
*Research article***Substantiating the directions of health tourism development in Czechia****Tetiana But^{1,*}, Libor Lnenicka¹ and Tetiana Pulina²**

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Abstract: The purpose of the article is to substantiate the directions of health tourism development in Czechia. The purpose of the study is the subjects of health tourism: well-known rehabilitation centers in Czechia, medical institutions, health resorts. The methodological basis was formed by the following methods: abstract-logical; statistical; expert evaluation; cluster analysis; piecewise linear approximation. Among the most popular regions of Czechia for health tourism, the main places are Prague, Moravian-Silesia, Olomouc, Plzeň, South Moravian and South Bohemian. The increase in the number of patients among residents of the country and foreigners who use health tourism services is studied. The five leaders among the countries that used the services are identified. The main problems and advantages of health tourism in Czechia are identified. The Czech tourism development strategy for 2021–2030 is analyzed and directions for its implementation are proposed. **Originality / value:** the originality of the study lies in forecasting the directions of health tourism development in Czechia using the method of piecewise linear approximation in the following areas: adults with health insurance; adults at their own expense, children and teenagers, which will increase the volume of income for health tourism institutions in Czechia. According to the forecasting results, the demand for health services will increase by 3% annually. The results of this study can be useful for substantiating the directions of further health tourism development in the country, which will ensure the competitiveness and investment attractiveness of the country.

Keywords: health tourism; medical tourism; spa tourism; recreology; rehabilitation; piecewise linear approximation; forecasting

JEL Codes: L83, O19, O43, O52, P25

1. Introduction

The main goal of this article is to substantiate the directions of health tourism development in Czechia. A healthy and happy person is the key to the development of any society. Wellness tourism is one of the fastest growing types of tourism at present. The analysis of supply and demand in the wellness tourism market raises relevant issues that need attention, such as different typologies of service providers and the lack of reliable and comparable data and evidence-based information, which makes it difficult to assess performance at the level of the country, destination or individual institution. Sustainability and responsibility have become key criteria in health tourism which often relies on natural resources and assets. When managing health tourism, it is certainly important to follow a sustainable approach in terms of development, effective planning and impact management. Health and wellness tourism is still a niche market, and it is important not to overstate statistics and not to double count. Destinations should consider the impact of health tourism on the quality of local residents' life. The well-being of local residents is no less important than improving the health of tourists. Monitoring economic, social and environmental impacts requires special attention and resources. Health tourism does not necessarily follow a seasonal pattern compared to other tourism segments. Health tourism can contribute to the expansion of tourism, as many health and medical facilities can be located on the outskirts of cities and in rural areas.

Czechia is an attractive destination for health tourism in Central and Eastern Europe. Traditional spa treatment with a strong medical background, as well as wellness and spa tourism are changing along with the environment, e.g. political, economic, legal, etc. Due to the growing effects of the financial crisis, further negative trends in the profitability of Czech spas can be expected. Due to the changing market conditions, Czech health tourism has developed a completely new approach to providing its own services, in which the health improvement of consumers is carried out with a clear focus on its customers' requirements.

Recreational activities are of great importance for maintaining physical and mental health. Recreation (from the Latin *recreatio* = refreshment, rest, recovery) is characterized by the time during which a person's strength (physical, intellectual and emotional) is restored, and by activities consciously or instinctively aimed at recovery (Kraftova et al., 2011).

It is recreology that has led to the emergence of a new branch of the economy – balneology. Balneology as a scientific field studies the healing properties of natural physical factors, their effect on the human body, the possibility of their use for therapeutic and preventive purposes in resorts and beyond. It develops methods and recommendations for the rational use of healing environmental factors for therapeutic and health purposes.

Czechia is rich in various mineral springs, has therapeutic mud and clean air, and a favorable geographical location that facilitates the treatment of certain types of diseases. All this allows achieving maximum results in the rehabilitation process.

Rehabilitation (RHB) is an activity aimed at the optimal restoration of a person's physical, mental, social and work abilities that have been impaired by injury or illness. It is an interdisciplinary field (Moon, 2019).

Treatment and rehabilitation are popular with domestic and foreign visitors. The services of local centers and health resorts are used by patients not only from Europe, but also from more remote parts

of the continent (visitors from Eastern countries, the Arab world, the Middle East, and China). Czech doctors provide an extremely wide range of treatment for diseases, and natural resources, favorable climate and geographical location contribute to the rapid recovery of the body after major surgeries and therapeutic procedures. The treatment of certain diseases depends on a combination of medical procedures, preventive and restorative exercises, and the composition of water and mud.

Therefore, the study of the directions of health tourism development in Czechia will increase tourist flows to the country and identify the main areas of development of individual regions within the Czech tourism industry.

2. Literature review

The competitiveness of a country and its investment attractiveness depend on many economic factors, including the development of the tourism industry. The tourism industry has been facing environmental problems for several decades. The economically active population, which has daily physical and psychological stress, needs to restore their strength and health, which depends, among other things, on rehabilitation and recuperation in health resorts.

Health tourism takes place through medical treatment, sanatoriums, wellness centers and spa resorts, which is often shaped to a large extent by both administrative regulations and public interests — they are promoted by health insurance, at personal expense, and by a person's own desire to restore or improve their health.

The study of the areas of health tourism development in Czechia was conducted by means of research on various types of health recreation in Europe and in Czechia: medical, wellness, and spa tourism, as recuperation and rehabilitation is possible through various types of rest and recreation.

Borzyszkowski & Lubowiecki-Vikuk (2019) studied health tourism in Central and Eastern Europe. The researchers investigated the important role of health tourism destination management organizations aimed at promoting the health tourism product. This approach has determined the growing role of health tourism in the coming years and its importance as a tourism product.

Kotikova & Schwartzhoffova (2013) studied health and spa tourism on the example of Czechia and Slovakia. Scientists have studied the problems of health and spa tourism development in Czechia and Slovakia, as successor states of Czechoslovakia, due to the interrupted tradition of tourism during the period of state communist rule in 1949–1989. This approach indicates a deliberate restraint on tourism development during the communist era. Therefore, the identification of these problems will provide an opportunity not to limit tourist flows to Czechia by visa restrictions, other legislative acts and unfavorable exchange rates, but rather to promote health tourism.

Jónás-Berki et al. (2015) used the example of Hungary to study the characteristics of health tourism destinations from a regional and spatial perspective. The researchers studied health tourism on the basis of classical medical centers with natural healing water. This approach indicates that the restructuring of the health tourism market occurs with constant innovation and involvement of medical services in health tourism, and geographical attachment in the development of health tourism disappears.

Lubowiecki-Vikuk et al. (2023) investigated the promotion of health tourism through the activities of destination management organizations (DMOs) in the post-COVID-19 era. This approach highlights the importance of creating and strengthening a destination brand based on health and safety by taking into account the importance of ecosystem services.

The development of health tourism on the example of medical resorts from the point of describing the relationship between medical and non-medical forms of spa tourism was studied by Derco & Pavlisinova (2017). The researchers studied spa centers and the importance of state insurance for the occupancy rate of hotel rooms, the method of payment for spa services and their medical or health-improving nature. This approach indicates that health tourism is characterized by a trend towards demographic aging of the population and an increase in healthcare costs, including the costs of health insurance companies for health and resort treatment. Therefore, the development of health tourism requires interconnecting the traditional use of natural healing sources for treatment with the state health insurance system and the level of health resort procedures, which will lead to an increase in the length of stay.

The study of Slovak medical spas and their relationship to evaluating the efficiency and financial performance of the medical spa sector is investigated in the work of Čabinová & Onuferová (2019). The scientists proposed the development of a system of enterprises' management control, which is important for achieving sustainable success, goals, plans, strategies and competitive positions of medical enterprises for the health tourism development. This approach revealed significant shortcomings, as both indicators were assessed as average and not sufficiently profitable for shareholders.

Services to medical tourism destinations in Central and Eastern Europe as a type of health tourism were studied by Lubowiecki-Vikuk and Dryglas (2019). The researchers investigated medical services in the context of socio-demographic determinants using a questionnaire survey from the British and Germans as regular consumers of health tourism. The results showed that destinations for medical services vary by gender, age, and nationality. This approach revealed certain disadvantages for medical tourism organizers and destination management organizations.

The potential of medical tourism as a type of health tourism in Central and Eastern Europe was studied by Lubowiecki-Vikuk & Kurkowiak (2017). Using a ranking of countries based on their potential in the field of medical tourism, the researchers identified four different groups of countries and found that countries from the European Union (EU), which are characterized by higher economic indicators, create clusters and occupy the highest positions in this ranking. This approach can be a useful tool for various stakeholders from the point of medical tourism development in this part of Europe, while indicating that price is not the main criterion. However, this approach does not take into account all the elements of creating and maintaining the potential of medical tourism as a health destination.

