

ECONOMIC ASPECTS OF TOURISM ILLUSTRATED BY THE CHALK UNDERGROUND IN CHEŁM IN 2018–2025, INCLUDING THE COVID-19 PANDEMIC

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Abstract

This article aims to analyse changes in tourist traffic in the Chalk Underground in Chełm between 2018 and 2025, with particular emphasis on the impact of the COVID-19 pandemic, the seasonality of tourist traffic, and the structure of visitors by ticket type. The Chalk Underground in Chełm is a unique geological, historical, and cultural heritage site in Poland and Europe, playing an important role in the development of urban tourism and geotourism in the region. The analysis was based on statistical data provided by the site manager, including the number of annual and monthly visitors, broken down into standard, reduced, and group tickets. The study employed comparative and descriptive analysis methods to identify long-term trends and periodic fluctuations in tourist traffic. The study results indicate that during the analysed period, there was a long-term increase in the number of tourists visiting the Chalk Underground, interrupted, however, by a significant drop in visitor numbers in 2020–2021, due to the COVID-19 pandemic and the site's temporary closure. After 2022, a gradual recovery in tourist traffic and a return to the classic seasonal model were observed. Individual tourism remains the dominant form of sightseeing, while group and educational tourism show greater variability and strong seasonality. The analyses confirmed the research hypothesis and showed that the Chalk Underground in Chełm is an important feature of urban tourism and geotourism, with significant potential for further development, despite periodic disruptions caused by crises. The analysis of tourist traffic is also important from an economic perspective, as the volume and structure of visits directly translate into the site's revenues, impact on the local labour market, and the development of related services in Chełm.

Keywords: Chalk Underground in Chełm, tourist traffic, urban tourism, geotourism, underground tourism, tourism seasonality, COVID-19 pandemic, tourism economics.

1. Introduction

The centuries-old popularity of mines is not solely due to a fascination with the underground world. Poland and Europe host many mines open to visitors, but the Chalk Underground in Chełm is a truly unique, invaluable cultural, historical, and geological heritage site, unmatched anywhere else in the world. The uniqueness of the historic Chełm mine also lies in the skilful combination of tradition and modernity. Innovative ways of making underground spaces accessible not only improve the comfort and safety of tourist traffic but also highlight the site's historical, natural, and educational value, reinforcing its importance within the context of national heritage and the development of cultural tourism.

Tourism, Tourist Traffic, Tourist Attraction, COVID-19

Today, the tourism sector is an important component of the global economy, significantly influencing the creation of added value and shaping the labour market, both in Poland and internationally (Widomski 2020, quoted in Brenk, Smoleńska 2023). In recent decades, there has been dynamic growth in both domestic and foreign tourism (Brenk, Smoleńska 2023). Tourism and related concepts have evolved with the development of travel and the growing interest in this topic across various fields of study. The definitions of tourism vary considerably, mainly depending on the perspective from which it is analysed (Roman, Niedziółka, Roman 2022). According to the definition of the World Tourism Organization (UN Tourism, formerly UNWTO),

tourism “comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited” (Recommendations on Tourism Statistics, p. 5). Polish academic literature often refers to the definition proposed by Przeclawski (Widomski 2020). According to this definition, tourism encompasses phenomena related to the spatial mobility of individuals, resulting from a voluntary and temporary change of place of residence, pace of life, and living environment, as well as from establishing direct contact with the visited natural, cultural, or social environment (Przeclawski 1973, quoted in Widomski 2020).

Tourism, as a complex and multidimensional phenomenon, can be analysed from various perspectives, including psychological, social, economic, spatial, and cultural (Kowalczyk 2003, quoted in Więckowski 2010). Consequently, it is a subject of study across many fields, with geography playing a particularly important role (Więckowski 2010). Tourism encompasses both the movement of people for leisure purposes. Therefore, it can be regarded as a system comprising participants, activities, and space that enables people to rest and regenerate through travel and temporary stays away from their everyday lives (Knafou, Stock 2003, quoted in Więckowski 2010).

An integral part of tourism is the movement of people in space, i.e. tourist traffic (Liszewski 1995). As Mazurski notes, the very act of moving through space is the essence and purpose of tourism activities (Mazurski 2006, quoted in Więckowski 2010). The core of tourism is the movement of people from one place to another. It is also a special form of consumption—tourists are not limited to goods and services; they also ‘consume’ emotions, impressions, and experiences related to travel (Więckowski 2010). According to Liszewski’s concept, tourism has four fundamental components. The first is people, i.e. participants and the main subjects of tourism activities. The second component is free time, which is a prerequisite for participating in tourism. The third component is tourist traffic, i.e. the movement of people across geographical space. The fourth component covers the various effects and consequences of travel, stays, and tourist services in a specific place, including their natural, social, and economic dimensions (Liszewski 2013).

From a global perspective, the following basic types of tourism can be identified:

1. cognitive–educational tourism,
2. religious and pilgrimage tourism,
3. escapist tourism (resulting from the need to change one’s immediate social and urban environment),
4. recreational and health tourism,
5. sports, congress, and professional tourism (Ostrowski 2005).

In scholarly terms, this classification reflects the diverse motivations of participants in the tourist movement, including cognitive and spiritual needs, as well as the pursuit of psychophysical regeneration, professional fulfilment, and participation in academic and sporting events (Ostrowski 2005). Regardless of the motivation of the individual undertaking a tourist activity, the fundamental purpose of tourism is to utilise tourist resources located in areas remote from the individual’s permanent place of residence (Meyer 2008).

