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Geographical and Communication Aspects of NATO Public Diplomacy in the Western Balkans

ABSTRACT

In the 21st century, public diplomacy has gained significant importance and is used by state, private, and mostly civilian sectors. In this paper, NATO's public diplomacy activities are divided into two parts: activities implemented by the Alliance itself and activities conducted indirectly through the Atlantic Councils, non-governmental organizations established with the aim of promoting and encouraging NATO values. Accordingly, an analysis of the content of the Alliance's Annual Reports from 2011 to 2023 and seven interviews with the presidents of the Atlantic Councils from the region and Croatia were conducted. The results of the research confirm that NATO uses more "soft power" mechanisms and cooperation with civil society than classic institutional and security channels within the framework of public diplomacy in the Western Balkans. The Atlantic Councils carry out public diplomacy activities that are in line with the NATO Annual Reports. Moreover, in the Western Balkans, there is a uniform spatial distribution of NATO public diplomacy activities by country, regardless of membership in the Alliance.

Keywords: public diplomacy, NATO, Western Balkans, Atlantic Councils, spatial distribution

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INTRODUCTION

In February 2025, news spread around the world that a whole series of financial assistance programs of the United States Agency for International Development (USAID) were being terminated. USAID is one of the best-known global institutions, which actively implements public diplomacy programs in almost all parts of the world. It is not surprising that, in 2024 alone, USAID invested 40 million dollars in Serbia, 76 million dollars in Bosnia and Herzegovina, 77 million in Montenegro, etc. (Huseinović, 2025). Considering these amounts of money, one clearly gets the impression that public diplomacy programs bring large financial resources to certain countries. Today, almost every international organization has at least one form of public diplomatic activity within its member states, but also outside its territory. This paper investigates the public diplomacy programs of the NATO Alliance in the Western Balkans. The time frame of this paper is the period from 2011 to 2023, with an epilogue covering certain events in 2024.

The relationship between NATO and the area now called the Western Balkans began as early as 1952, when secret negotiations were held regarding Yugoslavia's entry into the Alliance. However, after Stalin's death, such ideas remained unfulfilled (Vukadinović et al., 2007). At the beginning of the war in 1991, NATO stood aside, but some members called on the warring parties to establish peace. From 1992 to 2001, NATO conducted three military missions in the Adriatic Sea, five missions in Bosnia and Herzegovina, one each in FR Yugoslavia and Kosovo, and three in North Macedonia (NATO, 2023). After the signing of the peace treaties, NATO began its activities by including the region in the Alliance. In 1995, Albania and the then FYROM Macedonia joined the Partnership for Peace, and in 2000, Croatia followed. The remaining countries joined the Partnership in 2006, while Kosovo has not yet become a member of that pre-accession program (NATO, 2024a). Albania and Croatia were the first to become members of the Alliance in 2009, followed by Montenegro in 2017 and North Macedonia in 2020. Bosnia and Herzegovina has candidate status, Serbia does not wish to join the Alliance, and Kosovo does not have a formal army, which is a prerequisite for membership negotiations (Bytyci, 2018).

In accordance with the above, the main goal of this paper is to politically and geographically examine and present the activities of NATO's public diplomacy in the Western Balkans. For the purposes of this paper, NATO's public diplomacy activities are divided into two parts: activities carried out by the Alliance itself and activities conducted indirectly through the Atlantic Councils, non-governmental organizations established with the aim of promoting and encouraging NATO values. In line with this, the research has two directions: the first focuses on the analysis of activities presented in the Alliance's Annual Reports that are relevant for implementation in the Western Balkans, and the second on interviews conducted with the presidents of the Atlantic Councils from the region. A secondary goal of this paper is also to present the spatial distribution of the activities analyzed in the Reports. Based on the research objectives and NATO's public diplomacy activities, three hypotheses are put forward:

H1: In the Western Balkans, NATO uses „soft power” mechanisms and cooperation with civil society more than classic institutional and security channels within the framework of public diplomacy.

H2: The Atlantic Councils carry out public diplomacy activities that are in line with the long-term stabilization and support policies of the NATO Alliance for the Western Balkans region presented in the Annual Reports.

H3: In the Western Balkans, the spatial distribution of NATO’s public diplomacy activities by country is uniform, regardless of membership in the Alliance.

Croatia is also included in the research and is referred to as a case study in this paper. Given that it has completed the process of Euro-Atlantic integration and is therefore no longer considered part of the region, it serves as a relevant indicator of the success of that process (Dursun-Özkanca, 2019). Data related to Croatia are not included in the conclusions of the paper and the confirmation or refutation of the hypotheses.

LITERATURE REVIEW

Public diplomacy is not a new concept in world literature, but in the context of NATO’s activities in the Western Balkans region, it can be said that it is a “recent” activity over the past 30 years. The American diplomat Gullion (1965) was the first to introduce the concept of public diplomacy and described it as an extension of traditional diplomacy through programs of communication, education, culture, direct contact with foreign workers, etc. Public diplomacy experienced significant growth in the 1990s with the fall of communism, when intensive globalization and the spread of primarily American cultural influence began (Fitzpatrick, 2010). Certain theoretical problems are associated with public diplomacy: is it an independent scientific field or part of international relations, what methods should be used to research it, how can its impact be evaluated, etc. (Ayhan & Sevin, 2022). Various authors have contributed to defining the basic concepts of public diplomacy. Taxonomies are provided by Cull (2008), Fitzpatrick (2010), Pamment (2014), etc., normative frameworks by Cull (2019), Fitzpatrick (2007), Zaharna (2022), and a structural overview of the discipline is given by Sevin et al. (2019). It is also important to note that many authors see public diplomacy as an interdisciplinary science with connections to international relations, public relations, media studies, etc. (Darnton, 2020; Fitzpatrick et al., 2013; Golan et al., 2015; L’Etang, 2009; Signitzer & Coombs, 1992).

It is also necessary to briefly review the distinction between public diplomacy and “soft power.” According to Nye (2004), “soft power” is the ability to achieve desired results through attraction rather than through coercion or bribery. Nye believes that public diplomacy is a tool that states use to transform their attractive resources into “soft power.” Wei (2020) states that public diplomacy transforms these state resources (e.g., culture, values, policies) into “soft power” resources. In other words, public diplomacy does not directly influence foreign governments but rather the perceptions of citizens, who can (but do not necessarily have to) influence their own government.

NATO began to develop public diplomacy very early, even before it was defined. In 1950, the NATO information service was established with the aim of spreading accurate information about the

activities of the Alliance (Wolff, 2014; Schindler, 2016). NATO's Public Diplomacy Department was officially launched in 2003, integrating the previous information service (Maronkova, 2018). This Department was created following NATO's communication activities related to the intervention in Kosovo and the terrorist attacks of 9/11/2001 (Schindler, 2016). The Department is best known for allocating financial resources to various projects that promote NATO values (Binnendijk & Priebe, 2019). Until the economic crisis of 2008, the Alliance's public diplomacy activities were not widely questioned, but after that, funding began to be monitored more strictly, and the first scientific papers on this form of NATO activity appeared. Babst (2008), among the first, discusses the necessity of NATO's adaptation to new telecommunications technologies as part of public diplomacy. Akçadağ (2012) examines the creation of public perception of the Alliance in society. Wolff (2014) attempts to provide an evaluation of NATO's public diplomacy and recommendations for further action, while Maronkova (2018) analyzes in detail the activities of the Public Diplomacy Department and presents examples of how to evaluate this type of activity.

Pavlyshenko (2025) even analyzes the possibilities of applying artificial intelligence (AI) in public opinion research concerning NATO. There is also a series of papers with concrete examples of the Alliance's public-diplomatic activity: Saddiki (2012) writes about public perception of the Alliance after the intervention in Libya, Zavoneau (2013) about the development of NATO's perception in Romania, Schafer (2016) about the perception of NATO in Russia, Kostyrev (2023) about the Alliance's strategic communication with Ukraine, etc. Güleç (2021) connects several examples of NATO's public diplomacy and states that the Alliance recognized shortcomings in its communication and launched the "NATO 2030" project in a targeted manner. Finally, Yyakovenko and Piskorska (2023) write from a more recent perspective that the geopolitical situation has changed and it is once again necessary to reconsider public diplomacy through NATO's actions.

To influence public opinion, NATO and its member states typically use a combination of press offices, official speeches, and public diplomacy initiatives. Press offices and spokespersons of the Alliance attempt to convey the organization's position to the general public through the media, and also seek to influence how the media portrays events. In contrast to traditional diplomacy, public diplomacy is the effort of states to directly communicate with and influence foreign publics. In the case of NATO, strategic communication has been used during military interventions such as those in Bosnia, Kosovo, and Afghanistan (Wolff, 2014).