Becková & Kantorová (2021) investigated the problems of wellness tourism, such as insufficient funding, lack of qualified personnel, and the number of clients. The scientists analyzed the annual reports of individual health resort organizations and determined that wellness activities can be used to solve this problem. However, this approach points to the need for investment and the use of marketing measures to preserve wellness tourism as a type of health tourism.

Wellness tourism was studied by Vystoupil et al. (2017) by comparing and evaluating the position of the spa and wellness tourism sector in Czechia. The researchers studied geographical analysis, statistical information, and the importance of spa centers on the example of Czech water parks. This approach indicates the specific localization of the selected forms of health tourism.

A study of the spa industry in Czechia was conducted by Boleloucka & Wright (2020). The researchers recommend that spas change their strategy to maintain their market position and continue to develop new markets. This approach points to the need for innovative changes in the spa sector of health tourism, which are vital for maintaining market competitiveness and gaining international fame.

The specifics of the Czech spa industry were studied by Kraftova et al. (2017). Scientists have developed a special model to simplify categorization, which allows obtaining quick fundamental information about the relative attributes of the spa industry. This approach indicates that the methods of financing differ from public sources of financing in favor of private ones.

Thus, the above study focuses on narrow studies of the types and elements of health tourism, so there is a need for a more detailed study of the directions of health tourism development in Czechia, which makes the chosen topic relevant.

3. Methodology and data

In defining and summarizing theoretical and methodological approaches, processing the applied results of the study, the following methods were used in the study: abstract-logical (for theoretical generalizations and formulation of conclusions); statistical (for diagnostics of statistical indicators of directions of health tourism development); method of expert evaluation (to identify problems and prospects of the directions of health tourism development); method of cluster analysis (to segment consumers in medical institutions by criteria: geographical, demographic, socio-economic and behavioral); method of piecewise linear approximation (to forecast the directions of health tourism development); the method of expert evaluation (to identify the directions of health tourism development in Czechia).

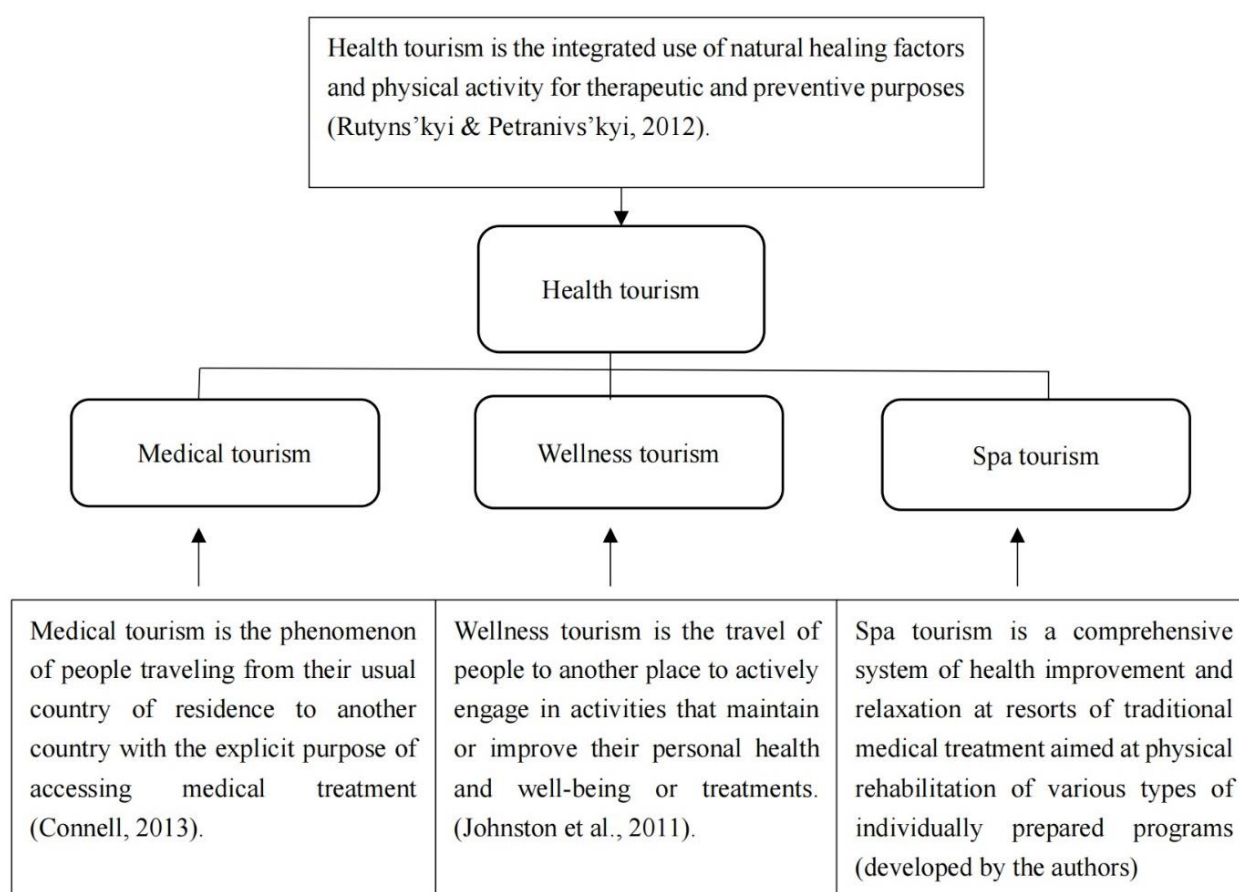


Figure 1. Classification of health and resort tourism. Source: developed by the authors.

To achieve the research objective, Figure 1 shows the classification of health tourism. A person's recuperation and rehabilitation is possible through various types of rest and recreation. To substantiate the directions of medical and health tourism development in Czechia, the following subjects of medical tourism were chosen as the object of study: well-known rehabilitation centers, hospitals, medical institutions of rehabilitation centers, and hospitals in Czechia.

The study was supported by the documentation of the Ministry of Regional Development of Czechia; reports of the National Information System for Healthcare and Outpatient Treatment of Czechia; the Institute of Medical Information and Statistics of Czechia; Information for the Charter of Medical Information and Statistics of Czechia; and websites of the most famous rehabilitation hospitals in Czechia by regions.

The directions of health tourism development in Czechia were forecast by using the piecewise linear approximation method based on data for the period from 2020–2022.

The average value of the parameters of the increase in the values of the parameters for the study interval of 2020–2022 for adult patients at the expense of insurance companies, for adult patients at their own expense, as well as for children and adolescents were calculated using the formula:

$$b_i = p_{j+1}^u - p_j^u \text{ for } j = \overline{1, n} \quad (1)$$

where, a_i is the difference between the values of the subsequent and previous year, b_i is the increase in the value of the parameter (the i -th cost indicator in thousands of people);

The forecasted values of the development of health tourism destinations for 2023–2025 were calculated using the parameter value p_j^u and the increase $b_i^{cp} = \Delta p_j^u$ according to the formula:

$$p_{n\text{posh}} = p_n^u + b_i^{cp} \quad (2)$$

Schematically, the gradual stages of study of recreology and health resort treatment analysis are shown in Figure 2.

The types of activities done during leisure (recreation) can be very diverse: physical activity (walking, sports), amateur activities (picking wild berries and/or mushrooms, hunting, fishing), interest in the world of arts (visiting theaters, cinemas, museums, festivals, participation in amateur performances), intellectual activity, communication based on free choice, entertainment (active, passive), travel for pleasure.

All types of recreation as activities aimed at restoring physical and mental health can be combined within the framework of traditional areas: physical education, sports, tourism, excursions.

Recuperation and rehabilitation characterize the process of health recovery in the qualitative aspect, and recreation is its substantive characteristic.