Tourist attractions are one of the most important components of the tourism market. These attractions encourage people to travel to specific places and make visitors enjoy their stay (Gunn 1979). Tourist attractions are among the most important components of the tourism industry, as

they encourage people to travel and visit specific places. Tourists are drawn to a particular region by these attractions, which in turn increases demand for other tourism-related services (Kruczek, Nowak 2023). They are a particularly important part of the tourism system, alongside components such as transport, information, tourist services, and management. However, tourists remain the main focus of this system (Kruczek 2011, quoted in Kruczek, Nowak 2023). The concept of ‘tourist attractions’ is difficult to define unequivocally. This term was introduced into the literature by Cohen in his work “Towards a Sociology of International Tourism”, in which he emphasises that the primary goal of mass international tourism is to visit tourist attractions (Cohen 1972, quoted in Kruczek, Nowak 2023). A distinctive feature of this phenomenon is the transformation, which involves additional ‘embellishment’ or enrichment of tourist attractions to make them even more interesting for visitors (Podemski 2004). In the literature, this term is defined in various ways. For example, Goodall describes tourist attractions as distinctive, often unique places—these can be natural features, historical monuments, or events such as festivals or sporting events (Goodall 1990, quoted in Kruczek, Nowak 2023). Similarly, Lew defines tourist attractions as ‘riches’, ‘products’, ‘images’, ‘attributes’ or ‘features’. Ultimately, he emphasises that tourist attractions are anything that motivates people to leave their homes and travel (Lew 1987). Davidson, on the other hand, sees tourist attractions as any natural features, anthropogenic structures, infrastructure, or events that draw visitors to a particular place (Davidson 1996, quoted in Kruczek, Nowak 2023).

Poland has seen an increase in the number of tourists and tourism revenues year on year. Poland has become an increasingly popular destination for both European Union residents and tourists from outside the EU. However, every global crisis affects tourism development in Poland, and the pandemic was no exception, leading to a serious slump in the tourism economy (Staszewska 2022). The concept of crisis is used across numerous academic disciplines that study various aspects of individual and societal functioning under dynamic change driven by civilisational progress. Consequently, this term is multidimensional and has varied conceptual references (Lipski, Leszczyński 2010, quoted in Staszewska 2022). Maditinos and Vassiliadis indicate that key categories of crises affecting the global tourism industry include terrorist acts, natural disasters, political instability, armed conflicts, and epidemics and diseases. In recent years, health issues in the context of various forms of tourism have become increasingly important as a cross-cultural and global issue (Maditinos, Vassiliadis 2008).

The COVID-19 pandemic, which broke out in early 2020, has proven to be a global, multidimensional crisis encompassing biological, financial, environmental, social, psychological, geopolitical, and even cultural aspects. It has affected almost all areas of life of modern societies (Matczak, Cłapa 2023). Before the coronavirus pandemic, the tourism and catering industries were among the fastest-growing sectors of the Polish economy. This stemmed from an increase in societal wealth and changes in how Poles spend their money in recent years (Staszewska 2022). The sudden emergence of SARS-CoV-2 and the numerous restrictions introduced in response, particularly lockdowns, led the tourism sector to experience one of the most severe crises in its history in 2020–2021 (Brenk, Smoleńska 2023).

As in other sectors of tourism, the pandemic has led to a serious crisis in the operation of tourist sites. The travel restrictions introduced in March and the closure of borders completely paralysed tourist traffic (Kruczek, Nowak 2023). Not only were restaurants and hotels closed, but so were various tourist attractions, such as underground tourist routes and museums. Numerous cultural events were also cancelled (Niezgoda, Markiewicz 2022).

Urban Tourism

The study of urban life is fascinating, but it also requires a great deal of effort. As part of extensive research efforts to explain urban life, issues related to tourism and recreation are increasingly being considered (J. Kaczmarek, S. Kaczmarek 2009). As places that serve a variety of social, economic, and cultural functions, cities have long been a draw for tourists. The main tourist attractions in urban areas—important to both visitors and residents—include, among others, historical sites, architectural monuments, and sporting events (Kaczmarek 2013).

Urban tourism has only recently been regarded as an important area of research. It is usually defined as a form of tourism in which the primary destination is a city (Mikos von Rohrscheidt 2008). At the same time, there is an ongoing discussion about a broader definition of this concept, its specifics and its links to other terms, such as ‘tourism in the city’ or ‘tourism in urban areas’ (Żabińska 2013). For example, Kowalczyk, in reviewing Western literature, does not deny the existence of differences between the concepts discussed. At the same time, for his research, he adopts a broad definition of ‘tourism in urban areas’, which he understands as:

- all forms of tourism in urban areas,
- forms of tourism related to the attractions and tourist development found in urban areas,
- tourism, the purpose of which is to visit and explore a city understood as cultural heritage, constituting an integral part of the urban tourist space (Kowalczyk 2005, quoted in Żabińska 2013).

Similarly, Madurowicz points out that ‘tourism in the city’ is more closely related to the supply side of tourism, encompassing the city’s tourism functions and infrastructure. On the other hand, ‘urban tourism’ refers to the demand side of tourism, and in particular to the quality and intensity of the tourist’s contact with the culture of the place visited (Madurowicz 2008, quoted in Żabińska 2013).

