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**The impact of transport and telecommunication infrastructures
on the tourism competitiveness of regions**

Abstract: In the article were described the selected elements of tourism development, which are transport and telecommunication infrastructures. The aim of the study was to examine the impact of this infrastructure on the tourism competitiveness of countries in the world. Therefore, the synthetic index of competitiveness was described – The Travel & Tourism Competitiveness Index (TTCI), which is published by the World Economic Forum (WEF). The study included the selected pillars of the TTCI index, containing information about the transport infrastructure and the teleinformatics in years 2007-2015. Furthermore, the competitiveness of the Polish sector of tourism in the international arena on the field of infrastructure was discussed. It turned out, that in the analysis period, Poland took the highest position in the pillar of telecommunication infrastructure. The lowest position, Poland took in the terms of air transport infrastructure, although a significant improvement can be seen in that area in recent years.

Keywords:Transport and telecommunication infrastructure; Tourism; Competitiveness Index

Introduction

The problem of rivalry spatial units appeared in science in the eighties of the last century when about shaping their competitiveness began to speak in the context of territorial marketing. According to his idea, the individual villages or regions, according to their resources and needs, join the competition at all levels: investment attractiveness, development of transport infrastructure and standard of living [3].

Towns and regions also compete increasingly on attracting tourists. Tourist traffic, the essence of which is the voluntary relocation of tourists for recreational, cultural, medical purposes etc. is present in those places and at those areas that are attractive tourist attractions and an appropriate level of tourism development. Tourist, striving to achieve the objectives of the trip, reports the demand for accommodation, transportation, nutrition, recreation and sports, cultural and other [1]. The state of tourism management determines the possibilities of reaching out to the regions and tourist destinations, the conditions of tourists' stay, meeting the tourist demands, the extent of values utilization, and thereby determines the attractiveness of tourist regions [6]. The level of development is an element of competition between the towns and tourist regions, which are trying to provide tourists with the best conditions of residence and to reach areas of tourist reception.

The article discusses some elements of tourism development, which are transport infrastructure and ICT. With today's technology and knowledge about the efficiency and quality of functioning transport systems decides - apart from the improvement of material and construction of infrastructure (as, e.g. road quality, network size, type, and comfort) - increasingly feature in solutions using information technology [15]. Therefore, in the article examining the impact of transport infrastructure on the competitiveness of tourism also includes ICT systems.

The aim of the study is to assess the impact of transport infrastructure and ICT on the competitiveness of tourist countries in the world. Therefore, the analysis of the synthetic index of competitiveness - The Travel & Tourism Competitiveness Index (TTCI), which is published by the World Economic Forum (WEF). The study included selected pillars index TTCI transport infrastructure and ICT in years 2007-2015 [10-14]. In addition, were discussed competitiveness of Polish tourism in the international arena in the field of infrastructure.

The importance of transport in tourism development

One of the most characteristic features of tourism is movement, therefore transport, ensuring that move is an essential condition for its practice. It allows tourists to both reach the final destination, and move through the visited region. In addition to the communication function, also provides entertainment and recreation function, as the journey via some means of transport, for example cruise or ride a tourist cable, is a tourist attraction itself [7]. The development of tourism since its establishment was determined progress that happened in transit. Intensive development of tourism in recent decades was possible by changes taking place in the transport infrastructure. Constant investments to improve the comfort of the services provided, e.g. by shortening the travel time, made it possible to reach remote corners of the world. Distance, constituting yet half of the previous century, the primary determinant of travel, ceased to be an inhibiting factor, especially in the face of the development of air transport, which is currently the fastest growing mode of transport [8]. Thanks to him international tourism has become widespread and developed on a massive scale.

The development of tourism is dependent on transport not only at the macro level. Also in scale of reception areas (country, region, locality) provided the competitiveness of the tourist economy is the existence of a transport system composed of two subsystems: the availability of transport and intra-regional tourist transport. The first task is to provide convenient connections from key sending markets, and the second - facilitate the use of existing assets, attractions, and equipment service reception area [4].

Transport in tourism can be classified in different ways. From the point of view of the environment in which it takes place and type of transport used for this purpose, is divided into:

- land transportation (automotive, rail, bicycle, pedestrian),
- air transport (aviation),
- water transport (maritime navigation, inland waterways).

Taking into account the organizational and functional tourist transport, separates [7]:

- travel via public transport, in the public network connections that take place regularly,
- rides by specially hired or reserved means of transport (e.g. coaches, tourist trains, trains, hotel, rented boats, charter flights),
- travel via public transport for solely or almost solely tourist destinations (e.g. tourist bus lines, cruise ships, railway line, lifts etc.),
- journeys via own means of transport (e.g. cars, motorcycles, bicycles, boats, canoes, private planes),
- pedestrian traffic.