As for the Western Balkans, NATO's public diplomacy began in 1991, when the Alliance sent messages urging a reduction in hostilities (Mulchinock, 2017). Earlier scholarly works have mostly focused on the general relationship between the Alliance and the region, but some public diplomacy activities can also be discerned from them. Initially, most research addressed NATO's military actions: Beale (2004), Blease (2010), Jakešević (2018), Risso (2021), etc. By the 1990s, regional politicians (except Serbian) had accepted the narrative of NATO membership, and by the second half of the decade, campaigns encouraging NATO membership of countries from the region had already begun (Mulchinock, 2017). NATO's public diplomacy was challenged by the bombing of FR Yugoslavia, which created a negative image of NATO in Serbia—an image that remains relevant today. Furthermore, there are papers discussing the security architecture of the region: Seroka (2007),

Grillot et al. (2010), Dursun-Özkanca (2019), Distler (2022), etc. These works also address perceptions of the Alliance itself, which is an essential part of public diplomacy according to Maronkova (2018). There are relatively few papers dealing exclusively with NATO's public diplomacy in the region, but the following stand out: Wolfgram (2008), who analyzes propaganda in NATO's actions in Kosovo; Vukasovich and Dejanovic-Vukasovich (2016), who investigate narratives about humanitarian aid; Tahiri and Mavraj (2019), who write about media discourses between public and private media regarding NATO; and Hedling et al. (2022), who research the creation of a particular "face" of NATO activity in the region.

In the context of the Western Balkans, the concept of "soft power" takes on specific geopolitical and symbolic dimensions. NATO's use of "soft power" must be understood not just as a generic strategy of attraction through values and culture but also as a targeted response to a historically fragmented and symbolically contested region. Orsós (2025) emphasizes that the geopolitical tensions surrounding Kosovo are not merely territorial but also deeply symbolic, tied to narratives of legitimacy and identity. Similarly, Pap and Tóth (2008) highlight how ethnic and religious minorities played a key role in the fragmentation of the Western Balkans, indicating that any strategy relying on "soft power" must account for these intra-state sensitivities. NATO's public diplomacy, therefore, not only projects "soft power" externally but also seeks to build internal resilience in diverse and often divided societies. In such a context, "soft power" manifests in NATO's emphasis on civic cooperation, information campaigns, and the promotion of shared Euro-Atlantic values as counterweights to competing narratives.

METHODS

A growing number of researchers in the field of public diplomacy are questioning the possibilities and scope of various research methods within this scientific discipline. Wei (2020) identifies two basic empirical methods in public diplomacy research: public opinion polls (targeting the general public) and unstructured interviews with a smaller number of targeted individuals (including intensive and in-depth interviews, statements, and discussions). Hasnat and Leshner (2022) advocate for the use of the experimental method, which has been successfully applied in communication sciences. Ayhan and Sevin (2022) list the following research methods in the field of public diplomacy: historical analysis, in-depth qualitative analysis, and the application of commonly used social science methods, including mixed methods and impact evaluation. Maronkova (2018) writes extensively about methodological issues in public diplomacy, noting that it is not limited to one, two, or three research methods, but is instead defined in a methodologically broad manner. In public diplomacy research, it is also essential to clearly define what is to be "measured" to avoid methodological confusion and misinterpretation. The author also mentions the OASIS model, which stands for Objectives, Audience Insight, Strategy, Implementation, and Evaluation. While the OASIS model is very detailed, it is not always suitable for research papers with a limited word count.

Based on the objectives and hypotheses, this paper employs two research methods: content analysis and interviews. To examine the public diplomacy activities independently carried out by the Alliance, a content analysis of NATO's Annual Reports was conducted. This method was chosen because it allows for the systematic study of written sources and ensures temporal continuity in the research. Moreover, it guarantees the objectivity of the data through the use of clearly identified written sources (Krippendorff, 2019). It also served as a foundation for the spatial distribution analysis. While other official NATO publications, national government reports, and strategic communications are not examined in depth here, they remain important reference points for understanding the broader context in which public perceptions are shaped. These documents often articulate the intended goals of external actors like NATO. The exclusion of structured document analysis does not indicate theoretical or methodological neglect; rather, it reflects the specific aim of this study—to emphasize the perception gap between institutional intentions and public attitudes. Future research could incorporate such documents in a comparative framework to assess whether the narratives promoted by NATO or national governments resonate with societal attitudes, as reflected in polling data or public discourse.

Accordingly, the publicly available Annual Reports of the NATO Secretary General were analyzed. These reports list and describe all NATO programs, including those related to public diplomacy. Available from 2011 through 2023, the reports are published by the NATO Public Diplomacy Division (NATO PDD). The authors were made aware of the reports' relevance during official correspondence with the Division while researching this topic. These reports provide the most systematic overview of NATO's activities in the region. The first part of the analysis focused on the spatial dimension, identifying all programs implemented in the Western Balkans and Croatia. The second part examined all NATO public diplomacy programs and how their implementation was described for the Western Balkans and Croatia. The results combine both parts of the analysis and are presented in the first table.

To investigate the activities of the Atlantic Councils, interviews were conducted with the presidents of the councils in the regional states and Croatia. This method was selected for its ability to capture the qualitative dimension of public diplomacy, in contrast to the predominantly quantitative focus of the Reports. The interviews provided greater insight into the topic by exploring the views and perceptions of the Council Presidents (Brinkmann, 2013).

In total, seven semi-structured interviews were conducted. The Kosovo Atlantic Council is not officially recognized by the International Board of Atlantic Councils; therefore, in that case, the interview was conducted with the president without formal international status. The interviews were conducted in Croatian and English. Communication with the presidents from Bosnia and Herzegovina, Montenegro, Serbia, and North Macedonia was in Croatian, and responses were received in their national languages. Communication with the presidents from Kosovo and Albania was conducted entirely in English. The interviews were conducted between February 1 and March 2, 2025, using the "paper-pencil" method: questions were sent via email, and the respondents returned their written answers. Although video interviews were offered, all participants declined, preferring to respond in writing.

The interviews were structured into five thematic groups: the role of the Atlantic Council in the civilian sector, public perception of NATO and public information, youth and educational programs,

NATO's "soft power," and the future of NATO's civilian activities. A total of 17 questions were asked, many of which included sub-questions, resulting in more detailed responses. The responses were coded and analyzed using the QDA City program. The results of both the content analysis and the interview method were used to test the first two hypotheses. The IBM SPSS Statistics program was used for hypothesis testing. To achieve the secondary research objective, ArcMap and Excel were used. Through content analysis and interviews, public diplomacy programs were spatially mapped within the countries of the Western Balkans and Croatia. Additionally, a small case study compares NATO public diplomacy in Serbia, Kosovo, and North Macedonia. Following this, quantitative data on the number of programs were entered into Excel, and the third hypothesis was tested using the IBM SPSS Statistics program.

RESULTS

Analysis of NATO Annual Reports for the Period 2011–2023

As previously mentioned, NATO has regularly published its Annual Reports since 2011 on its official website. These reports contain detailed descriptions of the activities carried out by the Alliance throughout each year. For the purposes of this paper, activities spatially related to the Western Balkans and Croatia were first identified, and then filtered based on their connection to public diplomacy. Filtering was conducted using the following key phrases: *public diplomacy*, *civilian population*, *media*, *media campaigns*, *civilian/humanitarian assistance*, and *public perception*. A close reading of the reports identified activities that could fall under the Alliance's military, political, or public diplomacy efforts.

As noted in the literature review, public diplomacy remains a somewhat poorly defined discipline. Therefore, the content analysis encountered difficulties in classifying certain Alliance activities as public diplomacy. To avoid ambiguity and questionable results, the authors chose to exclude military-related activities from the scope of public diplomacy. These included military missions, equipment, threats, cooperation, and modernization. Similarly, clearly defined political activities—such as political meetings, disagreements, and obstacles—were also excluded. All remaining activities concerning the civilian population were retained within the scope of public diplomacy. In this paper, the civilian population is defined in accordance with the Geneva Convention as all persons who do not belong to the armed forces and do not take part in hostilities (International Committee of the Red Cross [ICRC], 1949). All of NATO's public diplomacy activities in the Western Balkans and Croatia are presented in Table 1. Since 2011, civilian support activities by KFOR in Kosovo have been regularly highlighted in the reports. Although KFOR is primarily military in nature, its operations include a wide range of assistance to the civilian population and public outreach. For this reason, KFOR represents one of the primary direct public diplomacy activities conducted by NATO in the Western Balkans.

In addition to civilian support by KFOR, each report refers to NATO's so-called "open door policy," publicly expressing its support for the accession of Western Balkan countries to the Alliance.

Most reports clearly state NATO's backing of the peace process between Kosovo and Serbia and its support for a stable and functional Bosnia and Herzegovina. The 2015 report specifically mentions the launch of a joint scientific project by Montenegro, Croatia, and North Macedonia, supported by the United States (NATO PDD, 2015). This project is particularly significant as it is prominently featured in the report, which covers the entire Alliance. Its aim was to demonstrate how NATO funding could contribute to broader development objectives beyond purely military goals.