The city is an important area for tourism research, as it has the highest tourist traffic. During periods of seasonal growth in visitor numbers, a significant number of tourists pass through every day in search of cognitive and emotional experiences and information, gathering data in the form of visual representations, artefacts, souvenirs, and memories. The highest tourist traffic usually concentrates in the city centre, often identified as the Old Town, due to the high density of cultural heritage sites, museums, and cultural and educational events (Chylińska 2018). One of the important functions of cities has long been, and will likely continue to be, meeting the needs of participants in tourist traffic (Ashworth 1989, quoted in Seweryn 2013). Therefore, it is hardly surprising that urban tourism is growing in many metropolitan areas. The attractiveness of cities is significantly shaped by their multifaceted nature and contrasts, which set them apart within the so-called urban tourist space. These areas encompass phenomena that span almost every spectrum: from dynamism to stagnation, from freedom to restriction, from the sacred to sophisticated entertainment. This variety of attractions promotes the development of diverse forms of urban tourism, including cultural, religious, recreational, entertainment, congress and conference tourism, as well as sports and commercial tourism (Seweryn 2013).

Geotourism and Underground Tourism

Areas with natural features bear witness to the geological development of a given region. Those with the highest value are considered particularly important for both research and geological education purposes (Stach 2014). In the late 20th century, a new form of tourism began to take shape: geotourism, which aims to promote conscious exploration and experience of natural features (Zgłobicki, Warowna, Baran-Zgłobicka, Gajek, Jezierski 2015). Hose was the first person

to define geotourism. He emphasised that its task is to create facilities, interpretation aids, and services that allow tourists to gain knowledge and understanding of geology and landforms, going beyond mere aesthetic pleasure (Hose 1995, quoted in Zgłobicki, Warowna, Baran-Zgłobicka, Gajek, Jezierski 2015). The author highlights the difference between nature tourism, which focuses on relaxation and restoring mental and physical balance, and qualified tourism of the cognitive variety, which aims to deepen knowledge of the places visited. Therefore, education plays a key role in geotourism, and its main task is to explain geological concepts clearly to a wide audience (Miśkiewicz, Doktor, Słomka 2007). Geotourism encompasses a range of interrelated components, such as geological conditions, education, benefits for local communities, and tourist satisfaction (Dowling 2009). Geosites, or geotourism sites, should meet specific criteria for aesthetics and the distinctiveness of their form. Both natural features and anthropogenic structures can have high research and tourism value (Z. Alexandrowicz, S. W. Alexandrowicz 2004).

In the literature, geotourism, also known as geological tourism, is classified as a form of educational or nature tourism (Newsome, Dowling 2010, Migoń 2012, quoted in Stach 2014). However, in all approaches, geotourism is defined as a form of travel focused on visiting places and sites distinguished by specific geological features (Stach 2014). According to Słomka and Kicińska-Świdarska, geotourism is a type of educational tourism focused on experiencing and learning about geological sites and processes, while also appreciating their aesthetic value (Słomka, Kicińska-Świdarska 2004, quoted in Stach 2014). Geotourism stimulates visitors not only emotionally but also cognitively. While visiting geological sites, it is possible to analyse the connections between animate and inanimate nature, assess the role of geological processes in the functioning of the anthropogenic environment, and acquire practical skills and knowledge of the natural sciences (Prószyńska-Bordas, Woźniak 2016).

The concept of geotourism is related to underground tourism. From a geotourism perspective, underground sites such as caves and anthropogenic sites such as former mining and military facilities are particularly valuable because they offer opportunities to observe various components of the orogenic belt, learn about mining (mining and excavation techniques), and explore biological, historical, and other factors (P. Zagożdżon, K. D. Zagożdżon 2016). Places such as cellars, old tunnels and underground passages, spaces beneath historic buildings, crypts, and shelters have not yet been comprehensively researched in Poland regarding their role in tourism. This contrasts with natural underground features, such as caves, and with anthropogenic structures, particularly those created by mining operations, which have been the subject of numerous studies (Chylińska 2018). In recent years, Poland has seen rapid growth in activities related to the opening, adaptation, and revitalisation of underground sites of historical and cultural value, including former mining excavations. This is the result of the efforts of local and regional communities, which see it as a way to boost sustainable economic growth by encouraging new, attractive forms of tourism. This phenomenon can be described as the revitalisation of underground spaces in Poland, leading to the systematic creation and development of underground tourist routes (Chmura, Wieja 2015).

Polish underground tourist routes are primarily educational—their main purpose is to teach visitors about the area's geological structure, old methods of resource extraction, and the history of the place. These sites are most often visited by organised groups, predominantly school pupils, students, senior citizens and employee groups (Syposz-Łuczak 2008). Opening historic underground sites to tourists is often the only way to preserve and protect them and the associated above-ground monuments. However, tourist safety cannot be overlooked. Due to the nature of underground routes, there are specific hazards that do not occur in above-ground sites (Słota

2017). The adaptation of underground excavations for tourism involves appropriate modifications to mining and construction facilities to ensure maximum safety for people staying underground. The tourist route must be educational and informative, and provide visitors with a comfortable experience as they explore the underground sites (Tajduś, Mikoś, Chmura 2006). The preservation and long-term protection of historic underground sites require a coordinated approach that involves cooperation among specialists from various fields of engineering and experts in the humanities and arts (Mikoś 2005). Underground tourist routes have various features that affect a place's attractiveness, such as route length, type of mineral mined, depth, period of mine operation, mining leftovers, excavation architecture, and accompanying infrastructure. A common feature of these sites is their educational, cognitive, and historical value. These factors shape visitors' awareness, broaden their knowledge, and determine the attractiveness of a given underground site (Syposz-Łuczak 2008).

