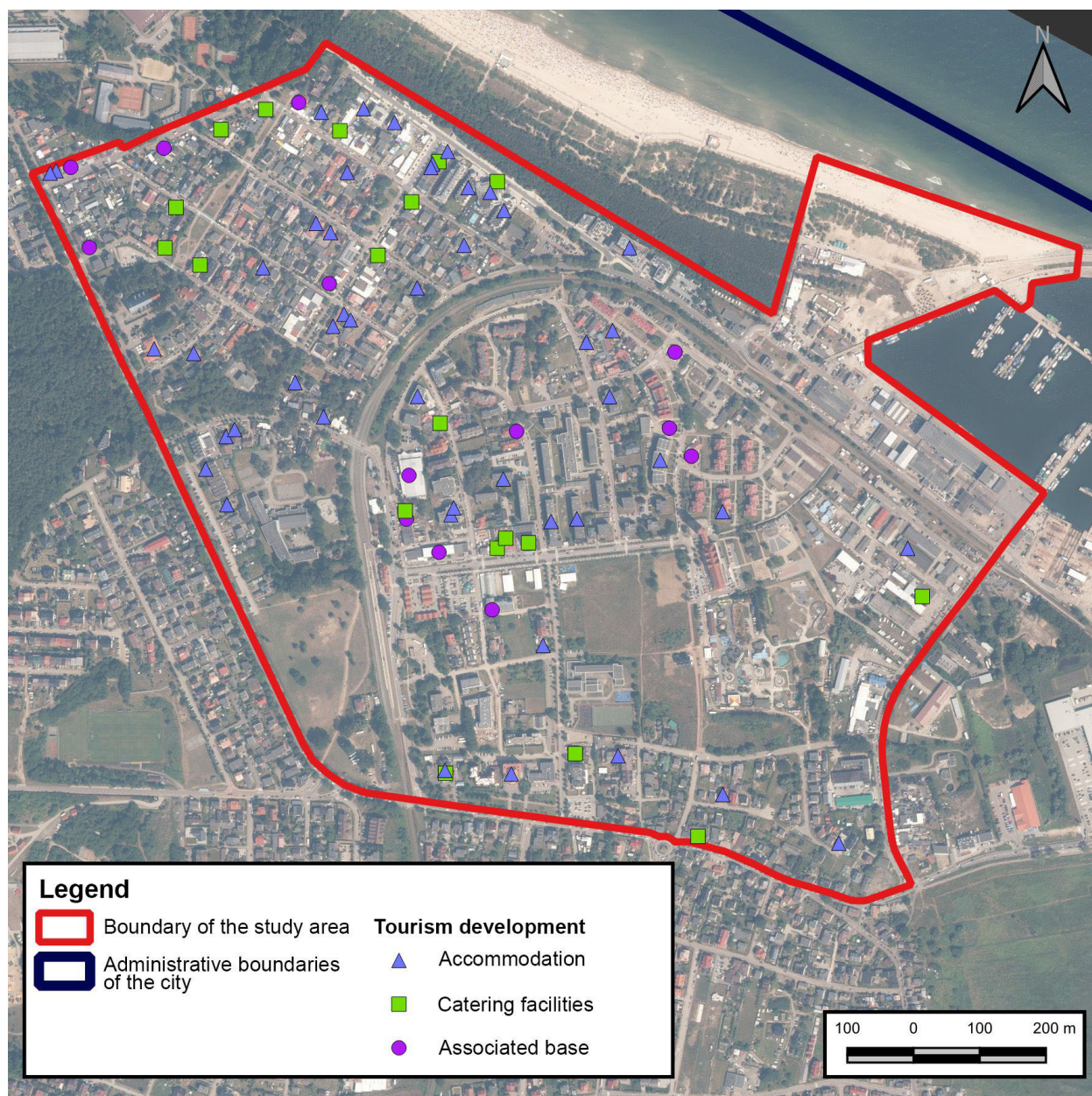
During the summer season, there are additional 290 accommodation facilities, which provide 7,419 accommodation places to cater for the increased tourist traffic. There are nearly 6 times more temporary accommodation facilities than year-round facilities, and over 5 times more seasonal accommodation places than year-round beds. These are visible differences between the summer season and the off-season. The highest density of seasonal accommodation facilities is in the north-western part of the area. The seasonal catering base and the associated base are located in the western and northern part of the area due to the tourist popularity of the place. In the summer, there are 127 seasonal catering facilities, and 160 facilities of the associated base (Fig. 10A).

By contrast, there are only 19 seasonal catering facilities in Puck and 14 facilities of the associated base.

It is worth noting that in the case of Puck, there is a clear division of the location of a specific tourist base. The accommodation base is located in buildings, while the seasonal catering and associated base in temporary structures. In Władysławowo, the situation is more complex. Facilities providing seasonal catering or associated services are also located in buildings.

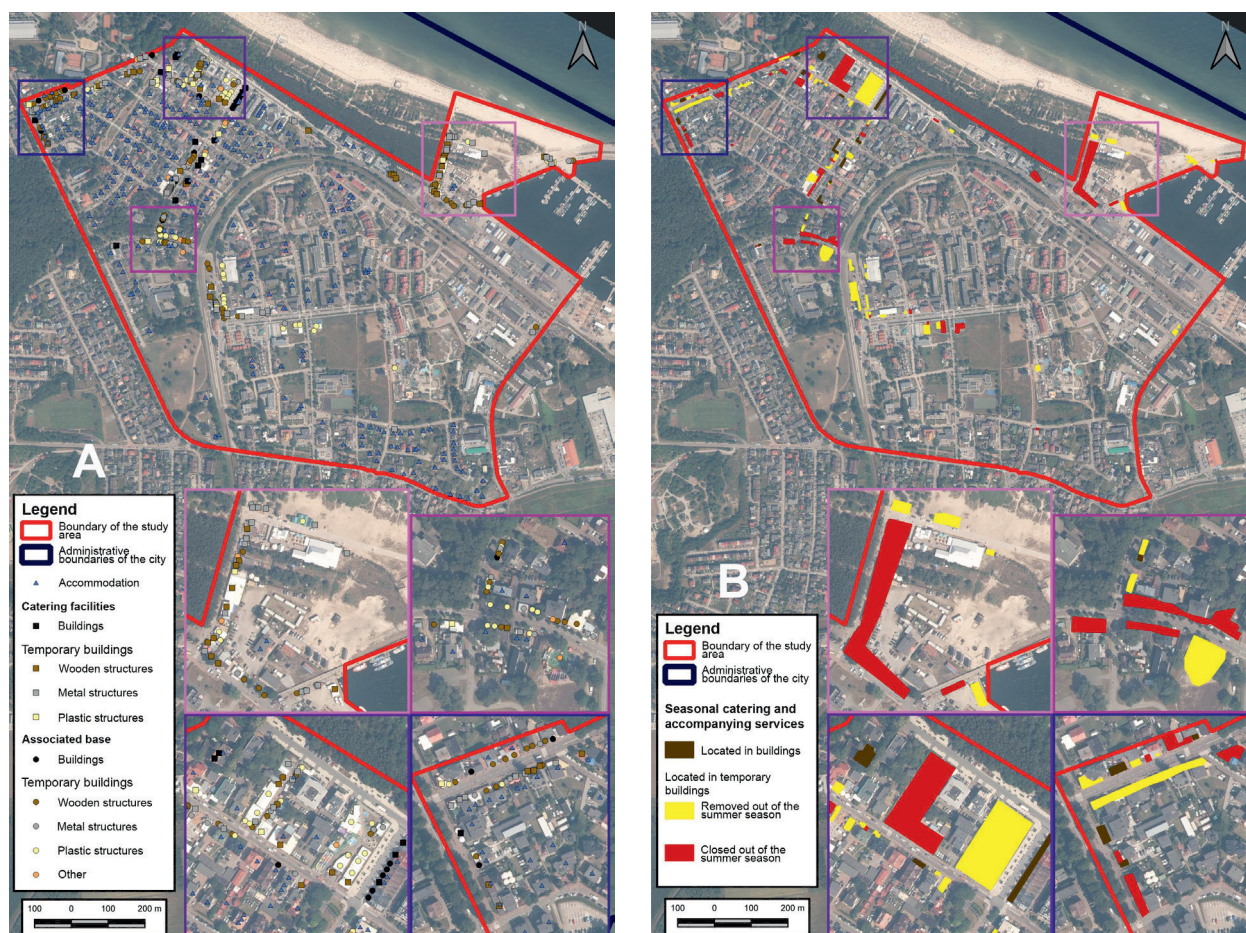
Due to the dense concentration of seasonal facilities within the analyzed area of Władysławowo, their off-season condition is shown on the map using the surface method (Fig. 10B). Seasonal facilities located in buildings account for 8% of all seasonal facilities in the area. Their largest concentration occurs in the north-western part of the area. Temporary seasonal facilities have been divided into two groups. The first one are temporary facilities that have been cleared and are absent outside the holiday season. During the tourist peak, such facilities account for





**Fig. 9.** Spatial identification year-round tourist base within the analyzed area in Władysławowo  
*Source:* own study based on various materials (2021).





**Fig. 10.** Spatial identification seasonal tourist base (A) and the impermanence of tourist buildings the analyzed area in Władysławowo (B)

Source: own study based on various materials (2021).

a total of 44% of seasonal facilities. They are most prevalent in the northern, western and central parts of the area. The second group of temporary facilities are those that are closed off season. They include the largest group of seasonal tourist facilities – 48%. Their largest concentration occurs in the north-western, north-eastern and central parts of the area.

The volume of tourist traffic in the summer season in Puck and Władysławowo is very high, which often results in uncontrolled and massive expansion of the tourist base. The influx of tourists is associated with ensuring appropriate conditions to meet their basic needs: accommodation, catering and other associated services (Parzych, 2017). Catering facilities in seaside

towns include bars, fish and chips shops, pizzerias, ice cream parlors, fast food bars, cafes, pastry shops, cocktail bars (Fig. 12A). The associated base mainly consists of facilities which also provide services in the form of small trade – e.g. sale of souvenirs, clothing, books (Fig. 11A). All these shops are highly seasonal (Łojek, 2003). The uncoordinated nature of the development, especially the appearance and esthetics of seasonal facilities, built on the basis of a notification of a temporary facility for 120 days (in accordance with national legislation), have become a major problem in the light of spatial governance standards. The low quality of temporary structures, each of which is trying to stand out with its appearance





**Fig. 11.** Spatial development during the tourist season (A) and outside the tourist season (B) in the analyzed area in Puck  
Source: own materials (2021).



**Fig. 12.** Spatial development during the tourist season (A) and outside the tourist season (B) in the analyzed area in Władysławowo  
Source: own materials (2021).

against the background of other structure, trying to attract customers' attention, becomes a reason for discussion on the assessment of lowering the quality of relaxation and the esthetics of the town. The problem of the low standard of construction of the facilities is directly related to the nature of the facility. Its temporary nature does not encourage investors to incur significant construction costs, and the relatively low investment outlay allows for greater profits or reduces the risk of losses (Cern & Bojar-Fijałkowski, 2014).

Outside the tourist season, the temporary facilities have been cleaned up and there is no trace of them after summer (Fig. 11B). In the second option, a less

attractive one in terms of esthetics, spatial order and functionality – temporary objects are closed, fenced-off with some ugly wall, boarded up with repulsive planks or boards, obscured by some metal elements, etc. Such facilities look abandoned in space, and several such places on one street looks like area an abandoned and forgotten by the population (Fig. 12B).

The problem of landscape esthetics in seaside towns is not only related to the gastronomy and associated base located in temporary buildings. The accommodation base plays an important role in shaping the space. The desire to host as many visitors as possible, first of all, is associated with a change in the cubature and physiognomy of existing residential

buildings, which are adapted to accommodate tourists (Durydiwka & Duda-Gromada, 2014). Secondly, the newly constructed buildings are highly diverse, often chaotically located, without connection to the existing infrastructural elements. The new buildings are not related to tradition and the region. This results in increasing spatial chaos and the blurring of cultural identity, history and tradition (Kwiatkowska & Marks, 2016). Thirdly, the investment area has significantly exceeded the permissible capacity, which additionally results in the fact that tourism development elements are increasingly located on dunes and overflow plains (Kistowski & Korwel-Lejkowska, 2005). One forgets about shaping the new development in line with the existing one in order to integrate it into the existing landscape, as well as about the existing threat resulting from the violation of areas that are valuable for nature and sensitive to anthropopressure.

### Spatial policy tools

Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego (SUiKZP) [Eng.: the Study of Conditions and Directions of Spatial Development] and Miejscowe Plany Zagospodarowania Przestrzennego (MPZP) [Eng.: Local Spatial Development Plans] are the basic tools for shaping spatial policy for the analyzed towns. In this research, the provisions in the documents that concern the issue of seasonal development have been analyzed. For this purpose, the official local government websites of both towns were used – Public Information Bulletins (Bulletin of Public Information of Puck, 2021; Bulletin of Public Information of Władysławowo, 2021).

The currently binding SUiKZP for Puck was adopted by Resolution No. III/8/2018 of the Puck Town Council of 5 December 2018. According to the content of the document, the location in the coastal zone of Puck Bay determines the key nature of tourism for the town's economy. According to the planning document, 187 business entities operating in the field of accommodation and gastronomy were registered in the town. However, the document emphasizes that the data does not reflect the real number of entities.

A significant deficit in the places of accommodation of tourists in facilities providing accommodation services constitutes a problem in Puck. The lack of accommodation has a negative impact on activities aimed at improving the condition of technical infrastructure (conducted in the Port of Puck) and the image of the town (renovation of the Old Town), which do not bring the desired effect. Too small number of tourists, including foreign tourists, and a narrow offer of services related to beach tourism and sports and recreational facilities also constitutes a threat to the town's development. The operational objectives include those related to tourism and spatial development, such as sustainable shaping of spatial order, implementation of ordering solutions in spatial development, i.e. esthetic and functional public space, or the development of modern facilities for the tourism sector, among others. The areas of tourism services include the area of the town located in the coastal zone, thus predisposed to serve as the main tourist base of the town. All investment activities should strive to develop attractive space and scenic tourist-recreational complexes appealing to tourists. It is emphasized that special attention should be paid to the esthetics of facades and roofs of buildings, the composition of landscaped greenery and the applied forms of landscape architecture.

The currently binding SUiKZP for Władysławowo was adopted by Resolution No. XLII/302/02 of the Town Council in Władysławowo of 30 January 2002. As of April 25, 2022, work on a new document is underway. Władysławowo is a town without a clearly shaped functional and spatial structure. The reason for the chaotic development of buildings lies in the intensive increase in the number of inhabitants of the town. The document assumes the continuation of the development of the existing town structure while striving to shape new urban and architectural values and to improve the functioning of the town as a whole. Among others, the document adopted the following strategic objectives: spatial development of the town with particular emphasis on the conservation of nature and landscape, protection of the cultural landscape, functional-spatial and esthetic ordering

of the development or creation of favorable conditions for the development of broadly understood services related to tourism and recreation. The town area has been defined as an area of special tourist activity.

Within the analyzed area for Puck, there are six MPZP documents in force. Such document is an act of local law, understood as a generally applicable source of local law. Among others, the provisions contained in them allow for the location of seasonal facilities (up to 180 days) with the area in a horizontal plan not exceeding 50m<sup>2</sup> and a height of not more than 4 m. MPZP allows the location of seasonal facilities only in the service strip. Another document specifies, for example, that due to the principles of protection and shaping the spatial order, the total area of seasonal facilities in the horizontal plan may reach a maximum of 150 m<sup>2</sup>. This provision applies in the northern part of the area. The document also includes provisions, e.g. on the exclusion of the location of temporary service and commercial facilities or construction facilities in public spaces.

In the case of Władysławowo and the analyzed area, three MPZP documents are currently binding. Among others, the provisions indicate that temporary, seasonal service and commercial facilities may be erected for a period of up to 120 days and located at a distance of not less than 2 m from the border of the building plot and the road plot. The resolution identifies areas in which the location of temporary facilities is allowed and areas in which their location is prohibited. The ban includes, for example, temporary use, development and landscaping in a manner inconsistent with the plan.

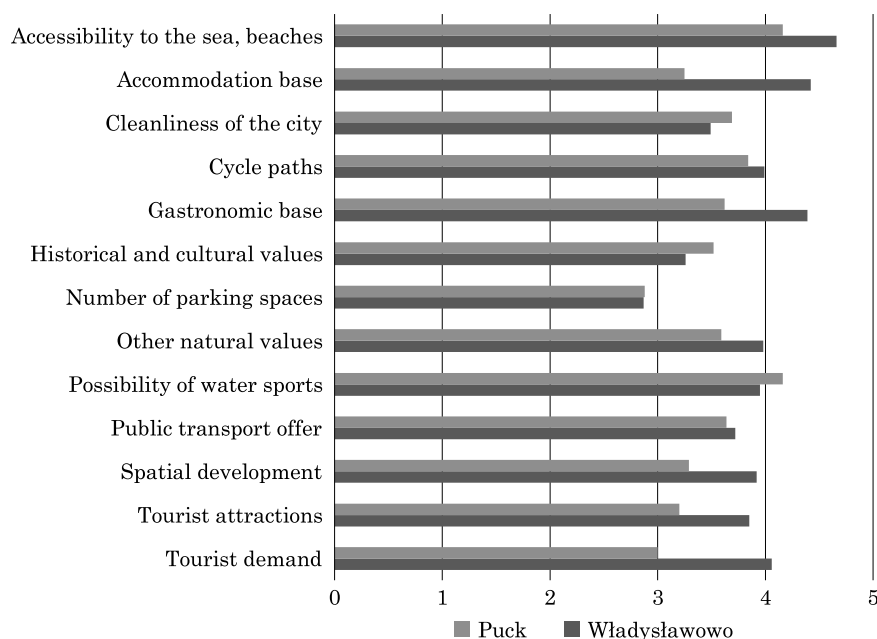
### **Perception of the tourist offer and the state of spatial development**

The key element of the study was to check the public opinion about the tourist offer and the state of spatial development and the attractiveness of the towns of Puck and Władysławowo. With that in view, an online survey was conducted. The survey was implemented with the Google Forms tool and the distribution of the questionnaire form on local social networks of

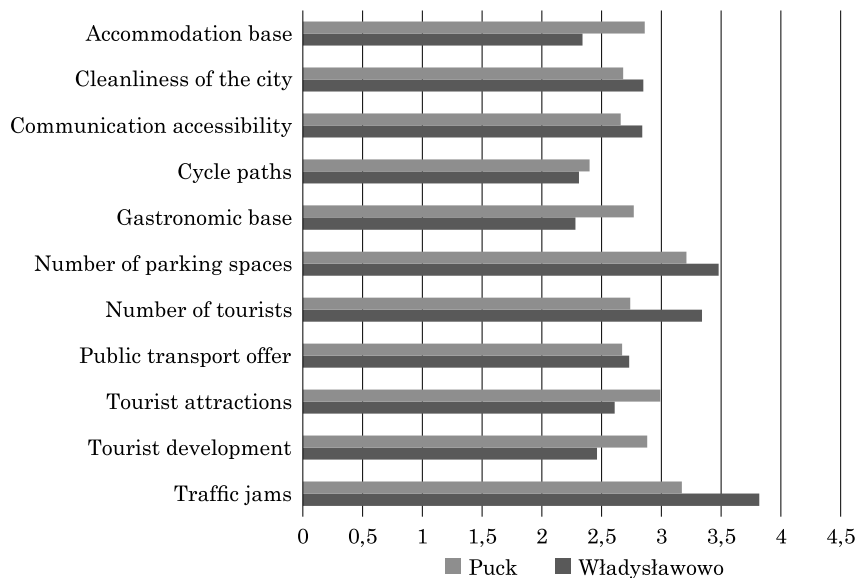
both towns. The form consisted of ten questions. Two questions included the metrics (gender, age), four questions were single-choice ones, and the remaining four questions concerned the assessment of individual elements on a scale from 1 to 5, where 1 meant the lowest value and 5 the highest one. The survey involved 137 respondents, of whom 116 (85%) were women and 21 (15%) were men. The highest number of responses was given by persons between 30 and 45 years of age (51%), and the lowest number by those above 60 years of age (1%). In turn, 39% of respondents were between 18 and 29 years of age, and 9% were between 45 and 60 years of age.

Based on the collected opinions, it should be noted that the respondents did not rate the attractiveness of the gastronomic base and tourist services in Puck highly (Fig. 14), because the number of seasonal facilities in the town is small. This means the respondents do not often use such services. However, the respondents positively assessed Puck's esthetics (Fig. 13). In the case of Władysławowo, the gastronomic base and associated services were highly rated in terms of attractiveness (Fig. 13). A large concentration of seasonally operating facilities in the town translates into a high intensity of their use. Respondents critically assessed the esthetics of the analyzed area in Władysławowo (Fig. 14).

The study was extended to learn the opinion of business people. An individualized in-depth interview was conducted with one of their representatives based on a previously developed ten-question interview scenario. The Sales Manager of one of the leading clothing brands in Poland was selected for this role. For example, in the case of Władysławowo, seasonal facilities start functioning in the first or second week of June, and their work ends in the first half of September. The peak season lasts from July 15 to August 15. In Władysławowo, all points of sale are tents, i.e. temporary buildings. After the summer season ends, some of the tents remain with the equipment for the winter period, while some are dismantled by an external company. The equipment is transported to the company's warehouse located in a nearby town. In Władysławowo, out of three tents only one remains



**Fig. 13.** Ranking of assessments of factors affecting the attractiveness of towns  
*Source:* research results based on an online survey (2022).