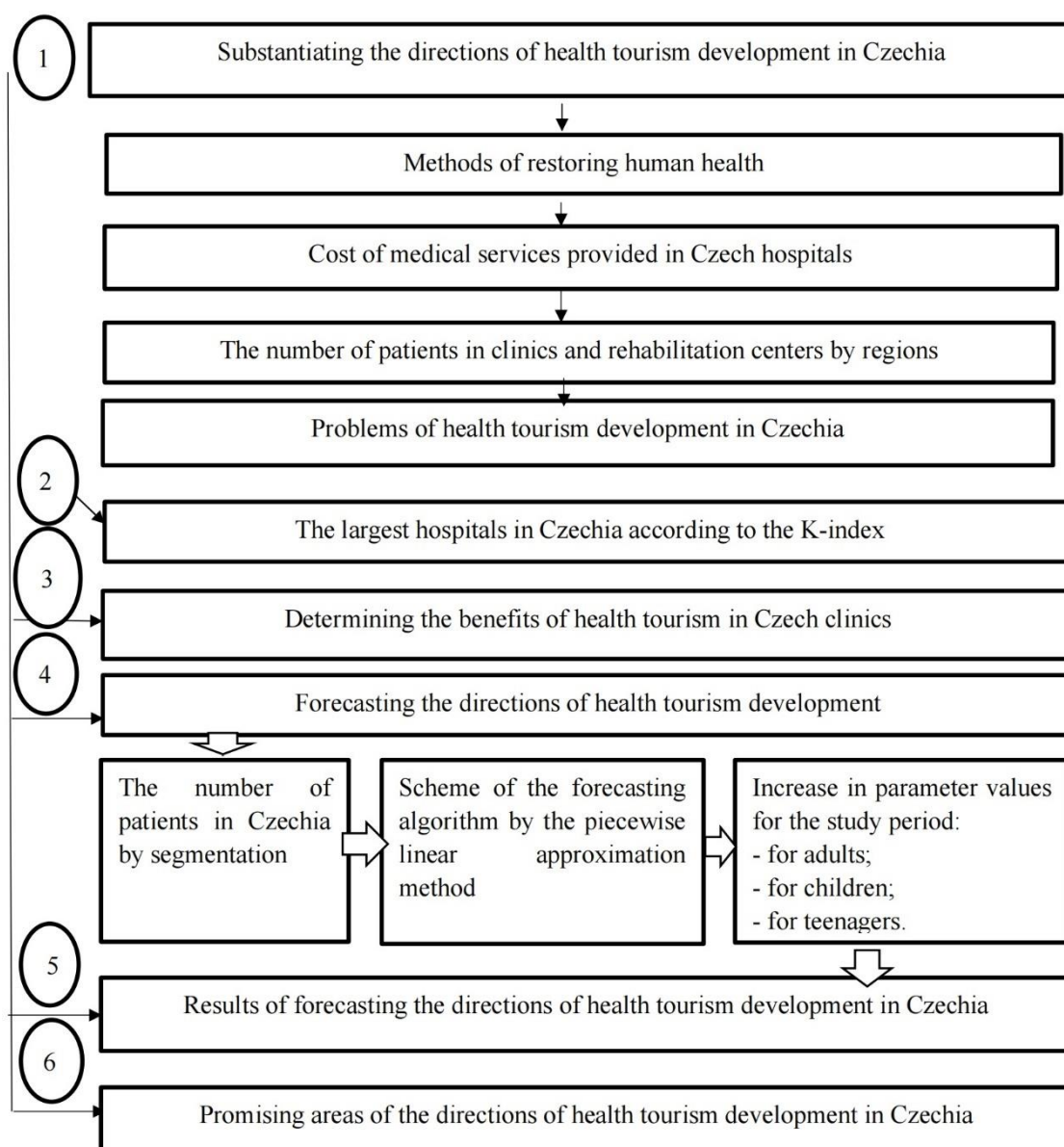


Figure 2. Stages of research on the directions of health tourism development in Czechia.
Source: developed by the authors.

There are several methods of restoring human health (Table 1).

Table 1. Methods of restoring human health.

METHODS	PECULIARITIES OF RECOVERY METHOD
classical therapeutic methods	Procedures using mineral water, therapeutic mud, healing gas (gas injections);
modern therapeutic methods	Involve a combination of classical methods with electric current, magnetism and other medical advances;
wellness	Symbiosis of medical therapy and oriental practices, Wellness programs, SPA, yoga, massage;
auxiliary	Active recreation, walks, sports.

Source: developed by the authors.

Each of these methods has its own meaning, is used according to the management of responsible climatic conditions, therapeutic opportunities that are necessary for the recovery of the body after complex surgical interventions, cancer treatment, stressful life situations.

4. Results

According to the Institute of Medical Information and Statistics of Czechia, more than 2.3 million patients from all over the world undergo rehabilitation in Czechia every year. More than 80% of people receive treatment on an outpatient basis, and about 20% require hospitalization. Approximately 96% of patients note the effectiveness of the chosen rehabilitation program and are satisfied with its results.

Of the total number of almost 148,500 foreigners, 67,000 (45%) were from the European Union (EU). The share of foreigners from EU countries has been gradually decreasing, despite an overall increase in their absolute number since 2016 (54%). The decline was affected by the withdrawal of the United Kingdom of Great Britain and Northern Ireland (UK) from the EU in 2020. The most commonly treated foreigners in 2021 were again Slovak citizens, with 36,900 (25%), followed by Ukrainians with 28,100 (19%), Russians with 9,500 (6%), Vietnamese with 8,600 (6%), and Germans with 7,600 (5%) (Current information UZIS CR, 2022).

The long-standing experience and traditions of health tourism in Czechia have prerequisites for the development of recreation and occupy the leading position in the Czech medical tourism. A large number of hospitals win the certificate of financial stability by CZECH Stability Award.

Attendance at selected clinics and rehabilitation centers is shown in Table 2.

Table 2. Number of patients in clinics and rehabilitation centers by region.

NAME	REGION	NUMBER OF PATIENTS			
		2019	2020	2021	2021–2019
University Hospital Motol	Prague	1,331,839	1228308	1,308,482	–23,357
(Inpatient + outpatient care)	Prague	23,351	22,125	28,002	4,651
Institute for Clinical	Karlovy Vary	500,000	10 mln.	200,000	–300,000.
Rehabilitation Institute Kladruby	Central Bohemian	1,807	1,575	1,473	–334
Hospital Písek	South Bohemian	40,500	42,300	416,500	1,150
Hospital Vyškov	South Moravian	14,445	15,402	15,338	893
Hospital Mariánské Lázně	Plzeň	18,950	19,050	20,450	1,500
Rehabilitation Institute Brandýs nad Orlicí	Pardubice	1,620	1,385	1,029	–591
Paseka Professional Medical Institute p.o.	Olomouc	3,028	2,819	3,264	236
Hospital Kadaň	Ústí	10,152	7,227	8,926	–1,226
Hospital Faculty and Medical Faculty in Hradec Králové	Hradec Králové	48,300	43,252	46,575	–1,725
Medical Institute of Metylovice-Moravian-Silesian health resort	Moravian-Silesia	465	435	472	7

Source: developed by the authors.

The results of Table 2 show an unstable dynamics in the number of patients in clinics and rehabilitation centers by regions of Czechia in 2019–2021. An increase in the number of patients is observed in the city of Prague, Moravian-Silesia, Olomouc, Plzeň, South Moravian and South Bohemian regions.

Based on the analysis of the number of clinics in the Czech region by region, the following have the largest number of clinics: South Moravian region (15), South Bohemian region (9), Prague (9), Hradec Králové region (7). The rest of the regions have a small number of clinics, which are located mainly in regional centers.

The further development of health treatment is driven by the growing demand for rehabilitation services through the marketing tools to promote them.

The cost of medical services in health resorts and medical facilities is influenced by several factors: the nature of the disease; the type of medical facility - public/private; the city where the clinic is located; the treatment regimen; additional services (e.g., translation services).

The number of services sold and their price have a great impact on the promotion of hospitals in Czechia. Payments are made by clients both from personal financing sources and through health insurance.

Let us conduct a comparative analysis of prices for services in some well-known clinics from each region of Czechia (Table 3).

Table 3. The cost of medical services provided in well-known medical institutions in Czechia in 2021.

MEDICAL INSTITUTION	KIND OF TREATMENT SERVICE	PRICE / EUROS
University Hospital Motol (Inpatient + outpatient care)	Consultation with a cardiologist	300
	Brain MRI	1200
	Cardiac diagnostics before surgery	105–126509
	EEG (electroencephalography)	219–893
	Stem cell therapy	1033–1278
	Scoliosis surgery	630–780
Institute for Clinical and Experimental Medicine	Consulting services	17
Gastrocenter in Karlovy Vary, examinations aimed at early detection of the initial stages of serious diseases of the digestive system.	Wellness program for children	225
	Classical whole body massage	56
	Mineral bath	54
	Hydromassage	36
	Dry soda bath	28
	Mud wrap	30
	Pearl bath	28
	Oxygen therapy	26
Rehabilitation Institute Kladrubby	Electrotherapy	20
	Gynecological and obstetrical procedures	2–1020
	Plastic surgery procedures	265–1009
Hospital Písek, outpatient and inpatient medical, diagnostic and therapeutic services	Traumatology, surgery and orthopedic procedures	6–21
	Department for Children and Adolescents	350–834
	Gynecology and Obstetrics Department	30–13000
	Emergency Eye Care	300–550

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MEDICAL INSTITUTION	KIND OF TREATMENT SERVICE	PRICE / EUROS
Hospital Vyškov	Surgery Clinic	20–870
	Orthopedic Clinic	20–500
	Stem Cell Therapy	1050–1250
Hospital Mariánské Lázně	Surgical Clinic	2–147
	Gastroenterology	10–500
	Orthopedic Emergency	10–12500
	Department of Radiology	5–150
	Rehabilitation, Physical Therapy, and Physical Therapy	0,6–56
	Medical Rehabilitation and Physical Therapy	14–25
Rehabilitation Institute Brandýs nad Orlicí	Other medical procedures	5–8
	Hydrotherapy - 20 minutes	3–27
	Massage and relaxation procedures	8–25
	Physical therapy and occupational rehabilitation services	1–15
	Rent of a bed with adjustable height and headboard along with the equipment.	5/day
Paseka Professional Medical Institute p.o.	Surgical operations	266–1018
	Traumatology services	6
	Ultrasound testing	30–43
	Biochemical test, immunology	6–21
	Gynecology	161–1018
Hospital Faculty and Medical Faculty in Hradec Králové	Infectious diseases and vaccines	400–4450
	Centre for Biomedical Technology Transfer	40–2500
	Laser centre and independent	Od 958
	Cosmetic treatment	Od 1729
	Breast Modelling	Od 1729
	Dentistry	Od 42–2108
	Children's Department	50–2000
	Acupuncture outpatient clinic	5–250
	Reprocentre	20–500
	Children's treatment at the expense of state insurance	-
Medical Institute of Metylovice-Moravian-Silesian health resort		

Source: developed by the authors.