Chalk Underground in Chełm: An Overview of the Geology, History and Archaeology

The city of Chełm is situated in the Chełm Hills (Pagóry Chełmskie), which are entirely composed of chalk rock covered with Tertiary sediments consisting of sand and sandstone (Gazda, Harasimiuk, Krzowski 1992). Chalk is a sedimentary rock formed by the accumulation and diagenesis of the remains of living organisms (Harasimiuk 1975). Chalk is composed primarily of dendritic limestone and carbonate remains of organic life, predominantly foraminifera, and less frequently single-celled algae (coccoliths), inoceramids, brachiopods and snails (S. Rybicki, J. Rybicki 1973). Chalk colours range from white to yellowish white to greyish white. Its cross-section has a matt, earthy appearance; it is whitish, soft when wet, and becomes brittle when dry (Tworek 2016). It is a rock formed from living organisms, with high porosity and water absorption, yet low strength and light weight. The Chełm region has some of the largest chalk deposits in Poland (Olszewski 1998). Chalk has always been widely used in many areas of the economy. For example, it is used in the production of cosmetics; in the past, it was used to make whitening face powder, toothpaste, paints, and pastels. It is also used as a cleaning agent for polishing metals and non-ferrous metal products. It also has applications in medicine, the pharmaceutical industry, paper manufacturing, rubber production, the chemical industry, cement manufacturing, and metallurgy (Gołub 2001). Chalk blocks are an excellent sculpting material for creating architectural and decorative elements in religious buildings. The use of chalk in decorative art is evident in mouldings in churches in Uchanie, Lublin, Zamosc, and Krakow (Zimmer 1974). During archaeological research in Chełm, various economic chalk artefacts are regularly discovered. These include spindle whorls, weaving weights, and casting moulds used to make bronze ornaments. In the past, chalk played a key role as a primary ingredient or additive in various types of mortar (Gołub 2009).

Chalk mining in the Chełm region has a long tradition dating back to the early Middle Ages. The oldest known excavations, dating back to the 13th century, are located under what is now known as Cathedral Hill (Castle Hill) and in its immediate vicinity. Initially, these excavations were used for defensive purposes, providing shelter from foreign invasions, including those by the Mongols and Tatars, and for sacred purposes, such as burial sites (Kiszczak 2023). At the end of the 19th century, Fiodor Cherbaczewski, a clergyman, described his visit to the catacombs located under Castle Hill. During this visit, he saw the graves of Daniel Romanowicz and other important and distinguished individuals who were buried there (Gołub 2009). The 16th to 18th centuries saw the intensive development of chalk mining. During this period, demand for writing chalk increased, and it was sold in many towns across the Polish-Lithuanian Commonwealth. The

inhabitants of Chełm, mainly Jews, were involved in the extraction and trade of chalk, which was sometimes referred to as ‘white gold’ (Gołub 2001). One of the earliest and most important documents confirming the existence of chalk mining is a 17th-century work by the Ruthenian Uniate Church Bishop Jakub Susza, OSBM, entitled *Phoenix tertiato redivivus albo Obraz starożytny chełmski*: [...] “kopią krede i rozwożą po całej Polsce, [...] Pod całym miastem, mianowicie pod domami żydowskimi ciągną się podziemne lochy, z których ciągle wybierają krede, i ta stanowi największy handel w całym mieście” [They mine chalk and distribute it throughout Poland, [...] Underneath the entire city, namely under Jewish houses, there are underground caverns from which they constantly extract chalk, and this is the largest trade in the entire city] (Susza 1684, quoted in Tworek 2016, s. 27). Other sources of information on chalk mining and trade are municipal records from the 17th and 18th centuries. These documents also contain typical entries such as *dungeons carved out of chalk rock*, *dungeons cut out of chalk*, or *dungeons cut out of rock* (Tworek 2016).

Chalk mining and underground excavation took place in brick cellars (less frequently in chalk cellars) beneath the wooden houses of Chełm residents. This practice is confirmed by 17th-century records, which indicate that 80 out of 100 houses in the Old Town had cellars with entrances to chalk tunnels (Kiszczak 2023). Intensive tunnelling weakened the structural integrity of buildings, causing the collapse of streets and the market square. Chalk mining in Chełm gradually died out in the late 18th and in the 19th century. At that time, the municipal authorities took measures to preserve the urban architecture (Tworek 2016). In 1787, the City Council introduced the first ban on mining chalk under the streets and ordered the filling in of excavations, with the costs of these activities being borne by the mine owners. However, this ban was not observed. Further regulations were introduced in 1827 by the government of the Lublin Governorate, and in 1837, the ban on chalk mining was additionally confirmed by the Government Commission for Internal Affairs. Finally, the extraction of ‘white gold’ came to an end at the turn of the 20th century due to the growing number of mining accidents near the Old Town (Gołub 2009).

Archaeological research conducted in the 1990s and early 2000s provided new information on chalk extraction methods and resolved doubts about the techniques used (Gołub 2001). The corridors were simple sections, ranging from a few to several metres in length and 1.5 to 2 metres in width. On both sides, at approximately 0.5 metres above the floor, symmetrical shelves were carved out for storing food (Gołub 2002). The city had small private mines, with entrances in brick cellars. These mines were often connected via multi-level corridor systems. The technical measures used during operation, such as arched corridors and additional smoothing of the walls with small cuts made with stone or chalk pebbles—a practice unique to Chełm—testify to the advanced knowledge of rock mechanics possessed by local residents (Gołub 2009).