**Fig. 14.** Ranking of assessments of factors affecting the negative perception of towns  
*Source:* research results based on an online survey (2022).

for the winter period. When asked why tents dominate as commercial points and not permanent buildings, the respondent referred to the specifics of seaside towns in the country. It is dominated by low, dispersed development typical of fishing settlements, which

forces investment in tents, due to the lack of appropriate infrastructure, of which Władysławowo is an ideal example. Plots on which temporary facilities are located are both leased from private individuals and from the town. The interviewee emphasized that



seasonal facilities are a special attraction for tourists as well as a shelter from unfavorable (local) weather conditions. This is especially true on rainy days, which are numerous on the Baltic Sea.

### **Possibilities of increasing the level of esthetization of seaside towns: a landscape resolution**

Tourism is a complex and multifaceted phenomenon, causing various consequences of a natural, economic, social, cultural and spatial nature. The factor of spatial changes is primarily the tourism development process, whose purpose is to adapt space for service and meeting the tourists' needs (Durydiwka & Duda-Gromada, 2014).

The landscape resolution as well as the MPZP document have a character of an act of local law. In accordance with the provisions of the spatial planning and development act (Spatial planning and development act, 2003), the provisions of the landscape resolution regulate the rules and conditions for the location of small architecture elements, advertising boards and advertising devices and fences, their dimensions, quality standards and the types of building materials from which they can be made. The resolution may prohibit the placement of fences and advertising boards and advertising devices, excluding signboards. In the case of signboards, the landscape resolution defines the rules and conditions of their location and dimensions. It also determines the number of signboards that may be placed on the property by the entity operating on its premises.

The landscape resolution specifies the conditions and deadline for adapting the existing small architecture elements, fences and advertising boards and devices to the prohibitions, rules and conditions specified therein. The deadline may not be shorter than 12 months from the date of coming of the resolution into force (Bąkowski, 2017).

Adopting solutions by towns in the form of landscape resolutions would especially help to reduce or solve the ubiquitous problem of littering space with advertisements. This particularly applies to facil-

ities providing accommodation and catering services, which try to distinguish themselves from the competition in order to attract the attention of potential customers. Temporary commercial facilities also follow the same strategy of local marketing. In addition, unified or visually similar elements of small architecture or fences will gain a positive tone in shaping esthetic space of towns.

Based on the conducted research and its conclusions, it should be pointed out that such a solution would be strategic and at the same time obligatory to ensure esthetic urban space for the towns under analysis – Puck and Władysławowo.

### **SUMMARY**

Seasonal tourism development negatively affects the landscape of seaside towns. There are notable differences in space during the summer and off-season. The intensity of temporary development during the season is due to the increased tourist traffic in the summer months and the necessity to meet the tourists' needs. Based on the conducted research, the hypothesis that the local entrepreneurs' desire to maximize profits translates into constructing seasonal tourism development thus reducing the level of esthetization of space is confirmed.

Tourism brings many benefits to Puck and Władysławowo, including income for the town from tax revenues or jobs for the local community. Temporary development is a less favorable issue for the image of the town. Under the influence of seasonal buildings, individual streets change their character. Numerous facilities with different structures and types of construction are located on them. Adjacent facilities often contrast with each other, each having with a different specificity. Temporary facilities are built for a specific period of time. The off-season tourist base can be divided into two categories. The first one includes facilities that have been dismantled and will be rebuilt in the following year. The second group includes facilities that have stopped operation and are closed off season. They look particularly unsightly; consequently, the streets on which they stand look

abandoned, neglected and forgotten. At the beginning of the tourist season, their functioning is restored.

The effects of changes in the spatial structure of towns are felt. Every investor tries to visually highlight their facility, trying to attract as many customers as possible. It happens that the individual character of the temporary facility is often unrelated to the local culture and destroys the identity of the town.

One of the possibilities to stop the spread of uncontrolled temporary development is to use planning documents, such as SUiKZP and MPZP. The documents offer great opportunities that are insufficiently used by municipalities. Indicating where the temporary buildings can be located would affect the esthetization and ordering of the space. Their provisions may include a number of parameters and guidelines for seasonal development, thus influencing its shaping. A landscape resolution, as an act of local law just as MPZP, also has an impact on the shaping of the space, emphasizing its aesthetics through guidelines on elements of small architecture, advertising boards or fences. It is assumed that the simultaneous implementation of solutions from the three above-mentioned documents highlighting the nature of planning policy could definitely contribute to solving the problem situation faced by the surveyed towns.

**Author contributions:** authors have given approval to the final version of the article. Authors contributed to this work as follows: N.S., M.P. and S.Ż. developed the concept and designed the study, N.S. collected the data, M.P. analyzed and interpreted the data, S.Ż. prepared draft of article, M.P. revised the article critically for important intellectual content.

**Funding:** Not applicable.

**Funding:** Not applicable.

## REFERENCES

- Apanowicz, J. (2002). *Metodologia ogólna* [General methodology]. Gdynia: Wydawnictwo Bernardinum [Bernardinum Publishing].
- Bąkowski, T. (2017). Zakres swobody i władztwa planistycznego gminy w kształtowaniu treści krajobrazowej [The extent of the municipality's freedom and planning authority in shaping the landscape content]. *Gdańskie Studia Prawnicze* [Gdańsk Legal Studies], XXXVIII, 57–68.
- BarOn, R.R.V. (1973). Seasonality in tourism – part II. *International Tourism Quarterly*, 1, 51–67.
- BDL GUS [GUS Local Data Bank]. (2021). Retrieved from: <https://bdl.stat.gov.pl> (16.11.2021).
- Belej, M. (2021). Analysis of spatial distribution of touristic accommodation in Poland with the kernel density estimation of POIs. *Acta Scientiarum Polonorum. Administratio Locorum*, 20(3), 159–171. <https://doi.org/10.31648/aspal.6818>
- Bigović, M. (2011). Quantifying seasonality in tourism: a case study of Montenegro. *Academica Turistica: Tourism & Innovation Journal*, 4(2), 15–32. Retrieved from: [http://www.hippocampus.si/ISSN/2335-4194/4\\_2\\_15-32.pdf](http://www.hippocampus.si/ISSN/2335-4194/4_2_15-32.pdf) (16.11.2021).
- Biuletyn Informacji Publicznej Puck [Bulletin of Public Information of Puck]. (2021). Retrieved from: <https://bip.miastopuck.pl> (16.11.2021).
- Biuletyn Informacji Publicznej Władysławowo [Bulletin of Public Information of Władysławowo]. (2021). Retrieved from: <https://bip.wladyslawowo.pl> (16.11.2021).
- Borzyzkowski, J. (2014). Zjawisko sezonowości w turystyce – istota problemu i działań krajowych podmiotów polityki turystycznej na rzecz jego ograniczania [The phenomenon of seasonality in tourism – the nature of the problem and national tourism policy actors' efforts to reduce it]. *Rozprawy Naukowe Akademii Wychowania Fizycznego we Wrocławiu* [Scientific dissertations of the Academy for Physical Education in Wrocław], 45, 167–176.
- Butler, R. (1994). Seasonality in Tourism: Issues and Problems. In A. Seaton (Ed.). *Tourism: The Status of the Art* (pp. 332–339). Chichester: John Wiley & Sons.
- Centralna Baza Danych Geologicznych [Central Geological Database]. (2021). Retrieved from: <https://dm.pgi.gov.pl/> (15.11.2021).
- Centralny Rejestr Form Ochrony Przyrody [Central Register of Nature Protection Forms]. (2021). Retrieved from: <http://crfop.gdos.gov.pl/CRFOP/search.jsf> (15.11.2021).
- Cern, G., & Bojar-Fijałkowski, T. (2014). Rozwój turystyki pośród zadań jednostek samorządu terytorialnego ze szczególnym uwzględnieniem przypadku gminy Władysławowo [Development of tourism among the tasks of local authorities with particular emphasis on

- the case of Władysławowo municipality]. *Przestrzeń, Ekonomia, Społeczeństwo* [Space, Economy, Society], 5/1, 67–82.
- Chung, J.Y. (2009). Seasonality in tourism: A review. *E-review of Tourism Research*, 7(5), 82–96. Retrieved from: [https://agrilife.org/ertr/files/2012/09/578\\_seasonality-in-tourism.pdf](https://agrilife.org/ertr/files/2012/09/578_seasonality-in-tourism.pdf) (16.11.2021).
- Corluka, G. (2019). Tourism seasonality—an overview. *Journal of Business Paradigms*, 4(1), 21–43.
- Czarniawska, B. (2014). *Social Science Research: From Field to Desk*. Los Angeles: SAGE Publications.
- Dawidowicz, A., & Sońta, M. (2014). Analiza porównawcza wybranych geoportali europejskich [Comparative analysis of selected European geoportals]. *Acta Scientiarum Polonorum. Administratio Locorum*, 13(2), 59–76.
- Dudziak, S., & Borzyszkowski, J. (2016). Problem sezonowości popytu w turystyce na przykładzie wykorzystania bazy noclegowej w hotelach nadmorskich [The problem of seasonality of demand in tourism on the example of the use of accommodation in seaside hotels]. *Studia i Prace WNEiZ US* [Studies and Papers of WNEiZ US], 43, 79–88. <https://doi.org/10.18276/sip.2016.43/3-07>
- Durydiwka, M., & Duda-Gromada, K. (2014). Influence of tourism on the spatial development of seaside resorts: Selected aspects. *Turyzm* [Tourism], 24(1), 59–65. <https://doi.org/10.2478/tour-2014-0007>
- Geoportal. (2021). Retrieved from: <https://www.geoportal.gov.pl> (16.11.2021).
- Główny Urząd Geodezji i Kartografii [Main Office of Geodesy and Cartography]. (2021). Retrieved from: <https://www.gov.pl/web/gugik> (16.11.2021).
- Gon, M., Grassetti, L., Marangon, F., Rizzi, L., & Troiano, S. (2019). Between seasonality and overtourism in seaside destinations: Multi-stakeholder perceptions of hosting music events during summer season. In *Overtourism* (135–148). Abingdon: Routledge.
- Hakuć-Błazowska, A., Turkowski, K., Kupren, K., & Czarkowski, T.K. (2012). Conditions of sustainable development of rural tourism based on the example of the Kozłowo commune, province of Warmia and Mazury. *Acta Scientiarum Polonorum. Administratio Locorum*, 11(2), 73–83.
- Hylleberg, S. (1992). *Modelling seasonality*. Oxford: Oxford University Press.
- Kistowski, M., & Korwel-Lejkowska, B. (2005). Wpływ turystyki na rozwój przestrzenny miejscowości nadmorskich – wybrane aspekty [Impact of tourism on the spatial development of seaside towns – selected aspects]. *Turyzm* [Tourism], 24, 65–71.
- Kistowski, M., Trocha, A., & Tupaj, A. (2010). Kontrasty zagospodarowania i ruchu turystycznego na polskim wybrzeżu Bałtyku na przykładzie gmin Władysławowo i Tolkmicko [Contrasts of management and tourism on the Polish Baltic Sea coast using the example of the municipalities of Władysławowo and Tolkmicko]. *Problemy Ekologii Krajobrazu* [Problems of Landscape Ecology], 27, 179–187.
- Koenig-Lewis, N., & Bischoff, E.E. (2005). Seasonality research: The state of the art. *International Journal of Tourism Research*, 7, 201–219. <https://doi.org/10.1002/jtr.531>
- Kondracki, J. (2000). *Geografia regionalna Polski* [Regional geography of Poland]. Warszawa: Wydawnictwo Naukowe PWN [PWN Scientific Publishers].
- Koźmiński, C., & Michalska, B. (2016). Sezonowość i zmienność ruchu turystycznego w Polsce [Seasonality and variability of tourist traffic in Poland]. *Ekonomiczne Problemy Turystyki* [Economic Problems of Tourism], 35, 9–23. <https://doi.org/10.18276/ept.2016.35-01>
- Kuklińska, K.L. (2014). Ocena przygotowania ośrodków pomocy społecznej do działań na rzecz osób 45+ – wstępne wyniki eksploracyjnych badań ankietowych [Evaluation of the preparedness of social welfare centres for activities for people 45+ – preliminary results of an exploratory questionnaire study]. *Przedsiębiorczość i Zarządzanie* [Entrepreneurship and Management], XV, 109–126.
- Kwiatkowska, D., & Marks, E. (2016). Zagospodarowanie turystyczne terenów nadmorskich w Polsce – przykład Helu – Półwyspu Helskiego, Sopotu i Ustki [Tourism development of coastal areas in Poland – example of Hel – Hel Peninsula, Sopot and Ustka]. *Zeszyty Naukowe. Turystyka i Rekreacja* [Scientific Journals. Tourism and Recreation], 1(17), 239–252.
- Łojek, A. (2003). Analiza ruchu turystycznego miejscowości letniskowej na przykładzie Jastrzębiej Góry w świetle badań ankietowych [Analysis of tourist traffic in a summer resort on the example of Jastrzębia Góra in the light of surveys]. *Słupskie Prace Geograficzne* [Słupsk Geographical Papers], 1, 69–80.
- Manning, R.E., & Powers, L. (1984). Peak and Off-Peak Use: Redistributing the Outdoor Recreation/ Peak and Off-Peak Use: Redistributing the Outdoor Recreation/ Tourism Load. *Journal of Travel Research*, 23(2), 25–31. <https://doi.org/10.1177/004728758402300204>

- Martín Martín, J.M., Salinas Fernandez, J.A., Rodriguez Martin, J.A., & Ostos Rey, M.D.S. (2020). Analysis of tourism seasonality as a factor limiting the sustainable development of rural areas. *Journal of Hospitality & Tourism Research*, 44(1), 45–75. <https://doi.org/10.1177/1096348019876688>
- Nowicka, K. (2019). Turystyka w dokumentach strategicznych gmin wiejskich województwa pomorskiego [Tourism in the strategic documents of rural municipalities in Pomorskie Voivodeship]. *Studia Obszarów Wiejskich [Rural Studies]*, 53, 63–76. <https://doi.org/10.7163/SOW.53.5>
- Parzych, K. (2017). Wykorzystanie funduszy europejskich na rozwój zagospodarowania turystycznego gmin nadmorskich Pobrzeża Bałtyku [Use of European Funds for the Development of Tourism in the Coastal Municipalities of the Baltic Sea Region]. *Turyzm [Tourism]*, 27(1), 45–51. <https://doi.org/10.18778/0867-5856.27.1.05>
- Radlińska, K. (2017). Sezonowość w turystyce nadmorskiej – wyzwanie dla strategii zarządzania zasobami ludzkimi w przedsiębiorstwach turystycznych [Seasonality in coastal tourism – a challenge for human resource management strategies in tourism enterprises]. *Studia i Prace WNEiZ US [Studies and Papers of WNEiZ US]*, 48, 65–76. <https://doi.org/10.18276/sip.2017.48/2-06>
- Soldatke, N., Żukowska, S., & Połom, M. (2022). Zjawisko wykluczenia transportowego na terenie powiatów puckiego i wejherowskiego w 2019 r. [The phenomenon of transport exclusion in the districts of Puck and Wejherowo in 2019]. In M. Pacuk, & M. Połom (Eds.). *Warunki i czynniki rozwoju pomorza – wybrane problemy [Conditions and factors for the development of Pomerania – selected issues]* (pp. 142–159). Gdańsk-Pelplin: Wydawnictwo Bernardinum [Bernardinum Publishing].
- Szarek-Iwaniuk, P.K. (2018). Ocena potencjału rozwoju funkcji turystycznej z wykorzystaniem metody taksonomicznej – studium województwa warmińsko-mazurskiego [Assessment of the development potential of the tourism function using the taxonomic method – a study of the Warminsko-Mazurskie voivodeship]. *Acta Scientiarum Polonorum. Administratio Locorum*, 17(2), 181–193. <https://doi.org/10.31648/aspal.351>
- Szmytkie, R. (2016). Dezintegracja zlepieńców miejsko-wiejskich w Polsce w latach 2008–2016 [Disintegration of urban-rural conglomerates in Poland 2008–2016]. *Prace Geograficzne [Geographical Studies]*, 147, 145–168. <https://doi.org/10.4467/20833113PG.16.026.6088>
- Uchwała Nr III/8/2018 Rady Miasta Puck z dnia 5 grudnia 2018 r. w sprawie uchwalenia zamiany Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego Gminy Miasta Puck [Resolution No. III/8/2018 of the Town Council of the Town of Puck of 5 December 2018 on adoption of the amendment to the Study of Conditions and Directions of Spatial Development of the Municipality of Puck] (Poland).
- Uchwała Nr XIX/120/2016 Rady Powiatu Puckiego z dnia 13 kwietnia 2016 r. w sprawie: przyjęcia Strategii Rozwoju Ziemi Puckiej na lata 2016–2025 [Resolution No. XIX/120/2016 of the Puck County Council of 13 April 2016 on: adoption of the Puck Land Development Strategy 2016–2025.] (Poland).
- Uchwała Nr XLII/302/02 Rady Miejskiej Władysławowo z dnia 30.01.2002 r. w sprawie uchwalenia Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego Gminy Miasta Władysławowo [Resolution No. XLII/302/02 of the Władysławowo Town Council of 30.01.2002 on adopting the Study of Conditions and Directions of Spatial Development of the Municipality of Władysławowo] (Poland).
- Ustawa z dnia 27 marca 2003 r. – Planowanie i zagospodarowanie przestrzenne [Spatial planning and development act of 27 March, 2003, Journal of law of 2003 vol. 80, item 717] (Poland).
- Zawadka, J., Jęczmyk, A., Uglis, J., & Wojcieszak-Zbierska, M.M. (2021). Plany turystyczne mieszkańców miast w dobie pandemii COVID-19 [Travel plans of city dwellers in the era of the COVID-19 pandemic]. In M. Makowska-Iskierka, & J. Wojciechowska (Eds.). *Warsztaty z Geografii Turyzmu*, t. 11, *Krajoznawstwo a turystyka [Workshop on the Geography of Tourism, vol. 11, Countryside and Tourism]* (pp. 13–34). Łódź: Wydawnictwo Uniwersytetu Łódzkiego [University of Lodz Publishing].
- Zdrojewski, E., & Guzińska, M. (2011). Salda migracji jako podstawa typologii województw [Migration balances as a basis for typology of provinces]. *Zeszyty Naukowe Instytutu Ekonomii i Zarządzania [Scientific Journals of the Institute of Economics and Management Economics]*, 1(15), 93–116.





## STUDY OF THE CONTEMPORARY TRENDS IN THE DEVELOPMENT OF TRANSPORT SYSTEMS OF THE UKRAINIAN RAILWAYS

Oleh Strelko<sup>1</sup>, Oleksandra Solovyova<sup>2</sup>, Yuliia Berdnychenko<sup>3</sup>, Hanna Kyrychenko<sup>4</sup>, Lyubov Solovyova<sup>5</sup>

<sup>1</sup> ORCID: 0000-0003-3173-3373

<sup>2</sup> ORCID: 0000-0002-7933-3929

<sup>3</sup> ORCID: 0000-0001-7536-7155

<sup>4</sup> ORCID: 0000-0002-6883-1877

<sup>5</sup> ORCID: 0000-0002-9559-6104

<sup>1,2,3,4,5</sup> State University of Infrastructure and Technologies  
Kyrylivska Street 9, Kyiv, 04071, **Ukraine**

### ABSTRACT

**Motives:** The development of development of informatization and digitalization is critical not only for improving the efficiency of transport operations, but also for promoting economic growth because digital and information technologies are becoming a key tool for managing technological processes and creating added value.

**Aim:** The aim is to study was to assess contemporary trends in the development of transport systems which rely on information and communication technologies and drive innovative development strategies in the Ukrainian railways.

**Results:** The study demonstrated that railway transport operations in Ukraine should be rationalized by transitioning to a new innovative model which incorporates high-tech infrastructure facilities and specialized complexes based on advances in scientific knowledge, modern technology, and equipment.

**Keywords:** digital transformation, digital advantages, innovative development, railway transport management

### INTRODUCTION

Global scientific and technological trends of recent decades have significantly strengthened the role of transport systems in the socio-economic development of states, based on which the focus on the effective functioning of transport systems becomes one of the determining factors in the development of the economy of countries (Jabłoński & Jabłoński, 2020; Hryhorak et al., 2021; Fomin et al., 2021).

At the same time, the current stage of development of the world economy is based on the paradigm of establishing the principles of a new technological system and significantly increasing the importance of information (Zhu et al., 2018). This is explained by the fact that knowledge and information are one of the key elements of the digital economy, which today is reflected in all areas of economic activity and in the social sphere.

✉ olehstrelko@gsuite.duit.edu.ua, ✉ solovyova\_os@gsuite.duit.edu.ua, ✉ berdnychenko\_ya@gsuite.duit.edu.ua,  
✉ kyrychenko\_gi@gsuite.duit.edu.ua, ✉ solovyova\_lm@gsuite.duit.edu.ua

Digitization in the railway industry is a complex, multifaceted process that affects various aspects of business processes and determines trends of the scientific and technological development. Despite the fact that the development and implementation of digital technologies and solutions is not a core activity for the most railway companies, development of appropriate spheres directly related to digitalization is today the main scientific and technological priority of the entire industry.

Currently, international organizations and associations exert significant influence upon the scientific and technological development of the railway industry. These organizations actively publish reports and White Papers which outline priority trends for the development of the railway industry, strategies for scientific and technological development, and note both challenges and the most successful products and technologies. Such documents directly affect the development vector of the entire industry. Among such documents, the following could be distinguished:

1. The White Paper of the European Commission “On the way to a single European transport space: Towards a competitive and resource-saving transport system” (hereinafter referred to as the EU White Paper);
2. White Paper issued by the Association of American Railroads “Putting technology to work. How Freight Rail Delivers the 21st Century” (hereinafter referred to as the White Paper of AAR);
3. The EU Shift2Rail Railway Transport Development Program (hereinafter referred to as the EU Program).

Let us consider briefly the key trends of the scientific and technological development of the railway industry in accordance with the above-mentioned documents.