It should be noted that the prices for health resort services are affordable. The government of Czechia takes care of children's treatment and rehabilitation. Profitable health resort treatment services should be considered the ones covered by health insurance.

The top ten leaders in terms of the longest period of time (days) by treatment purpose were: Palliative care (20.3), Child psychiatry (19.1), Geriatric (15.7), Psychiatry (15.4), Rehabilitation and physical medicine (14.4), Orthopedic care (11.1), Rheumatology (10.2), Dermatology (8.4), Burns treatment (8.3), Clinical hematology (8.3).

It should also be noted that it is quite possible to choose any type of treatment in Czech medical institutions. Regarding the treatment of foreigners in Czechia, it should be noted that in 2021, foreigners covered more than 90% of healthcare costs (1,055 million Czech Koruna - CZK) in cash or

in the form of insurance. Outstanding expenses increased in 2021 from CZK 85 million to CZK 102 million, but their share remains at less than 9%, of which the aforementioned CZK 65.8 million (64%) were overdue, compared to CZK 59.4 million (70%) in 2020. The remaining 10.5 million CZK (0.9%) of the costs were paid for the foreigner by the state authorities of Czechia (UZIS CR, 2022).

In 2021, a total of 148.5 million people used the medical services of inpatient healthcare facilities in Czechia per a thousand strangers. After a previous decline in 2020 due to restrictions during the COVID-19 pandemic, the demand for spa services increased by almost 43%, i.e. even 16% more than in the previous year. The current maximum is 127,600 foreigners in 2019 (Report on the state of human rights in the Czech Republic in 2021).

In 2021, the increase in spa services was also driven by the ongoing large-scale vaccination against COVID-19, which also affected foreigners. In the long term, 2021 continues the initial upward trend in the number of patients using health resort services (Kocanova et al., 2023). The number of foreigners by age group and method of payment for healthcare is shown in Table 8.

Based on the analysis (CSU, 2022), it was found that in 2021, the greatest demand for health resorts in Czechia was among foreigners from the following countries: Ukraine, Slovakia, Poland, Germany, and the United Kingdom.

Throughout Czechia, the following regions that provided health resort services in 2021 were the most popular: Prague, South Moravian, Central Bohemian, Moravian-Silesian, and Plzeň (UZIS CR (2022)). Among the age group of foreigners using health resort services in Czechia are people aged 20–59.

The analysis of the number of patients in Czechia in selected clinics among adults, children and youth for the period of 2017–2022 is presented in Table 4.

Table 4. Number of patients in selected clinics of Czechia (excluding foreigners), thous.

	2017	2018	2019	2020	2021	2022	2022–2017
adult patients							
At the expense of health insurance, thous.	98	99,3	103	73	77	120	22
At own expense, thous.	109	99,4	119	76	103	115	6
pediatric and adolescent patients							
Children	9,2	9,6	9,2	7,2	6	8	–1,2
Adolescents	1,9	1,5	1,8	1,7	1,5	3	1,1

Source: UZIS CR (2022).

The table shows the popularity of out-of-pocket medical services. There has also been a decrease in the number of adult patients using health insurance in health resorts during the analyzed period.

The problems in the health tourism development in Czechia are shown in Figure 3.

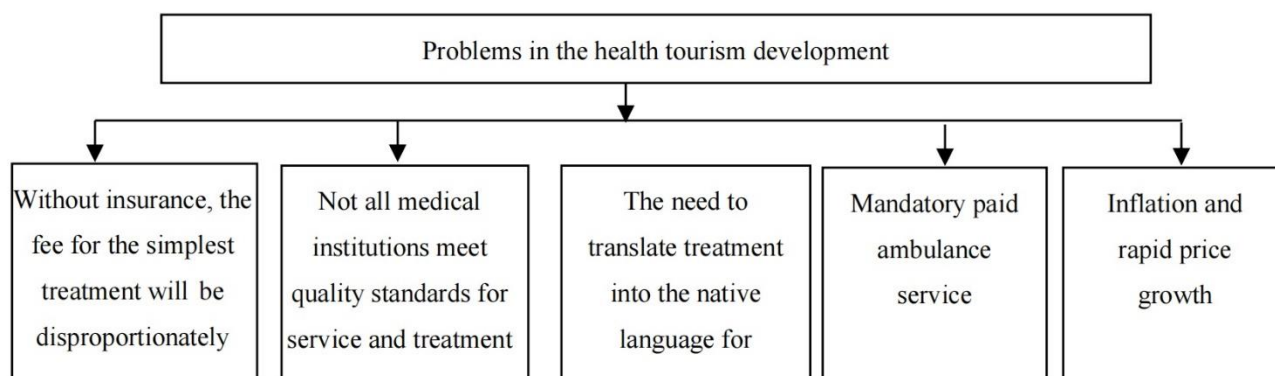


Figure 3. Problems in the health tourism development in Czechia. Source: developed by the authors.

Among the problems in the health tourism development in Czechia are the following: disproportionately high fees for the simplest manipulation without insurance; not all medical institutions meet quality standards for service and treatment; the need to translate treatment into the native language for foreign patients; mandatory paid ambulance service; inflation and rapid price increases. Inflation has led to the closure of some departments in clinics and rehabilitation centers. Some recreational resorts are forced to stay afloat by relying on government revenues or laying off medical staff.

Since the average annual inflation rate in Czechia in 2021 was 3.8%, the Czech government must strictly adhere to legal regulations on the rational use of financial revenues by hospitals that provide medical services in various areas of treatment.

Let us examine the largest hospitals in Czechia according to the K-index (The index of key risks - abbreviated K-Index, is an indicator of the level of risk factors.) in the period from 2019 to 2021 (Table 5). The index of key risks – abbreviated K-Index, is an indicator of the level of risk factors. These factors are associated with the risk of corruption and wasteful use of public money.

Table 5. The largest hospitals in Czechia according to the K-index* for 2019–2021.

№	Name	2019	2020	2021	2020–2019
1	Regional Hospital of Karlovy Vary, a.s.	4,47	1,74	2,68	–1,79
2	Regional Hospital of Kolín, a.s., hospitals of the Central Bohemia Region	2,64	2,04	4,81	2,17
3	Municipal Hospital in Ostrava, contributory organization	2,88	2,05	4,58	1,77
4	University Hospital in Motol	3,11	2,08	3,19	0,08
5	University Hospital Olomouc	2,22	2,08	4,15	1,93
6	University Hospital Plzeň	4,04	2,14	5,03	0,99
7	Hospital in Homolce	2,86	2,38	3,27	0,41
8	Hospital in České Budějovice, a.s.	3,65	2,43	3,21	–0,44
9	Regional Hospital in Kladno, a.s., Hospital of the Central Bohemia Region	2,64	2,52	5,88	3,24
10	University Hospital Ostrava	3,5	2,59	4,86	1,36

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№	Name	2019	2020	2021	2020–2019
11	Regional Hospital in Mladá Boleslav, a.s., Hospital of the Central Bohemia Region	5,08	2,63	5,84	0,76
12	Central Military Hospital – Military University Hospital in Prague	1,98	2,89	2,64	0,66
13	General University Hospital in Prague	2,77	3	5,13	0,36
14	Institute for Clinical and Experimental Medicine	3,7	3,12	5,74	2,04
15	University Hospital Bulovka	2,81	3,12	5,09	2,28
16	Thomayer University Hospital	3,71	3,2	5,67	1,96
17	Hospital Uherské Hradiště a.s.	3,52	3,43	6,12	2,6
18	Hospital with polyclinic in Česka Lípa, a.s.	2,14	3,56	4,56	2,42
19	University Hospital Hradec Králové	3,17	3,57	5,54	2,37
20	Silesian Hospital in Opava, contributory organization	3,83	3,57	5,29	1,46
21	Regional resort center, a.s.	2,56	3,63	6,78	4,22
22	Masaryk Institute of Oncology	3,68	3,63	6,43	2,75
23	Hospital of Pardubice Region, a.s.	4,34	3,88	4,79	0,45
24	St. Anne's University Hospital in Brno	2,5	3,92	3,24	0,74
25	Znojmo Hospital, contributory organisation	4,25	4,2	4,8	0,55
26	Regional Hospital Náchod, a.s.	4,62	4,23	6,59	1,94
27	Kralovské Vinohrady University Hospital	4,69	4,49	4,72	0,03
28	Hospital Jihlava, contributory organisation	4,25	4,72	4,58	0,33
29	University Hospital Brno	4,73	4,96	5,41	0,68
30	Regional Hospital Liberec, a.s.				
31	Institute of Haematology and Blood Transfusion in Prague	3,87	6,31	5,98	2,11
32	Regional Hospital T. Bata, a. s.	21,87	18,6	6,26	–15,61

Note: The K-index* was not calculated for organizations with less than 60 contracts per year or a small volume of contracts. Source: CSÚ (2022).