Since 2015, the Annual Reports have become significantly longer and more detailed (Table 1). This shift is the result of the strengthening of NATO's diplomacy following Russia's illegal annexation of Crimea. From 2017 onwards, the reports have consistently mentioned NATO's campaign against disinformation, which has become one of the key objectives of the Alliance's public diplomacy. At that time, the Public Diplomacy Division began financing a substantial number of NGO activities aimed at countering disinformation (NATO PDD, 2017).

In 2020, the *#WeAreNATO* campaign was launched, marking the Alliance's first major digital campaign involving participation from all member states. The aim was to raise public awareness that NATO is more than just a military alliance—it encompasses people from diverse backgrounds and a wide range of activities. Since 2020, the Annual Reports have more clearly outlined the programs implemented not only in the Western Balkans but also across the entire Alliance (NATO PDD, 2020). These include efforts to combat corruption and support reforms intended to stabilize the region.

Of particular interest is the emphasis on programs exploring public opinion through various surveys. Other key priorities highlighted include addressing hybrid threats, increasing journalist engagement in reporting on NATO, and expanding the number of scientific projects.

It is evident that NATO invests significantly in public diplomacy in the Western Balkans, as each Annual Report includes at least one program or form of assistance directed at the region. The fact that NATO has maintained a continuous presence in the area since 1992 underscores the region's strategic importance for the Alliance. NATO also established a branch office in Sarajevo, in addition to its military base in Kosovo (Mulchinock, 2017).

Unfortunately, there is a noticeable lack of specific financial data on these programs, which limits the ability to form a comprehensive understanding of NATO's activities in the region. However, it is clear that Kosovo and Bosnia and Herzegovina receive the most attention. For instance, the reports do not mention any specific projects in Albania, aside from those implemented at the broader Alliance level.

Every project funded by NATO or the Public Diplomacy Division is required to display the Alliance's logo prominently. In most cases, the presence of this logo increases the program's perceived credibility (Wolff, 2014). For example, non-governmental organizations implementing programs with the NATO logo significantly enhance their legitimacy, as receiving NATO funding involves navigating a rigorous bureaucratic process, and the projects themselves must be well-designed (Maronkova, 2018).

NATO's public diplomacy efforts in the Western Balkans and Croatia are continually evolving in response to global geopolitical developments. Accordingly, the security environment in the region must be carefully monitored.

Performance of the Atlantic Councils

The Atlantic Treaty Association (ATA) is a non-governmental organization dedicated to promoting NATO and its civilian role. The ATA comprises 37 Atlantic Councils located in NATO member states and partner countries in the Alliance's geographic vicinity (ATA, n.d.a). Established in 1954, the ATA should not be confused with *The Atlantic Council*, a U.S.-based think tank founded in 1961, nor with the *North Atlantic Council*, NATO's principal decision-making body composed of representatives from all member states (ATA, n.d.a).

Table 1. The Goals of NATO's Public Diplomacy in the Area of the Western Balkans and Croatia, Described in the Annual Reports of the Secretary General from 2011 to 2023

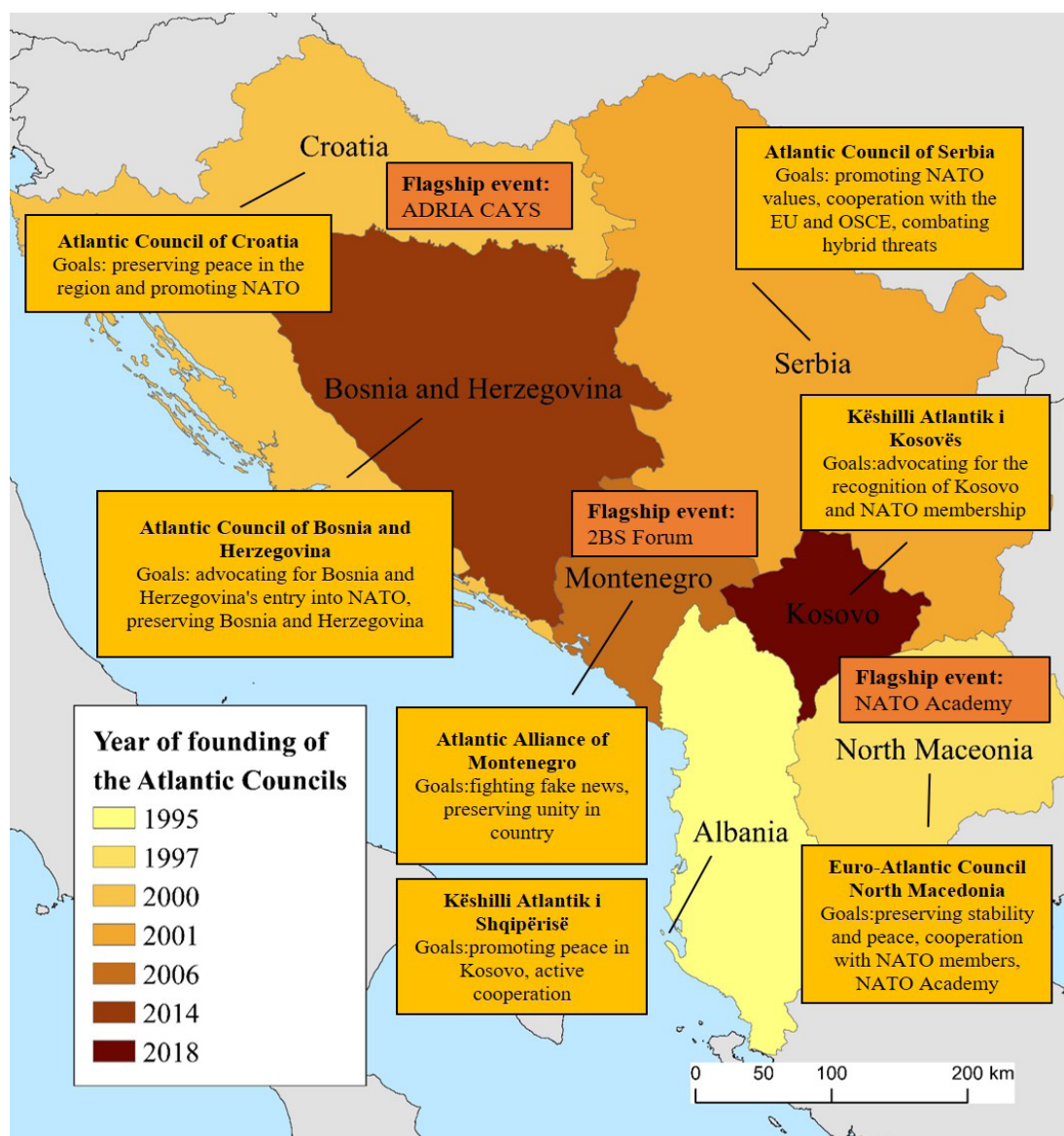
Year	No. of pages	NATO's public diplomacy goals
2011	20	Support for NATO KFOR civilian missions, fostering dialogue between Serbia and Kosovo, security cooperation with countries in the region
2012	21	Stronger civilian activities of KFOR, active involvement of countries in the Partnership for Peace, promotion of peace in Serbia and Bosnia and Herzegovina, openness to future members
2013	28	The development of KFOR's civilian activities, the transfer of certain duties to the Kosovo police, the development of a special program for Serbia, cooperation with future members
2014	24	Further development of the peace process in Kosovo, open door policy towards Bosnia and Herzegovina, Montenegro and North Macedonia, individual approach
2015	128	Strengthening of civilian and public action, cooperation in Kosovo, project „Science for Peace and Security” between Croatia, North Macedonia and Montenegro
2016	126	Further support for civilian action by KFOR, public campaign for Montenegro's accession, continuation of the joint project - the topic of urgent civilian cases
2017	120	Fighting disinformation, further development of communications, inclusion of Montenegro in civilian programs, trust-building programs
2018	136	Use of social networks, integrity building program - fight against corruption in the Western Balkans, support for civilian action by KFOR, fostering Bosnia and Macedonia's membership, support for civil society
2019	132	More active involvement of citizens in NATO activities, support for reforms in Bosnia and Herzegovina, inclusion of women from the Western Balkans, support for KFOR's civilian activities
2020	146	<i>#WeareNATO</i> campaign, inclusion of North Macedonia in civilian structures, support for KFOR's civilian activities, assistance in the COVID-19 crisis
2021	154	Listening to citizens' opinions, encouraging scientific projects, combating hybrid threats, supporting KFOR's civilian activities, supporting reforms
2022	172	Resilience programs, continued strengthening of cooperation with Bosnia and Herzegovina, anti-corruption and civilian programs in Serbia, civilian presence in Kosovo, supporting reforms
2023	172	Increasing financial support for civil society organizations, increasing journalistic reporting, combating disinformation, increasing presence in Bosnia and Herzegovina and Serbia, supporting EU integration

Source: NATO Public Diplomacy Department (NATO PDD), 2011–2023

Atlantic Councils are typically established in countries aspiring to NATO membership. Their primary role is to promote NATO and prepare the general public for full integration into the Alliance (ATA, n.d.a). After a country becomes a member, these Councils continue to operate, actively promoting

Euro-Atlantic values. In the Western Balkans, the Albanian Atlantic Council has the longest-standing presence, having been founded in 1995, while the most recent—Kosovo’s Council—was established in 2018 (ATA, n.d.b). Each Council has specific objectives (Figure 1), tailored to the national context in which it operates—for example, advocating for the recognition of Kosovo.