Type of used transport and its form of organization depends on the purpose and nature of travel tourism, as well as the distance between the place of tourist's residence and travel destination. In turn, the level of intensity of passenger transport is closely related to the occurrence of seasonality of tourism in the reception areas. This situation affects the actions taken both by public transport operators and private bus companies that recognize the possibility of increasing the revenues generated from the operation of tourism - decide to introduce during tourist seasons in order to allow the secure tourist transportation needs. These actions taken by the different entities are often not related in any way, and as their result often comes to the occurrence of strong competitive pressure, which interferes with the functioning of the public transport system in the region [5].

The competitiveness of tourism in the world due to the transport infrastructure and ICT

Interest in competitiveness problem in tourism resulted in the appearance of the numerous initiatives, whether of an intra, industry, and international. The most famous project is undertaken by the World Economic Forum (WEF) initiative estimating synthetic Competitiveness Index Travel and Tourism - The Travel & Tourism Competitiveness Index (TTCI). Since 2007. WEF prepares about this industry report *Travel & Tourism Competitiveness Report*. Published in it index of competitiveness refers generally to the attractiveness of the tourism market for investors, not consumers. The authors based on two groups of information: 1) the study experts - leaders of organizations and companies; 2) data of international organizations (e.g. World Tourism Organisation - UNWTO, the International Air Transport Association - IATA, World Bank) and companies representing the tourism sector (airlines, car rental companies). In addition, they also used information from national sources [2].

The index of tourism competitiveness in 2007-2013 was built based on three core areas (subindices) the competitiveness and 14 essential pillars.

The first area - included widely understood system of legal regulations related to tourism. To which belonged general rules of law, acts relating to tourism activities, the regulations in terms of environmental protection regulations and the safety of tourists, the health situation and health situation of hygienic-sanitary.

The second area - analyzed business environment and tourism infrastructure, including inter alia: infrastructure, air and land transport (network density, availability, quality etc.), infrastructure directly tourist (the number of hotel rooms and rental cars and ATMs), ICT infrastructure (availability of the Internet and systems of fixed and mobile telephony, coverage and quality of wireless networks, etc.), as well as price competitiveness in the provision of tourism services (fuel prices, hotel rooms, airport charges).

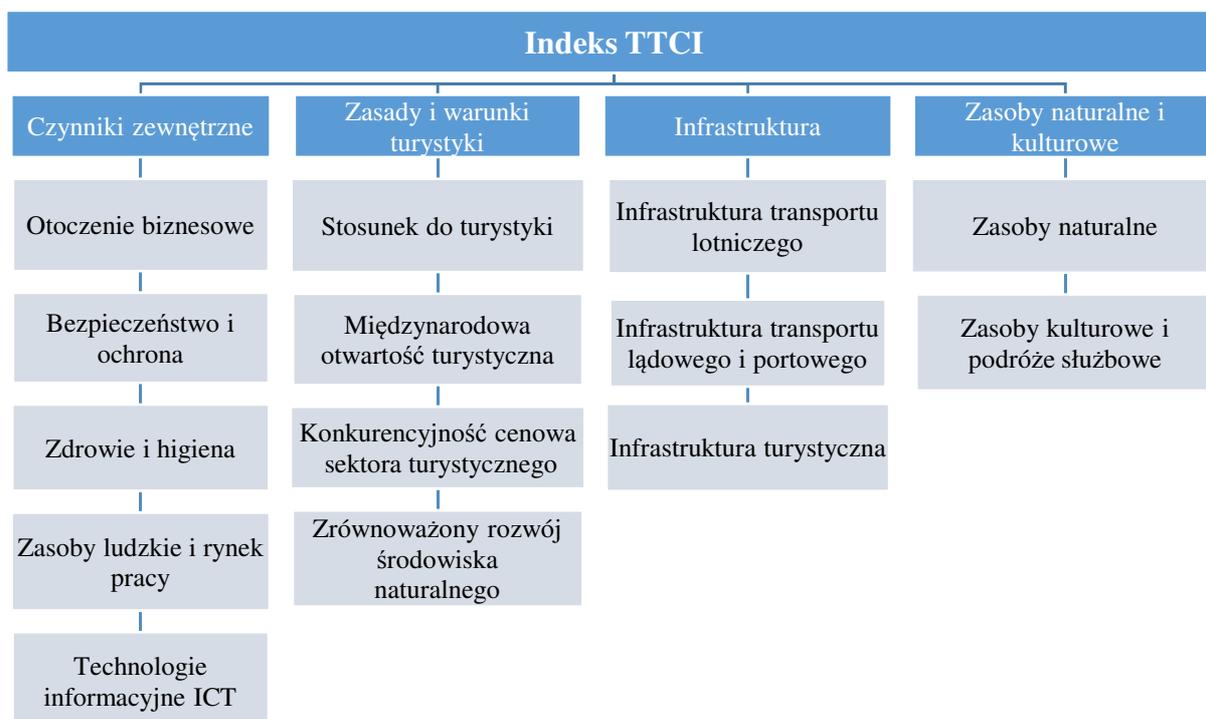
The third area - concerned the essential resources for the development and functioning of tourism. It contained human resources (availability of personnel for tourism, the quality of the education system, life expectancy), natural resources (areas and forms of protected nature), cultural resources (monuments and their class, exhibitions, fairs, number of sports stadiums). In this area also included the attitude of society to tourism.