When examining the key risk index or K-index, which is a measure of risk factors related to the risk of corruption and mismanagement of public funds, it should be noted that during the analyzed period from 2019 to 2021, the K-index of the largest hospitals in Czechia increased, with only three hospitals having a negative value: Regional Hospital T. Bata, a.s. (–15.61), Regional Hospital Karlovy Vary, a.s. (–1.79) and a slight decrease in Hospital České Budějovice, a.s. (–0.44). This indicates that in a larger number of the most popular hospitals, public funds for multidisciplinary treatment in Czechia are used for their intended purpose and that medical facilities are being developed.

Rapid price growth continued in early 2022, with the consumer price index rising by 11.1% year-on-year in February. However, in early 2022, there was an increase in the number of mass-visit accommodation facilities. The number of guests increased by 571.6%, and the number of overnight stays increased by 517.7% (Scan, 2022; UZIS CR, 2022).

The main advantages of health tourism in Czechia when taking a course in Czech rehabilitation medical and healthcare facilities are listed in Figure 4.

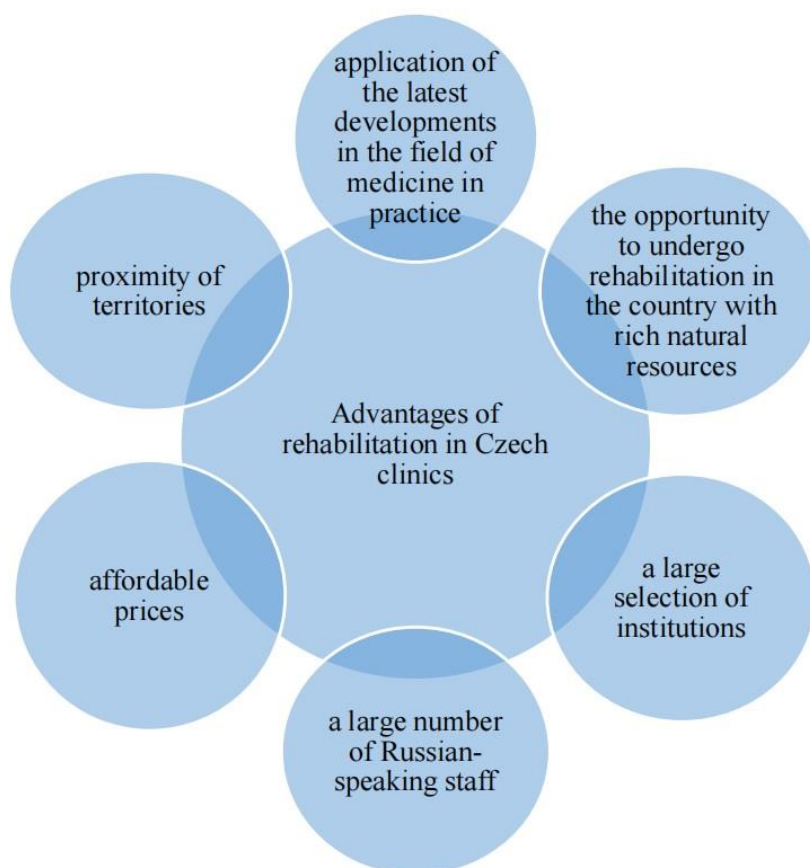


Figure 4. Advantages of health tourism in Czech clinics. Source: developed by the authors.

Among the advantages of the health tourism in Czechia are the following: the use of the latest medical developments in practice; the opportunity to undergo rehabilitation in a country with rich natural resources; a large selection of institutions; a large number of Russian-speaking staff; affordable prices; and the proximity of the territories.

In order to ensure the health tourism development in Czechia, a quantitative and qualitative forecast of the situation is conducted. One of the forecasting methods that reduces the impact of uncertainty and risk factors is the piecewise linear approximation method (Sheludko, 2018; Goncharov, 2020). The piecewise linear approximation method is a universal method based on the piecewise linear approximation of the distribution function, so it has a fairly simple machine implementation and provides the required transformation accuracy.

The main idea of the piecewise linear approximation method is to divide the space of input parameters into such regions, within each of which a complex dependence in the entire space can be approximated by a linear function. Therefore, this method is widely used in simulation modeling.

Let us consider the use of the piecewise linear approximation method for forecasting the directions of health tourism development. A generalized diagram of the algorithm for forecasting the directions of health tourism development by the piecewise linear approximation method is shown in Figure 5.

A multifactorial forecast is substantiated by the method of piecewise linear approximation of the development of recreology and health resort treatment in Czechia.

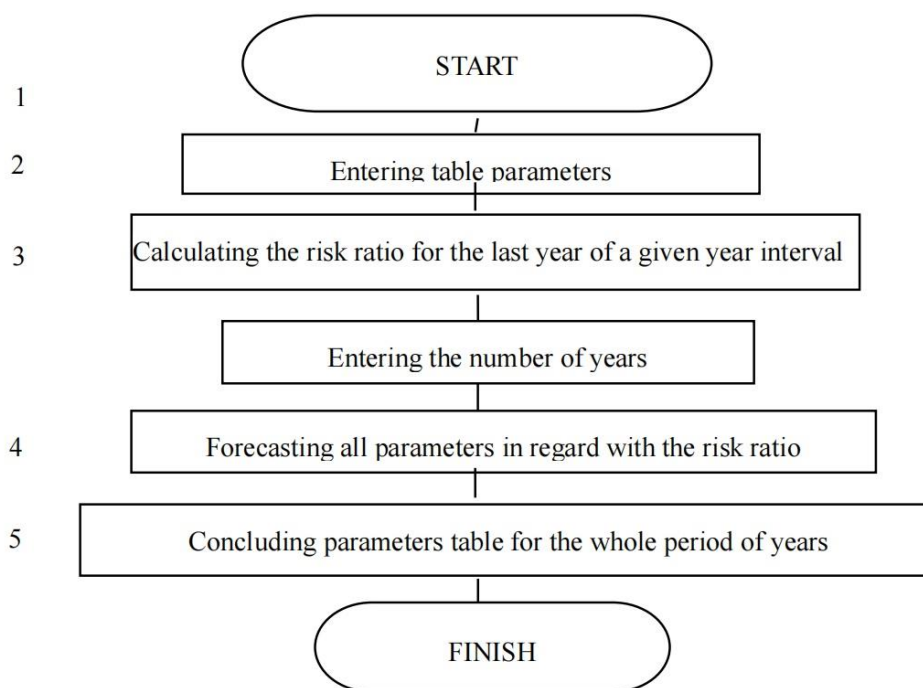


Figure 5. Generalized scheme of the algorithm for forecasting the health tourism development in Czechia by the method of piecewise linear approximation. Source: developed by the authors.

To determine forecasting for the directions of health tourism development in Czechia, statistical data on the number of patients in selected clinics in Czechia are chosen among adult patients, adolescents and children within the last 4 years of 2019–2022, which are presented in Table 6.

Table 6. Number of patients in selected clinics in Czechia among adult patients, adolescents and children, thous. of people (excluding foreigners), thous.

Years	Adult patients		Children	Adolescents
	At the expense of health insurance, thous	At own expense, thous		
2020	73	76	7,2	1,7
2021	77	103	6	1,5
2022	120	115	8	3

Source: UZIS CR (2022)

For the studied interval of years “n”, a broken line of approximation is built, where the abscissa indicates the years, and the ordinate — the true predicted value of the parameter in this year (according to the enterprise). A detailed diagram of the algorithm to forecast the directions of health tourism development using the piecewise linear approximation method is shown in Figure 6.