Underground Tourist Route in Chelm

In the 20th century, several buildings collapsed in the Old Town, with the most devastating incident taking place on 29 November 1965. These developments forced the municipal authorities to undertake systematic expert studies and safety measures between 1966 and 1973 (Kiszczak 2023). As a result of these efforts, a significant portion of the underground excavations was secured by filling them with sand and sealing them with brick dams, and they were also surveyed. Research on the excavations was conducted by the Department of History of Architecture, Cracow University of Technology, under the supervision of Prof. Zin and Dr Grabski (Wyszyńska 1986). A 30-person team from a Mysłowice mining company, Przedsiębiorstwo Robót Górniczych,

secured the chalk corridors and adapted them for future use as tourist routes. Prof. Wiktor Zin emphasised that during the work, approximately 8 km of excavations were examined, representing only about one-fifth of the entire underground corridor system, which is estimated to have a total length of 40 km (Tworek 2016).

The first trips to the underground chalk mine were organised by the Chełm branch of the Polish Tourist and Sightseeing Society [Polskie Towarzystwo Turystyczno-Krajoznawcze, PTTK] in the early 20th century, with two such tours taking place in 1911 (Paszkiwicz 2001). Between 1937 and 1939, a small tourist route approximately 300 metres long was created; in 1939, the first systematic measurements of the underground corridors were carried out (Tworek 2016). The current tourist route was opened in 1972, while its final configuration was established in 1985 (photos 1–3). On 25 January 1995, the site was entered in the register of monuments (No. C/40), as an Old Polish mining monument and recognised as an important element of Poland’s mining heritage (Kiszczyk 2023).



Photo 1. The Chalk Chamber, known as the Chamber of Bieluch the Ghost or the Wishing Chamber (photo by J. Kiszczyk)

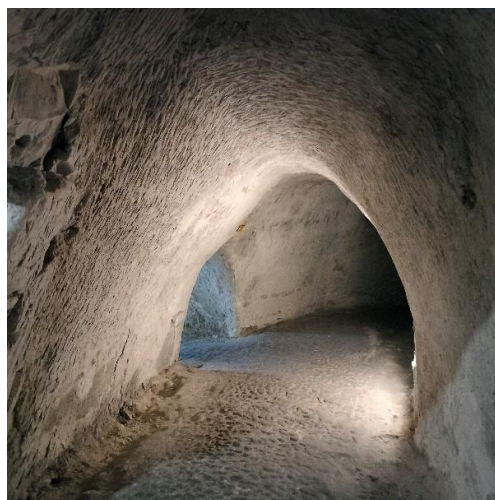


Photo 2. Chalk excavation (photo by J. Kiszczyk)



Photo 3. Chalk corridor with pieces of chalk rock (photo by J. Kiszczak)

The study proposes the following hypothesis: During the period under study, the number of tourists visiting the Chalk Underground in Chełm increased. The following research questions were posed:

1. How did the number of visitors to the Chalk Underground in Chełm change between 2018 and 2025?
2. Did the number of tourists increase steadily, or were there seasonal fluctuations due to external factors?
3. How did the structure of tourist traffic change according to ticket type (standard, reduced, group tickets)?
4. What are the main seasonal trends in tourist traffic in the Chalk Underground?
5. In which months is tourist traffic highest, and in which is it lowest?
6. Does seasonality differ depending on the type of ticket?
7. To what extent has the COVID-19 pandemic affected the number of visitors to the Chalk Underground in Chełm?
8. How quickly did tourist traffic recover after the site was closed?
9. Have there been any noticeable changes in visitor trends since the pandemic?

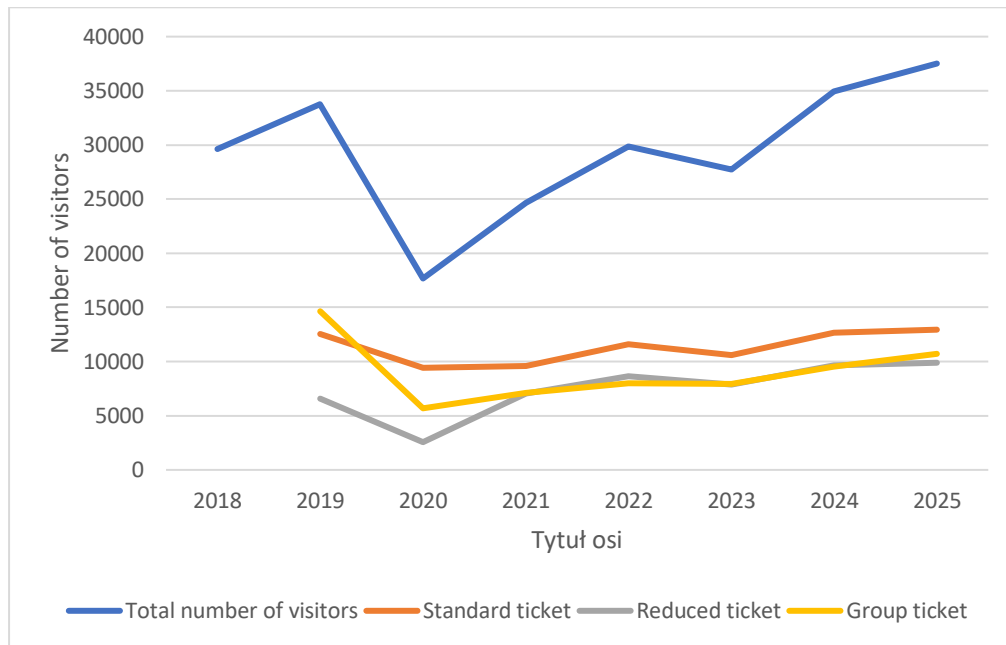
Analysis of Tourist Traffic

An analysis of the data in Chart 1 indicates clearly differentiated dynamics in tourist traffic at the Chalk Underground in Chełm during the study period. In 2018–2019, a relatively stable and, in some places, even growing level of visitor numbers was observed, which can be interpreted as the result of the site's established position in the tourist offer of the city and the region. The dominant category in the visitor structure remains individual tourists using standard tickets, which indicates a high level of interest in the site among adults travelling alone or in small family groups.