In the context of the digitalization of the railway industry, the EU White Paper highlights the following trends:

- Application of the improved intelligent railway network management systems and passenger mobility information system;

- Creation of an intelligent system for selling tickets for combined types of transport (arrangement of multimodal transportation);
- Rationalization of the traffic schedule and transport flows by using the TEN-T system (trans-European transport network) in the infrastructure;
- Use of intelligent transport systems;
- Deployment of the Galileo European global navigation satellite system;
- Application of detection and tracking technologies;
- Development of personal data privacy protection technology;
- Development of security technologies.

Among the priority areas of digitization, the White Paper of AAR singles out:

- Real-time monitoring of infrastructure facilities;
- Use of innovative monitoring technologies to improve quality of the equipment maintenance;
- Prevention of errors caused by the human factor;
- Introduction of the special software for monitoring, planning and accounting of fuel and energy consumption;
- Use of intelligent sensors in the framework of the maintenance and repair processes;
- Application of big data and artificial intelligence technologies;
- Automation of production processes.

Among the priority areas of digitization in the EU Program, the following are indicated:

- Automated control of train traffic;
- Technologies of virtual coupling of railway cars;
- Ensuring cyber security;
- Use of “smart” stations;
- Introduction of “smart” energy supplies;
- Increasing compatibility of various services;
- Introduction of technologies for tracking the movement of trains, passengers and cargo;
- Creation of “service assistants” for travel.

It is worth noting that the leading EU and US railway companies are also implementing actively their own digital development strategies while identifying various advanced digital developments as their own priorities of the scientific and technological

development. However, the mentioned strategies largely overlap and correlate with the above-mentioned documents.

At the same time, at the current stage of the development of railway transport in Ukraine, little attention is paid to the formation of programs, concepts and strategies for the development of information and digital technologies in the arrangement of railway transport (Fesovets et al., 2019).

The only hint at the improvement of existing information technologies in the transport is reflected in the Concept of the Development of the Digital Economics and Society in Ukraine for 2018–2020 (Verkhovna Rada of Ukraine, 2018a) and in the National Transport Strategy of Ukraine for the period until 2030 (Verkhovna Rada of Ukraine, 2018b). Document (Verkhovna Rada of Ukraine, 2018a) characterizes the plan of digital transformation measures, including those for transport; however, specific measures are not specified which would take into account specifics of the railway industry functioning, and this requires further studies. According to (Verkhovna Rada of Ukraine, 2018b), in the context of innovative development of the transport industry and the involvement of global investment projects, namely, introduction of integrated information systems for passengers and cargo owners, it is provided:

1. Implementation of the latest technologies and information support of transportation, in particular by creating a single information system of technological interaction of various types of transport (railway, water, automobile, and aviation), cargo owners, forwarders, and state control bodies at transport and checkpoints;
2. Implementation of innovative solutions and best global practices, in particular joint customs and border control during customs and other control procedures in the case of transportation as well as integration of information exchange systems between border and customs services and carriers to speed up control procedures;
3. Simplification of formalities and improvement of cargo handling technologies in logistics terminals, airports and ports of Ukraine;

4. Stimulating the introduction of innovative technologies (smart infrastructure and smart mobility) and intelligent transport systems;
5. Widespread use of “cloud” data storage technologies, virtualization, data centres etc.;
6. Increasing the capacity of the road network through the introduction of intelligent transport systems;
7. Implementation of systems for automated control of the preservation of cargo during transportation by all types of transport;
8. Creation of conditions for the development of transport and logistics activities and competitive ZRL-5RL providers.

This concept corresponds to the modern directions of development of transport systems based on the analysis of global trends (Granström et al., 2022; Doubell et al., 2021; Strelko et al., 2019):

- Formation of new concepts and technologies for the movement of goods and passengers (high-speed rail, magnetic levitation transport, hyperloop etc.);
- “Uberization” of the passenger and cargo transport market (when, thanks to the use of IT platforms (mobile applications), direct interaction between consumers and service providers is carried out);
- Development of unmanned (autonomous) vehicles;
- Development of electric transport technologies;
- Development of intelligent transport technologies, in particular intelligent traffic and safety management systems;
- Development of multimodal integration of transportation by various types of transport in regional, interregional and international connections, creation of large multimodal centres (hubs).

Taking into account the fact that in Ukraine many planned reforms to rationalize the operation of railway transport have not been implemented, as well as against the background of the lack of innovative strategies for the development of Ukrainian railways at the state level, an urgent need to develop projects for the development of information and digital technologies, as advanced directions of innovative activity, with the purpose of increasing efficiency of railway transportation.



It is worth noting that the development of informatization and digitalization is an integral component not only for improving efficiency of transport, but also for the development of the country's economy, since digital and information technologies are becoming a key tool for managing technological processes and creating added value (Abushaega et al., 2021; Severino et al., 2021; Kulbovskiy et al., 2021; Statyvka et al., 2021, Fishchuk et al., 2018).

That is, one of the main mechanisms of improvement and development of transport systems, including of Ukrainian railways, in the new technological and economic conditions, development of the information technology system as well as their digital transformation should take place, which should be recorded at the state level.

The purpose of the paper is to study today's trends in the development of the transport systems of the Ukrainian railways in the context of digitalization and based on the study of international experience in this sphere.

## LITERATURE REVIEW

The issue of digitalization of railway transport is covered in scientific publications (Zorić et al., 2022; Peraković et al., 2022; Timchenko et al., 2020). In the papers, attention is focused on the activation of digital transformations in railway transport of EU countries, the state of ICT implementation in railway transport is revealed, and the main directions of implementation of digital transformations in the domestic railway industry at the technological and organizational levels are determined.

Papers (Sharma & Sharma, 2022; Ursarova et al., 2022; Bibik et al., 2020) proposed a solution to an important problem – formation of managerial influence for the management of technological processes of cargo delivery by rail transport at the modern level of requirements for the efficiency of transportation organization. Application of the proposed method allows solving the problems of operational control practice in the formation of means of operational management of technological processes of the railway dispatching division.

Taking into account the views of scientists regarding the features of ensuring sustainable development of railway transport and taking into account the global trends of digital transformation of the transport and logistics space (Beek et al., 2019) it has been proven that the use of digital tools in the activities of railway transport enterprises will contribute to the improvement of safety and unification of train traffic management standards, improvement of innovation processes and investment activities of railway transport enterprises, improving the processes of digital interaction between enterprises of the industry with clients and expanding the list of information services for consumers of transport services as well as improving the personnel management system in railway transport.

Research on the innovative development of the railway transport in Ukraine was carried out in the papers (Pidopryhora & Kovalova, 2021; Tokmakova et al., 2016; Sementsova & Krykhtina, 2018). In paper (Pidopryhora & Kovalova, 2021), the authors note that the transition to the innovative path of development of the railway transport requires a qualitative change in the approach to the methodology and practice of managing the development of the industry as well as appropriate changes in the system of measuring and regulating the innovative activity of the business entities. However, the mechanisms and formalization of actions to implement the transition to the innovative path of the development of the Ukrainian railways have not been characterized.

Paper (Tokmakova et al., 2016) is dedicated to the study of the strategic guidelines for the innovative development of the railway transport in Ukraine. The result of the research conducted was the determination of the implementation of high-speed traffic as the main strategic orientation of the innovative development of the railway transport of Ukraine and the necessary condition for entering the global transport and logistics system of passenger and goods traffic. But in the study conducted the ways of implementing the characterized key spheres of innovation and investment activities of the railway industry enterprises are not sufficiently specified.

Work (Sementsova & Krykhtina, 2018) is dedicated to highlighting the main problems of investment and innovation development of the domestic railway industry and providing recommendations on the ways to solve them. As a result of the study conducted, the authors formalized a number of measures to overcome the problems of investment and innovation development of the railway industry; however, digital transformation is not included in the proposed system of measures.

The papers (Ovchynnikova & Toropova, 2019; Mnykh, 2020; Obruch, 2019) are devoted to the study of the need for digital transformation in the process of development of the railway transport in Ukraine.

In paper (Ovchynnikova & Toropova, 2019), the role of digitization in the process of ensuring the efficiency of operation and competitiveness of the Ukrainian railway transport enterprises was determined. The authors outline the following areas of activities of the railway transport enterprises as the priority ones: development of customer service based on the use of digital communication channels, strengthening of the partnership relations based on the digital platforms, creation of forecasts based on Big Data, and implementation of the personnel strategies. However, the proposed measures are the basis for the economic rationalization of the railway activities through the use of digital technologies.

The strategic context of the balanced development of the railway transport enterprises based upon the digitalization is studied in paper (Mnykh, 2020). In the course of the study the author summarized the foreign experience of digitalization in the railway industry and identified the features of the innovative development of railway enterprises in competitive market conditions. But the determination of the strategic context of managing the balanced development of the railway transport enterprises was based exclusively on the conditions of digitalization of the economics of Ukraine taking into account the study of future technological and market trends.

The study conducted in work (Obruch, 2019) is dedicated to revealing the role of the digital platforms in the development of services rendered by the railway transport enterprises as well as determination of their

advantages, functions, principles and organizational conditions of development. The author notes that increasing competitiveness and ensuring balanced development of the railway transport enterprises requires a comprehensive improvement of the processes of implementing their services which can be realized thanks to the use of digital tools, among which the development of the digital platforms is of great significance. However, the study conducted is focused only on the introduction of the digital platforms, while the process of digital transformation includes a wider toolkit of possible mechanisms for rationalizing the activities of the Ukrainian railways.

Thus, the review of the literary sources showed that quite a lot of studies were devoted to the need for innovative development of railway transport, including those taking into account importance of the digital transformation. However, the characteristics of specific mechanisms for the implementation of the innovative strategy of the development of the Ukrainian railways in the context of digitalization have not been studied much, and based on this fact this work is a relevant study and is of great importance.

Considering the fact that digitalization is achieved by implementing a system of solutions (services, applications, etc.) based on the state-of-the-art information and communication technologies that use a digital asset (a system of knowledge on business and external environment in the digital format which is covered by the right of ownership and/or right of use), formalization of the innovative strategy for the development of the Ukrainian railways in the context of this study is based on the basic principles of informatization and digitalization in the railway transport.

Global scientific and technical progress forms a significant reserve for improving the efficiency and quality of the transport process, the leading elements of which are the development of information and digital technologies in the operation of the transport systems. Currently, there are no programs for the innovative development of the railway transport in Ukraine regarding the development of informatization and digitalization of railway transportation, and it is therefore the selected research topic is particularly relevant.

## METHODOLOGY

To achieve the goal, the following tasks shall be solved:

1. Determining the basic principles of informatization in the railway transport which form the basis i.e. the necessary (but not sufficient) condition for digitization;
2. Investigating digitalization and its toolkit in the context of the railway transport functioning;
3. Performing an analysis of appropriate European strategic documents concerning railway transport with the identification of the key trends in the digital development;
4. Formalizing the most effective digital technologies for their application in the Ukrainian railways with the determination of the effects of their use.

When solving the mentioned tasks we used such methods of system analysis as abstraction and concretization, analysis and synthesis, induction and deduction, and formalization and specification.

## RESULTS

### Determination of the basic fundamentals of informatization in the railway transport

The analysis of the priority spheres of the scientific and technical development of the railway industry in the USA and the EU showed that the formation of the concept of informatization should be the initial stage in the rationalization of the activities of the Ukrainian railways which would take into account formation as well as introduction in the today's conditions of complex information technologies in the functioning of the industry, creation of a single information transmission network, significant increase of the capacity of the communication networks, introduction of the state-of-the-art software tools, and creating a modern system of collecting and processing primary information on the entire railway network.

The need to form the concept of informatization in the railway transport in Ukraine is determined by the fact that due to the development of the information

system efficiency of the functioning of the industry increases, since the entire transport process, including organizational and technological as well as management and decision-making procedures is provided with proper information support. Based on this, we will consider the key principles in the implementation of the concept of informatization of railway transport:

1. Transformation from autonomous management systems of individual railway transport enterprises to complex information systems implementing massive management functions;
2. Transformation to integrated automated and automatic control systems;
3. Transformation to automated information and management systems;
4. Formation of a complex of interdependent centralized objects of databases and knowledge bases as well as the ones distributed according to levels and management;
5. Application of electronic document management in the new information technologies;
6. Provision of information interaction with all participants of the transportation process (formation of interaction of various types of transport), state permitting and control bodies based on electronic information exchange together with the application of international standards;
7. Focus of data infrastructure development on open systems interaction architecture, application of modern architectures such as, for example, client-server etc.

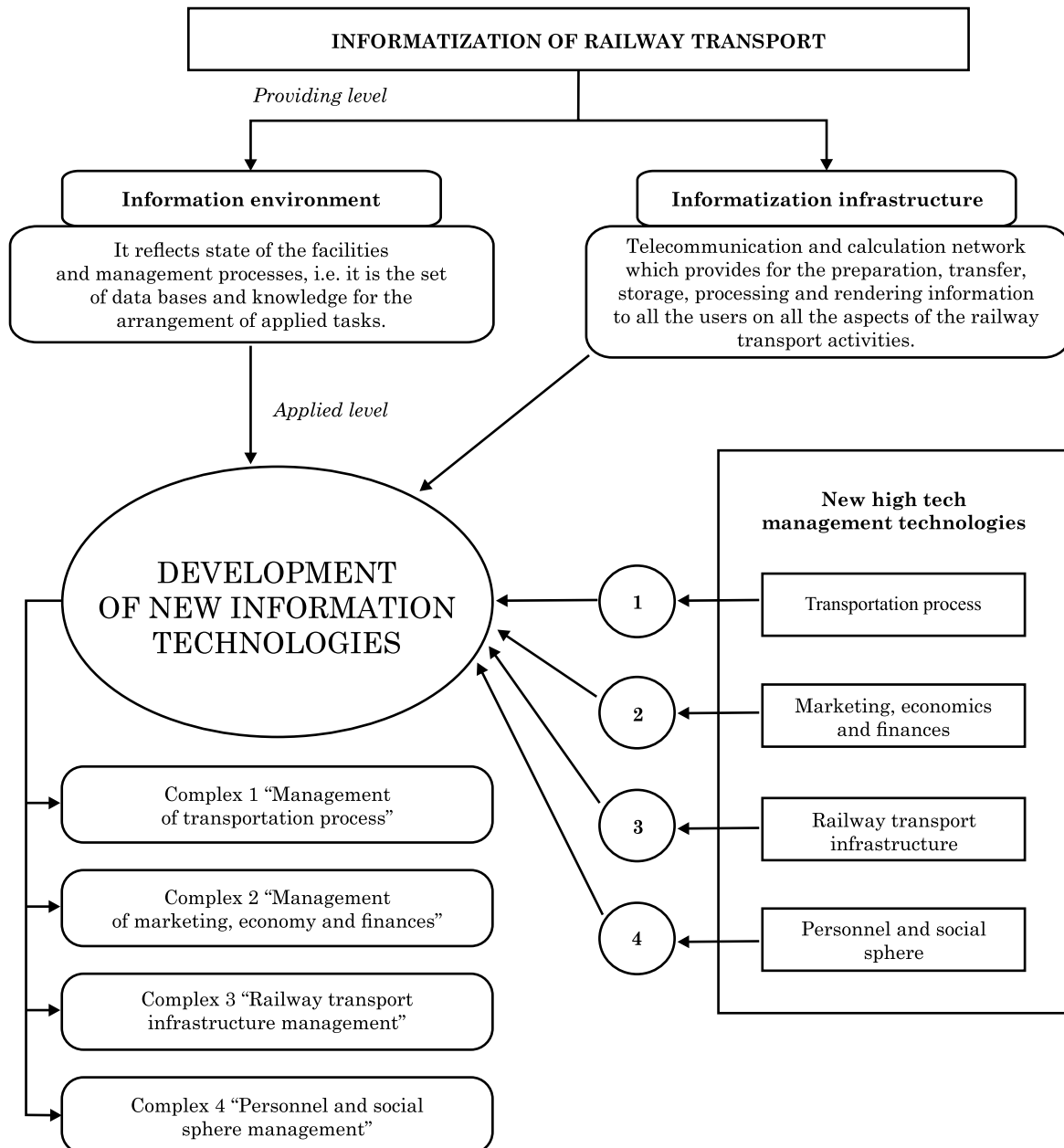
The need for continuous development of railway transport management information support is justified by the fact that in the conditions of restructuring the management system, changing functions and forms of ownership, increasing independence of enterprises, increasing and developing economic ties on a new economic basis without building a system of agreed models of basic and technological processes and defining basic information needs for their implementation is impossible. Based on this, it is advisable to consider the development of the informatization of Ukrainian railways as a system of coordinated functional models of information technology com-

plexes that ensure the maximum implementation of one of the functions of railway transport management (Fig. 1).

On the basis of the proposed concept, it is possible to focus attention on the main business processes in the activity of railway transport with the distribution

according to the existing levels of the management hierarchy of the functions performed at each level.

From a technical point of view, high requirements for the efficiency of management of the transportation process create the need for a higher level of informatization. This is explained by the fact that information



**Fig. 1.** Informatization of railway transport of Ukraine  
Source: own elaboration.



technology today is not just a means of supporting management, but one of the most important elements of the transport infrastructure, which from the category of auxiliary means has become the main technology and significantly affects the improvement of the transportation management process.

The prospects of informatization according to the concept (Fig. 1) are implemented in the form of a two-level structure:

1. Providing level – contains the information environment and forms the basis for information technologies;
2. Applied level – connects new methods, management mechanisms, information environment and informatization infrastructure.

According to the concept, a complex of information technologies is proposed, which are based on the following principles:

- Wide user access to the database and technical means;
- Use of modern methods and means of receiving and transmitting information at high speed and minimal distortion (program control and highly reliable communication channels);
- Highly effective means of automatic recording of information about rolling stock, automatic management of dynamic arrays of locomotives, wagons, and containers;
- Electronic document management of the transportation process according to simplified schemes of information circulation;
- Development of decision-making tools based on knowledge bases including situation modelling systems, option evaluations, and expert systems;
- Formation of elements and systems of artificial intelligence for decision-making in situations that are difficult to formalize;
- Development of user interaction languages with the information service system.

## **Digitalization and its toolkit in the context of railway transport functioning**

The next stage of the development of railway transport in Ukraine should be transition to digital transformation which will be carried out on the basis of information technologies.

It is worth noting that there are significant differences between informatization and digitalization, in particular:

Informatization is a certain set of toolkits which includes technological provision and software as well as data transmission systems that allow certain types of reporting and information exchange;

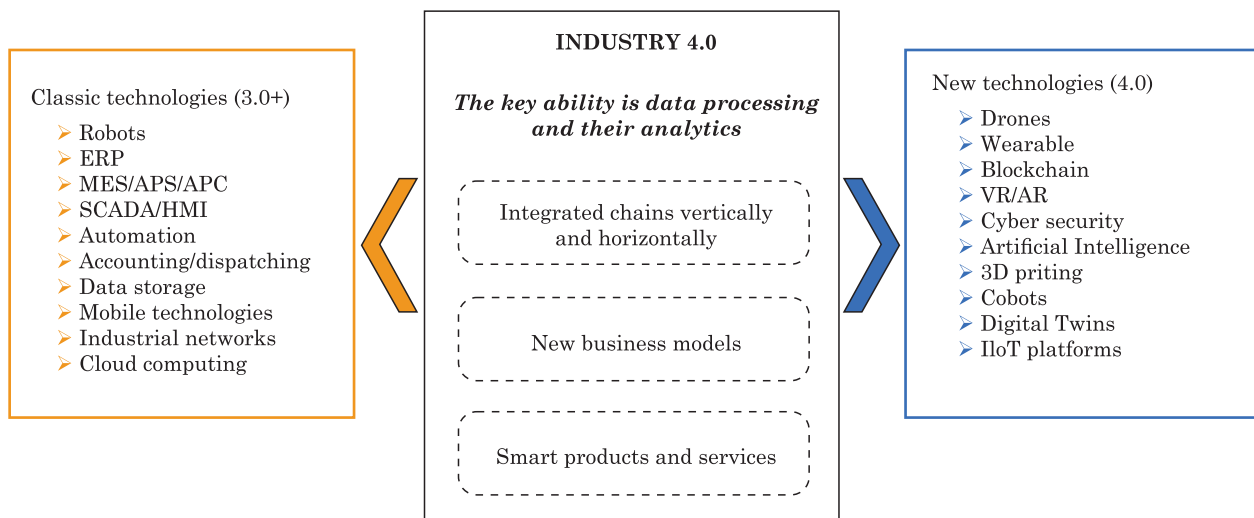
Digitalization represents another level of development: after entering the necessary data into the digital system, thanks to digitalization, tasks set by the user are solved, information is analyzed, and a forecast is provided.

Therefore, the informatization system is organically included in the digitalization system, which necessitates the step-by-step rationalization of railway transport.

The digital transformation of the transport system involves a large-scale change in technological and organizational processes through their digitization, which is aimed at increasing the productivity of traffic organization and increasing efficiency of managing the entire transportation process while ensuring its absolute safety. The model of digital transformation also takes into account adaptive capabilities that allow quick and flexible response to changes in the market situation and ensure a high speed of decision-making based upon a balanced assessment of possible risks, which is achieved through the use of various digitalization tools and mechanisms.

Key elements of digital transformation that can be used in all types of business activities, including on railway transport, are shown in Figure 2.

By analogy with the consideration of the structure of railway transport informatization, it is advisable to form a system of agreed functional models of digitization complexes with proposed mechanisms for implementing digital transformation.



**Fig. 2.** Toolkits of digital transformation in all types of business activities  
Source: own elaboration.

The structure of the digitalization of railway transport is expediently formed on the basis of the research carried out by The Mobility Innovation Lab (MIL) on the digital transformation of railways:

- Complex 1 “Digitization of management of operational work”;
- Complex 2 “Digitization of asset maintenance”;
- Complex 3 “Digitization of infrastructure maintenance”;
- Complex 4 “Digitization of control and signalling systems”;
- Complex 5 “Digitization of customer service”.