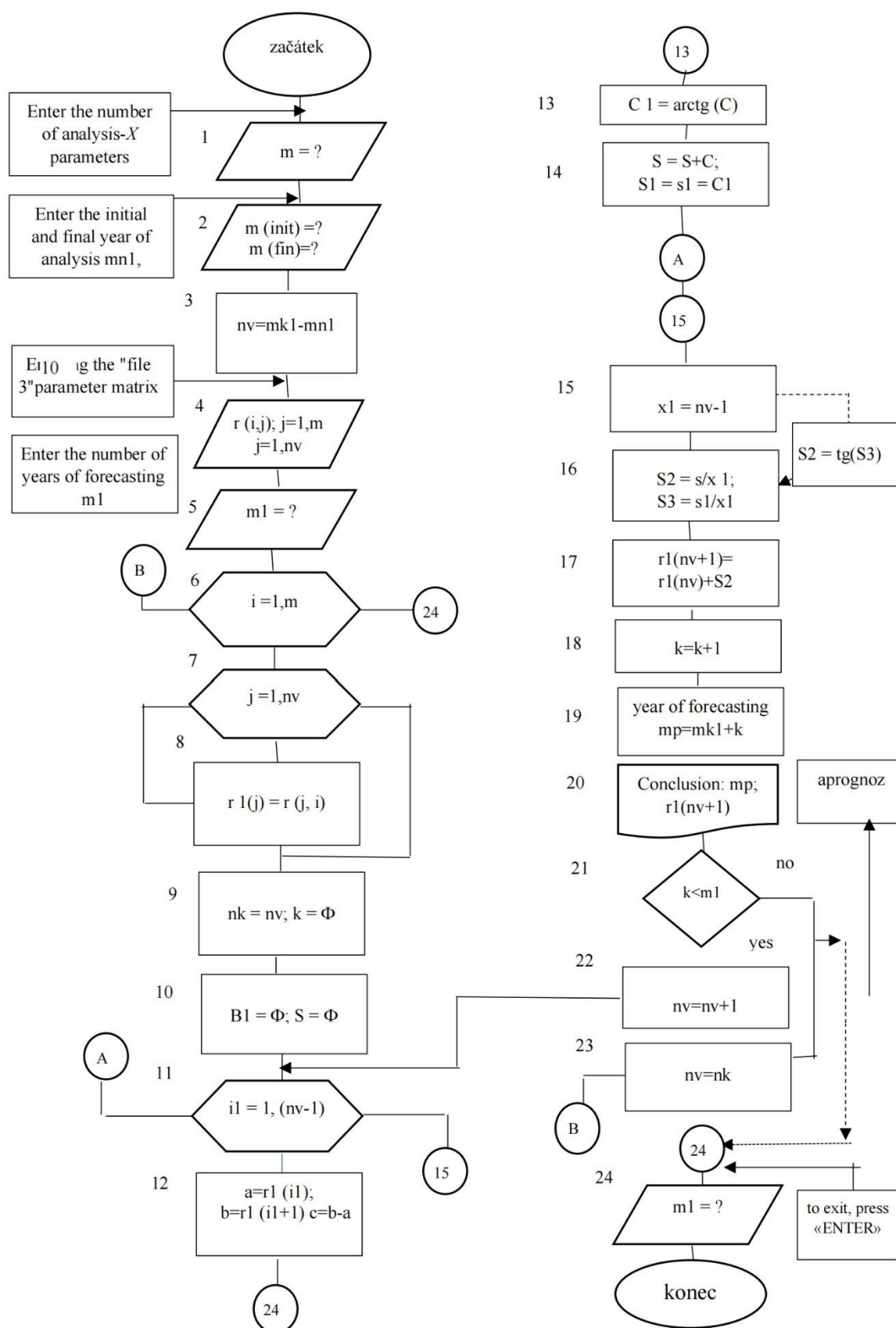


Figure 6. Scheme of the algorithm to forecast the directions of health tourism development by the piecewise linear approximation. Source: Goncharov et al. (2020).

For simplicity, we introduce the notation:

- a_i — the difference between the values of the next and the previous year.
- b_i — increase in the parameter value (i-indicator of costs per thous. people);

$$b_1 = p_{j+1}^n - p_j^n \quad (3)$$

Let us build a table of the increase in the parameter value for a given interval of years (Table 7, Table 8; Table 9, Table 10).

Table 7. Increase in parameter values for a given interval of years of adult patients, due to the cost of the insurance company, thous. people.

Interval	2021–2020	2022–2021
i	1	2
b_i	4	43

Source: developed by the authors.

The average value of the parameters increase in values for a given interval of 2020–2022 for adult patients, at the expense of the insurance company is 24,000 people.

Table 8. Increase in parameter values for a given interval for adult patients, at their own expense, thous. people.

Interval	2021–2020	2022–2021
i	1	2
b_i	27	12

Source: developed by the authors.

The average value of the parameters increase in values for a given interval of 2020–2022 for adult patients at their own expense is 20,000 people.

Table 9. Increase in parameter values for a given interval for children, thous. people.

Interval	2021–2020	2022–2021
i	1	2
b_{i_i}	-1,2	2

Source: developed by the authors.

The average value of the parameters increase in values for a given interval of 2020–2022 for children is 400 people.

Table 10. Increase in parameter values for a given interval for adolescents, thous. people.

Interval	2021–2020	2022–2021
i	1	2
b_i	-0,2	1,5

Source: developed by the authors.

The average value of the parameters increase in values for a given interval of 2020–2022 for adolescents is 650 people.

Since a_i , b_i in this line are the angles of a right triangle, then:

$$\frac{b_i}{a_i} = \operatorname{tga}_i, \quad (4)$$

$$b_i = a_i \operatorname{tga}_i, \quad (5)$$

Taking into account that for any interval $a_i = 1$, then,

$$b_i = a_i \operatorname{tga}_i, \quad (6)$$

In the following, we can find some

$$a_i = \operatorname{arctga}_i, \quad (7)$$

For the apparent correctness of finding the sum of angles

$$S_{a_i} = \sum_{i=1}^{n-1} a_i, \quad (8)$$

where, S_{a_i} is the sum of the slope angles of the lines in the intervals of piecewise linear approximation; a_i is the angle of the slope of the line chart of the next year of analysis relative to the previous ones; n is the number of years.

However, the additional computational Equation (4) will necessarily introduce a calculation error on the PC.

Therefore, to implement the method, we will find the sum of b_i .

$$S_{b_i} = \sum_{i=1}^{n-1} b_i, \quad (9)$$

Then, from the expression of the form,

$$b_i^{cp} = \frac{S_{b_i}}{n-1}, \quad (10)$$

We find the average incremental value of the parameter Δp_i^n .

Using the value of the parameter p_n^n and the increment $b_i^{cp} = \Delta p_j^n$ we find the predicted value of the parameter.

$$P_{progn} = p_n^n + b_i^{cp}, \quad (11)$$

The forecasted values of the directions of health tourism development in Czechia for 2023–2025 are shown in Table 11.

Thus, the method of piecewise linear approximation allows obtaining objective values of the parameters for forecasting the directions of health tourism in Czechia for the next year after a given interval of the years studied. The analysis of the initial data shows that the actual values of the parameters, in some cases, are not an objective characteristic, and changes in their values from year to year depend on subjective factors.

Table 11. Forecasting all parameters of the directions of health tourism in Czechia for 2023–2025, thous. people.

Years	Adult patients		Children	Adolescents
	At the expense of health insurance, thous	At own expense, thous		
2023	144	135	8,4	3,65
2024	168	155	8,8	4,3
2025	192	175	9,2	4,95

Source: developed by the authors.

In order to reduce the influence of subjective factors, we introduce a risk ratio that can be used by the management of recreational and medical institutions as a variable when planning the value of a parameter based on the results of forecasting.

Forecasting the development parameters of the directions of health tourism in Czechia in such areas of tourism as adults with health insurance; adults at their own expense; children; adolescents will increase the amount of income for health tourism institutions in Czechia, which will boost the competitiveness and investment attractiveness of the country.

However, the problem today is the inefficient and insufficiently rational use of all these resources, and the mismatch between the level of the tourism industry development and the available potential. As a result, the volume and dynamics of tourist services are inferior to the optimal estimated number that the country can accommodate.

The successful implementation of Tourism Development Strategy of the Czech Republic 2021–2030 — an investment-attractive territory with a developed industrial complex and infrastructure — has contributed to the following results MRDCR (2023):

- marketing activities aimed at promoting the regions as attractive;
- higher quality, speed and transparency of administrative services;
- development of business support infrastructure in the following areas;
- continued development of the network of business support infrastructure facilities in the regions;
- raising awareness of potential tourists and stakeholders of the cultural and tourism potential of the regions, developing the relevant infrastructure; clusters of culture and event tourism (The Tourism Development Strategy of the Czech Republic 2021–30, 2021).