In pillars forming areas is given a set of variables related directly or indirectly to the development of the tourism market. The vast predominance of these variables illustrate the phenomena of legislation, tourism policy and the material and social conditions for the provision of tourist services indicates a supply-side approach to the issue of competitiveness.

In order to determine the level of partial index for the region are used both the data of qualitative and quantitative terms. Qualitative data are collected from management opinion (Executive Opinion Survey) conducted annually by the World Economic Forum. The respondents are the presidents of the largest enterprises in the countries covered by the study, who make investment decisions. In the measurement of opinion on the calculation of the

index TTCI uses a 7-step scale. On the other hand data of a quantitative nature are derived from a variety of sources, both public and provided by industry organizations, and international organizations and experts from the tourism sector. Data on quantitative are recoded on a scale of 7-step. In calculating the value of indicators at different levels (pillars areas, the rate synthetic TTCI) a simple average of values of the lower level [9].

The latest Travel & Tourism Competitiveness Report published in 2015 includes 141 countries, more than 90% of the world population and 98% of world GDP. In 2015, slightly changed design index (Fig. 1). Now it consists of four areas and, as in previous years - 14 pillars. TTCI construction in 2015 is substantially similar to that of 2007-2013. In the construction of index were mostly used the same pillars and indicators, as in previous years, and changes relate to, i.a. shifts pillars between areas. In ranking from 2013 (like in 2011 and 2009) the first three places were occupied by: Switzerland, Germany and Austria. Two years later, the current leader of the ranking dropped to sixth position, mainly due to the worsening of the variables characterizing natural and cultural resources. In 2015, the head of the ranking were: Spain, France and Germany. In general rankings these countries owed their high positions in all groups of indicators. However, detailed analysis of the individual pillars and their constituent variables in 2007-2015 showed that the positions of countries in the ranking of influence could also be a slight change in the design of the TTCI.



1. The structure of sub-index TTCI in 2015

Authors of the concept and methodology for creating an index of competitiveness in tourism presented in the reports of the World Economic Forum emphasize that developed index ranking of countries is quite positively and highly correlated with both the number of tourist arrivals and tourism revenue from individual countries.

Due to the purpose of the following article we will examine the three pillars of the index TTCI, which relate to the transport infrastructure and ICT. Table 1 shows leaders in the world rankings because of these pillars in 2007-2015. As seen in the table in terms of air transport infrastructure the head of rankings in the analyzed period are Canada and the US, which has always occupied first or second place. Good position in this pillar in 2007-2011

had also the United Kingdom and Australia. From 2013 leader in the field of air transport infrastructure was the United Arab Emirates. The inland transport infrastructure (since 2015 land and port) is the domain of mainly Asian countries - Hong Kong and Singapore. Among the European countries for the special attention in this regard deserve mainly Germany and Switzerland, and in the last audited period - Netherlands. Ranking of countries in the world due to the IT infrastructure is characterized by the differentiation. In 2007-2011, the leaders were: Sweden, Switzerland and Iceland. In 2013, led South Korea, who six years earlier was on the third position. In 2015, the leader became Finland, and since 2013 in top three is Hong Kong.