Figure 1. Official Names, Year of Establishment and Main Goals and Projects of the Atlantic Councils



Source: ATA, n.d.b.

The Atlantic Councils of Montenegro, North Macedonia, Serbia, and Croatia are among the more active, as they conduct regular activities. They consistently publish various materials, organize conferences on an annual or semi-annual basis, maintain a developed network of associates, and engage in recognizable initiatives within Euro-Atlantic circles. The 2BS Forum, NATO Academy, and ADRIA CAYS are annual conferences that bring together young Euro-Atlantic leaders and experienced panel speakers.

Most of the Councils in the region, including the Croatian Council, receive financial support from the NATO Public Diplomacy Division (AVH, 2023). Additionally, there are various national government competitions for NGOs that provide further funding opportunities. Some Councils have also developed partnerships and secured sponsorships from various institutions. Regular panel speakers include representatives from the security, political, military, and economic sectors (Saarelaid, 2020). It can be concluded that the Atlantic Councils are important stakeholders in NATO's approach to civil society, and their relevance is recognized through NATO's financial support and the activities of the Public Diplomacy Division.

The Role of the Atlantic Councils in the Civil Sector

Public diplomacy often relies on the civil sector, which includes all organizations, associations, and initiatives that operate independently of the state and private sectors. The civil sector is characterized by its non-profit orientation, volunteerism, and ideological independence from the state (Carothers & Barndt, 1999). A key component of the civil sector is civil society itself—citizens who organize independently and manage civil projects on their own. The Atlantic Councils are actors within this civil sector, and all presidents of the Western Balkans and Croatian Councils agreed that their Councils play an important role in promoting Euro-Atlantic values within civil society.

In the first part of the interviews, respondents answered three questions: on the main role of the Atlantic Council in promoting NATO values; on cooperation with non-governmental organizations; and on the inclusion of the academic community. During the coding process, 14 codes were identified (Table 2), each of which was mentioned at least twice by one of the interviewees.

Table 2. Codes Present in the Responses of the Interviewees in the First Part of the Interview

Countries of the interlocutors	Role of A. Councils	Collaboration with NGO-s	Academic community
Albania	1, 2, 3, 5	2, 3, 4, 5	6, 7, 8
Bosnia and Herzegovina	2, 3, 5, 9	2, 4, 5	-
Kosovo	1, 3, 9, 10, 13, 12, 14	5, 9, 11, 12	4, 6, 7, 8, 12
Montenegro	1, 2, 4, 5	5, 8, 9	6, 7
North Macedonia	1, 2, 5	4, 5, 11	6, 7, 4
Serbia	1, 2, 5, 14	2, 4, 5	2, 6, 7
Croatia	1, 2, 5	2, 5, 8	6, 7, 8

Codes: 1 – Public diplomacy, 2 – Democratic education, 3 – Hybrid threats / Disinformation, 4 – Youth work, 5 – Civil inclusion / Civil society, 6 – Academic integration, 7 – Security studies / NATO topics, 8 – Participation of institutions, 9 – Regional factor (especially the Western Balkans), 10 – Infrastructure / forensic capacities, 11 – Media literacy, 12 – International cooperation, 13 – Post-conflict approach, 14 – Euro-Atlantic integration. Source: Results of the interviews, 2025.

The analysis of the code table reveals varying degrees of engagement by the Atlantic Councils, NGOs, and the academic community in the Western Balkan countries and Croatia. The role of the Atlantic Council is most prominent in Montenegro, where activities were recorded in seven different areas.

The Croatian interlocutor states: *“The Councils are a bridge to citizens in explaining the values on which the rule of law, as well as individual and collective security, are based.”*

In all countries, public diplomacy, democratic education, and civil inclusion emerge as the most frequently mentioned activities, suggesting a consistent strategic approach across the region. The Bosnia and Herzegovina interlocutor notes: *“The development of a healthy state requires a healthy civil society, and it is the Atlantic Councils that have the opportunity to be leaders in the development of such societies.”*

Cooperation with NGOs is evident in all observed countries, with civil inclusion mentioned in each. However, specific activities—such as working with youth and promoting media literacy—are more common in Montenegro and North Macedonia. Atlantic Councils must not become isolated entities within society, but rather should actively collaborate with other civil society actors and the academic community (ATA, n.d.a). It is particularly important to develop ties with universities or faculties aligned with Euro-Atlantic values, such as political science and defense studies.

The Serbian interlocutor emphasizes: *“...Universities must understand civil society and encourage their students to actively participate in it in order to create active citizens of each country.”* All presidents underline the importance of cooperation with Europe-oriented associations. Concluding this part of the interview on the positioning of the Atlantic Councils within the civil sector, the view of the Macedonian interlocutor stands out: *“The world is an increasingly fragmented place; only countries with a functional society and strong institutions manage to maintain prosperity. Atlantic Councils should not be just associations but should help their countries develop civil society.”*

Despite the broader trend of undervaluing many achievements of the civil sector, the Atlantic Councils continue to pursue their goals and strive to foster as much cooperation as possible for the benefit of their members and society as a whole.

Public Perception of NATO and Informing Citizens

According to Wolff (2014), strong public support reinforces the Alliance, while weak support undermines its influence. All presidents agree that public perception of NATO varies from country to country and also depends on the timing of the survey. The Croatian, Macedonian, Albanian, and Kosovo interlocutors expressed satisfaction with the public perception of the Alliance in their respective countries but noted that further progress could still be made.

The Serbian president remarked: *“...Because of the bombing in 1999, Serbs will never accept NATO as an option...”* The Bosnia and Herzegovina interlocutor observed that the country is divided, with roughly half supporting the Alliance and half opposing membership. The Montenegrin interlocutor expressed concern: *“In my country, there used to be far more people who supported the Alliance and Euro-Atlantic integration, but that percentage is decreasing every year. Honestly, I worry.”*

Public perception (Figure 2) is closely tied to support for NATO membership. According to the International Republican Institute (2024), support rates were as follows: Kosovo – 88%, Albania –

85%, Croatia – 78%, North Macedonia – 52%, Bosnia and Herzegovina – 50%, Montenegro – 39%, Serbia – 3%.

Figure 2. Percentage of Support for NATO Membership



Source: IRI (2024)

In the second part of the interview, the interviewees were asked to answer the following questions: whether they believe that NATO has a positive perception in their country and what the common opinions and attitudes about it are; what the main sources of disinformation about NATO are and why they occur; how, in their opinion, such disinformation can be most successfully countered; what measures the Atlantic Council is implementing to improve understanding of NATO among different social groups; and what common measures are being implemented in this regard in the Western Balkans region. In the coding process (Table 3), a total of 13 codes were identified.

There are several lines of thought on the public perception of NATO and the process of informing citizens, as confirmed by the fact that the interlocutors do not fully share the same views on this issue. The presidents do not have unified positions on informing citizens. The Albanian interlocutor points out: “It is obvious that NATO has not yet developed a fully adapted communication system for each of its members.” Unlike the European Union, NATO has only two official languages—English and French—which significantly complicates access to information for the general public.

Table 3. Codes Present in the Interviewees’ Answers in the Second Part of the Interview

Countries of the interlocutors	Positive perception of NATO	Disinformation sources	Countermeasures against disinformation	Measures of A. Councils	Regional measures
Albania	1, 4	6, 7	8, 9, 10	5, 8, 9	11, 5
Bosnia and Herzegovina	1	6, 7	8, 9	-	11
Kosovo	1	6, 7	8, 9	5, 8	11, 5
Montenegro	1, 2, 4, 7	6, 7, 12	8, 9, 10, 11	5, 8, 9, 13	11, 5
North Macedonia	1, 4, 7	6, 7, 12	8, 9, 10	5, 8, 13	11, 5
Serbia	–	3, 6, 7, 12	8, 10	9	11
Croatia	1, 4	6, 7	8, 9	5, 9	11, 5

Codes: 1 – NATO as protection and security, 2 – NATO as an obstacle to peace / source of conflict, 3 – NATO as a means of political influence of great powers (especially the USA), 4 – NATO as a symbol of Western values / belonging to the West, 5 – NATO as a threat / aggressor (especially with the mention of the bombing), 6 – Distrust of NATO due to historical events (e.g. the 1999 bombing), 7 – Disinformation / influence of Russian narratives and propaganda, 8 – Distrust of general international alliances / institutions, 9 – Support for membership for pragmatic reasons (economic, political, security), 10 – NATO membership without deep understanding / unconscious acceptance, 11 – Neutrality / opposition to any military alliance, 12 – Ethnic/national feelings (e.g. Serbian, Albanian, Bosniak identity), 13 – Ignorance / disinterest / confusion about NATO. Source: Results of the interviews, 2025.