As a result of the intensive development of information and communication technologies, the implementation of the digital transformation of railway transport should be carried out with the help of modern digitalization tools which will provide data analytics and an opportunity to comprehensively solve the issues of effective development of the digital system in the arrangement of railway transportation. Taking into account the key elements of digital transformation (Fig. 2), we will formulate a priority digitalization toolkit for Ukrainian railways:

- Cloud technologies;
- Distributed ledger technology;
- Big Data technology;
- Internet of Things concept;

- Augmented Reality technologies;
- Artificial Intelligence technologies;
- Additive technologies (Additive Manufacturing; Additive Fabrication).

We will provide a more detailed description of the proposed digital transformation toolkits.

Cloud technologies provide the possibility of providing the user with convenient and prompt access to a whole complex of computer resources and capacities via the Internet, including various servers, storage systems, services and applications the use of which involves the possibility of relieving them from the load without the involvement of the provider and significant operational costs. Thus, cloud technologies allow the transfer of data processing and storage functions from personal computers to Internet servers, which allows for instant remote access of any level from any part of the world and from any device to information resources, radically changing existing business models and increasing the effectiveness and efficiency of business operations.

Distributed ledger technologies allow for the organization, storage and exchange of data share by all participants of a trusted environment, each of which has a complete copy of the data ledger and access to the entire transaction history. At the same time, the reliability and security of information

is ensured by cryptographic protection using special keys and an electronic signature, which allows monitoring the actions of all participants. Distributed ledger technologies provide synchronization of data ledger copies based on the agreement (consensus) of the participants to add new information, as well as reliable data protection against possible changes, partial or complete deletion.

One of the most common distributed ledger technologies is the blockchain technology, which is a sequential chain of data blocks that contain information built according to certain rules, when each new block is introduced into a chain of chronologically and cryptographically interconnected blocks. Thus, blockchain technology provides reliable storage of the entire data chain in the absence of centralized control.

Big data technology, the emergence of which is connected with the need to ensure the processing, analysis and storage of large volumes of constantly growing and updated data, the size of which exceeds the capabilities of traditional databases and analytical tools and systems. Currently, the main value of data is determined by the possibility of their participation in increasing competitiveness and efficiency of activities, creating new products, ensuring the validity and quality of management decisions made both on the basis of identified cause-and-effect relationships and on the basis of established correlation dependencies.

The concept of the “Internet of Things” provides for ensuring the interaction of physical and virtual objects and systems between themselves and the external environment based on built-in information and communication technologies and standards using communication channels. The development of cloud technologies and Big Data technologies, widespread computerization, and even a reduction in the cost of computing power and data transmission play a decisive role in the emergence of this concept. The Internet of Things, actually representing a set of interconnected devices, items, detectors and sensors, allows collecting various information about the connected control object and transmitting it for further processing and storage via the Internet.

Augmented reality technologies open up new opportunities for perceiving the surrounding world,

enrich it and make it more valuable and informative. This technology allows you to supplement the real world with virtual elements distributed in space, in real time by overlaying special content (text, graphics, and audio sequence).

Artificial intelligence technologies are based on the use of various algorithms that provide simulation of human thinking processes to support decision-making. Artificial intelligence, being a cognitive tool, allows, based on the analysis of the capabilities of the human mind and modelling of the internal structure of the system, to make decisions depending on the problem and context in real time, which allows automating a significant part of production processes and ensuring the digitalization of economic and social processes.

Additive technologies make it possible to create objects by layer-by-layer addition (build-up) of material based on the data of their digital model with the help of computer three-dimensional technologies. Thus, additive technologies, or the so-called 3D printing, is based on the construction of an object by sequential application of layers that form its contours and appearance, which is an alternative to traditional methods of production and modernization of objects.

The considered mechanisms of digital transformation of railway transport allow not only changing individual business processes, but also to ensure the restructuring of the entire industry in general and set the trajectory of its future development. At the same time, the greatest effect will be achieved due to the synergy of technologies, that is, the possibility of their application in aggregate.

It should also be noted that on the basis of the development of the digitalization of railway transport of Ukraine, the realization of the transit potential of the country, the increase of revenues from the export-import of transport services, the provision of new opportunities for the development of the transport industry and the economy as a whole due to the integration of the national transport system into the international digital transport space are expected in the future on the conditions of equality, mutually beneficial cooperation and equitable accelerated development.

### **Analysis of the European strategic documents concerning railway transport with the identification of the key digital development trends**

In order to confirm the relevance and necessity of developing the proposed innovative model of the development of Ukrainian railways, it is advisable to analyze the European experience of the development of digitalization in railway transport in more detail.

In 2014, the European Union (hereinafter referred to as the EU) created the public-private joint venture of Shift2Rail (Association of Industrial Automation of Ukraine, 2022) to provide a platform for the coordination and development of research and innovation activities that will be integrated into advanced rail solutions. Although Shift2Rail does not define digitization as an objective per se, it carries out activities related to it in some of its five Innovation Programs (IPs). For example, the first program (IP1) is designed to strengthen the digitalization of train subsystems and equipment (traction, brakes and doors). IP2 aims to support the European Railway Traffic Management System (ERTMS) as a solution for signalling and control systems worldwide. IP4 introduces innovations in digital services for passengers (ticketing, trip tracking etc.), while IP5 focuses on new digital features that improve the punctuality of rail freight.

In June 2018, the European Commission (hereinafter referred to as the EC) adopted a proposal for the approval of the “Digital Europe” Program for 2021 to 2027, which is currently being discussed by the EU co-legislators in the context of long-term financial support. “2021–2027 Digital Europe Program” (Ciechanowska, 2020) is a funding instrument that will focus on strengthening the EU’s potential in key sectors: high-performance computing, artificial intelligence, cyber security and digital skills. This program includes a transport component, which is included in the goal of the program with the aim of comprehensive development of digital capabilities in the country’s economy and society.

As to more technical aspects, to improve the interoperability of digital technologies and foster innovation, the EC published the “ICT” Standardization Priorities for the Digital Single Market in April 2016. “ICT” standards ensure the interaction of digital technologies and are the basis of an effective single digital market, an important participant of which is railway transport. It assumes that digital technology is already a key element of rail transport and that the latter can bring benefits from the proposed ICT standardization. In the same month, to strengthen the industrial and innovation aspects of the Digital Market Strategy, the EC adopted the Regulation of “Digitizing European Industry – Making the most of the Digital Single Market” (Document 52016DC0180, 2016), the main objective of which was to ensure that industry in all sectors and territories are fully aimed at digital innovation. In this regulation, the transport sector is mentioned very briefly, limited to automated driving. Nevertheless, the EC identified five priority areas for standardization of all the industries – 5G provision, cloud computing, Internet of Things, data technology and cyber security.

Thus, the EU has been actively developing digital technologies for many years, including on the rail transport. In addition to the legal framework discussed above, it is worth paying attention to the strategic directions of the development of digitalization in the EU railway transport. Representing railways, The Community of European Railway and Infrastructure Companies (CER), The International Rail Transport Committee (CIT), European Rail Infrastructure Managers (EIM), and The International Union of Railways (UIC) companies jointly developed and presented the “Road Map for of Digital Railways” (A Roadmap for Digital Railways, 2020).

The roadmap presented digitization as a top priority for the development of the railway industry and a key to railway competitiveness. The main part of the document describes the modern mechanisms of digital transformation of railways, which the representatives recommend for implementation in order to rationalize the operation of EU railway

transport. The proposed digitization toolkits includes (A Roadmap for Digital Railways, 2020):

1. Digitization of customer service:

- a. Adif Mobile is an application that shows real-time traffic information, train arrival and departure schedules, platform information, station and shopping area information and maps, and offers the option to subscribe to train and trip alerts;
- b. ÖBB multi-media portal platform is a partnership with a wireless connectivity and ICT solutions provider to provide an advanced multi-media portal platform for passengers, providing ÖBB customers with direct access to timely travel information and services, on-demand multimedia content and entertainment provided through the on-board train platform;
- c. Interoperable product service interface of the Association of German Transport Companies (VDV): almost every public transport organization (POO) in Germany which sets schedules and tariffs and concludes contracts for public transport has its own mobile application; since each application requires a separate registration, VDV eTicket Service has developed on behalf of several POOs an interoperable product service interface to make the mobile ticket convenient for customers;
- d. The Xrail project is a project that unites 6 railway partners (CFL cargo, DB Schenker Rail, Green Cargo, Rail Cargo Group, SBB Cargo and B Logistics) who aim to significantly increase the competitiveness of railcar shipments in Europe due to enhanced information before, during and after transportation as well as services for providing international transportation schedules, delay notifications and next-day arrival notifications.

2. Digitization of operational work (priority: Internet of Things & artificial intelligence):

- a. NMBS/SNCB's Optical character recognition (OCR) – digital technology that automates the previously manual input of railcar identification numbers through trackside cameras that check

the composition of trains; this information can be used for various purposes: information for the passenger, maintenance point, traffic control, train staff; it detects vandalism; regular inspections can help determine where and when railcars were damaged;

- b. CFL Traceability of goods – tracking software capable of locating cargo using GPS, it also allows tracking the CO2 impact of transport services;
  - c. DB's DIANA predictive maintenance platform – sensor technologies collect data in real time, which is then transmitted and distributed on the diagnostic and analysis platform (DIANA); the process includes measurement, collection, analysis and finally provision of structured data (DIANA is a user interface that enables a variety of applications, especially for predictive maintenance);
  - d. SBB Adaptive steering (ADS) is a real-time management of railway services (mobile application for drivers) to avoid unscheduled stops; the dispatch software calculates the optimal speed for each individual train based on forecasts across the entire rail traffic network, thus creating a “green wave” for rail traffic (over 5,000 parameters are analyzed every three seconds and train traffic forecasts are calculated, then the recommended optimal speed is sent to the driver).
3. Digitization for the purpose of increasing the competitiveness of railways:
- a. RailTopoModel – a standard for all data exchanges in the sphere of railway infrastructure; the first release (RailTopoModel Version 1, April 2016) is the basis of a universal language designed to support digital continuity in railways throughout the lifecycle and operation of the rail network;
  - b. Building Information Modelling – information modelling of objects, that is, the process of generating, creating and managing physical, environmental, commercial data throughout



the life of the project using technologies based on models related to the project information database;

- c. Swedish Trafiklab – ASTOC/SJ is a place where developers can share data and APIs (application programming interfaces) for public transport in Sweden and easily get the information they need to develop accurate services;
- d. ATOC's open data – ATOC – opens information data for public access for use by developers and third parties, including information channels with national passenger information systems, in creating their own programs;
- e. Open data platforms are open data platforms where there is an opportunity to cooperate with startups in order to solve current problems of the railway industry.

Therefore, the analyzed experience of the digital transformation of railway transport in Europe shows that the use of digital technologies is one of the main priorities for the development of the railway sector and its future. This is confirmed by the fact that for a long time the European railway industry has been offering its customers highly efficient and attractive transport services using modern technologies of digital transformation.

### **Formalization of the most efficient digital technologies for their application on the Ukrainian railways**

On the basis of the study conducted, it is possible to formalize some possible solutions for the implementation of an innovative strategy for the development of Ukrainian railways in the context of digitalization, taking into consideration their current state.

Development of the existing and the implementation of the proposed digitalization options in the Ukrainian railway transport will ensure an increase in the efficiency of the activities, in particular:

1. In the field of passenger and suburban transportation:
  - a. Improving the quality and velocity of passenger service;

- b. Increasing the innovative and investment attractiveness of the Ukrainian railways, creating new jobs;

2. In the field of freight transportation:

- a. Competitiveness of railway transportation, attraction of investments, private rolling stock, private traction, and rapid renewal of the freight wagon fleet;
- b. Improved system compatibility is to allow customers to travel using a wide range of different and connected regimes at a single integrated price;
- c. To arrange a multimodal logistics system with automation of contracting, payments, movement of accompanying documentation, insurance, etc.;

3. In the field of the infrastructure and rolling stock management:

- a. Reducing the rate of aging of the technical items, increasing the safety of train traffic;
- b. Rationalization (lowering) of operational costs;
- c. Restoration of the domestic locomotive industry and making it competitive in the future;
- d. Transition to repairs in accordance with the condition, reduction of costs for diagnostics and repairs, and rationalization of the depot network;

4. In the field of production:

- a. Preparation of the “base”: availability of digital data in automatic mode for their further processing;
- b. Reduction of the costs for the production of individual spare parts; shortening the release dates of new products;

5. In the field of signalling and interoperability:

- a. Involvement of a larger number of providers will improve the quality and speed of the Internet, and as a result it will increase the comfort of the trip, the attractiveness of services due to additional services that could be provided with the aid of the Internet, in particular, Smart Mobility;
- b. Increasing comfort, attracting passengers, and increasing revenues due to connection to Smart Mobility.

## CONCLUSIONS

Currently, special attention is paid to the issues of informatization and digital transformation of various sectors of the economy and spheres of activity, and the development of transport systems in this context is becoming one of the priority directions of the country's strategic development.

The research conducted showed that within the framework of rationalizing the work of railway transport of Ukraine, it is necessary to foresee a transition to a new innovative model of functioning, the foundation of which will be high-tech infrastructure objects and specialized complexes that take into account scientific knowledge and achievements of advanced technology and equipment. For this purpose:

1. The basics of informatization and digitalization of railway transport are characterized as essential prerequisites for the modern technological, economic and managerial development of the industry, increasing the efficiency and safety of the transportation process as well as high-quality transport service for users of railway transport;
2. Structures, actual principles and mechanisms of implementation of the proposed new innovative model of railway transport development were formulated;
3. An analysis of the effectiveness of the development of digital technologies was carried out on the example of EU countries whose experience shows the priority of introducing digitalization into the strategic development of railways.
4. Possible solutions for the implementation of an innovative strategy for the development of the Ukrainian railways in the context of digitalization were formalized taking into account their current state, and effects of their implementation were determined.

It should also be noted that the development of projects for the innovative development of railway transport in the context of the introduction of modern information and digital technologies has high investment attractiveness, both for the transport

system itself and for the country. This is confirmed by the fact that:

1. Railway informatization is not only an objective need for the organization of railway transport, but it can also increase labour productivity, expand transport markets, improve the quality of services for passengers and shippers, as well as promote reforms and innovations in the railway industry;
2. Due to the implementation of large-scale national projects of digital transformations – from priority sectors of the economy to such areas of life as medicine, education, transport, ecology, tourism etc., Ukraine will be able to reach a GDP value of \$1 trillion as early as by 2030, i.e. 8 times more.

At the same time, implementation of the transition to an innovative model of development depends on the joint participation and interaction of the state, industry enterprises, innovative companies being developers of new technologies and equipment, expert institutes, including international ones, and the scientific and educational community.

Thus, one of the most acute problems of the Ukrainian railway transport is the low intensity of introduction of innovative technologies and systems, which negatively affects efficiency of functioning, image, economic indicators, and competitiveness. The study conducted in this work can become a universal tool for strategic planning of the innovative development of the Ukrainian railways in the context of informatization and digitization of their activities, and it will allow optimizing activities of the Ukrainian railways making them client-oriented, rationalizing management and control of working capacity, and integrating them into the European and Eurasian transport network.

**Author contributions:** authors have given approval to the final version of the article. Authors contributed to this work as follows: O. Strelko developed the concept and designed the study, O. Solovyova collected the data, L. Solovyova analysed and interpreted the data, Yu. Berdnychenko prepared draft of article, H. Kyrychenko revised the article critically for important intellectual content.

**Funding:** This research received no external funding.

**Note:** The results of this study were not presented in any other form.

## REFERENCES

- A Roadmap for Digital Railways. (2020). *Digitalisation is one of the top priorities for the rail sector and its future. Representing the railways*. Retrieved from: <https://documents.pub/document/cer-cit-eim-and-uic-present-this-joint-a-roadmap-for-digital-railways-2-digitalisation.html?page=12>
- Abushaega, M.M., Daehy, Y.H., Alghamdi, S.Y., Krishnan, K.K., & Khamaj, A. (2021). Design of supply chain network to reduce impacts of damages during shipping. *Management and Production Engineering Review*, 12(2), 17–26. <https://doi.org/10.24425/mper.2021.137674>
- Association of Industrial Automation of Ukraine. (January 4, 2022). *Digitalization, Innovation, Metro. Open innovation, Rail technologies. The digital transformation of rail A revolution within the sector – Mobility Innovators*. Retrieved from: <https://mobility-innovators.com/the-digital-transformation-of-rail-a-revolution-within-the-sector/>
- ter Beek, M.H., Borälv, A., Fantechi, A., Ferrari, A., Gnesi, S., Löfving, C., & Mazzanti, F. (2019, October). Adopting formal methods in an industrial setting: the railways case. In ter Beek, M.H., McIver, A., Oliveira, J. (Eds.). *Formal Methods – The Next 30 Years*. FM 2019. *Lecture Notes in Computer Science*, vol. 11800 (pp. 762–772). Cham: Springer. [https://doi.org/10.1007/978-3-030-30942-8\\_46](https://doi.org/10.1007/978-3-030-30942-8_46)
- Bibik, S., Strelko, O., Nesterenko, H., Muzykin, M., & Kuzmenko, A. (2020, November). *Formulation of the mathematical model for the planning system in the carriage of dangerous goods by rail*. IOP Conference Series: Materials Science and Engineering (Vol. 985, No. 1, p. 012024). IOP Publishing. <https://doi.org/10.1088/1757-899X/985/1/012024>
- Ciechanowska, M. (2020). Program ramowy Horyzont Europa czynnikiem wspierającym transformację energetyczną kraju [Horizon Europe framework programme as a factor supporting the energy transformation of the country]. *Nafta-Gaz*, 11, 870–874. <https://doi.org/10.18668/NG.2020.11.13>
- Document 52016DC0180. (2016). *Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions. Digitising European Industry Reaping the full benefits of a Digital Single Market*. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016DC0180>
- Doubell, G.C., Kruger, K., Basson, A.H., & Conradie, P. (2021, August). *The Potential for Digital Twin Applications in Railway Infrastructure Management*. World Congress on Engineering Asset Management (pp. 241–249). Cham: Springer. [https://doi.org/10.1007/978-3-030-96794-9\\_22](https://doi.org/10.1007/978-3-030-96794-9_22)
- Fesovets, O., Strelko, O., Berdnychenko, Y., Isaienko, S., & Pylypchuk, O. (2019). *Container transportation by rail transport within the context of Ukraine's European integration*. Proceedings of the 23rd international scientific conference Transport Means (pp. 381–386). Part 1, 2019-October. Kaunas University of Technology, Kaunas. Retrieved from: <https://transportmeans.ktu.edu/wp-content/uploads/sites/307/2018/02/Transport-means-2019-Part-1.pdf>
- Fishchuk, V., Matiushko, V., Cherniev, Ye., Yurchak, O., Lavryk, Ya., & Amelin A. (2018). *Ukraine 2030E is a country with a developed digital economy*. Retrieved from: <https://strategy.uifuture.org/kraina-z-rozvinutoyu-cifrovoyu-ekonomikoyu.html#6-2-12> (30.01.2023).
- Fomin, O., Lovska, A., & Horban, A. (2021). Historical aspects of construction and operation of train ferry routes. *History of Science and Technology*, 11(2), 351–382. <https://doi.org/10.32703/2415-7422-2021-11-2-351-382>
- Granström, R., Söderholm, P., & Eriksson, S. (2022). Rail View, Sky View and Maintenance Go – Digitalisation Within Railway Maintenance. In R. Karim, A. Ahmadi, I. Soleimanmeigouni, R. Kour, & R. Rao (Eds.). *International Congress and Workshop on Industrial AI 2021. IAI 2021. Lecture Notes in Mechanical Engineering* (pp. 224–239). Cham: Springer. [https://doi.org/10.1007/978-3-030-93639-6\\_19](https://doi.org/10.1007/978-3-030-93639-6_19)
- Hryhorak, M., Lyakh, O., Sokolova, O., Chornogor, N., & Mykhailichenko, I. (2021, November). *Multimodal freight transportation as a direction of ensuring sustainable development of the transport system of Ukraine*. IOP Conference Series: Earth and Environmental Science (Vol. 915, No. 1, p. 012024). <https://doi.org/10.1088/1755-1315/915/1/012024>