In 2020, there was a sharp decline in tourist traffic, directly related to the COVID-19 pandemic and the site's temporary closure. The decline was apparent across all ticket categories, particularly for group tickets, due to restrictions on school trips and group tours. In 2021–2022, a gradual recovery in tourist traffic was observed, although it still did not reach pre-pandemic levels, confirming the long-term impact of the health crisis.

A marked recovery occurred after 2022, particularly between 2023 and 2025, when visitor numbers rose again. Despite a short-term decline in 2023 due to renovation work in February, the long-term trend was upward, confirming the research hypothesis. There is also a noticeable, gradual return of group tours, which may indicate a restoration of confidence in organised forms of sightseeing and the site’s growing educational role.

Chart 1. Tourist traffic at the Chalk Underground in Chełm in 2018–2025,* including ticket types.



Source: Own study based on data from the Chalk Underground in Chełm

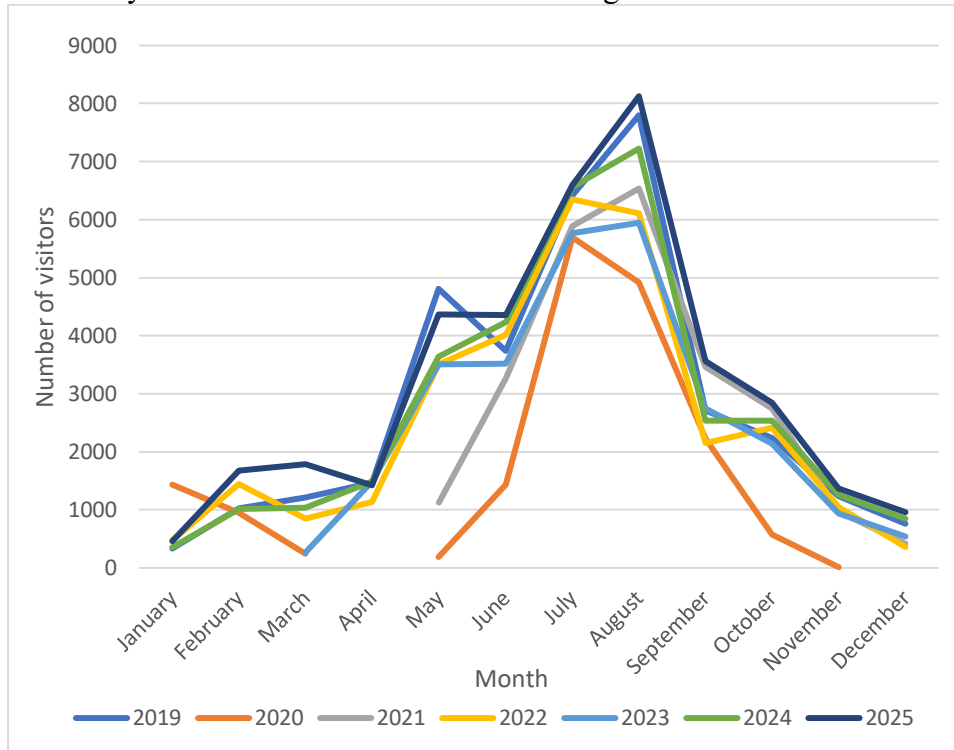
*COVID-19 pandemic; the Chalk Underground was closed from 12 March to 22 May and from 7 November to the end of February 2021. Renovation work carried out in February 2023

Chart 2 illustrates the marked seasonality of tourist traffic, typical for cultural and educational tourist attractions. The highest traffic volume is observed in the summer, particularly from June to August, consistent with nationwide trends in domestic tourism seasonality. The summer holiday season brings an increase in family and individual travel, and the Chalk Underground becomes one of the city’s key attractions.

The second clearly identifiable period of increased traffic is spring, especially May and June, which can be linked to school activity and the organisation of educational trips. The lowest tourist traffic is recorded in winter, particularly in January and February, which is further exacerbated by seasonal site closures and a lower tendency to travel during this period.

During the pandemic years (2020–2021), seasonality was significantly disrupted: the tourist traffic curve flattened, and traditional seasonal peaks were reduced. After 2022, a gradual return to the classic seasonal model is observed, which may indicate a normalisation of tourist behaviour and a revival of demand for visiting underground sites.

Chart 2. Seasonality of tourist traffic at the Chalk Underground in Chełm in 2019–2025.



Source: Own study based on data from the Chalk Underground in Chełm

Seasonality of Tourist Traffic by Ticket Type:

(a) Standard ticket: Chart 3

The seasonality of tourist traffic for standard tickets is most similar to the overall picture shown in Chart 2. The highest traffic volume is recorded in the summer, confirming the dominant role of individual tourists in the visitor structure. The relatively high turnout during transitional periods (spring, early autumn) may indicate that the site is attractive even outside the peak holiday season, especially among tourists interested in cultural tourism and geotourism.