In addition, the information space is burdened by an increasing amount of disinformation. The Macedonian interlocutor warns: “...it is abnormal for every fifth piece of news to be part of someone’s propaganda or an attempt to deceive the people.” The Montenegrin president states similarly: “Where would we get if we tried to prevent every piece of disinformation or if we tried to deny it?” In his opinion, efforts should be focused on monitoring and exposing the so-called “big news”—that is, information that can have a significant impact on the public’s perception of the Alliance. The importance of a regulatory framework is also emphasized, especially when it comes to content on social networks and internet portals (Begović, 2022). In most countries, NATO is perceived as a guarantor of security and protection, while in some cases the symbolic role of the Alliance as an expression of belonging to Western values is emphasized.

However, interlocutors from Montenegro and North Macedonia state that their publics are suspicious of NATO as a potential source of conflict, which indicates the existence of divided narratives within societies. The main sources of disinformation come from Russian narratives and propaganda. In some cases, ethnic and national sentiments further increase distrust, and Serbia stands out for its perception of NATO as an instrument of great powers, especially the USA. Countermeasures to disinformation in most countries are based on strengthening information, rational interpretation of

the benefits of membership, and encouraging critical thinking. In this context, the Atlantic Councils carry out activities aimed at informing, cooperating with the civil sector, and strengthening resistance to disinformation, while regional measures are mainly based on neutrality and general distrust of military alliances.

Youth and Educational Programs

Regarding activities involving young people, each Atlantic Council usually has an organized youth wing, or YATA (Youth Atlantic Treaty Association), whose goal is to promote NATO values among individuals aged 18 to 30. YATA members participate in all Atlantic Council activities, and regular ATA conferences are specifically designed for them (ATA, n.d.c). NATO also organizes the NATO Youth Summit annually in May, which brings together young Euro-Atlanticists and YATA members (NATO, 2024b). In the Western Balkans, the YATAs in Serbia, Montenegro, and North Macedonia are active, and the Croatian YATA is also notable for its work. Atlantic Councils in the region strive to actively involve young people in their work, and former YATA members in Serbia and North Macedonia are now among the main leaders of their respective Atlantic Councils. The Serbian interlocutor emphasizes: „*Young people are the future; all Atlantic Councils will one day depend on them. It is important to integrate them into the system.*” The Montenegrin interviewee notes: „*... we have gained a lot of new members in YATA; many young people believe in Euro-Atlantic values. It is up to us to guide them and show them how to preserve these values.*”

In the third part of the interview, the interviewees were asked to answer questions about the existence of special educational programs or initiatives for youth related to NATO in their country; the ways in which the Atlantic Council encourages the active participation of young people in discussions on security and international relations; and other programs or methods of involving youth. In the coding process (Table 4), a total of nine codes were identified.

Table 4. Codes Present in the Answers of the Interviewees in the Third Part of the Interview

Countries of the interlocutors	NATO-related educational programs	Ways to encourage young people in discussions about security	Other programs/modus of youth involvement
Albania	1, 3, 7, 8	2, 9	3, 5, 7, 8
Bosnia and Herzegovina	-	2, 4, 9	4, 5
Kosovo	1, 2, 6, 7, 8	2, 6, 9	-
Montenegro	6, 8	3, 6	3, 5, 6
North Macedonia	1, 6, 7, 8	2, 6, 9	3, 6, 7, 8
Serbia	1, 3, 4, 5, 8	2, 4, 9	3, 5, 7, 8
Croatia	1	2, 6, 9	3, 7, 8

Codes: 1 – Lack of national educational programs, 2 – Involvement of YATA organization, 3 – Exchange programs/ study abroad, 4 – Difficult access to information/disinformation, 5 – Role of NGOs, 6 – Cooperation with educational institutions, 7 – Need for greater support from the state/ministries, 8 – Access to NATO career mainly from outside the country, 9 – Inclusion of youth in public discussions and strategic documents. Source: Results of the interviews, 2025

The analysis shows that all countries share common challenges in youth engagement, with the most prominent being the lack of national education programmes in nearly all cases. Involvement in YATA organisations stands out as a key mechanism for engagement, while access to NATO careers is predominantly located outside the respective countries, confirming a lack of domestic opportunities. Exchange programmes and cooperation with the non-governmental sector are often used as alternatives, though these options are unevenly available.

It is encouraging that the inclusion of young people in public debates is acknowledged, although implementation varies depending on political will and available resources. NATO offers significant employment and educational opportunities for young people, such as the NATO Defence College in Rome and the Young Professionals Programme (NATO, 2024c). NATO headquarters in Sarajevo mainly employs foreign experts, providing limited opportunities for local staff.

A Macedonian interlocutor notes: *“For young people, the largest NATO education programme is our NATO Academy, but we cannot teach young people everything in a week.”* An Albanian interlocutor adds: *“Our YATA president really wanted to get a job at NATO, but for that she had to undergo a lot of education outside the country.”* The interlocutors agree that NATO-related youth education and employment programmes are scarce and suggest the development of national programmes, so that young people do not have to leave their countries.

NATO’s Public Diplomacy Division has previously aimed to target what it considers to be two key demographic groups: security opinion leaders and young people (Wolff, 2014). In general, the focus on youth is driven by the Alliance’s concern that young people do not believe NATO is relevant, nor do they have a positive perception of the Alliance as older generations who lived through the Cold War did (Saarelaid, 2020). However, if NATO wants to shape public opinion, it must target the broader public, not only security experts and young people. Such public image management is part of the more complex process of constructing public perception toward an international organization.

Public Diplomacy and NATO’s “Soft Power”

According to Nye (2004), there are three fundamental pillars of „soft power”: culture, political values, and foreign policy. In NATO’s case, the Alliance promotes a culture of security and stability, supports democratic values, and maintains a developed foreign policy with non-member states. NATO is developing so-called *smart power*, combining elements of both “soft” and “hard” power (Stavridis, 2014).

According to the Kosovo interlocutor: *“Greater engagement and openness towards the public would be much more beneficial to NATO and its mission in times of hybrid warfare and the exploitation of democratic values.”* On the topic of “soft power,” the Macedonian interlocutor suggests: *“NATO is neither the first nor the last Alliance to expand its ‘soft power,’ but it is fortunate to be able to learn from other people’s previous mistakes. I think the Alliance understands the situation in the region and knows how to adjust its policies in accordance with general public opinion.”*

In the fourth part of the interview, the interlocutors were asked to answer questions about how NATO uses public diplomacy to strengthen support in Western Balkan countries; what the most

successful NATO public diplomacy projects are in their country and across the region; and whether NATO has been successful in expanding its “soft power,” including which achievements in this area are considered the most significant. In the coding process (Table 5), a total of eight codes were identified.

Table 5. Codes Present in the Respondents’ Responses in the Fourth Part of the Interview

Country	NATO’s strengthening of support	Public diplomacy projects	The success of „soft power”
Albania	1, 2, 3, 4, 8	2, 4, 5, 8	5, 8
Bosnia and Herzegovina	1, 4, 7, 8	2, 4, 7	-
Kosovo	1, 2, 3, 5, 6, 8	2, 3, 5, 6	-
Montenegro	1, 2, 3	1, 2, 5	6, 8
North Macedonia	1, 2, 3, 4, 5, 8	2, 3, 5, 6	5, 8
Serbia	1, 2, 3, 4, 7	2, 4, 5, 7	5, 7
Croatia	1, 5	1, 5	5, 8

Codes: 1 – Cooperation with civil society and the non-governmental sector, 2 – Educational activities and public events (campaigns, NATO weeks, debates, etc.), 3 – The role of the media and public information, 4 – Cooperation with universities, 5 – Focus on youth and projects for young leaders, 6 – Combating disinformation and hybrid threats, 7 – Political constraints or external influences (e.g., Russia, internal divisions), 8 – NATO as a mechanism for security and stability in the region. Source: Results of the interviews, 2025

The coding shows that cooperation with civil society, educational activities, and youth involvement are the most commonly used approaches. Albania, North Macedonia, and Montenegro demonstrate the widest application of these tools. Bosnia and Herzegovina and Serbia, in addition to these activities, face political constraints and external influences, which reduce the impact of public diplomacy and overall support. Public diplomacy projects most often include education and cooperation with universities, while youth engagement is strongly present in nearly all countries.

The successes of “soft power” are more visible in countries that perceive NATO as a guarantor of stability, such as Albania and Croatia. On the other hand, the interviewee from Bosnia and Herzegovina states that more effort should have been invested so that the country would not remain so divided on the issue of NATO membership: *“If Serbia has already decided to be militarily neutral, more effort could have been invested in encouraging the citizens of the Republic of Srpska to support the unified entry of Bosnia and Herzegovina into the Alliance.”*

In conclusion, NATO’s “soft power” is clearly developing in the region and is particularly evident through various civil society projects. In the future, greater efforts are needed to present NATO and its activities to the widest possible audience. It is essential to continue fostering a positive perception of the Alliance, especially from NATO’s own perspective.