- Jabłoński, A., & Jabłoński, M. (2020). Social perspectives in digital business models of railway enterprises. *Energies*, 13(23), p. 6445. <https://doi.org/10.3390/en13236445>
- Kulbovskiy, I.I., Aharkov, O.V., Kharuta, V.S., & Halushko, M.M. (2021). Main criteria of complex evaluation of subway train power facility technological productive potential. *IOP Conference Series: Materials Science and Engineering*, 1021(1), p. 012007. <https://doi.org/10.1088/1757-899X/1021/1/012007>
- Mnykh, O.B. (2020). Stratehichniy kontekst zbalansovano-rozvytku pidpriemstv zaliznychnoho transportu na osnovi tsyfrovizatsii [Strategic context of balanced development of railway transport enterprises based on digitalization]. *Visnyk ekonomiky transportu i promyslovosti [Herald of the economy of transport and industry]*, 69, 135–146.
- Obruch, H.V. (2019). Rozvytok posluh pidpriemstv zaliznychnoho transportu na osnovi rozbudovy tsyfrovyykh platform [Development of services of railway transport enterprises based on the development of digital platforms]. *Pidpriemnytstvo ta innovatsii [Entrepreneurship and innovation]*, 10, 69–73.
- Ovchynnikova, V.O., & Toropova, V.I. (2019). Rozvytok pidpriemstv zaliznychnoho transportu Ukrainy v umovakh tsyfrovizatsii [Development of railway transport enterprises of Ukraine in conditions of digitalization]. *Visnyk ekonomiky transportu i promyslovosti [Herald of the economy of transport and industry]*, 68, 175–181.
- Peraković, D., Periša, M., Petrović, M., Cvitić, I., & Zorić, P. (2022). Challenges of Improving the Railway Passenger Information System in the Republic of Croatia. In L. Knapić, D. Peraković, M. Periša, & M. Balog (Eds.). *Sustainable Management of Manufacturing Systems in Industry 4.0. EAI/Springer Innovations in Communication and Computing* (pp. 143–158). Cham: Springer. [https://doi.org/10.1007/978-3-030-90462-3\\_10](https://doi.org/10.1007/978-3-030-90462-3_10)
- Pidopryhora, I.V., & Kovalova, D.A. (2021, October). Innovatsiyni rozvytok zaliznychnoho transportu Ukrainy [Innovative development of railway transport of Ukraine]. *Liudyna, suspilstvo, komunikatyvni tekhnolohii: materialy IX mizhnarodnoi naukovo-praktychnoi konferentsii [Man, society, communication technologies: materials of their international scientific and practical conference]*. Kharkiv: DISA PLIuS.
- Sementsova, O.V., & Krykhtina, Yu.O. (2018). Investytsiino-innovatsiyni rozvytok zaliznychnoi haluzi: problemy, perspektyvy ta napriamky podolannya [Investment and innovation development of the railway industry: problems, prospects and directions for overcoming]. *Ekonomika ta suspilstvo [Economy and society]*, 17, 360–365.
- Severino, A., Martseniuk, L., Curto, S., & Neduzha, L. (2021). Routes planning models for railway transport systems in relation to passengers' demand. *Sustainability*, 13(16), p. 8686. <https://doi.org/10.3390/su13168686>
- Sharma, M.G., & Sharma, S.M. (2022). Frontiers of Blockchain for Railways. In A. Emrouznejad, & V. Charles (Eds.). *Big Data and Blockchain for Service Operations Management. Studies in Big Data*, 98. Cham: Springer. [https://doi.org/10.1007/978-3-030-87304-2\\_15](https://doi.org/10.1007/978-3-030-87304-2_15)
- Statyuka, Y., Kyrychenko, H., Strelko, O., & Berdnychenko, Y. (2021). Control of technological processes using a fuzzy controller of the system for management of cargo delivery by railway. *Acta Scientiarum Polonorum. Administratio Locorum*, 20(3), 241–251. <https://doi.org/10.31648/aspal.6808>
- Strelko, O.H., Kyrychenko, H.I., Berdnychenko, Y.A., Sorochnytska, O.L., & Pylypchuk, O.Ya. (2019). Application of information technologies for automation of railway and cargo owner interaction. *IOP Conference Series: Materials Science and Engineering*, 582(1). <https://doi.org/10.1088/1757-899X/582/1/012029>
- Timchenko, L., Wójcik, W., Kokriatskaia, N., Tverdomed, V., Poplavskiy, O., Levchenko, O., & Kryvinska, N. (2020). New Methods of Network Modelling Using Parallel-Hierarchical Networks for Processing Data and Reducing Erroneous Calculation Risk. In *CITRisk* (pp. 201–212). Retrieved from: <http://ceur-ws.org/Vol-2805/paper15.pdf>
- Tokmakova, I.V., Khomotiuk, O.V., & Novikov, R.O. (2016). Stratehichni oriientyry innovatsiynoho rozvytku zaliznychnoho transportu Ukrainy [Strategic guidelines for the innovative development of railway transport in Ukraine]. *Visnyk ekonomiky transportu i promyslovosti [Herald of the economy of transport and industry]*, 55, 73–79.
- Ursarova, A., Mussaliyeva, R., Mussabayev, B., Kozachenko, D.M., & Vernigora, R.V. (2022). Multi-Criteria Evaluation of Professional Qualities of Railway Dispatching Personnel Using Computer Simulations. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, 2, 141–147. <https://doi.org/10.33271/nvngu/2022-2/141>

- Verkhovna Rada of Ukraine. (2018a). *Concept of development of the digital economy and society of Ukraine for 2018–2020*. Retrieved from: <https://zakon.rada.gov.ua/laws/show/67-2018-%D1%80#Text> (30.01.2023).
- Verkhovna Rada of Ukraine. (2018b). *National transport strategy of Ukraine for the period until 2030*. Retrieved from: <https://zakon.rada.gov.ua/laws/show/430-2018-%D1%80#Text> (30.01.2023).
- Zhu, L., Yu, F.R., Wang, Y., Ning, B., & Tang, T. (2018). Big data analytics in intelligent transportation systems: A survey. *IEEE Transactions on Intelligent Transportation Systems*, 20(1), 383–398. <https://doi.org/10.1109/TITS.2018.2815678>
- Zorić, P., Mikulčić, M., Musa, M., & Kuljanić, T. (2022). Analysis of Available Information and Communication Solutions and Services for Railway Passenger Information in the EU. In L. Knapčíková, D. Peraković, A. Behúnová, & M. Periša (Eds.). 5th EAI International Conference on Management of Manufacturing Systems. *EAI/Springer Innovations in Communication and Computing*. Cham: Springer. [https://doi.org/10.1007/978-3-030-67241-6\\_29](https://doi.org/10.1007/978-3-030-67241-6_29)





ORIGINAL PAPER

Received: 20.09.2022

Accepted: 12.01.2023

## RECREATIONAL AND LEISURE DEVELOPMENT FOR THE ELDERLY IN RESIDENTIAL AREAS IN LUBLIN

Ewa Trzaskowska✉

ORCID: 0000-0002-7698-9471

The John Paul II Catholic University of Lublin

Konstantynów Street 1H, 20-950 Lublin, **Poland**

### ABSTRACT

**Motives:** A city is a socio-urban system. In urban development, emphasis is placed on housing needs, which leads to the development of housing estates. Although housing estates are poorly rated in Europe, they are still attractive places to live in Poland. However, they do not always meet the residents' needs. This is especially true of seniors.

**Aim:** Six housing estates in different districts of Lublin were analyzed. An attempt was made to determine whether recreational and leisure facilities in the examined housing estates are conducive to senior activities, whether they are influenced by the time of construction, and what measures can be implemented to improve the accessibility of these spaces.

**Results:** In contrast to newly built neighborhoods, older block housing is more abundant in green areas and public spaces that encourage active and passive recreation. Recreational development in housing estates lacks facilities for diverse groups of seniors. Active modernization measures are not being implemented to improve their functioning.

**Keywords:** seniors, leisure, block housing, development estates, greenery, public spaces

### INTRODUCTION

One of the most important services offered by cities is the fulfillment of the housing needs of the population. The urban unit that fulfills this function is residential neighborhoods. It is estimated that they are inhabited by more than half of the urban population (Zaborowski et al., 2009) and this percentage is increasing every year (Bakalarczyk, 2021). Unfortunately, this environment has quite a few disadvantages that their residents have to deal with on a daily basis (Gabryńczyk & Orlńska, 2019).

In Europe and Poland, the construction of settlements intensified, in the post-war years. Efforts were made to create spaces that were comfortable for

their residents. Pedestrian traffic became a priority, inside them, while the possibility of vehicular traffic was eliminated. A green structure was introduced, which often assumed grandiose proportions, along with a recreational structure and elements of small architecture, such as sculptures, which enriched and made neighborhood areas more attractive. By designing according to the principle that man comes first, concepts were introduced that realized his basic needs. Such settlements enjoyed the approval of residents (Wrana & Czapla, 2016). In Poland, after the change of the political system (in the 1990s), there was a transformation of the previous character of settlement units in terms of urban development. It began to be practiced to sell land to developers, who created groups

✉etrzaskowska@kul.pl

of buildings separated by fences, devoid of greenery and recreation areas (Przesmycka & Sosnowska, 2013).

Unlike in Germany, the UK, or France, block housing estates in Poland are not stigmatizing or emptying. At the beginning of the 21st century, 84% of respondents in Poland said that living in a block of apartments does not degrade socially. Housing estates are inhabited by all social strata, and migration is largely the result of the aging of the generation that lived in them in the 1970s–80s and younger residents moving in or renting. Therefore, the focus should be on preserving their key assets and realizing their potential, but also adapting them to the changing needs of residents (Chmielewski & Mirecka, 2001).

One of the global trends that affects all cities in developed countries, including Poland, is the aging of the population (Fabiś et al., 2015), for which most cities are not prepared (Labus, 2014; Szołtysek & Trzpiot, 2019). In the face of these changes, seniors will play a key role in shaping urban life and cities must take measures to adapt to this situation (Labus, 2014). Korzeniak (2011), the source of the success of European cities in the 21st, on this issue, sees an integrated approach. Among other things, it is based on adapting the urban environment for the elderly so that they can remain active and healthy. In addition, it emphasizes public and commercial services, which should function in such a way as to make them more accessible and adaptable to the different levels of fitness of the elderly. In 2007, the WHO launched the Age Friendly Cities project (Tomczyk & Klimczuk, 2016; Magdziak, 2017), which considers as an important feature of cities the presence of public spaces friendly to healthy aging, the presence of green areas in residential areas, which become the closest and most used place of life for seniors (Niezabitowska et al., 2013). Studies show that a condition for staying fit in old age is, among other things, independence, which is provided by one's own apartment, a familiar neighborhood (Magdziak-Grabowska, 2014; Miśnikiewicz, 2017). Measures should be taken to remove architectural, functional-spatial barriers and create incentives for the use of public spaces and green areas. Favor activities for healthy aging and prevention

of diseases of old age, preserving physical and mental fitness (Bakalarczyk, 2021). Research at the level of neuroscience indicates that an aesthetically pleasing environment raises the level of endorphins – the happiness hormone, and the satisfaction of being in a well-appointed space with diverse vegetation, fosters social integration, undertaking activities that promote fitness. It affects the quality of life (Steuden, 2001; Ranzijn, 2002; Kaczmarczyk & Trafiałek, 2007; Trempała, 2011; Tomczyk & Klimczuk, 2016). In order to understand the importance of common spaces, an everyday perspective and a practical approach were adopted. It was assumed that spatial elements in the place where seniors live have a significant impact on initiating, or limiting, their activities. A comparative analysis of leisure and recreational spaces and technical infrastructure located within six neighborhoods built in different periods of Lublin's development was carried out, as well as assessments of the extent to which they fulfill the needs of seniors to spend their free time actively or passively.

## MATERIALS AND METHODS

Analyses were made to determine the adaptation of open areas and public spaces of residential areas to the needs of the aging population and the capabilities of senior citizens. The main problem was whether the existing spatial development (spatial layout, communication, elements of small architecture) is adapted for these people. Areas were studied in terms of daily recreation. In addition, the analyses singled out places conducive to social contacts and enabling and encouraging active leisure activities. The settlements selected for the study were ZOR Zachód, Adam Mickiewicz, Błonie, Poręba, Botanik and SBM Oaza, located in different neighborhoods (Table 1). The choice resulted from the urban transformations of the settlements created in different periods of Lublin's development and the changing approach to shaping recreational areas.

Field visits and inventories of recreational forms in the structure of settlements were carried out, along with an assessment of the opportunities for active

**Table 1.** Summary of permeable and impervious surfaces in the settlements

The name of the estate	Time of construction of residential buildings	Location district	surface the terrain [m <sup>2</sup> ]	surface buildings [m <sup>2</sup> ]	surface biologically active [%]
ZOR Zachód	40–50. XX c.	Wieniawa	60,717	14,914	38
A. Mickiewicza	50–70. XX c.	Rury	309,403	52,612	52
Błonie	80. XX c.	Czuby Północne	162,504	24,391	54
Poręba	90. XX c.	Czuby Południowe	458,541	76,405	44
Botanik	2000–2010	Sławin	177,285	31,247	18
SBM Oaza	2010–2020	Węglin Południowy	41,509	13,757	20

Source: own preparation.

and passive leisure activities of their residents. Their number, state of preservation of equipment, aesthetics, presence of greenery, and accessibility for people with dysfunctions were taken into account. This made it possible to determine the nature of the entire recreational and leisure system and its possibilities for use by residents.

## RESULTS

The largest areas are in the settlements of Poręba and A. Mickiewicz, but the largest amount of biologically active, open areas is in the settlements of Błonie and A. Mickiewicz, it is more than 50%. The least amount of these areas is found in the newest settlements built after the transformation period. They occupy about 20% (Table 1).

Quantitatively, the largest number of recreational spaces was recorded in the A. Mickiewicz estate, there are as many as 16 well-developed and diversified squares, there are places for exercise and varied greenery (tall trees, clumps of shrubs, flowerbeds with flowering perennials). Considering the size of the settlements, the situation seems to be good in terms of the presence of such spaces also on SBM Oaza and on ZOR Zachód. However, this does not correspond to the actual situation. Such spaces as squares do not exist in the settlements: Poręba, Błonie, Botanik, SBM Oaza. On the other hand, there are more recreational places for young people in these settlements (sports fields, skatepark, ping-pong tables). Places dedicated to children under 10, on the other hand, are found in the youngest estates: SBM Oaza, Botanik, Poręba.

Due to the nature of the largely retired residents, taking care of grandchildren are also in the older settlements in the A. Mickiewicz and ZOR Zachód (Table 2). The quantity does not always indicate the presence of quality spaces for seniors (Table 3).

In ZOR Zachód, squares with benches, and seats in playgrounds that can be used for passive recreation can be considered to meet the expectations of seniors. Highly aesthetic is the green square occurring between the buildings on Puławska 13 and 15 Street. It is distinguished by the presence of three benches with backrests, and an abundance of greenery. The other zones have fewer leisure infrastructure elements and a small amount of greenery. None of the analyzed spaces is adapted to the full realization of the needs of active spending of time of this group of residents. The problem is the small number of benches, most of them without backrests and armrests. There is a shortage of benches near blocks, and along traffic routes, which hinders passive recreation. Much of the pavement is dilapidated. There have been no revitalization or modernization activities concerning public spaces. Replacement of benches has not been reported.

On the A. Mickiewicz estate, the places chosen by seniors are squares, which form a rich network. Most of them are at least partially shaded, rich in vegetation and small architecture. They occur between almost all blocks of flats. In every part of the estate there are well decorated playgrounds, sports fields with benches. In the center of the estate there is a large “rocket square”, recognizable in Lublin, with sidewalk games, a large number of playground equipment (rocket,

**Table 2.** Diversity of leisure and recreational spaces in Lublin's settlements

Number of recreational spaces	ZOR Zachód	A. Mickiewicza	Błonie	Poręba	Botanik	SBM Oaza
Playground	8	9	9	23	12	15
Single play equipment	2	4	0	2	0	0
Volleyball court	0	2	1	0	0	0
Volleyball and basketball court	0	2	1	0	0	0
A basketball court	1	1	1	2	0	1
Basketball and football field	0	0	1	0	0	0
Football pitch	1	1	1	5	2	1
Ping-pong table	0	1	4	0	0	0
Stand for board games	0	2	4	0	0	0
Outdoor gym	0	2	4	2	1	1
Fitness track	0	0	1	0	0	0
Skatepark	0	0	1	0	0	0
Sidewalk games and activities	0	2	1	0	0	0
Playground for dogs	0	1	0	0	0	0
Green square	2	0	0	0	0	1
A square with a discount	2	7	0	0	0	0
A square with a paved surface	1	8	0	0	0	0
A square with a fountain	1	1	0	0	0	0
Park/insulating greenery	0	1	0	0	0	0
Sum	18	42	29	34	15	19

Source: own preparation.

**Table 3.** Quality of leisure and recreational structure elements for seniors

The name of the estate	The condition of the equipment			The condition of the surface			Aesthetics, the presence of greenery			Accessibility for people with disabilities		
	3	2	1	3	2	1	3	2	1	3	2	1
ZOR Zachód			+			+		+			+	
A. Mickiewicza	+			+			+				+	
Błonie			+	+				+				+
Poręba			+	+				+				+
Botanik			+	+					+			+
SBM Oaza			+	+					+			+

Markings: 3 good, 2 average, 1 poor

Source: own preparation.

airplane, ship, car), gym, game tables, fountain, gazebos, very many benches with backrests. In another part there is a slightly smaller playground, with a toboggan hill, a bicycle track, flowerbeds and a rest area with benches to facilitate social interaction among seniors. The estate is characterized by rich greenery, private front gardens, ornamental flowerbeds. Lawns

are mowed less frequently (about 5 times a season), which increases biodiversity and reduces noise. There are feeders, birdhouses, insect hotels. Places for hedgehogs are created. As a result, the animal world is rich, allowing contact with nature valued by seniors. On the estate, a great number of benches have been set up along the alleys, and they also occur at most of the



entrances to the blocks. Surfaces are mostly renovated, and stairways have handrails. Upgrades, renovations are being carried out on the estate. The central square has been rebuilt, new benches are being inserted. A lot of new infrastructure elements are observed, new plantings (trees, shrubs, perennials).

Seniors do not have their own places on the Błonie settlement, they can only rest in children's recreation areas or use board game stands. There is a similar situation on the Poręba settlement, out of 35 areas, 11 belong to private areas (playgrounds). There are few benches, the greenery is not very diverse. Surfaces are mostly in good condition.

A very small variety of facilities for leisure activities is found in the SBM Oaza estate. There are 19 leisure and recreational spaces, of which 3 are private areas. These are playgrounds located within fenced apartment complexes, to which residents of other blocks do not have access. The remaining 16 are public areas, but as many as 12 are for children's recreational needs in the form of playgrounds. There is very little greenery in the area, and no shade greenery. The problem is the small number of benches, often without backrests and armrests, and there is a lack of benches near blocks, along traffic routes. Surfaces are mostly in good condition.

The study shows that the Adam Mickiewicz estate has the most developed leisure structure, there are areas that meet the needs of representatives of each age group, in addition, they are characterized by a large amount of diverse greenery and elements of leisure infrastructure. ZOR Zachód the oldest of the estates assessed, despite the presence of a large amount of vegetation requires supplementing it with elements of leisure infrastructure, as the area is quite poor in terms of the possibility of realizing the needs of passive or active rest of seniors. The newest estates, which include Poręba, the construction of which began at the end of the 20th century, and Botanik and Oaza, already built in the 21st century, are characterized by the gradual disappearance of the variety and quantity of recreational and leisure spaces over the years. This is due to the fact that developers erecting multifamily development zones do not pay attention

to the needs of residents, beyond having their own unit and parking space. Most often, recreational spaces are playgrounds designed for children under 10 years old, and the rest of the population can only spend their leisure time using the benches located within them, and sometimes there are small playgrounds suitable for only one sport. Green areas are much more sparse than those found in settlements dating from earlier years.

## CONCLUSIONS AND DISCUSSION

Several problems were diagnosed in the study areas. One of the main ones that appeared in each settlement is the neglect of the recreational needs of people with disabilities. Only in the ZOR Zachód, Adam Mickiewicz and Błonie estates was the presence of areas allowing passage or free stopping for users with mobility impairments observed in several squares. There is a lack of exercise areas adapted for the elderly and people with disabilities. In most neighborhoods, there is a small number of organized recreation areas adapted to the different activity levels of seniors, i.e. places that older people could use without any restrictions. This includes places for intimate recreation near the entrances to stairwells, as well as at some distance from them. There is a lack of squares with a small area, separated from other activity zones (often oppressive, such as children's playgrounds), intended for a small number of users, for resting in peace and quiet, holding meetings, holding conversations and observing the surroundings. Similar restrictions apply to active leisure zones, such as recreational or sports areas with equipment directly adapted to the limited physical capabilities of seniors, which should enable them to improve their physical condition or at least perform simple physical exercises for rehabilitation.

Another issue is the creation of consistent greenery. A model in the creation of greenery is the Adam Mickiewicz estate, which is distinguished by a park-like establishment. The approach to the formation of green areas mainly within developer settlements indicates that no systemic thinking is being done.

One observes the occupation of biologically-active areas for parking spaces and pedestrian and roadways, fencing off individual development complexes. The dismissive approach of developers has led to an extreme reduction in the natural values of the settlements: Botanik, Oaza and partly Poręba. In these cases, not only is it scarce. Good practices related to the shaping of greenery useful to residents, including for recreation, have been forgotten, and only representative courtyards have been introduced, which are poor in greenery, consisting of lawn and a few small shrubs. The role of greenery in improving health and affecting living comfort is underestimated (White et al., 2013). There is a lack of sensory gardens and community gardens, which have a therapeutic impact. Multifunctionality should be taken into account in their design. Greenery also has functions: they regulate climatic conditions (accumulate heat, provide shade, moderate diurnal temperature fluctuations, retain water, create habitats for animals, etc.), and they can also be used as a habitat for animals. In order for its impact to be maximized, it is necessary to combine it into greenery systems (Bożętka, 2008).

As the years passed, a different approach was taken to maintaining a balance between residential development, leisure and recreational spaces and green areas. Ensuring the right conditions for the formation of the human living environment began to be linked to the provision of appropriate conditions for recreation in the second half of the 20th century. In the Ordinance of 29.01.1974 on indicators and guidelines, the ratio of leisure areas in the settlement per capita (8 sq. m.) and the minimum share of the area allocated for leisure and isolation greenery (not less than 50%) were specified. In the 1980s, the indicators and norms were abandoned. Since 12.04.2002, the Decree of the Minister of Infrastructure on the technical conditions to be met by buildings and their location has been in force. According to it, the area of biologically active areas in relation to the plot area should be min. 25%, and 30% in relation to the area of playgrounds and recreational areas in the building complex (Szulczewska & Giedych, 2010). This has resulted in differences in the quality and level of development

of these structures in individual neighborhoods. Developer developments are not up to par with older housing estates in terms of equipment to enable seniors to spend their leisure time.