Tab. 1. Leaders in the world rankings due to the selection of the pillars of tourism competitiveness index in 2007-2015

Filary indeksu	2007	2009	2011	2013	2015
Infrastruktura transportu lotniczego	USA Kanada Wielka Brytania	Kanada USA Australia	Kanada USA Australia	Kanada USA Zjednoczone Emiraty Arabskie	Kanada USA Zjednoczone Emiraty Arabskie
Infrastruktura transportu lądowego	Niemcy Hong Kong Singapur	Szwajcaria Hong Kong Francja	Hong Kong Singapur Niemcy	Hong Kong Singapur Szwajcaria	Hong Kong Singapur Holandia
Infrastruktura teleinformatyczna (ICT)	Szwecja Islandia Korea Południowa	Szwecja Islandia Szwajcaria	Szwecja Szwajcaria Islandia	Korea Południowa Hong Kong Szwecja	Finlandia Hong Kong Dania

* since 2015 the inland and ferry transport infrastructure

Table 2 presents the leaders of the world ranking in pillars of the transport infrastructure and ICT in 2015. At the same time it contains a set of variables that are part of the audited pillar. Due to the fact that each of the pillars consist of at least a few variables, it is possible to exact their analysis and identify variables that are the strength of the tourism economy, as well as those that delay its development. Position of the country in the ranking of a particular pillar is given on the basis of the aggregate index, which ranges from 1 to 7. The higher value, the higher position in the rank. For example in case of air transport infrastructure, the highest ratios achieved: Canada (6.8), USA (6.0) and the United Arab Emirates (5.9). Therefore these countries were at the forefront of this ranking.

Tab. 2. Leaders in the world ranking in terms of transport infrastructure and ICT in 2015

Nazwa filaru	Nazwa i pozycja kraju		
	I	II	III
Infrastruktura transportu lotniczego	Kanada	USA	Zjednoczone Emiraty Arabskie
1. jakość infrastruktury transportu lotniczego	16	9	2
2. liczba pasażerokilometrów na liniach krajowych w mln/tydz.	9	1	91
3. liczba pasażerokilometrów, loty międzynarodowe w mln/tydz.	12	1	3
4. liczba lotów na 1000 osób	9	13	8

5. przepustowość lotniska w mln osób	9	29	58
6. liczba linii lotniczych na lotnisku	10	1	12
Infrastruktura transportu lądowego i portowego	Hong Kong	Singapur	Holandia
1. jakość dróg	7	6	5
2. jakość infrastruktury kolejowej	3	b.d	9
3. jakość infrastruktury portowej	4	2	1
4. jakość sieci transportu drogowego	2	8	9
5. gęstość linii kolejowych km/km ²	b.d	b.d	8
6. gęstość dróg w km/km ²	13	4	6
7. gęstość dróg utwardzonych w km/km ²	10	2	7
Infrastruktura teleinformatyczna (ICT)	Finlandia	Hong Kong	Dania
1. wykorzystanie ICT dla transakcji pomiędzy firmami	5	19	27
2. wykorzystanie Internetu w transakcjach firma - klient	33	27	23
3. osoby korzystające z Internetu (w %)	7	30	4
4. abonenci Internetu szerokopasmowego na 100 osób	15	16	2
5. liczba komórkowych abonamentów telefonicznych na 100 osób	8	1	46
6. liczba komórkowych abonamentów usług internetowych na 100 osób	2	10	8
7. dostęp do telefonii komórkowej (% populacji)	59	1	b.d
8. jakość dostaw energii elektrycznej	3	2	5

The competitiveness of tourism in Poland due to the transport infrastructure and ICT

According to *The Travel & Tourism Competitiveness Report* from 2015 Poland was ranked on 47th place, up five places lower than two years earlier, but the two places higher than in 2011, and nine positions higher in comparison to 2007. Top rated area of competitive concern terms and conditions of tourism (zone II) - 23 position in the world ranking. The worst classification of our country in terms of infrastructure (area III) admitting only 62 place. Due to the remaining areas, i.e. External factors (area I), and natural and cultural resources (area IV), we took the 39 and 43 position. A careful analysis of the competitiveness of Polish tourism indicates that we have strong position in the areas that are the basis of the key themes of tourism. In 2015, we took the 26 position due to the openness of the tourist (attitude of the authorities and society to foreign tourists), 28th place in terms of environmental sustainability, 35 position in terms of cultural heritage and 45 due to the nature of the objects that belong to world heritage.

In the worst part of assessed area (III) were pillars relating to air transport infrastructure, land and port. Poland fared the worst in terms of air transport infrastructure, although in recent years it can be observed a significant improvement. In 2015, occupied 73 position, which is 23 positions better than in 2007 (Table 3). In the opinion of aviation infrastructure is taken into account, inter alia the number of available airline, airport capacity and the number of flights (Table 4). On the negative assessment of the merits particularly limited airport capacity (position 109 in the world ranking) and the poor quality of air transport infrastructure (position 86). The highest position within the pillar in question was characterized by a variable of the number of airlines handled at airports. In 2015, Poland took in this regard 39 position, which moved up two places in comparison with the year 2013.