The strategic directions of the tourism sector development are:

- Czechia’s management and support system;
- innovative offer and experience;
- tourism services demand/consumers;
- research, development, monitoring, information;
- measures to work with staff;
- development of Czechia’s management system;
- implementation of Czechia’s financial system from several sources;
- support for the construction and modernization of Czechia’s infrastructure;
- support of Czechia’s integrated marketing communications system for internal regions;
- creating a system for collecting statistical data and conducting research in Czechia;
- Czechia’s education system based on close cooperation and communication between service providers and educational institutions;
- ensuring the tourists’ safety in the regions;

- cooperating and coordinating Czechia's development, consumer rights protection;
- management and coordination of Czechia in crisis situations;
- preserving the potential of cultural, technical and natural heritage, cultural landscape and the use of cultural and creative industries in Czechia;
- continuous development of the service quality system;
- preventing and mitigating the environmental impact in Czechia, the essence and application of the system of retraining and professional development in Czechia;
- supporting the employment development in Czechia;
- building positive relations between residents and the Czech authorities.
- organizing national and international scientific, cultural and business events (festivals, artistic seminars, congresses, exhibitions);
- developing associations of agro- and rural tourism, promoting tourism services in rural areas;
- stimulating promotional campaigns for various recreational and tourist potential of the region (medical resorts, mineral water resorts);
- developing ethnic tourism for Ukrainians, Jews, Poles, Arabs, Germans, and Chinese.

In order to implement the strategy for the development of recreation and health resort treatment in Czechia, it is proposed to:

- create favorable conditions for the development of promising thematic areas of tourism, including health and wellness, medical, etc;
- spread information about recreational and health resort opportunities in the country;
- create conditions for as many tourists as possible to visit the country's regions;
- preserve and develop the main health resort facilities, improving the accessibility of health resort services.

A promising direction for the health tourism development in Czechia is to treat patients in accordance with the latest scientific achievements and professional training of specialists, increase cooperation with medical faculties in different regions, and improve professional practice and student internships.

5. Discussion

Thus, the study of substantiating the directions of health tourism development in Czechia is driven by a wide range of services and available tourism resources that have made it one of the main tourist destinations for health and/or spa tourism. But despite the countless benefits of international medical tourism, the development of this typology can have negative consequences.

Achieving the directions of health tourism in Czechia is possible by analyzing the world experience and numerous approaches proposed by scientists:

- by identifying the problems of the development of recreation and health resort treatment through the study of the spa industry, which has lost its support from state funding and has become part of the market environment. Such a negative fact as a reduction in the number of patients receiving comprehensive or partially paid health/spa treatment, which is compensated by the self-sufficiency of patients within the framework of domestic and inbound tourism, was studied by Attl (2014);
- by assessing the state of health resort services for children's tourism during the Second World War. The negative trend was observed despite the increase in children's health resorts and health

facilities in 1947 and the increase in medical staff caused by the lack of funding, labor and qualified personnel, as well as the conversion of children's medical institutions to adult institutions. However, due to government measures aimed at restoring children's health resorts and their services, by 1950 the bed supply reached the pre-war level; a network of specialized sanatoriums began to develop, which led to an increase in the effectiveness of health improvement measures Sher et al. (2023).

It is also necessary to take into account other approaches of European scholars who have pointed out the need for

- introducing continuous innovations in health tourism (Jónás-Berki et al., 2015);
- creating and strengthening the brand of a tourist destination based on health and safety, taking into account the importance of ecosystem services (Lubowiecki-Vikuk et al., 2023);
- interconnecting the traditional use of natural healing sources with the state health insurance system and the level of health resort procedures, which will lead to an increase in the length of stay (Derco & Pavlisinova, 2017);
- developing a system of enterprises' management control by taking into account financial indicators that will be sufficiently profitable for all stakeholders (Čabinová & Onuferová, 2019);
- taking into account the regular consumers' requirements for medical services (the British and Germans) (Lubowiecki-Vikuk & Dryglas, 2019);
- taking into consideration all the elements of creating and maintaining the potential of medical tourism by various indicators that form clusters (Lubowiecki-Vikuk & Kurkowiak, 2017);
- using marketing measures to preserve wellness tourism as a type of health tourism (Becková & Kantorová, 2021);
- introducing changes in their strategy in the spa sector of health tourism (Boleloucka & Wright, 2020);
- financing both the private and public sectors of the spa industry (Kraftova et al., 2017).

Thus, the above approaches indicate the importance of using rationally all these resources today and the inconsistency of the level of health tourism development in Czechia, given the existing potential.

Each of the studied methods has its own significance, is used in accordance with the corresponding climatic conditions, medical capabilities necessary for the body recovery after complex surgical interventions, treatment of cancer, and stressful life situations.

The proposed method of piecewise linear approximation for forecasting the directions of health tourism development in Czechia based on the values of such parameters as adults with health insurance; adults at their own expense, children and adolescents will increase the amount of income for health tourism institutions in Czechia.

The above-mentioned areas of health tourism development indicate that the medical tourism industry, as a type of medical tourism, is in great demand by patients around the world. The tools for improving the health tourism industry point to certain problems associated with the growth of additional services and maximizing the attractiveness of travel using the utility function. This can be achieved by minimizing the total cost and maximizing the attractiveness of travel. A further area of research will be the development of an algorithm for determining the route of a patient-tourist with optimizing the distribution of patients from the country of origin to hospitals in the country of destination and the schedule of visits to tourist cities.

6. Conclusions

Thus, the directions of health tourism development in Czechia have been studied. In order to substantiate the directions of health tourism development in Czechia, medical tourism, wellness tourism and spa tourism in Czechia have been analyzed.

The methods of restoring human health based on the use of a significant number of recreational resources are investigated.

The number of patients among residents of the country and foreigners using health tourism services has increased. Among the most popular regions of Czechia for health tourism, Prague, Moravian-Silesian, Olomouc, Plzeň, South Moravian, and South Bohemian regions were identified as the leading places. Ukraine, Slovakia, Poland, Germany, and the United Kingdom were among the top five countries that used the services of health tourism in Czechia in 2021.

The main problems that hold back the directions of health tourism development in Czechia include: disproportionately high fees for the simplest manipulation without insurance; not all medical institutions meet quality standards for service and treatment; the need to translate treatment into the native language for foreign patients; mandatory paid ambulance service; inflation and rapid price increases.

Among the advantages of health tourism in Czech clinics are the following: the use of the latest medical developments in practice; the opportunity to undergo rehabilitation in a country with rich natural resources; a large selection of institutions; a large number of Russian-speaking staff; affordable prices; and proximity to the territory.

The proposed method of piecewise linear approximation for forecasting the directions of health tourism development in Czechia based on the values of such parameters as adults with health insurance, adults at their own expense, children and adolescents will increase the amount of income for health tourism institutions in Czechia.

Based on the results of forecasting the directions of health tourism development in Czechia by the method of piecewise linear approximation, an increase in demand by 3 % annually is determined. The tourism development strategy of Czechia for 2021–2030 is analyzed and directions for its implementation are suggested. It is the health tourism development in Czechia that ensures the competitiveness and investment attractiveness of the country.

Conflict of interest

All authors declare no conflicts of interest in this paper.

References

- Agalarova LS, Rozanova TP, Stytsiuk RY, et al. (2023) The problems of development of medical health-improving tourism in modern conditions. *Problems of Social Hygiene, Public Health and History of Medicine* 31: 44–50. <https://doi.org/10.32687/0869-866X-2023-31-1-44-50>
- Attl P (2014) Czech spas economy and tourism. *Economic Development and Management of Regions*, 26–32.
- Becková H, Kantorová K (2021) Wellness as a cure for the problems of Czech spas? *Int J Spa Wellness* 4: 36–52. <https://doi.org/10.1080/24721735.2021.1908077>