Designing public spaces with the needs of seniors in mind is difficult, as this is an inhomogeneous social group. The elderly have different mental and physical abilities, different expectations, capabilities and predispositions (Steuden, 2001). The design efforts of urban planners and architects should move in the direction of creating a fully accessible public space that meets the expectations of all users of the space, regardless of age and whether they are able-bodied or have functional limitations due to dysfunction. Steinfeld and Maisel (2012), Wysocki (2012) emphasize that Universal Design should be used, which implies optimizing their functionality as much as possible. Provisions on the necessity of applying Universal Design are found in the Law on Revitalization (2015, Article 3, paragraph 2, point 3), indications for their implementation are present in the Constitution of the Republic of Poland (Article 32, point 2). In this aspect, the construction law should be amended so that new housing complexes are built in accordance with the principles of Universal Design and provide an opportunity to adapt to the individualized needs of the disabled elderly. The World Bank has determined that for new developments based on this concept, adapting the facility to the needs of people with mobility and perception limitations increases the cost of construction by only less than 1% (Wysocki, 2015). Thus, taking into account the needs of users with reduced functionality, including the elderly at the initial concept stage, significantly reduces the subsequent cost of adapting public spaces and facilities. Admittedly, elevators, ramps and handrails are appearing in new housing developments. Often, however, unexpected things can make it difficult, if not impossible, for some users to use these spaces. Therefore, as Gabryńczyk and Orlińska (2019), who conducted research in Wrocław, point out, none of the newly created or revitalized places can be ascribed the title of fully universal, although most have features that bring them closer to such a designation.

Universal design also does not apply to the creation of places for recreation or the development of green spaces. That's why large-panel estates are an attractive place to live in Poland, competing with new developer apartments with existing infrastructure, greenery. Of course, the degree of development varies in terms of functional structure, not all of them have a full program of housing estate amenities, but the free arrangement of buildings with ample spaces between them allows for the investment of missing services. And accommodating people with disabilities and the elderly is easier than in developer housing estates, where space is scarce (Gronostajska, 2016). The research undertaken shows that modern block housing estates struggle with standards that do not force developers but also in the revitalization of block housing estates leisure and recreational spaces beyond playgrounds. Hence, it is necessary to prepare new standards, implement good practices but also develop processes to enforce certain rules for creating the built environment (Newton, 2015; Wysocki, 2015, 2021).

It is important to identify existing barriers and determine how to overcome them for individual sites. These are necessary activities in organizing support for seniors and helping them transition to a more active lifestyle, despite existing limitations. In order for spaces to be best suited for different groups of seniors, but also to achieve the expected behavior, to act stimulating and invigorating for users, cooperation of experts is advisable: architects, designers, psychologists, sociologists, therapists, rehabilitators. This is essential in terms of functional technical solutions. It is worth adding to this social participation, conducted among all groups of users of settlements. This is important because it is usually assumed that physiological and safety needs are the same for everyone and accepted canons are used in design (Niezabitowska et al., 2013). And research results are interpreted on a large scale. The therapeutic importance of the aesthetic impact of the environment is generally ignored.

## REFERENCES

- Bakalarczyk, R. (2021). *Seniorzy obecni? Starzejące się społeczeństwo-prognozy, wyzwania, możliwości*. Warszawa: Caritas Polska.
- Bożętka, B. (2008). Systemy zieleni miejskiej w Polsce – ewolucja i problemy kształtowania [Urban green areas systems in Poland – evolution and problems of management]. *Problemy Ekologii Krajobrazu*, 22, 49–63.
- Bujacz, A., Skrzypka, N., & Zielińska, A.M. (2012). Publiczna przestrzeń miejska wobec potrzeb seniorów. Przykład Poznania [Public urban space towards seniors' needs. Example of Poznań city]. *Gerontologia Polska*, 20(2), 73–80.
- Chmielewski, T., & Mirecka, M. (2001). *Modernizacja osiedli mieszkaniowych*. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej.
- Fabiś, A., Wawrzyniak, J.K., & Chabior, A. (2015). *Ludzka starość. Wybrane zagadnienia gerontologii społecznej*. Kraków: Oficyna Wydawnicza „Impuls”.
- Gabryjańczyk, K., & Orlińska, S. (2019). Przestrzenie publiczne bez barier – analiza wrocławskich przestrzeni pod względem dostępności i funkcjonalności dla osób z niepełnosprawnościami [Public spaces without barriers – accessibility and functionality analysis of Wrocław city's public spaces according to the needs of people with disabilities]. *Acta Sci. Pol. Administratio Locorum*, 18(2), 153–165. <https://doi.org/10.31648/aspal.3661>
- Gawron, G., Klimczuk, A., & Szweđa-Lewandowska, Z. (2021). *Starzenie się populacji. Aktywizacja, koprodukcja i integracja społeczna osób starszych* [Population Ageing: Activation, Co-Production, and Social Integration of Older People]. Katowice: Wydawnictwo Uniwersytetu Śląskiego. <https://doi.org/10.31261/PN.4035>
- Gronostajska, B.E. (2016). *Kształtowanie środowiska mieszkaniowego dla seniorów*. Wrocław: Oficyna Wydawnicza politechniki Wrocławskiej.
- Jurkowska, A. (2002). Idea projektowania uniwersalnego w planowaniu przestrzennym [The idea of „universal designing” in spatial planning]. *Architectus*, 1(11), 155–158.
- Kaczmarczyk, M., & Trafiałek, E. (2007). Aktywizacja osób w starszym wieku jako szansa na pomyślne starzenie [Activating elderly people – a chance of good and satisfying aging]. *Gerontologia Polska*, 15(4), 116–118.

- Korzeniak, G. (2011). Główne cechy i elementy modelu zintegrowanego planowania rozwoju miast [Integrated Urban Development Planning: A Model Proposal]. In G. Korzeniak (Ed.). *Zintegrowane planowanie rozwoju miast*. Kraków: Instytut Rozwoju Miast.
- Labus, A. (2014). *Starzejące się społeczeństwa europejskie XXI wieku w koncepcji odnowy miejskiej* [Ageing european societies of the 21st century in urban renewal concepts]. Gliwice: Wyd. Politechniki Śląskiej. doi: 10.13140/2.1.2450.0808
- Magdziak, M. (2017). Miasto dostępne dla osób starszych. *Studia KPKZ*, 176, 195–208.
- Magdziak-Grabowska, M. (2014). Trendy i rozwijające się koncepcje w budownictwie mieszkaniowym dla osób starszych [Trends and concepts developed in housing for the elderly]. *Zeszyty Naukowe Politechniki Śląskiej. Architektura*, 50, 117–129.
- Miśniakiewicz, A. (2017). Aktywność seniorów w najbliższym otoczeniu, na przykładzie wybranego wrocławskiego osiedla – problemy i potrzeby przestrzenne [Seniors activity in nearest surrounding on the example of housing estate in Wrocław – spatial problems and needs]. *Przestrzeń, Ekonomia, Społeczeństwo*, 12(2), 281–300. <https://doi.org/10.23830/12II2017/281300>
- Newton, R. (2015). Rekomendacje: starzenie się a tere-ny otwarte. In A. Labus (Ed.). *Miasto dla wszystkich. Szkice o przestrzeni publicznej w perspektywie starzejącego się społeczeństwa* (pp. 52–85). Warszawa: Fundacja Na Miejsce. doi: 10.13140/RG.2.1.3701.8963
- Niezabitowska, E., Bartoszek, A., Kucharczyk-Brus, B., & Niezabitowski, M. (2013). *Środowisko zamieszkania polskich seniorów w badaniach interdyscyplinarnych. Studium przypadku na wybranych przykładach*. Katowice: Wyd. Śląsk.
- Przesmycka, E., & Sosnowska, M. (2013). Przeobrażenia osiedli mieszkaniowych Lublina [Transformations of Lublin's housing estates]. *Teka Komisji Architektury, Urbanistyki i Studiów Krajobrazowych*, 9(4), 45–52.
- Ranzijn, R. (2002). The potential of older adults to enhance community Quality of life. *Ageing International*, 27, 30–55.
- Steinfeld, E., & Maisel, J. (2012). *Universal Design*. New Jersey: John Wiley & Sons.
- Steuden, S. (2001). *Psychologia starzenia się i starości*. Warszawa: Wydawnictwo Naukowe PWN.
- Szołtysek, J., & Trzpiot, G. (2019). *Miasta przyjazne seniorom*. Katowice: Wydawnictwo Uniwersytetu Ekonomicznego.
- Szulczewska, B., & Giedych, R. (2010). Ekologiczno-prze-strzenne wskaźniki stosowane w planowaniu i projektowaniu terenów zieleni osiedli mieszkaniowych. In M. Kosmala (Ed.). *Zieleń osiedlowa stan obecny i wskazania poprawy* (pp. 9–21). Toruń: Wyd. PZiITS.
- Światowa Organizacja Zdrowia (WHO). 2007. Globalne miasta przyjazne starzeniu: przewodnik. Retrieved from: <https://apps.who.int/iris/handle/10665/43755> (29.07.2022).
- Tomczyk, Ł., & Klimczuk, A. (2016). Inteligentne miasta przyjazne starzeniu się – przykłady z krajów Grupy Wyszehradzkiej [Smart, Age-friendly Cities: Examples in the Countries of the Visegrad Group]. *Rozwój Regionalny i Polityka Regionalna*, (34), 79–97. Retrieved from: <https://pressto.amu.edu.pl/index.php/rprpr/article/view/8611>
- Trempała, J. (2011). *Psychologia rozwoju człowieka*. Warszawa: Wydawnictwo Naukowe PWN.
- Wrana, J., & Czapla, K. (2016). Modernist Estate of Lublin as an answer to demands of society – synergy aspect. *Budownictwo i Architektura*, 15(2), 043–050. [https://doi.org/10.24358/Bud-Arch\\_16\\_152\\_06](https://doi.org/10.24358/Bud-Arch_16_152_06)
- White, M.P., Alcock, I., Wheeler, B.W., & Depledge, M.H. (2013). Would You Be Happier Living in a Greener Urban Area? A Fixed-Effects Analysis of Panel Data. *Psychological Science*, 24(6), 920–928. <https://doi.org/10.1177/0956797612464659>
- Wysocki, M. (2012). Przestrzeń dostępna – wyzwanie społeczne i projektowe [Accessible space – social and design challenges]. *Czasopismo Techniczne Architektura*, 1-A(2), 443–453.
- Wysocki, M. (2015). *Przestrzeń Publiczna Przyjazna Seniorom. Poradnik RPO*. Warszawa: Biuro Rzecznika Praw Obywatelskich.
- Wysocki, M. (2021). Tworzenie miasta przyjaznego wszystkim [Creating a Friendly City for All]. In K. Solarek (Ed.). *Miasto dostępne jako jedno z wyzwań zintegrowanego planowania* [Accessible City as One of the Challenges for Integrated Planning] (pp. 37–57). Warszawa: PAN.
- Zborowski, A., Dej, M., & Gorczyca, K. (2009). Ocena jakości życia w wymiarze obiektywnym i subiektywnym w zdegradowanych dzielnicach śródmiejskich i strefie wielkich osiedli mieszkaniowych w wybranych miastach Polski. In A. Zborowski (Ed.). *Demograficzne i społeczne uwarunkowania rewitalizacji miast w Polsce* (pp. 136–165). Kraków: Instytut Rozwoju Miast.



ORIGINAL PAPER

Received: 19.12.2022

Accepted: 14.04.2023

## THE ROLE OF OLD TOWNS IN SMALL WARMIAN TOWNS IN SHAPING THE REGION'S CULTURAL LANDSCAPE

Marek Zagroba✉

ORCID: 0000-0003-2096-7297

University of Warmia and Mazury in Olsztyn

Prawocheńskiego Street 15, 10-720, Olsztyn, **Poland**

### ABSTRACT

**Motives:** The historical urban layout and architectural design of old towns significantly contribute to the cultural landscape of small towns and the region. The main aim of this study was to evaluate the role of historical spatial structures in the development of the local cultural landscape. The study was conducted in small Medieval towns in the Region of Warmia in north-eastern Poland. The extent to which the architectural design of historical urban structures, in particular architectural landmarks, influences the local landscape was analyzed.

**Aim:** The described research goals were achieved with the use of several research methods. The study demonstrated that the Medieval spatial urban layout of old towns, including architectural landmarks, significantly influences the region's cultural landscape and contributes to a strong sense of local identity. The results suggest that historical architecture and urban layout can contribute to the economic development of small towns.

**Results:** The results indicate that well-preserved historical urban structures can contribute to the economic growth of small towns and effective promotion of regions.

**Keywords:** small towns, spatial structure, cultural landscape, historical urban centers, architectural landmark

### INTRODUCTION

Small historical towns play one of the most important roles in regional urbanization processes. The distinctive identity of historical towns in the local landscape can be attributed to their low development density and the fact that they had been established in close proximity to each other. Historical towns, in particular those founded in the Middle Ages, were separated by small distances due to technical limitations. Small medieval towns are characterized by low-rise buildings and low development density, which

clearly distinguishes them from large urban areas. As a result, landmark buildings and structures in historical towns have dominated for centuries and continue to dominate over the modern landscape (Matthew, 1983). These structures include church steeples, town hall towers, and monumental fortified castles. These three types of public buildings are characteristic of Medieval towns.

Historic towns have a grid layout with a regular network of perpendicular streets. Towns with a grid layout featured blocks of dense development, with a centrally located market square where most trading activities took place (Mumford, 1961; Benevolo, 1995).

✉ [mazag@uwm.edu.pl](mailto:mazag@uwm.edu.pl)



The role of historical urban design was explored on the example of three small towns in the Region of Warmia in north-eastern Poland (Barczewo, Pieniężno, and Reszel). Three out of the eleven existing Medieval towns in Warmia were selected for the study. In these towns, the elements of the original urban layout were preserved to a varied degree. These towns were selected for the study due to their similar location, spatial attributes, and history, as well as differences in the contemporary character of downtown areas. The examined towns were established in the Middle Ages when the Teutonic Knights colonized Warmia and built an urban settlement network in the region. Despite the fact that historical spatial structures have been preserved to a varied degree in the studied towns, their layout strictly follows Medieval urban design principles.

Warmian towns were established in locations that were difficult to access, and all of them featured defensive walls and fortifications. Security was a key concern in most Warmian towns which were founded as military outposts by the Teutonic Knights during their attempts to colonize this part of East Prussia. The layout of historic towns in Poland and other European countries was generally consistent with the Medieval practice of establishing urban settlements *in cruda radice* (from a “raw root”) (Ennen, 1975; Mullermertens, 1987; Schofield, 2003). In Warmia, towns were created along transportation routes, and they were separated by a distance of 25–30 km. In Warmia, a settlement network was developed over a period of less than 100 years (Lewerenz, 1975). Interestingly, all Medieval towns in Warmia, excluding Olsztyn, remain small settlements with a population under 20,000. Population is one of the most popular criteria for classifying towns and cities into different size categories (Bagiński, 1998; ESPON, 2014; Servillo et al., 2017).

Historical spatial structures play a special role in the urban layout. Most old towns constitute historical town centers, and they differ from other urban districts in scale, development density, and architectural design. However, some old towns have been deprived of their historical character. In the final months

of War World II, the Soviet army initiated a deliberate campaign aiming to destroy and burn down historical buildings in Warmian towns. After the war, Warmian towns were reconstructed according to socialist realism principles (Gawryluk, 2008). Poland remained under Soviet influence, and post-war reconstruction efforts based on the socialist realism doctrine were the second reason for the loss of historical identity in Warmia.

Historic urban districts are usually the only surviving witnesses of Medieval towns' rich history and regional architectural traditions. Historical spatial structures bear testimony to local identity, and they constitute living systems that adapt to local conditions and functional needs (Hoeschele, 2010). Medieval towns were developed on a much smaller scale than modern cities, and the organization of urban life differs considerably from the hustle and bustle of modern living in a rapidly globalizing world (Miele, 2008; Broadway, 2015). The functional uniqueness of historical towns contributes to sustainable development, higher quality of life, and the protection of the local heritage, including the region's cultural landscape (Mayer & Knox, 2006; Saraiva & Pinho, 2017; Torres Barchino et al., 2018; Bernat et al., 2022). Sustainable development and heritage protection lie at the heart of local policies and strategies, which is why most Warmian towns belong to the Cittaslow International movement which promotes the slow life philosophy and reconciles economic development with the preservation of historical heritage (Servon & Pink, 2011; Mallet, 2018). These towns do not feature large industrial complexes or high-rise residential buildings. As a result, old towns can be easily identified against the backdrop of modern urban development, and they set the directions for the scale and density of future development. They also act as architectural landmarks that dominate over the local urban panorama. Historical towns are increasingly popular among people who wish to live in peaceful surroundings, away from the hustle and bustle of modern city life (Zagroba et al., 2021). Historical spatial structures that testify to Medieval towns' historical identity play an important role in that process.

The main aim of the present study was to analyze and evaluate the role of historical spatial structures in Warmian towns in shaping the local cultural landscape (Böhm, 2011). The degree to which historical urban structures have been preserved was analyzed, and structures which should be restored and included in urban revitalization programs were identified. Historical town centers feature urban planning and architectural solutions whose role cannot be underestimated in the life of modern cities. The layout and character of old towns fulfill different social needs and aspirations, both material and spiritual, and historical districts are popular tourist destinations. The original urban layout of some towns has been transformed beyond recognition, and the resulting differences set the directions for research into the role of historical spatial structures in the local cultural landscape (Berglund, 1986; Ricci, 2007). The research aims were achieved with the use of a novel method developed by the author. Historical urban structures were evaluated in multi-criteria analyses, and the results were used to determine the role of historical urban layout and architecture in the development of urban space. The results were also used to assess the extent to which historic structures were preserved in the modern urban fabric in the context of the region's cultural landscape. These observations supported the identification of sites and structures that should be revitalized to restore spatial order and improve the functioning of the examined towns (Szarek-Iwaniuk, 2021).

An attempt was also made to determine whether historical spatial structures are the key determinants of a region's cultural landscape and which historical elements in Medieval towns exert the greatest influence on the local cultural landscape.

The present study was undertaken to address the general scarcity of research on national and international standards for comprehensive assessments of historical urban structures in small towns. Most research on the subject has been conducted in large cities, and the proposed assessment criteria have been developed based on the distinctive characteristics of large urban agglomerations (Mandeli, 2019). These

attributes cannot be used to evaluate historical centers in small towns. The methodology developed in this study is dedicated specifically to small towns.

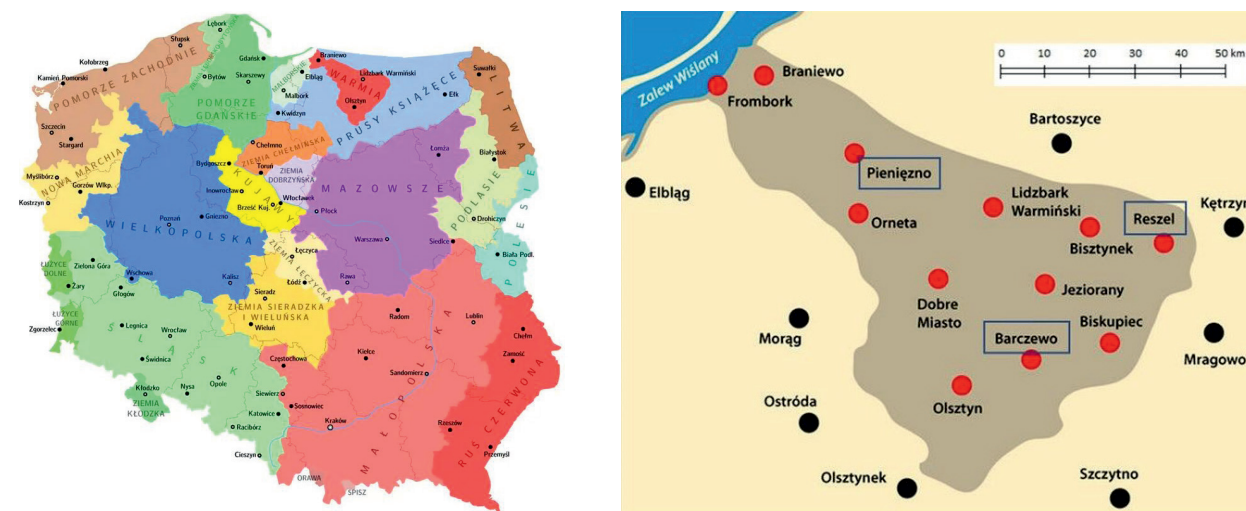
## MATERIALS AND METHODS

### Study areas

Warmia is situated in north-eastern Poland, and it is one of the most popular tourist destinations in the country which attracts both domestic and foreign visitors. Warmia is renowned for its unspoiled nature, scenic landscapes, undulating terrain, numerous lakes, and rich cultural heritage. Historical urban architecture, including landmark buildings such as churches, town halls, and castles, are the hallmarks of local building traditions (Kowalczyk, 2008; Jaszczak & Denekas, 2014).

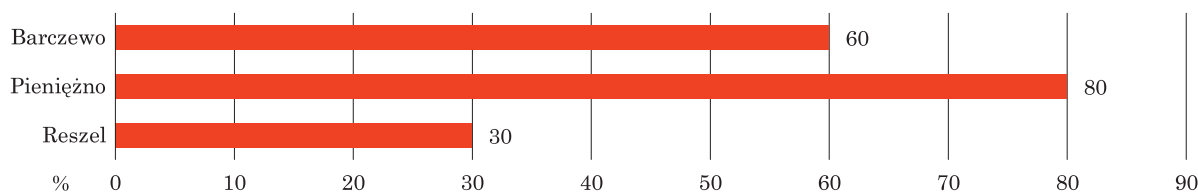
The study was conducted in three out of the eleven Medieval towns in the Region of Warmia in north-eastern Poland: Barczewo, Pieniężno, and Reszel (Fig. 1). These towns were selected for the study due to similarities in their location, history, and spatial attributes. The analyzed towns had been originally built as military outposts with defensive walls and fortified castles, and they were founded in the same historical period spanning around 100 years. These military outposts were built by the knights of the Teutonic Order which colonized this part of East Prussia in the 14th century (Srokowski, 1945; Krassowski, 1990). The above small towns were also selected for analysis due to the different extent to which their historical spatial structures have been preserved. These structures were damaged by the Soviet army at the end of World War II, and the reconstruction efforts undertaken after the war differed in the examined towns (Figures 2 and 3).