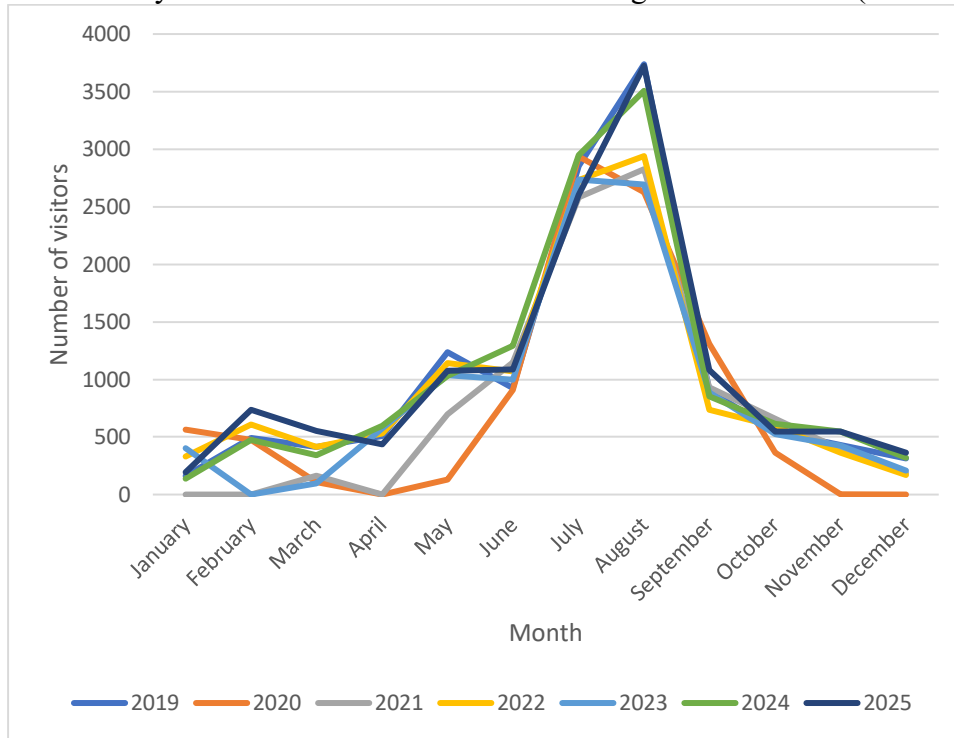
(b) Reduced ticket: Chart 4

Tourist traffic related to reduced tickets shows stronger seasonality and greater volatility. The highest figures are observed during periods directly related to the school year, i.e. spring and early autumn. The marked decline in summer may be due to a smaller contribution from organised school groups and a shift towards individual visitors. During the pandemic, this category of traffic has almost completely disappeared, confirming the particular vulnerability of educational tourism to crises.

(c) Group ticket: Chart 5

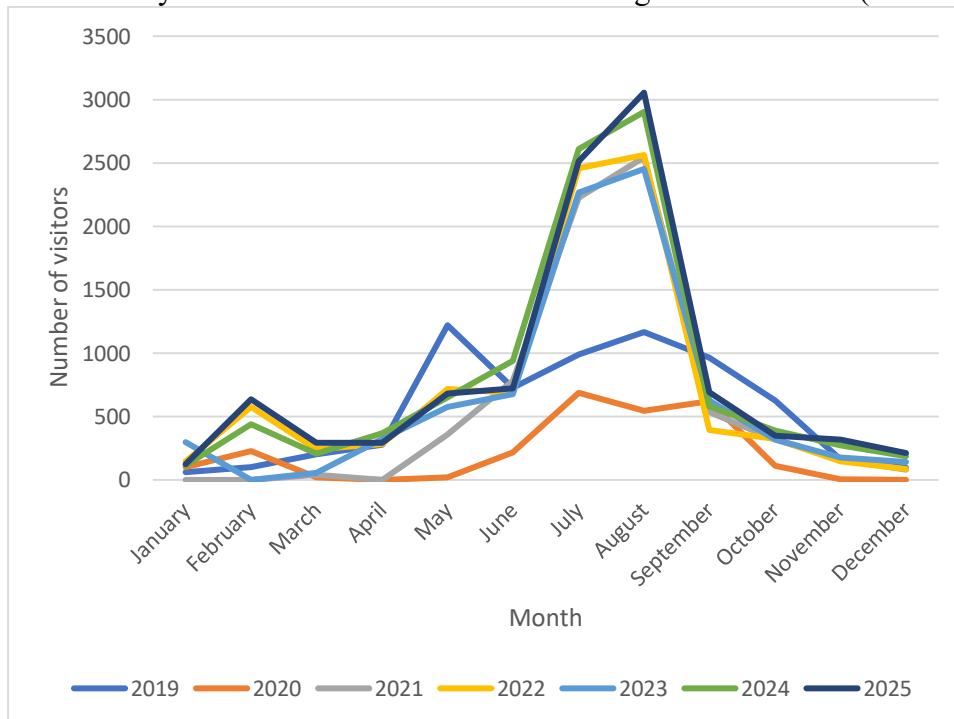
The seasonality of group tickets is most pronounced and concentrated in specific months. The highest traffic volume is recorded in spring and autumn, which is clearly linked to activities by schools, educational institutions, and organised groups. During the summer and winter months, this traffic decreases significantly, and almost disappeared in 2020–2021. After the pandemic, a gradual return of this form of tourism has been observed, which can be interpreted as a sign of the restoration of the educational function of the Chalk Underground as a geotourism and educational site.