Pillar of land and port transport infrastructure included specific issues related to the quality and density of roads, railway lines, as well as the quality of facilities, equipment and installations related to the functioning of the port. In ranking of competitiveness in 2015 in this regard, we took the 47 place in the world (Table 3) Our country has a relatively high density of railway lines (10 position in the ranking) and roads (28 position), but unfortunately the quality of those last raises a lot of claims, as evidenced by only 89 position in the world ranking (Table 4).

Tab. 3. Position of Poland in the world due to the selection of the pillars of tourism competitiveness index in 2007-2015

Filary indeksu	2007	2009	2011	2013	2015
Infrastruktura transportu lotniczego	96	79	88	86	73
Infrastruktura transportu lądowego	46	68	78	66	47
Infrastruktura teleinformatyczna (ICT)	43	41	44	41	44

Tab. 4. Position of Poland in the world ranking in terms of transport infrastructure and ICT in 2015

Nazwa filaru	Pozycja Polski
Infrastruktura transportu lotniczego	73
jakość infrastruktury transportu lotniczego	86
liczba pasażerokilometrów na liniach krajowych w mln/tydz.	48
liczba pasażerokilometrów, loty międzynarodowe w mln/tydz.	50
liczba lotów na 1000 osób	83
przepustowość lotniska w mln osób	109
liczba linii lotniczych na lotnisku	39
Infrastruktura transportu lądowego i portowego	47
jakość dróg	89
jakość infrastruktury kolejowej	54
jakość infrastruktury portowej	78
jakość sieci transportu drogowego	65
gęstość linii kolejowych km/km ²	10
gęstość dróg w km/km ²	28
gęstość dróg utwardzonych w km/km ²	27
Infrastruktura teleinformatyczna (ICT)	44
wykorzystanie ICT dla transakcji pomiędzy firmami	97
wykorzystanie Internetu w transakcjach firma - klient	51
osoby korzystające z Internetu (w %)	47
abonenci Internetu szerokopasmowego na 100 osób	45
liczba komórkowych abonamentów telefonicznych na 100 osób	24
liczba komórkowych abonamentów usług internetowych na 100 osób	38
dostęp do telefonii komórkowej (% populacji)	58
jakość dostaw energii elektrycznej	46

Within the first area, concerning the external factors affecting the competitiveness of the tourist countries, awarded the fifth pillar relating to ICT infrastructure. This pillar reflects the availability of Internet and telecommunications services (fixed and mobile) and their utilization in business operations. The value of the indicator in this area in 2015 amounted to 4.9 (scale 1-7), which gave our country 44 ranking in all analyzed countries (Table 3). They are responsible for the high values of the indicators related to the number of cell phone

subscribers and Internet services to 100 people (Table 4) At 141 countries we occupied in this regard, 24 and 38 position.

Conclusions

Presented in the elaboration the Competitiveness Index of Travel and Tourism (TTCI) allows a comprehensive assessment of the tourism potential of the region. Its use in the research attractiveness of regions provides useful knowledge to pursue a policy for the development of tourism, because it allows you to identify the strengths and weaknesses of the region and his bid against rival countries [9] Multi-level structure of the index TTCI allows analysis of its components (areas and pillars) and to indicate variables that are the strength of the tourism economy, as well as those that retard its development. The aim of the article was to evaluate the impact of transport infrastructure and ICT on the competitiveness of tourist regions in 2007-2015, so that it became possible to monitor changes in the development of selected areas. Because of that, the analysis was made of only three pillars of the index TTCI that are associated with these issues. In addition, for year 2015 we made a thorough analysis of a set of variables that are part of the pillars of the respondents, allowing indicate which of the indicators were competitive advantage surveyed countries in the world.

In the last part of the article presents the competitiveness of Polish tourism in the international arena in the field of study of the infrastructure. It turned out that our country has the highest position in years 2007-2015 he was the pillar on infrastructure. The worst fell, in terms of air transport infrastructure, although in recent years it can be seen a significant improvement in this regard.

Presented in the article considerations clearly indicate that you should pay special attention to the impact of transport infrastructure on the development of the tourism sector. Efforts should be given under intensification among improve of quality of air transport infrastructure, increase airport capacity, improve the quality of road and port infrastructure However, in the case of ICT infrastructure should improve the use of ICT in transactions between companies (see Tab. 4).

Source materials

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