The examined cities were established in the Middle Ages. The evidence for the above is provided by historical sources, in particular the research conducted in the first half of the 20th century by German scientists who analyzed the respective town charters (Bludau, 1901; Poschmann, 1937; Keyser, 1939). Over the centuries, Warmian towns developed



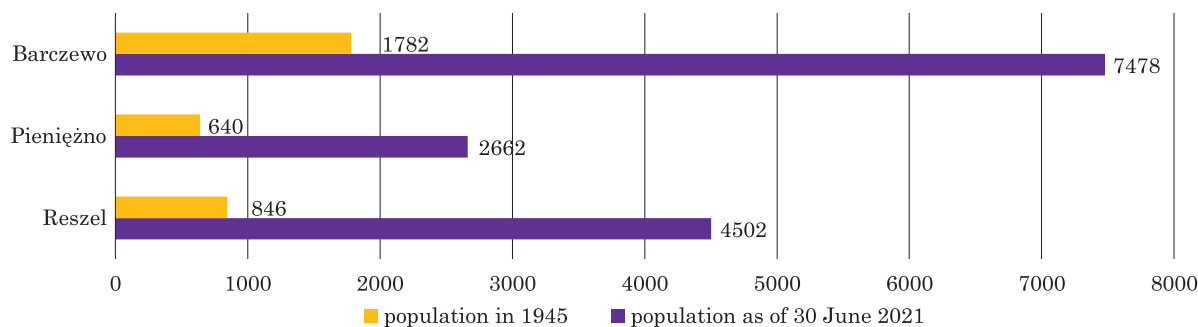
**Fig. 1.** Polish regions (left) and the location of small towns in the Region of Warmia (right)

Source: own elaboration based on: [www.puzzlefactory.pl/pl/puzzle/graj/krajobrazy/297006-regiony-polski#5x6](http://www.puzzlefactory.pl/pl/puzzle/graj/krajobrazy/297006-regiony-polski#5x6) (retrieved on 02.03.2023); [www.encyklopedia.warmia.mazury.pl/index.php?title=Plik:Warmia\\_mapka.jpg](http://www.encyklopedia.warmia.mazury.pl/index.php?title=Plik:Warmia_mapka.jpg) (retrieved on 02.03.2023).



**Fig. 2.** Percentage of historical buildings and structures that were destroyed during World War II

Source: own elaboration based on Czubiel & Domagała (1969).



**Fig. 3.** Population of the analyzed towns

Source: own elaboration based on [www.demografia.stat.gov.pl](http://www.demografia.stat.gov.pl) (retrieved on 20.06.2022).

rapidly and expanded their territory, and the greatest changes were observed in the second half of the 20th century. However, historical spatial structures in old towns still constitute the urban core in Warmian towns, which differs from other areas in the scale and density of development, as well as layout and

architectural features (Figures 4–7). In most cases, the damage sustained during World War II did not affect the historical character of the analyzed towns. However, the damage inflicted on Pieniężno and the resulting depopulation were so severe that the town lost its municipality status for 28 years (1945–1973).





**Fig. 4.** Barczewo – northern frontage of the old market square  
*Source:* own elaboration.



**Fig. 5.** Pieniężno – western frontage of the old market square  
*Source:* own elaboration.



**Fig. 6.** Reszel – aerial view of the town center  
*Source:* own elaboration.



**Fig. 7.** Reszel – southern frontage of the old market square  
*Source:* own elaboration.

It should also be noted that the Region of Warmia and Mazury in north-eastern Poland, including the region referred to as Holy Warmia (Achremczyk, 2011), boast the highest number of Polish cities that are members of the Cittaslow International movement which promotes a slow life style and living in harmony with nature. The only exception is Pieniężno, which is not a Cittaslow member, and where the historical structure of the old town has been least effectively preserved (Alexander, 1965; Zagroba et al., 2021).

## Methods

The extent to which historical spatial structures have been preserved in small towns, the role of historical sites in the development of modern towns, and their influence on the local cultural landscape should be examined in multi-criteria analyses because the architecture of old towns clearly differs from modern urban design and fulfills the residents' material and spiritual needs. Similar differences are observed in contemporary towns. The examined towns differ considerably in this respect. The unique character of old towns influences the formation of a region's cultural landscape. The preservation of historical structures in the studied towns was compared with the use of analytical methods that

have been well described in the literature and applied in research on urban management. These methods laid the ground for the development of a novel research tool supporting subjective evaluations of urban planning solutions and architectural features. This novel method was developed by the author. The proposed combination of research methods can be applied to other Medieval towns in Poland and Europe. Various criteria were applied in the analysis to evaluate different elements of historical urban structures that influence the local landscape.

A robust knowledge of the history of architecture and urban planning, as well as professional skills and knowledge in the area of urban management are essential for assessing the preservation of historical urban structures, identifying architectural styles and landscape components to guarantee that the results of the evaluation are not based solely on the observer's subjective perceptions.

The applied research methods were divided into three main categories, as presented below. A similar approach was used to present the results obtained in section Results.

1. An analysis of the spatial structure of small towns, including the scale of development and territorial reach in the context of the local landscape. Spatial features in the local landscape were classified based on an analysis of the following factors:
  - a. time of establishment – based on an analysis of the literature and iconographic sources, in particular the research conducted by German scientists at the turn of the 19th and 20th centuries (Boetticher, 1894; Bonk, 1895). These analyses supported the identification of differences and similarities in the spatial structure of the examined towns, including the location of architectural landmarks in the urban layout and the local topography. All of the analyzed towns had a grid street plan, with some local variations (Tołwiński, 1939);
  - b. local topography and urban design – based on an analysis of iconographic sources (maps and satellite images) and an inventory of old towns. The examined towns were classified in

view of urban planning solutions relative to the local landform. Topographic features, including river bends and river forks, influenced the grid street plan (Table 1). The grid street plan was less regular in towns situated at the fork of two rivers;



**Table 1.** Relationship between local landform and urban planning solutions

Urban planning solutions	Landform	
	River bend	River fork
Grid street plan	+	+
Rib pattern or a grid street plan	-	-
Dense urban network	+	+
Uncontrolled urban development in the direct vicinity of the river	+	+
Dense development resulting from space constraints	+	+
Spatial structure expansion in a direction opposite to the river or a water body	+	+

Source: own elaboration based on Czubieli & Domagała (1969).

- c. size and shape of the old market square – based on iconographic sources (maps and satellite images) and the results of local inventories. The size and shape of market squares in the center of Medieval towns were proportional to town area. The shape and size of old market squares and their location relative to modern transport routes were analyzed (Table 2);

**Table 2.** Shape and size of market squares in the analyzed towns

No.	Shape of market square	Size of market square
1.		The shape and relative surface area of a market square (ratio of market area to town area) significantly influence spatial organization. Square and rectangular markets are perceived as neutral and harmonious spaces.
2.		The relative surface area of market squares in the analyzed towns relative to other Warmian towns was classified as: average (7.5–9.0%) or large (10.5–16%).

Source: own elaboration based on Czubieli & Domagała (1969).



- d. the ratio of contemporary urban area to the area enclosed by defensive walls, i.e. the original area of Medieval towns – based on iconographic sources (historical maps and satellite images). This ratio was calculated to determine the increase in developed urban area (indicator WWPZ). The original area of Medieval towns was defined by defensive walls or natural features, such as river banks or lake shores. This area was calculated by analyzing satellite maps and comparing the results with the original layout of fortified walls. The results are purely hypothetical because historical events, such as fires, significantly altered street layout and the alignment of urban structures. Archeological surveys would be required to determine the original area with greater precision; however, such surveys fall outside the scope of the present study. The present-day area of the studied towns was determined by analyzing satellite images and conducting measurements with AutoCad software. To determine the extent to which the scale of urban development influences the regional landscape, the original and contemporary area of the examined towns was compared with the use of indicator (1):

$$WWPZ = \frac{PW}{PL} \quad (1)$$

where:

WWPZ – increase in urban area

PW – present-day area

PL – original area of Medieval towns

- e. preservation of historic architectural landmarks – based on an analysis of the literature, iconographic sources, and the results of local inventories. The degree to which historic architectural landmarks have been preserved was classified. Churches, town halls, and fortified castles are the three types of architectural landmarks that exert the greatest influence on the local landscape.
2. An evaluation of the spatial structure of the studied towns in the context of the local landscape. This part of the study involved cartographic methods.

Historical and contemporary maps were analyzed, satellite images were examined, and historical urban structures were analyzed during local inventories. The characteristic features and the unique ambience (*genius loci*) of historical town centers were assessed during local inventories, including:

- a. urban layout – based on an analysis of cartographic sources and the results of local inventories. The extent to which the original urban layout has been modified throughout the centuries was assessed based on an analysis of the Medieval layout of the examined towns. Warmian towns have a strictly geometric grid street pattern. Similar planning solutions can be encountered in other European regions, but regular geometric patterns were not always the norm in the Middle Ages, as can be seen in Italian towns. Camillo Sitte, a renowned architect who ignited a new era in urban planning, observed that artistic principles had always played a very important role during the establishment of Italian towns (Sitte, 1909; Gzell, 2014), which can be attributed to the local topography and climate. The preservation of the original layout of old towns which, together with architectural features, elicit strong emotional and esthetic responses and influence the region's cultural landscape, was assessed in the examined towns;
- b. architectural design of old towns – based on the results of local inventories. A robust knowledge of the history of Polish and European architecture was required to evaluate the quality of urban space and the influence of historical architecture on the esthetic appeal of the examined old towns. The architectural style of historical urban structures and the preserved architectural landmarks are distinctive elements that contribute to a sense of local identity. These attributes evoke an emotional response, referred to as *genius loci* in architecture, which denotes the unique spirit of a place. These subjective perceptions are usually associated with spaces where the form, scale, level of detail, texture, and color of historical architecture exert the greatest

influence on the human senses (Pawłowicz, 2017; Zagroba et al., 2020). Architectural landmarks significantly contribute to our perceptions of historical urban space. Landmark buildings and structures immediately attract the observer's attention and constitute integral elements of the local landscape. They influence the local panorama and play a very important role in the development of the cultural landscape (Table 3).

**Table 3.** The role of historical buildings in the development of local space and landscape

No.	Criterion	Perceptions of space
1.	Individual architectural structures	– form, scale, building materials, color – architectural style – positive/negative esthetic experience
2.	Frontage buildings, urban blocks	– diverse architectural forms and styles – form, scale, division, rhythm, roof patterns, building materials, facade color – enhanced/reduced esthetic experience – <i>genius loci</i> – architectural identity
3.	Architectural landmarks	– form, scale, architectural style – architectural composition – closure of urban axes – enhanced/reduced esthetic experience – spatiotemporal patterns – “experiencing” the urban fabric

Source: own elaboration.

3. The preservation and role of historical urban elements in the development of the local landscape was evaluated with the use of a novel method proposed by the author. This method was designed to analyze the emotional responses associated with perceptions of historical structures in old towns. The proposed approach was developed based on the concept of Wejchert's impression curve (Wejchert, 2008) as a set of subjective perceptions (Zonneveld, 1990; Myga-Piątek, 2012). Subjective assessments of landscape features were evaluated on a scale of 1 to 10 points, based on a landscape valorization

model that best reflects the unique attributes of old towns. The following attributes were included in the subjective assessment model:

- age – the historical age of the assessed landscape. The older the landscape components, the more valuable the entire landscape;
- historicity – a landscape is an element of the cultural heritage and a source of historical knowledge that embodies local traditions;
- authenticity – originality and preservation of landscape components (highly transformed landscapes are not authentic);
- esthetic value – the esthetic value of historical landscapes strongly influences human senses and emotions, and it is a highly subjective criterion;
- harmony – spatial order is the dominant attribute in landscape perceptions;
- uniqueness – the spatial attributes of unique and exceptional landscapes are rarely encountered in other landscapes;
- emotional value – a landscape evokes strong emotional responses and contributes to a sense of local identity and attachment.

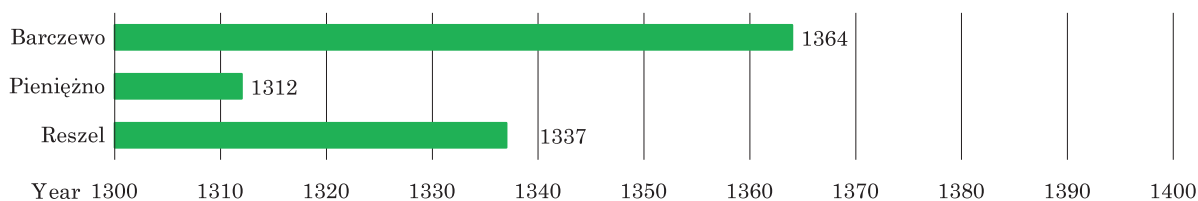
The choice of the above criteria was dictated by the fact that landscape should be regarded as a source of information, meaning, symbols, emotions, and esthetic values (Myga-Piątek & Nita, 2005).

## RESULTS

The historical structure of the studied towns and its influence on the cultural landscape were assessed with the use of the described methods. The results section has the same structure as the Materials and Methods section to ensure the legibility of the presented findings.

### Multi-criteria analysis of the spatial structure of small towns

- The analysis involved three out of the eleven Medieval towns in the Region of Warmia, which were founded in the same historical period. Two of the analyzed towns were established in the 14th



**Fig. 8.** Establishment of small Warmian towns

Source: own elaboration based on Czubiel & Domagała (1969).

- century. In turn, Braniewo was a Hanseatic town that was founded in the 13th century (Fig. 8);
- b. The spatial structure of the studied towns was affected mainly by the local landform. Topography was responsible for variations in the grid street plan and the location of architectural landmarks in the analyzed towns. Natural obstacles that offered protection against enemies, including rivers, lakes, and steep hills, played an important role during the establishment of Medieval towns. Two of the examined towns (Pieniężno and Reszel) were founded in a river bend, whereas the third town (Barczewo) was built in a river fork. Minor departures from the strict grid street pattern can be observed only in peripheral areas due to the proximity of water bodies;
  - c. The market square played a special role in Medieval towns. The market square was the focal point and the main area of trading activity in the Middle Ages. The three main categories of architectural landmarks, i.e. the church, the town hall, and the fortified castle, were built in the immediate vicinity of the market square. Most Medieval towns had regularly shaped market squares, although trapezoid or even triangular markets can also be encountered. Pieniężno and Reszel have square-shaped markets, whereas the market in Barczewo is rectangular;
  - d. The size of Medieval market squares was proportional to the town's area. The ratio of market area to town area was 10.6% on average in the studied towns, and it was estimated at 9.4% in all Warmian towns. The exact values for each town are presented in Table 4. Pieniężno is a clear outlier in this respect, probably because the size of urban

development in that town had been adapted to local needs, as well as the fact that Warmian towns had been established *in cruda radice*. Medieval towns were highly similar in size, which could be attributed to similarities in their economic status and the level of technological advancement in the Middle Ages. The average area of Medieval towns in Warmia was 6.1 ha. The average area of the examined towns was similar (5.5 ha), ranging from 4.5 ha in Pieniężno to 6.0 ha in Barczewo and Reszel.

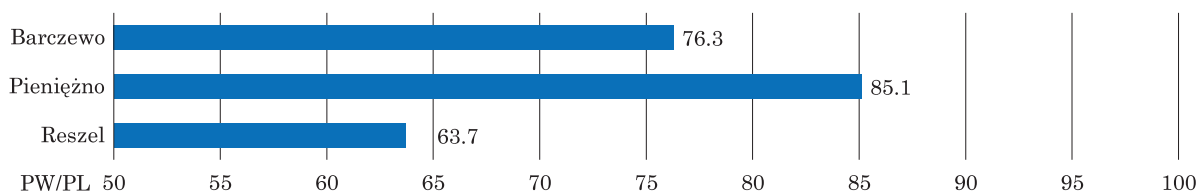
- e. The territorial reach of Warmian towns increased over the centuries due to technological progress and economic growth. The urban area spilled outside defensive walls. The increase in the size of Warmian towns and their present area are shown in Table 4. Only data on urban areas are presented; undeveloped areas, such as forests, water bodies, and agricultural land, were not taken into consideration in the analyzed towns. Measurements were conducted with the use of orthophotomaps, and the applied measurement methods were described in point 1d of subsection Methods.

**Table 4.** Size of the studied towns

No.	Town	Relative area of the market square [%]	Developed area enclosed by fortified walls [ha]	Present developed area [ha]
1.	Barczewo	8.5	6.0	458
2.	Pieniężno	16.0	4.5	383
3.	Reszel	7.5	6.0	382

Key: present developed area – urban area (built-up area with urban green spaces)

Source: own elaboration based on orthophotomaps ([www.google.com/maps](http://www.google.com/maps), retrieved on 19.04.2022).



**Fig. 9.** Increase in the developed area of the studied towns

Key: PW/PL is the ratio of contemporary town area to the town's area upon establishment.

Source: own elaboration.

The character and density of urban development changed as Medieval towns expanded their territorial reach. The most notable changes took place in the 19th and 20th centuries when European urban planning standards and architecture were revolutionized. The data presented in Figure 9 indicate that built-up area in the examined towns increased several dozen times since their establishment. The developed area of the examined towns increased 75-fold on average.

- f. The degree to which historical architectural landmarks were preserved in the analyzed towns was largely influenced by historical events, mostly wars and fires. These events were responsible for the extent to which historical churches, town halls, and castles survived to this day. Reszel deserves special attention in this respect, because all three types of architectural landmarks have been preserved in its panorama. Churches and town halls have been preserved in Barczewo and Pieniężno, whereas fortified castles were completely destroyed during the towns' turbulent history.

### Evaluation of the development of the cultural landscape based on the spatial structure of the studied towns

Historical spatial structures in small towns are unique carriers of cultural heritage. They shape the local identity and the region's cultural landscape. For this reason, the components of the urban layout and the architectural features of old towns were used as the criteria in the applied research method (subsection Methods, point 2, subpoints a and b; Table 3). The historical structure of the urban core and architectural landmarks play a special role

in this context. The scale and density of development in historical urban centers dominate over other town districts (Table 5).

**Table 5.** Preservation of the original spatial structure of the studied towns

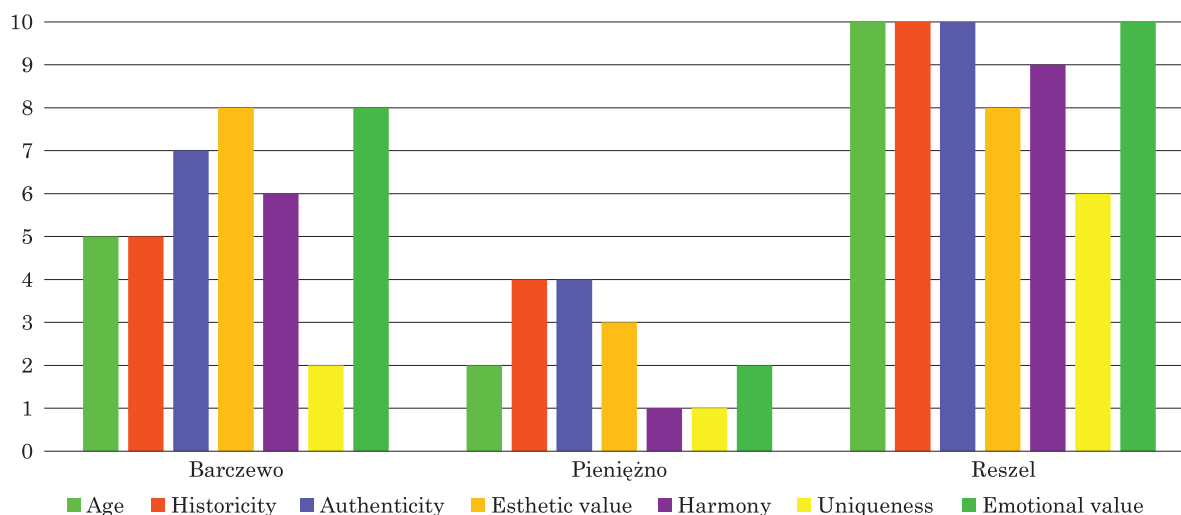
Criteria for evaluating the preservation of historical spatial structure	TOWN		
	Barczewo	Pieniężno	Reszel
Urban layout	Green	Yellow	Green
Historical architecture	Yellow	Red	Green
Identity of the old market square	Green	Red	Green
Architectural landmarks	Green	Yellow	Green

Key: green – preserved, red – not preserved, yellow – partially preserved

Source: own elaboration.

### Role of historical spatial structures in the development of the cultural landscape

Historical spatial structures in small towns have timeless value due to the specificity of the local cultural heritage and the unique identity of old towns. These values were reflected in the criteria used in the presented analysis (subsection Methods, point 3), which are closely related to perceptions of space, as well as esthetic and emotional experiences. As a result, the analyzed spatial structures differ considerably from the remaining urban areas in terms of the scale and density of development, as well as their distinctive architecture. These attributes and architectural landmarks significantly influence the local landscape. In the adopted valorization model, landscape attributes were evaluated on a scale of 0 to 10 points (Fig. 10). The analyzed towns differed considerably in the



**Fig. 10.** Landscape attributes of the historical spatial structure of the studied towns  
Source: own elaboration.

evaluated attributes, i.e. age, historicity, authenticity, esthetic value, harmony, uniqueness, and emotional value. The highest scores were noted in towns where historical spatial structures were most effectively preserved. The evaluated attributes received the lowest scores in Pieniężno, average scores in Barczewo, and the highest scores in Reszel.