- Brace O, Garrido-cumbrera M, García-marín R (2023) Approaches to health tourism from the geography. Definition and study field. *Cuadernos de Turismo* 51: 429–432. <https://doi.org/10.6018/turismo.571521>
- Brandys nad Orlicí Rehabilitation Institute (2023) Available from: <https://www.rehabilitacniustav.cz/>.
- Boleloucka E, Wright A (2020) Spa destinations in the Czech Republic: An empirical evaluation. *Int J Spa Wellness* 3: 117–144. <https://doi.org/10.1080/24721735.2021.1880741>
- Borzyszkowski J, Lubowiecki-Vikuk A (2019) Destination management organizations and health tourism visual identification in Central and Eastern Europe. *Eur Res Stud J* 22: 241–261. <https://doi.org/10.35808/ersj/1508>
- Derco J, Pavlisinova D (2017) Financial position of medical spas—the case of Slovakia. *Tour Econ* 23: 867–873. <https://doi.org/10.5367/te.2016.0553>
- Carneiro MJ, Eusébio C (2012) Segmentation of the tourism market using the impact of tourism on quality of life. *Tour Manag Stud* 7: 91–100.
- Chen CC, Petrick JF, Shahvali M (2016) Tourism experiences as a stress reliever: Examining the effects of tourism recovery experiences on life satisfaction. *J Travel Res* 55: 150–160. <https://doi.org/10.1177/0047287514546223>
- CSU (2022) Czech Statistical Government. Available from: <https://www.czso.cz/csu/czso/domov>.
- Čabinová V, Onuferová E (2019) Efficiency and financial performance evaluation of the medical Spa sector: An empirical study from Slovakia. *Calitatea* 20: 62–68.
- Derco J, Romaniuk P, Cehlar M (2020) Economic Impact of the Health Insurance System on Slovak Medical Spas and Mineral Spring Spas. *Sustainability* 12: 3384. <https://doi.org/10.3390/su12083384>
- Gastrocentrum Karlovy Vary (2023) Available from: <https://www.gastrokv.cz/cz/>.
- Goncharov OA, Vasiyeva LV, Junda AM (2020) Numerical methods for solving applied problems. training manual. Sumy: Sumy State University.
- Hospital in the Czech Republic (2023) Hospitals in the Czech republic hospitals in the Czech republic czech hospitals divided by Regions, Cities and doctors. Available from: <http://www.nasenemocnice.cz/nemocnice-jihocesky-kraj>.
- Jónás-Berki M, Csapó J, Pálfi A, et al. (2015) A market and spatial perspective of health tourism destinations: The Hungarian experience. *Int J Tour Res* 17: 602–612. <https://doi.org/10.1002/jtr.2027>
- IHISCR (2020) National health information system-outpatient care. Health care in the Czech Republic: a brief overview of the activities of the field general practitioner for children and adolescents for the period 2007–2020. Available from: <https://www.uzis.cz/res/f/008393/nzis-rep-2021-k18-a041-prakticky-lekar-pro-deti-a-dorost-2020.pdf>.
- IHISCR (2023) Institute of Health Information and Statistics of the Czech Republic. Statistics of health services. Available from: <https://www.uzis.cz/index.php?pg=vystupy--statistika-zdravotnich-sluzeb>.
- IHISCR (2023) Relevant information to the Charter of Health Information and statistics of the Czech Republic. Available from: <https://www.uzis.cz/res/f/008418/ai-2022-02-cizinci-2021.pdf>.
- Kadan Hospital (2023) Available from: <https://www.nemkadan.cz/>
- Kimes SE, Singh S (2009) Spa Revenue Management. *Cornell Hosp Q* 50: 82–95. <https://doi.org/10.1177/1938965508324868>
- Rehabilitation Institute Kladruby (2023) Available from: <https://www.rehabilitace.cz/>.

- Kočanová D, Kováč V, Serzhanov V, et al. (2023) Differences and Similarities in Patterns of 12. Ageing Society in the European Union. *Econ Manage* 26: 45–64. <https://doi.org/10.15240/tul/001/2023-1-003>
- Kolaee MH, Mirzapour Al-e-hashem SMJ, Jabbarzadeh A (2023) A local search-based non-dominated sorting genetic algorithm for solving a multi-objective medical tourism trip design problem considering the attractiveness of trips. *Eng Appl Artif Intell* 124. <https://doi.org/10.1016/j.engappai.2023.106630>
- Kotikova H, Schwartzhoffova E (2013) Health and spa tourism in the Czech and Slovak Republics, In: Hall, C.M. (Ed.), *Medical tourism: The ethics, regulation, and marketing of health mobility*, Routledge, 109–122.
- Kraftova I, Mandysova I, Matěja Z (2013) Specifics of the Czech spa industry and categorization model of spa towns. *Scientific Papers of the University of Pardubice* 28: 43–54.
- Kraftová I, Masuyama Y, Matěja Z, et al. (2011) Social responsibility in the spa industry: similarities or differences? (comparative study of the Czech and Japanese Environment). Available from: http://www.ekonomie-management.cz/download/1346064235_132b/2011_02_kraftova_masuyama_mateja_kornfeldova.pdf.
- Kudlacek M, Blankova B, Filipcic T (2007) Indicators of attitudes toward inclusion of students with physical disabilities in pe in the “atipdpe – sl” instrument for prospective Slovene physical educators and general educators. *Kinologia Slovenica* 13: 43–51.
- Lubowiecki-Vikuk A, Borzyszkowski J, Marczak M (2023) Marketing of tourism ecosystem services in times of uncertainty: Lessons from a health tourism destination in Poland, In: Gowreesunkar, V.G., Maingi, S.W., Ming'ate, F.L.M. (Eds.), *Management of Tourism Ecosystem Services in a Post Pandemic Context: Global Perspectives*, London: Routledge, 301–319.
- Lubowiecki-Vikuk A, Dryglas D (2019) Medical tourism services and medical tourism destinations in Central and Eastern Europe – the opinion of Britons and Germans. *Econ Res-Ekon Istraz* 32: 1256–1274. <https://dx.doi.org/10.1080/1331677X.2019.1627892>
- Lubowiecki-Vikuk A, Kurkowiak J (2017) Medical Tourism Potential of Central and Eastern Europe: Attempt at Classification. *CBU Int Conf Proc* 5: 286–293. <https://doi.org/10.12955/cbup.v5.940>
- Lončarić D, Perišić PM, Bagarić L (2018) The Relationship Between Tourism Experience Co-Creation, Life Satisfaction and Behavioural Intentions. *Cent Eur Bus Rev* 7. <https://doi.org/10.18267/j.cebr.203>
- Metylovice (2023) Specialist treatment institute Metylovice. Available from: <https://www.olum.cz/>.
- Migrant.Biz.Ua. (2023) Features of treatment and rehabilitation in the Czech Republic. Available from: <https://migrant.biz.ua/chexiya/medicina-cz/likuvannia-ta-reabilitatsiia.html>.
- Moon SB (2019) Scientific Background of Physical and Rehabilitation Medicine: Rehabilitation Sciences. *J Int Soc Phys Rehabil Med* 2: 125–129. https://doi.org/10.4103/jisprm.jisprm_29_19
- MRDCR (2023) Ministry for Regional Development of the Czech Republic, all rights reserved. Tourism development strategy of the Czech Republic 2021–2030. Available from: <https://mmr.cz/cs/ministerstvo/cestovni-ruch/archiv/koncepce-strategie/strategie-rozvoje-cestovniho-ruchu-cr-2021-2030>.
- Nitera-Kowalik A, Olszewska E, Smyda A (2016) Spa Resort Treatment As a Method of Preventing Negative Consequences of Aging. *Acta Balneol* 58: 110–117.
- Patterson I, Balderas-Cejudo A (2023) Tourism towards healthy lives and well-being for older adults and senior citizens: tourism agenda 2030. *Tour Rev* 78: 427–442. <https://doi.org/10.1108/TR-06-2022-0269>

- Písek Hospital (2023) Available from: <https://www.nemopisek.cz/aktuality/>.
- Rogerson CM, Rogerson JM (2023) The Historical Development of South African Small Towns as Spa Resorts, In: Donaldson, R. (eds), *Socio-Spatial Small Town Dynamics in South Africa*, Geo Journal Library, 225–242. https://doi.org/10.1007/978-3-031-37142-4_10
- Rutyns'kyi, Petranivs'kyi (2012) Health & spa tourism: current goals and modern approaches to the organization. *Bulletin of Lviv University. International relations series* 29.
- Schuh A (2009) Evidence of the Efficacy of Climatotherapy and Thalassotherapy A Review. *Schweizerische zeitschrift fuer ganzheitsmedizin* 21: 96–104. <https://doi.org/10.1159/000287219>
- Sheludko G, Ugrimov S (2018) Modernization adaptive piecewise linear approximation of difficult-to-compute functions. *J Mech Eng* 21: 60–67.
- Sher SA, Albitskiy VY, Ustinova NV (2023) Sanatorium and resort recreation services for child population in ussr in post-wwii period (1946 to 1950). *Pediatrics - Journal im G.N. Speranskogo* 102: 219–225. <https://doi.org/10.24110/0031-403X-2023-102-4-219-225>
- The Mariánské Lázně Hospital (2023) Available from: <https://neml.eu/>.
- Vyskov Hospital (2023) Available from: <https://www.nemvy.cz/>.
- Vystoupil J, Šauer M, Bobková M (2017) Spa, spa tourism and Wellness tourism in the czech republic. *Czech J Tour* 6: 5–26. <https://doi.org/10.1515/cjot-2017-0001>
- Watchman of the State (2023) Large hospitals in the Czech Republic according to the K-Index for 2022. Available from: https://www.hlidacstatu.cz/kindex/zebricek/Velke_nemocnice.
- Zhang P, Wu L, Li R (2023) Development Drivers of Rural Summer Health Tourism for the Urban Elderly: A Demand- and Supply-Based Framework. *Sustainability* 15: 10686. <https://doi.org/10.3390/su151310686>



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