The Future of NATO’s Civilian Activities

At a time when the EU and almost all NATO members are openly announcing increases in defense spending, it may seem unusual to discuss the future of the civilian activities of a military alliance.

However, NATO does not intend to halt its civilian activities—quite the opposite: it is expanding them through various segments of civil society (NATO PDD, 2023).

The new NATO Secretary General remains focused on strengthening the Alliance’s military capabilities, but also places emphasis on civilian efforts. Combating disinformation, encouraging reforms, fighting corruption, promoting the inclusion of women, and strengthening civil associations are just some of the future priorities of NATO’s civilian engagement (NATO, 2022).

The communication tools of the 21st century offer the Alliance numerous opportunities to inform the public, advocate for its policies, and establish interactive relationships with global audiences. NATO countries must adapt to these tools and take the aforementioned challenges seriously. Public diplomacy can effectively and successfully contribute to the legitimacy of the Alliance and enhance public understanding, thereby strengthening the transatlantic security community in the future (Babst, 2008).

The Albanian interlocutor believes that all NATO armed forces will need to adapt to new forms of warfare, such as the development of hybrid threats, while civilian operations “...will experience increased cooperation and understanding between members; otherwise, there will be no further development of an Alliance worthy of the 21st century.”

In the final part of the interview, the interlocutors were asked to answer questions regarding what recommendations they would give for strengthening NATO’s civilian engagement in the Western Balkans; how they see the future role of the Atlantic Council in light of political changes in the region; and how they perceive NATO’s role in the context of the new administration of President Donald Trump. In the coding process (Table 6), a total of six codes were selected.

Table 6. Codes Present in the Interlocutors’ Answers in the Fifth Part of the Interview

Country	Recommendations for strengthening civic engagement	The role of Atlantic Council	NATO role under Trump
Albania	1, 2, 3, 5	4	5, 6
Bosnia and Herzegovina	2, 3, 5	–	5
Kosovo	1, 2, 3, 5	2, 4	5, 6
Montenegro	2, 3, 5	2, 4	5, 6
North Macedonia	2, 3, 5	4	1, 5, 6
Serbia	2, 3, 5	2, 4	5, 6
Croatia	2, 3, 5	–	–

Codes: 1 – Combating disinformation and strengthening media literacy, 2 – Involvement of civil society and citizens, especially young people, 3 – Education and strengthening of democratic values, 4 – Role and transformation of the Atlantic Council as mediator and educator, 5 – Stability and security of the region, importance of civil-military cooperation, 6 – Stable relationship with the USA/Trump administration. Source: Results of the interviews, 2025

The analysis of the table shows that there is broad agreement among Western Balkan countries on the key priorities for strengthening NATO’s civilian engagement. Almost all interlocutors emphasize the importance of involving civil society and citizens—especially young people—and highlight the need for education and the strengthening of democratic values. The stability and security of the region,

along with the importance of civil–military cooperation, are recognized as fundamental goals in all responses, indicating a general consensus on the relevance of NATO’s civilian dimension.

The Macedonian interlocutor stresses the need for NATO’s continued support of the stabilization process in the countries of the region, particularly in Montenegro and Bosnia and Herzegovina. He adds: *“In addition to its standard activities, the Alliance must understand that the stability factor lies within several member states, and in those states in particular, civilian engagement is needed.”*

The role of the Atlantic Council is acknowledged in several countries—especially in Montenegro, Kosovo, North Macedonia, and Serbia—as an important bridge between NATO and the public. The Kosovo interlocutor concludes: *“If there is no NATO in Kosovo, the survival of the state is in question. The citizens of Kosovo must be aware of the importance of this Alliance.”* Regarding NATO under the Trump administration, the interlocutors express the need for a stable relationship with the United States and stress the importance of continuity in the Alliance’s mission, regardless of political changes in Washington.

Spatial Distribution of NATO Public Diplomacy Activities

Based on the analysis of the content of the Annual Reports and the interview results, a map (Figure 3) was created showing the spatial distribution of NATO public diplomacy activities in the Western Balkans and Croatia. The NATO public diplomacy activities presented are to a lesser extent part of general Alliance-wide programs and are, for the most part, specifically focused on countries in the region. NATO members in the region, including Croatia, benefit from slightly more programs implemented by the Alliance. However, the Public Diplomacy Division has sought to distribute support evenly across countries by financing conferences, combating disinformation, encouraging civil society development, and more. Regardless of their non-member status, it is evident that NATO is also active in Bosnia and Herzegovina, Serbia, and Kosovo. Albania and Kosovo record the lowest levels of NATO public diplomacy activity. Nonetheless, it is visually apparent that there is no exclusive concentration of public diplomacy efforts in just one or two countries.

Case Study: NATO Public Diplomacy in Serbia, Kosovo, and North Macedonia

In addition to the overall regional approach to public diplomacy, NATO’s operations at a more localized level were explored through a case study (Figure 4) involving three countries with differing attitudes toward the Alliance. Case studies can illustrate how NATO operates on a smaller scale while simultaneously contributing to an understanding of the broader regional context (Seroka, 2007). In Serbia, which is not a NATO member, there remains significant resistance to the Alliance due to the events of 1999. The government continues to exert strong control over the media, and a pro-Russian narrative dominates the public discourse (NATO PDD, 2023). Kosovo, which declared independence from Serbia in 2008, remains a major point of contention in the Western Balkans. Nevertheless, it seeks to position itself clearly within the Euro-Atlantic framework (Orsós, 2025).

Figure 3. Spatial Distribution of NATO Public Diplomacy Activities in the Western Balkans and Croatia from 2011 to 2023



Source: Developed by the authors according to NATO PDD and Atlantic Councils, 2025

NATO's public diplomacy efforts in Kosovo have been exceptionally well received and have resonated strongly with the population. North Macedonia, as one of NATO's most recent member states, is increasingly embracing the values of the Alliance. However, there are concerns regarding its future progress toward other forms of integration (NATO PDD, 2023). This case study demonstrates that

NATO is perceived differently in each of the three countries. The Alliance is actively working to adapt its public diplomacy strategies accordingly, in order to support its broader goal of promoting security and stability throughout the Western Balkans.

Figure 4. A Spatial Comparison of NATO Public Diplomacy in Serbia, Kosovo, and North Macedonia



Source: NATO Public Diplomacy Department (NATO PDD), 2011–2023

Public Diplomacy in Practice: Analytical Reflections on NATO's Regional Engagement

Public diplomacy in the Western Balkans and Croatia has existed since the beginning of the breakup of Yugoslavia. At that time, various international organizations and independent states encouraged peaceful conflict resolution and implemented the region's first public diplomacy programs. However, it was only after the Zagreb Summit in 2000 that the European Union's first intensive public diplomacy efforts in the region began to take shape—developing in parallel with NATO's—and the two are compared here.

Kovačević (2011) describes how the EU delegation in Serbia did not always succeed in its public diplomacy efforts, investing significant resources while public support for membership remained at around 50%. Jusić and Nidžara (2017) note that the EU faced a complex media environment in Bosnia and Herzegovina, where it failed to understand the different media preferences of the country's various ethnic groups. Koneska (2012) states that the EU has persistently tried to create a European narrative in its neighbourhood, but that this narrative is not “accepted” because the accession process is perceived as too slow. Džihic and Hamilton (2012) refer to the Western Balkans as the “unfinished business” of the international community, a region where money outweighs narrative.

In comparing NATO and EU public diplomacy, it becomes evident that NATO's approach was faster and more assertive. NATO focused first on promoting membership and then on values, whereas the EU reversed this order. NATO recognized the “right” moments for action and influence in the region, while the EU became entangled in its accession rhetoric without taking concrete steps. NATO was perceived as a key element of stability and security in every country (except Serbia), while the EU often failed to clearly communicate its public diplomacy objectives, leaving many of its messages “hanging in the air.” This qualitative, brief comparison shows that clear positions and actions tend to lead to more impactful public diplomacy outcomes.

One reason for the relative success of NATO's public diplomacy is its active development and use of *soft power* and civil society engagement. This aligns with the first hypothesis: *In the Western Balkans, NATO uses “soft power” mechanisms and cooperation with civil society more than traditional institutional and security channels within the framework of public diplomacy.*

To test this hypothesis, the results from the analysis of Annual Reports and interviews were assessed using Nye's framework, wherein *soft power* activities are categorized according to culture, political values, and foreign policy. It should be noted that the results for Croatia were excluded from this analysis. Activities conducted exclusively with civil society were identified separately, as were those conducted with state and security institutions.

For clarity, only the quantified data are presented here (Table 7), organized according to the activity categories described. The data were compiled into a table and analyzed using IBM SPSS Statistics software. A Chi-square test was applied, and the results showed a p-value of 0.0004, which is well below the threshold of 0.05. In addition, the Phi coefficient and Cramér's V coefficient were calculated as further measures of association between variables. Both coefficients yielded a value of 0.70, fully confirming the first hypothesis.