Chart 3. Seasonality of tourist traffic at the Chalk Underground in Chełm (standard ticket)



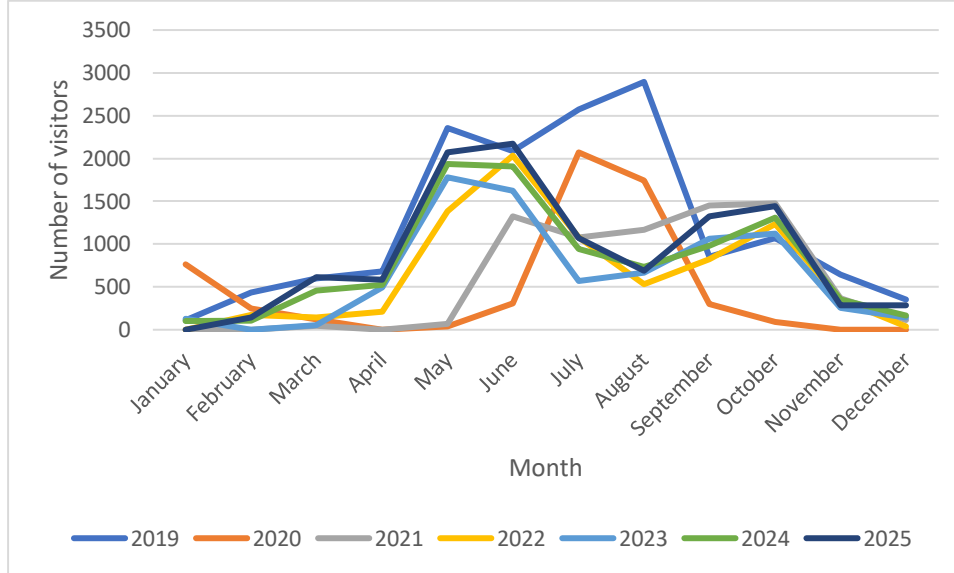
Source: Own study based on data from the Chalk Underground in Chełm

Chart 4. Seasonality of tourist traffic at the Chalk Underground in Chełm (reduced ticket)



Source: Own study based on data from the Chalk Underground in Chełm

Chart 5. Seasonality of tourist traffic at the Chalk Underground in Chełm (group ticket)



Source: Own study based on data from the Chalk Underground in Chełm

2. Conclusion

This study aimed to analyse changes in tourist traffic in the Chalk Underground in Chełm between 2018 and 2025, with particular emphasis on the impact of the COVID-19 pandemic, the seasonality of tourist traffic, and the structure of visitors by ticket type. The research verified the hypothesis and answered the research questions.

Regarding the first research question, the number of visitors to the Chalk Underground in Chełm during the study period showed a variable but long-term upward trend. In 2018–2019, tourist traffic remained stable, but in 2020–2021, it declined significantly due to the COVID-19 pandemic and the site’s temporary closure. After 2021, tourist numbers gradually increased, and in 2023–2025 they recovered, confirming the positive development trend.

In light of the second research question, it can be concluded that the number of tourists increased but was subject to significant fluctuations due to external factors. The COVID-19 pandemic had the greatest impact on the decline in tourist traffic, followed to a lesser extent by temporary renovation work in 2023. However, these factors were temporary and did not disrupt the long-term upward trend.

An analysis of tourist traffic structure by ticket type allows us to answer the third research question. The dominant category throughout the study period was individual tourists purchasing standard tickets, indicating the significant role of individual traffic in the site’s operations. Reduced and group ticket traffic showed greater volatility and stronger sensitivity to crisis factors, especially during the pandemic.

In the context of tourist traffic seasonality, in response to the fourth and fifth research questions, it was found that the highest traffic volume occurs in summer, spring, and autumn, while the lowest attendance occurs in winter. This seasonality is closely linked to the school year, holidays, and weather conditions, which is typical of cultural and educational tourist attractions.

The sixth research question concerned the variation in seasonality by ticket type. The analysis showed that the seasonality of tourist traffic varies significantly across ticket categories. Individual traffic (standard tickets) is relatively evenly distributed throughout the year, while reduced and group ticket traffic is clearly concentrated during the school year, confirming that educational visits account for the majority of this traffic.

To answer the seventh research question, it is clear that the COVID-19 pandemic had a significant negative impact on visitor numbers to the Chalk Underground in Chełm. This resulted not only in the temporary closure of the site but also in a significant reduction in group and educational traffic, which almost completely ceased in 2020–2021.

With regard to the eighth research question, it was found that tourist traffic recovered gradually and over an extended period after the pandemic. A notable recovery began after 2022, but it took several more years to return to pre-pandemic levels, underscoring the long-term effects of the health crisis on the tourism sector.

The final research question concerned potential changes in visitor structure after the pandemic. The analysis revealed that after the pandemic, the relative share of individual tourists increased, while group travel recovered more slowly. This may indicate a lasting change in tourist preferences, with individual forms of tourism becoming more popular.

In conclusion, the research unequivocally confirms the hypothesis that, during the study period, the number of tourists visiting the Chalk Underground in Chełm increased, despite severe but temporary disruptions related to the COVID-19 pandemic and other external factors. The results underscore the importance of the Chalk Underground as a major attraction for urban tourism and geotourism and indicate its significant potential for further development. The analysis of tourist traffic is also important from an economic perspective, as the volume and structure of visits directly translate into the site's revenues, impact on the local labour market, and the development of related services in Chełm.

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