## DISCUSSION

Historical spatial structures, in particular old towns, evoke the strongest emotional responses in assessments of urban management. These unique urban structures create a strong sense of local identity and have a positive social impact by integrating local community members (Durrel, 1969). Historical architecture has a unique ambience, which is undoubtedly influenced by the characteristic *genius loci*, which is why old towns are eagerly visited by both local residents and tourists. Despite similarities in local topography, urban layout, and development patterns, the analyzed towns differed considerably in the analyzed spatial attributes. For example, the main transportation routes in Pieniężno are located further away from the historical town center, and the buildings facing the old market square are used solely for residential purposes. As a result, the old town has

been deprived of its commercial functions, and the town center was relocated to another district.

Historical urban and architectural structures are the essence of spatial organization in old towns. These solutions bear testimony to the local cultural heritage, urban planning traditions, technical skills, sensitivity to beauty and harmony, and attachment to local engineering and architectural traditions. The results of local inventories and analyses of iconographic materials revealed that old towns play a vital role in shaping the local landscape. This is particularly true in small towns whose inhabitants feel more attached to their place of residence and feel more responsible for their towns than the inhabitants of large metropolitan areas (Canter, 1977). Small town residents have a strong sense of local identity, and they are more likely to refer to their place of residence as “my town” or “our town”. In contrast, large cities are characterized by higher levels of social anonymity, and social bonds are more difficult to build. In this study, the choice of research methods supported the identification of the relationships between the quality and value of the cultural landscape and the presence of historical elements in downtown areas of small towns. These relationships are visible in the scale of urban development, the local panorama, as well as on the regional scale. The applied research methods were



also highly useful in explaining why historical spatial structures make a key contribution to the quality of the cultural landscape, and why historical town centers attract both local inhabitants and tourists, and promote social integration.

The studied towns have a similar urban layout which testifies to Medieval building and planning traditions. In each town, the urban layout was influenced by local factors, and the observed differences can be attributed to variations in hydrographic (river) and topographic conditions. Historical urban layouts have been preserved to this day, and they have been effectively adapted to modern functions (Figliuolo, 2015) and smoothly incorporated into the existing pedestrian and traffic routes in downtown areas. However, certain adaptations are needed to convert old towns into pedestrian thoroughfares and minimize the impact of vehicular traffic (roads, car parks). In turn, the original architecture of the analyzed towns was less successfully preserved. The extent to which the Medieval urban layout of the examined towns was preserved is directly associated with the severity of damage sustained during World War II. The preservation of the original urban fabric was not the main objective of post-war reconstruction efforts, and the examined town centers were largely rebuilt in the spirit of the socialist realism doctrine which dominated in Central-Eastern Europe at the time.

Warmia is a region with gently undulating terrain, and it abounds in lakes and rivers. These topographic features had military significance, and they played an important role during the establishment of Medieval towns. Towns were nested in river bends or river forks which provided effective protection against potential aggressors on two or three sides of the settlement. Medieval town planners took advantage of geographical surroundings and natural obstacles to protect European towns in this era of lawlessness and violence (Jedwab et al., 2022).

The urban layout of Medieval cities was effectively incorporated into the local environmental conditions. The market square in the town center was a hub of trading activity, and it fueled the economic growth of Medieval towns. The size and shape of the market

square were adapted to the town's area and local planning solutions (Fusch, 1994). The market was directly linked with town's transportation routes, and major roads led from town gates to the market square. The shape of the market square also accentuates the regular and geometric urban layout of historic towns.

The function of market squares evolved gradually throughout the centuries. Historical buildings in market squares still host commercial and service outlets, but old town markets took on representative and recreational roles. These downtown areas became the hallmarks of local culture and identity, and they are popular destinations that attract both tourists and investors (Haas, 2009). These observations confirm that old towns have considerable economic significance. The size of market squares was directly influenced by the area occupied by Medieval towns.

Defensive walls and fortifications protected town residents against aggressors and enemies, and they directly determined the original size of Medieval towns. These structures were largely responsible for the compact of urban layout and the grid street pattern of Medieval towns (Hardt, 2000). Fortified structures limited the territorial expansion of Medieval towns for centuries. These urban developments began to spread outside defensive walls only in the 19<sup>th</sup> century when the construction of railway lines fueled local economies and contributed to population growth in Warmian towns (Czubiel & Domagała, 1969). The 19<sup>th</sup> century also witnessed the establishment of local workshops and production plants, including breweries, flour mills, lumber mills, and brick factories, which played an important role in the regional economy. As a result, Warmian towns expanded significantly beyond their defensive walls, and rapid urbanization processes have continued into the present.

The landscape of Warmian towns is largely shaped by the historical layout of their old towns. Architectural landmarks, including fortified castles, church steeples, and town hall towers, play a special role in this regard. These structures bear testimony to the region's architectural and civil engineering traditions. Architectural landmarks elicit strong emotional responses, and they provide Warmian

towns with a unique ambience (*genius loci*) and a spirit of time (*genius saeculi*). These subjective perceptions are largely shaped by historical urban and architectural solutions in old towns (Bravo, 2010). Architectural landmarks have been preserved to a varied degree in the studied towns; therefore, they exert a different impact on the development of the local landscape. A valorization model based on seven criteria was applied in this study to evaluate landscape attributes that are shaped by historical architecture and its components, including architectural landmarks. The highest score was obtained in Reszel, where the historical urban fabric, including the three main types of architectural landmarks, have been most effectively preserved. Historical urban structures were moderately well preserved in Barczewo which received an average score. Pieniężno ranked last in the evaluation because its old town has been largely deprived of historical character and identity.

## CONCLUSIONS

Planning and architectural solutions that have been preserved in the urban fabric of old towns constitute unique examples of European cultural heritage. In most cases, old towns continue to play the role of central public spaces. They have been effectively adapted to serve modern urban functions, and they make the greatest contribution to the urban panorama. Historical urban centers play a key role in the structure and life of small towns. Unlike large metropolises, historical old towns in small towns contribute to a sense of attachment. Inhabitants who strongly identify with their place of residence are more likely to use the phrases “my town” or “our town”. As a result, cultural heritage protection is an easier task in small towns because community members are more inclined to participate in local initiatives than big city dwellers.

The extent to which historical spatial structures shape the cultural landscape of small towns was evaluated with the use of seven criteria: age, historicity, authenticity, esthetic value, harmony, uniqueness, and emotional value. These criteria were directly correlated

with the extent to which the original urban layout and architecture had been preserved in Warmian towns. The analyzed criteria received the highest scores in towns whose historical attributes have been most effectively preserved.

The study demonstrated that old towns shape the identity of Medieval towns in Warmia and influence the quality of local life. The cozy ambience of old towns, small-scale development, historical architecture, and the presence of architectural landmarks are responsible for the unique character of old towns relative to other urban districts. These historical components are largely responsible for shaping the local cultural landscape. For this reason, modern urban planning solutions and construction permits in historic towns should be carefully analyzed to ensure that new projects, such as high-rise apartment buildings, silos, or antenna masts, do not exert a negative impact on the local panorama.

The study also revealed that effective management of historical urban centers accentuates the prominent character of these structures in the broader spatial context. New buildings and structures that could compromise the unique ambience of old towns and the local panorama are unlikely to be introduced in these areas due to small-scale development and the existing spatial constraints. Old towns do not feature vacant land plots or major transportation routes; therefore, large development projects, such as multi-story buildings, are unlikely to be commissioned in historical urban centers. Therefore, the spatial structure of old towns in itself offers the best protection against modern development. The presence of intrusive elements in the cultural landscape would have negative implications for regional promotion and tourism.

One of the greatest strengths of this study is that the results have numerous practical applications. Above all, the presented findings provide valuable inputs for territorial governments in the process of planning local and regional promotional campaigns. The results can also be used by the local authorities to exchange experiences relating to the implementation of development policies and promotional strategies.

The adopted research methods are universal tools that can be applied in small towns in other Polish regions, in other European countries, and in other parts of the world. The obtained findings make a meaningful contribution to the knowledge about the role and significance of historical spatial structures in the functioning of modern towns.

In the future, the proposed method for evaluating the quality of urban space in small towns will be verified based on expert surveys and the opinions of local community members who are the main users of these public spaces. The results will be used to modify the proposed approach. The present study was motivated by the general scarcity of research on international standards for assessing historical urban structures in small towns.

**Author contributions:** author has given approval to the final version of the article.

**Funding:** This research is not funded by external sources.

**Supplementary information:** author acknowledges following people and institution for help with the preparation of the article: Not applicable.

**Note:** The results of this study weren't presented in another form.

**Conflicts of interest:** The author declares no conflict of interest.

## REFERENCES

- Achremczyk, S. (2011). *Warmia*. Olsztyn: Littera.
- Alexander, C. (1965). *A City Is Not a Tree*. *Architectural Forum*, 122(1).
- Bagiński, E. (1998). *Małe miasta w strukturze osiedleńczej Polski* [Small towns in the settlement structure of Poland]. Wrocław: Politechnika Wrocławska.
- Benevolo, L. (1995). *The History of the City*. Cambridge: MIT Press.
- Berglund, B.E. (1986). The cultural landscape in a long-time perspective. Methods and theories behind the research on land-use and landscape dynamics. *Striae*, 24, 78.
- Bernat, S., Jaraszek, K., & Mękal, A. (2022). Assessment of the possibility of establishing cultural parks in selected rural and small town areas in the Lublin Province. *Acta Scientiarum Polonorum. Administratio Locorum*, 21(1), 25–40. <https://doi.org/10.31648/aspa.7077>
- Bludau, A. (1901). *Ostpreussen – Land und Volk. Oberland, Ermland, Natangen und Barten. Eine Landes – und Volkskunde*. Stuttgart.
- Boetticher, A. (1894). *Die Bau- und Kunstdenkmäler der Provinz Ostpreussen*. Heft 4, *Das Ermland*. Königsberg.
- Bonk, H. (1895). *Städte und Burgen in Altpreussen (Ordensgründungen) in ihrer Beziehung zur Bodengestaltung*. Königsberg.
- Böhm, A. (2011). *Protection of Cultural Landscape in Poland Today. Protecting and Saveuarding Cultural Heritage – Systems of Management of Cultural Heritage in the Visegrad Countries*. Cracow.
- Bravo, L. (2010, July). *Genius loci and Genius saeculi: a sustainable way to understand contemporary urban dynamics*. Paper presented at the meeting of the 14th International Planning History Society Conference, 12–15 July 2010 Istanbul, Turkey.
- Broadway, M. (2015). Implementing the Slow Life in Southwest Ireland: a Case Study of Clonakilty and Local Food. *Geographical Review*, 105(2), 216–234. <https://doi.org/10.1111/j.1931-0846.2014.12067.x>
- Canter, D. (1977). *The Psychology of Place*. London: The Architectural Press.
- Czubiel, L., & Domagała, T. (1969). *Zabytkowe ośrodki miejskie Warmii i Mazur* [Historic urban centers of Warmia and Mazury]. Olsztyn: Pojezierze.
- Durrel, L. (1969). *Spirit of Place*. Dutton, New York.
- Ennen, E. (1975). *The Medieval Town*. Amsterdam, New York: North-Holland publishing Company.
- ESPON. (2014). *Towns: mall and medium sized towns in their functional territorial context*. Applied Research 2013/1/23, Inception Report, Version 04/07/2012.
- Figliuolo, B. (2015). Economic typology of the cities in the lower middle ages. *Nuova Rivista Storica*, 99(3), 823–836.
- Fusch, R. (1994). The piazza in Italian urban morphology. *Geographical Review*, 84(4), 424–438. <https://doi.org/10.2307/215757>
- Gawryluk, D. (2008). Architektura modernistyczna na historycznych rynkach małych miast [Modernist architecture on the historical marketplaces of small towns]. *Teka Komisji Architektury, Urbanistyki i Studiów Krajobrazowych* [Teka Commission of Architecture, Urban Planning and Landscape Studies], 4, 229–243.

- Gzell, S. (2014). *O Architekturdze szkice pisane i rysowane* [On architecture – written and drawn sketches]. Warszawa: Blue Bird.
- Haas, T. (2009). Traditional European squares in contemporary urbanism: Dubrovnik's medieval squares. *Open House International*, 34(4), 57–73. <https://doi.org/10.1108/ohi-04-2009-b0007>
- Hardt, M. (2000). Fortifications of a medieval city. *Zeitschrift für Geschichtswissenschaft*, 48(4), 358–360.
- Hoeschele, W. (2010). Measuring abundance: the case of Cittaslow's attempts to support better quality of life. *International Journal of Green Economics*, 4(1), 63–81. <https://doi.org/10.1504/IJGE.2010.032601>
- Jaszcak, A., & Denekas, J. (2014). Znaczenie cech krajobrazu w kreowaniu przestrzeni kulturowej w układach regionalnych [The importance of landscape features in shaping cultural space in regional systems]. *Prace Komisji Krajobrazu Kulturowego* [Dissertation of Cultural Landscape Commission], 25, 7–18.
- Jedwab, R., Johnson, N.D., & Koyama, M. (2022). Medieval cities through the lens of urban economics. *Regional Science and Urban Economics*, 94. <https://doi.org/10.1016/j.regsciurbeco.2020.103598>
- Keyser, E. (1939). *Deutsches Städtebuch. Handbuch städtischer Geschichte*. Band 1, Nordostdeutschland. Stuttgart, Berlin.
- Kowalczyk, A. (2008). *Krajobraz kulturowy* [Cultural landscape]. In Z. Młynarczyk, & A. Zajadacz (Eds.). *Uwarunkowania i plany rozwoju turystyki* [Conditions and plans for tourism development] (pp. 121–137). Poznań: Wydawnictwo Naukowe UAM.
- Krassowski, W. (1990). *Dzieje budownictwa i architektury na ziemiach Polski* [History of civil engineering and architecture in Polish territories], vol. 2. Warszawa: Arkady.
- Lewerenz, T. (1975). *Die Größenentwicklung der Kleinstädte in Ost – und Westpreußen bis zum ende des 18. Jahrhunderts*, Marburg/Lahn: J. G. Herder-Institut.
- Mallet, S. (2018). The cittaslow label and its spreading in France: The slow to produce sustainable spaces? *Territoire en Mouvement*, 37. <https://doi.org/10.4000/tem.4173>
- Mandeli, K. (2019). Public space and the challenge of urban transformation in cities of emerging economies: Jeddah case study. *Cities*, 95, 102409. <https://doi.org/10.1016/j.cities.2019.102409>
- Matthew, D. (1983). *Atlas of Medieval Europe Hardcover*. London: Checkmark Books.
- Mayer, H., & Knox, L.P. (2006). Slow Cities: Sustainable Places in a Fast World. *Journal of Urban Affairs*, 28(4), 321–334. <https://doi.org/10.1111/j.1467-9906.2006.00298.x>
- Miele, M. (2008). CittàSlow: Producing Slowness against the Fast Life. *Space and Polity*, 12(1), 135–156. <https://doi.org/10.1080/13562570801969572>
- Mullermertens, E. (1987). Early forms of the medieval town or towns of a particular kind in the early Middle-Ages – reflections on the franco-german town development before the turn of the millennium. *Zeitschrift für Geschichtswissenschaft*, 35(11), 997–1006.
- Mumford, L. (1961). *The city in history: its origins, its transformations, and its prospects*. New York–Harcourt: Brace & World.
- Myga-Piątek, U. (2012). *Krajobrazy kulturowe. Aspekty ewolucyjne i typologiczne* [Cultural landscapes. Evolutionary and typological aspects]. Katowice: Uniwersytet Śląski. Retrieved from: <https://rcin.org.pl/publication/60474>
- Myga-Piątek, U., & Nita, J. (2005). Computer analysis of landscape changes in the Częstochowa Upland. *Geographical Information Systems in Research and Practice*, Hrvatski Informatičeskij Zbor, Zagreb, 349–355.
- Pawłowicz, J.A. (2017). Importance of Laser Scanning Resolution in the Process of Recreating the Architectural Details of Historical Buildings. *IOP Conference Series: Materials Science and Engineering*, 245(5). <https://doi.org/10.1088/1757-899x/245/5/052038>
- Poschmann, A. (1937). *600 Jahre Rössel. Bilder aus alter und neuer Zeit*. Rssel.
- Ricci, G.R. (2007). *Cultural landscapes*. Transaction Publishers.
- Schofield, J. (2003). Medieval town planning: A modern invention? *English Historical Review*, 118(478), 1040–1041.
- Saraiva, M., & Pinho, P. (2017). Spatial modelling of commercial spaces in medium-sized cities. *GeoJournal*, 82(3), 433–454. <https://doi.org/10.1007/s10708-015-9694-7>
- Servillo, L., Atkinson, R., & Hamadouch, A. (2017). Small and medium-sized towns in Europe: Conceptual, methodological and policy issues. *Tijdschrift voor Economische en Sociale Geografie*, 108(4), 365–379. <https://doi.org/10.1111/tesg.12252>
- Servon, L.J., & Pink, S. (2011). Cittaslow: Going Glocal in Spain. *Journal of Urban Affairs*, 37(3), 327–340. <https://doi.org/10.1111/juaf.12169>



- Sitte, C. (1909). *Der Städtebau nach seinen künstlerischen Grundsätzen*. Basel-Boston-Berlin.
- Srokowski, S. (1945). *Prusy Wschodnie. Studium geograficzne, gospodarcze i społeczne* [East Prussia. Geographic, economic and social studies]. Gdańsk: Instytut Bałtycki.
- Szarek-Iwaniuk, P. (2021). Measurement of spatial order as an indicator of sustainable development of functional urban areas in regional capitals. *Acta Scientiarum Polonorum. Administratio Locorum*, 20(2). <https://doi.org/10.31648/aspal.6536>
- Tołwiński, T. (1939). *Urbanistyka* [Urban planning]. *Budowa miasta w przeszłości* [The construction of the city in the past], vol. 1. Warszawa: Zakład Urbanistyki Politechniki Warszawskiej.
- Torres Barchino, A., Llopis Verdu, J., & Serra Lluch, J. (2018). Recovering Chromatic Space as a Sign of Identity in the Historic City. In *Putting tradition into practice: heritage, place and design*. Book Series: Lecture Notes in Civil Engineering, vol. 3 (pp. 1321–1328). [https://doi.org/10.1007/978-3-319-57937-5\\_136](https://doi.org/10.1007/978-3-319-57937-5_136)
- Wejchert, K. (2008). *Elementy kompozycji urbanistycznej* [Elements of urban composition]. Warszawa: Arkady.
- [www.demografia.stat.gov.pl](http://www.demografia.stat.gov.pl) (20.06.2022.).
- [www.encyklopedia.warmia.mazury.pl/index.php?title=Plik:Warmia\\_mapka.jpg](http://www.encyklopedia.warmia.mazury.pl/index.php?title=Plik:Warmia_mapka.jpg) (02.03.2023).
- [www.puzzlefactory.pl/pl/puzzle/graj/krajobrazy/297006-regiony-polski#5x6](http://www.puzzlefactory.pl/pl/puzzle/graj/krajobrazy/297006-regiony-polski#5x6) (02.03.2023).
- Zagroba, M., Pawlewicz, K., & Senetra, A. (2021). Analysis and Evaluation of the Spatial Structure of Cittaslow Towns on the Example of Selected Regions in Central Italy and North-Eastern Poland. *Land*, 10(8), 780, 1–29. <https://doi.org/10.3390/land10080780>
- Zagroba, M., Szczepańska, A., & Senetra, A. (2020). Analysis and evaluation of historical public spaces in small towns in the Polish region of Warmia. *Sustainability*, 12(20), 8356, 1–19. <https://doi.org/10.3390/su12208356>
- Zonneveld, J.I.S. (1990). *Introduction to cultural aspect of the landscape*. IALE Conference, Wageningen.



## CONTENTS

<b>Saiful Khozi, Ida Bagus Dharmawan, Dessy Handa Sari, Tizar M. Bijaksana, Suheriah M. Devi</b> An analysis of the perceived liveability index with the use of adjusted and weighted aspects based on a multi-stakeholder perspective in the Indonesian city of Balikpapan .....	131
<b>Ewa Hącia, Aleksandra Łapko</b> Websites as a tool for communicating with tourists – the example of yacht marinas on the Polish Baltic coast .....	153
<b>Agnieszka Labus</b> A smart age-friendly city in the context of the seasonal migration of senior residents. The case of Benidorm .....	169
<b>Firas Majeed, Zaynab Abaas</b> An analysis of Baghdad's masterplans based on the development of green areas .....	193
<b>Tomasz Podciborski, Anna Klimach, Dariusz Konieczny, Jacek Zabielski</b> A method for evaluating the impact of universal design on the attractiveness of military tourism sites .....	209
<b>Adam Senetra, Anna Żróbek-Sokolnik, Monika Wasilewicz-Pszczółkowska, Piotr Dynowski, Marta Czaplicka</b> Proposal of a point valuation method for the assessment of the sight-aesthetic value of the underwater landscapes of lakes in the context of exploration tourism .....	225
<b>Natalia Soldatke, Sandra Żukowska, Marcin Połom</b> Seasonality of seaside towns on the example of spatial planning solutions in Poland .....	241
<b>Oleh Strelko, Oleksandra Solovyova, Yuliia Berdnychenko, Hanna Kyrychenko, Lyubov Solovyova</b> Study of the contemporary trends in the development of transport systems of the Ukrainian railways .....	263
<b>Ewa Trzaskowska</b> Recreational and leisure development for the elderly in residential areas in Lublin .....	281
<b>Marek Zagroba</b> The role of old towns in small Warmian towns in shaping the region's cultural landscape .....	289