Table 7. Quantitative Analysis of NATO's Public Diplomacy Activities in the Western Balkans

Activities	Quantity	Activities	Quantity
Mechanisms of „soft power”	12	With state institutions	4
Cooperation with civil society	11	With security institutions	2
<i>Total</i>	<i>23</i>	<i>Total</i>	<i>6</i>

Source: Authors according to NATO PDD and Atlantic Councils, 2025

Another reason for the success of NATO's public diplomacy is the Alliance's dual approach—through general federal-level programs and through the activities of the Atlantic Councils. The second hypothesis addresses this dual mechanism: *The Atlantic Councils carry out public diplomacy activities that align with NATO's long-term stabilization and support policies for the Western Balkans, as outlined in the Annual Reports.*

To test this hypothesis, ten key recurring public diplomacy activities conducted by the Alliance were identified based on an analysis of the Annual Reports. These ten activities were then compared (Table 8) with the main activities of the Atlantic Councils, as mentioned by interviewees, using a binary framework of implementation versus non-implementation. The constructed table was entered into IBM SPSS Statistics software, and a Chi-square test was performed. The results yielded a p-value of 0.013, which is well below the 0.05 threshold, indicating that the Atlantic Councils do, in fact, carry out activities consistent with those reported in the Annual Reports. The Phi coefficient and Cramér's V were also calculated as additional measures of association. Both values were found to be $\Phi = 1.00$ and Cramér's $V = 1.00$, fully confirming the second hypothesis.

Table 8. Activities of the Alliance From the Annual Reports and Their Implementation by the Atlantic Councils

Alliance Activity	Status of activities in A. councils	Alliance Activity	Status of activities in A. councils
Support for KFOR's civilian operations	Non-implementation	Promotion of scientific cooperation and civil security projects	Implementation
Encouraging dialogue and reforms in Serbia and Bosnia and Herzegovina	Implementation	Support to civil society and journalism	Implementation
Open door policy and support for NATO expansion	Implementation	Involvement of citizens and dialogue with the public	Implementation
The fight against misinformation and hybrid threats	Implementation	Involvement of women and empowerment of youth	Implementation
Use of digital platforms and social networks	Implementation	Support for Euro-Atlantic integration and EU rapprochement	Implementation

Source: Authors according to NATO PDD and Atlantic Councils, 2025

The third important factor contributing to the success of NATO's public diplomacy is the spatial distribution of its activities. This is the subject of the third hypothesis: *In the Western Balkans, the spatial distribution of NATO's public diplomacy activities by country is balanced, regardless of membership in the Alliance.*

To test this hypothesis, the number of public diplomacy activities was first counted by country, as indicated in Figure 3 (Table 9). A one-way analysis of variance (ANOVA) was then conducted in IBM SPSS Statistics, distinguishing between NATO member states and non-member states. The results

($F = 0.05$; $p = 0.834$) confirm that there is no statistically significant difference in the intensity of NATO's public diplomacy between member and non-member countries. Additionally, the coefficient of variation was calculated at 29.88%, which falls within the range of a moderately uniform distribution. Based on these findings, the third hypothesis is also confirmed.

Table 9. Number of public diplomacy activities by country from 2011 to 2013

Country	Number of activities	Country	Number of activities
Albania	4	Kosovo	3
Bosnia and Herzegovina	7	North Macedonia	6
Montenegro	7	Serbia	6

Source: Authors according to NATO PDD and Atlantic Councils, 2025

CONCLUSIONS

The main goal of this paper was to politically and geographically examine and present NATO's public diplomacy activities in the Western Balkans. These activities were categorized into two main forms: those conducted directly by the Alliance, and those carried out indirectly through the Atlantic Councils—non-governmental organizations established to promote and support NATO values. Accordingly, the research included a content analysis of NATO's Annual Reports from 2011 to 2023, as well as seven interviews with the presidents of the Atlantic Councils in the region and in Croatia. The findings confirmed all three initial hypotheses. In the Western Balkans, NATO indeed relies more on *soft power* mechanisms and civil society cooperation than on traditional institutional and security channels in its public diplomacy. The Atlantic Councils conduct public diplomacy activities that align with the priorities outlined in NATO's Annual Reports. The spatial distribution of NATO's public diplomacy activities is relatively balanced across countries, regardless of NATO membership status.

The statistical confirmation of these hypotheses enabled a more structured understanding of NATO's public diplomacy efforts in the Western Balkans and Croatia. The hypothesis-driven approach allowed for a clear categorization of activities, revealed meaningful correlations between institutional reporting and civil society practices, and confirmed the geographic consistency of the Alliance's communication strategy. This analytical framework has strengthened the scientific foundation of the study's conclusions and identified areas where NATO's public diplomacy could be further expanded.

Overall, the research demonstrated that NATO has successfully developed and maintained public diplomacy initiatives in the Western Balkans, with consistent activities observed throughout the research period. Approximately 30% of these activities belong to NATO's general public diplomacy, while the remaining 70% are specific programs targeted at individual countries. The Atlantic Councils are aware of their civic role and actively promote NATO values and initiatives. However, their financial stability and operational capacities vary, resulting in differing levels of support for NATO's public diplomacy across the region. Given the post-conflict nature of the region and the ongoing geopolitical

competition among major powers, this research is particularly timely and relevant. It also highlights the growing role of civil society within the broader security architecture of the region. The study provides a unique and up-to-date analysis of the public diplomacy of the world's largest military alliance in the Western Balkans, offering valuable insights for further academic inquiry.

Future research could explore financial data related to NATO public diplomacy programs or expand the number of interlocutors, possibly incorporating surveys of program participants to better assess the effectiveness of NATO's messaging. Moreover, the methodology applied here may be transferable to other regions, such as the Baltics or Scandinavia. In conclusion, the topic of public diplomacy is likely to become increasingly important. NATO must continue to enhance its public diplomacy and communication strategies to demonstrate that it remains a vital force for peace and security in the transatlantic space (Maronkova, 2018).

REFERENCES

- Akçadağ, E. (2012). Public diplomacy: A remedy for NATO's image problem. *Bilge Strateji*, 4(6), 105–134.
- ATA. (n.d.a). *About us*. <https://atahq.info/about-us/>
- ATA. (n.d.b). *ATA network*. <https://atahq.info/ata-network/>
- ATA. (n.d.c). *YATA*. <https://atahq.info/yata/>
- AVH. (2023). *Izvešće o radu udruge za 2019–2023*. [Activity report for 2019–2023]. <https://atlantic-council.com.hr/godisnji-izvjestaj/>
- Ayhan, K. J., & Sevin, E. (2022). Moving public diplomacy research forward: methodological approaches. *Place Branding and Public Diplomacy*, 18(3), 201–203. <https://doi.org/10.1057/s41254022002635>
- Babst, S. (2008). *Reinventing NATO's Public Diplomacy* [Research Paper]. NATO Defense College.
- Beale, M. O. (2004). *Bombs over Bosnia: The role of airpower in Bosnia-Herzegovina*. University Press of the Pacific.
- Begović, M. (2022). *Uključenost mladih u demokratske procese u Europskoj uniji: Važnost zajedničkih vrijednosti i otpornosti na dezinformacije* [Youth participation in democratic processes in the EU: The importance of shared values and resilience to disinformation]. <https://atlantic-council.com.hr/wp-content/uploads/2023/01/Ukljucenost-mladih-u-demokratske-procese-u-EU.pdf>
- Binnendijk, A., & Priebe, M. (2019). *An attack against them all? Drivers of decisions to contribute to NATO collective defense*. RAND Corporation.
- Blease, D. (2010). Lessons from NATO's military missions in the Western Balkans. *Connections*, 9(3), 3–18. <https://doi.org/10.11610/Connections.09.3.02>
- Brinkmann, S. (2013). *Qualitative Interviewing*. Oxford University Press.

- Bytyci, F. (2018, December 14). *Kosovo approves new army despite Serb opposition, NATO criticism*. Reuters. <https://www.reuters.com/article/us-kosovo-army-idUSKBN1OD16S/>
- Carothers, T., & Barndt, W. (1999). Civil society. *Foreign Policy*, 117, 18–29. <https://doi.org/10.2307/1149558>
- Cull, N. J. (2008). Public diplomacy: Taxonomies and histories. *Annals of the American Academy of Political and Social Science*, 616(1), 31–54. <https://doi.org/10.1177/0002716207311952>
- Cull, N. J. (2019). *Public diplomacy: Foundations for global engagement in the digital age*. Polity Press.
- Darnton, C. (2020). Public diplomacy and international conflict resolution: A cautionary case from Cold War South America. *Foreign Policy Analysis*, 16(1), 1–20. <https://doi.org/10.1093/fpa/orz003>
- Distler, W. (2022). Securitising the present through the prism of the past: State-building and the legacy of interventions in Kosovo and Serbia. *Comparative Southeast European Studies*, 70(2), 267–288. <https://doi.org/10.1515/soeu-2022-0009>
- Dursun-Özkanca, O. (2019). The Western Balkans in the transatlantic security context: Where do we go from here? *Insight Turkey*, 21(2), 107–128.
- Džihic, V., & Hamilton, D. S. (Eds.). (2012). *Unfinished business: The Western Balkans and the international community*. Center for Transatlantic Relations, Johns Hopkins University SAIS.
- Fitzpatrick, K. R. (2007). Advancing the new public diplomacy: A public relations perspective. *The Hague Journal of Diplomacy*, 2(3), 187–211. <https://doi.org/10.1163/187119007X240497>
- Fitzpatrick, K. R. (2010). *The future of U.S. public diplomacy: An uncertain fate*. Brill.
- Fitzpatrick, K. R., Fullerton, J., & Kendrick, A. (2013). Public relations and public diplomacy: Conceptual and practical connections. *Public Relations Journal*, 7(4), 1–21.
- Golan, G. J., Yang, S.-U., & Kinsey, D. F. (Eds.). (2015). *International public relations and public diplomacy: Communication and engagement*. Peter Lang.
- Grillot, S., Cruise, R., & D’Erman, V. (2010). Developing security community in the Western Balkans: The role of the EU and NATO. *International Politics*, 47, 62–90. <https://doi.org/10.1057/ip.2009.26>
- Güleç, C. (2021). NATO and public diplomacy: Opportunities and constraints of 21st century. *Perceptions: Journal of International Affairs*, 26(1), 100–120.
- Gullion, E. (1965). Public diplomacy. *The Journal of International Affairs*, 19(2), 22–36.
- Hasnat, I., & Leshner, G. (2022). Experimental methods in public diplomacy. Place Branding and Public Diplomacy, 18(1), 1–29. <https://doi.org/10.1093/isagsq/ksac010>
- Hedling, E., Edenborg, E., & Strand, S. (2022). Embodying military muscles and a remasculinized West: Influencer marketing, fantasy, and “the face of NATO”. *Global Studies Quarterly*, 2(1), 45–55. <https://doi.org/10.1093/isagsq/ksac010>
- Huseinović, S. (2025). *Posljedice suspenzije američke pomoći za zapadni Balkan* [Consequences of US aid suspension for the Western Balkans]. <https://www.dw.com/hr/posljedice-suspenzije-ameri%C4%8Dke-pomo%C4%87i-za-zapadni-balkan/a-71500794>

- International Committee of the Red Cross*. (1949). *Geneva Convention relative to the Protection of Civilian Persons in Time of War* (Fourth Geneva Convention) (1949 August 12). <https://ihl-databases.icrc.org/en/ihl-treaties/gciv-1949>
- International Republican Institute. (2024). *Support for NATO membership in the Western Balkans*. <https://english.gazetatema.net/politics/support-for-nato-membership-in-the-western-balkans-i334689>
- Jakešević, R. (2018). Conflict resolution and peacebuilding in the Western Balkans – The role of external actors. *Teorija in Praksa*, 55(1), 99–122.
- Jusić, T., & Nidžara, A. (2017). Communication practices of the EU Delegation in Bosnia and Herzegovina: The challenges of promoting EU integration in a complex media landscape. *Central European Journal of Communication*, 10(1), 33–48.
- Koneska, C. (2012). The EU's public diplomacy and the Western Balkans: Building a narrative in the European neighbourhood. *Exchange: The Journal of Public Diplomacy*, 3(1), 63–75.
- Kostyrev, A. G. (2023). NATO–Ukraine strategic communications: Theory and practice. *Hileya: Scientific Bulletin*, 13(3), 1–38. <https://doi.org/10.31392/Hileya-POLITICAL-13-3-1-38>
- Kovačević, N. (2011). EU public diplomacy: The case of the EU Delegation in Serbia. *The Hague Journal of Diplomacy*, 6(3–4), 293–318.
- Krippendorff, K. (2019). *Content analysis: An introduction to its methodology* (4th ed.). SAGE Publications.
- L'Etang, J. (2009). Public relations and diplomacy in a globalized world: An issue of public communication. *American Behavioral Scientist*, 53(4), 607–626. <https://doi.org/10.1177/0002764209347633>
- Maronkova, B. (2018). *From crawling to walking: Progress in evaluating the effectiveness of public diplomacy – Lessons learned from NATO* (CPD Perspectives on Public Diplomacy, Paper 1). Figueroa Press.
- Mulchinock, N. (2017). *NATO and the Western Balkans: From neutral spectator to proactive peacemaker*. Palgrave Macmillan.
- NATO PDD. (2011–2023). *Annual reports of the Secretary General*. https://www.nato.int/cps/en/natohq/topics_212668.htm
- NATO PDD. (2015). *Annual report for 2015*. https://www.nato.int/cps/en/natohq/topics_212668.htm
- NATO PDD. (2017). *Annual report for 2017*. https://www.nato.int/cps/en/natohq/topics_212668.htm
- NATO PDD. (2020). *Annual report for 2020*. https://www.nato.int/cps/en/natohq/topics_212668.htm
- NATO PDD. (2023). *Annual report for 2023*. https://www.nato.int/cps/en/natohq/topics_212668.htm
- NATO. (2022). *NATO 2022 strategic concept*. <https://www.nato.int/strategic-concept/>
- NATO. (2023). *Operations and missions: Past and present*. https://www.nato.int/cps/ra/natohq/topics_52060.htm
- NATO. (2024a). *Partnership for Peace programme*. https://www.nato.int/cps/po/natohq/topics_50349.htm
- NATO. (2024b). *NATO Youth Summit*. <https://natoyouthsummit.com/>

- NATO. (2024c). *Engaging tomorrow's leaders: NATO's youth outreach programmes*. <https://www.act.nato.int/article/engaging-tomorrows-leaders-nato-youth-outreach-programmes/>
- Nye, J. S. (2004). *Soft power: The means to success in world politics*. Public Affairs.
- Orsós, Gy. (2025). Geopolitical Complexities of Kosovo: Symbolic and Geographical Tensions in the Western Balkans. *Modern Geográfia*, 20(2), 65–78. <https://doi.org/10.15170/MG.2025.20.02.04>
- Pamment, J. (2014). Articulating influence: Toward a research agenda for interpreting the evaluation of soft power, public diplomacy and nation brands. *Public Relations Review*, 40(1), 50–59. <https://doi.org/10.1016/j.pubrev.2013.11.019>
- Pap, N., & Tóth, J. (2008). The role of religious and ethnic minorities in disintegration of the state structure of Western Balkans. *Modern Geográfia*, 3(1), 38–46.
- Pavlyshenko, B. (2025). AI approaches to qualitative and quantitative news analytics on NATO unity. *arXiv:2505.06313*, 1–21. <https://doi.org/10.48550/arXiv.2505.06313>
- Risso, L. (2021). A forgotten success. *The RUSI Journal*, 166(6–7), 96–105.
- Saarelaid, K. (2020). *The role of civil society participation in international security organisations: the case of Estonian Atlantic Treaty Association* [Master thesis, Tallinn University of Technology].
- Saddiki, S. (2012). Arab public opinion and NATO after the international military operations in Libya. *Turkish Journal of International Relations*, 11, 78–89.
- Schafer, B. (2016). *Ally or Adversary? Public Opinion of NATO in Post-Soviet Russia*. University of Southern California.
- Schindler, C. (2016). Proactively preserving the inward quiet: Public Diplomacy and NATO. *Defense Strategic Communication*, 1(1), 133–147. <https://doi.org/10.30966/2018.RIGA.1.8>
- Seroka, J. (2007). Security considerations in the Western Balkans: NATO's evolution and expansion. *East European Quarterly*, 41(1), 25–38.
- Sevin, E., Metzgar, E. T., & Hayden, C. (2019). The scholarship of public diplomacy: Analysis of a growing field. *International Journal of Communication*, 13, 4814–4837.
- Signitzer, B. H., & Coombs, T. (1992). Public relations and public diplomacy: Conceptual convergences. *Public Relations Review*, 18(2), 137–147. [https://doi.org/10.1016/0363-8111\(92\)90005-J](https://doi.org/10.1016/0363-8111(92)90005-J)
- Stavridis, J. G. (2014). *The accidental admiral: A sailor takes command at NATO*. Naval Institute Press.
- Tahiri, L., & Mavraj, M. (2019). The image of Russia in the Kosovo media discourse: Comparison between the public and the private media. *Information & Media*, 86, 32–44.
- Vukadinovic, R., Čehulić Vukadinović, L. & Božinović, D. (2007). *NATO – Euroatlantska integracija* [NATO – Euro-Atlantic integration]. Topical.
- Vukasovich, C., & Dejanovic-Vukasovich, T. (2016). 'Humanitarian intervention', a predictable narrative? A comparative analysis of media narratives from Serbia to Syria. *Global Media and Communication*, 12(3), 311–331. <https://doi.org/10.1177/1742766516653163>

- Wei, C. (2020). Public Diplomacy: Functions, Functional Boundaries and Measurement Methods. In D. Turcanu-Carutiu, (Ed.), *Heritage* (pp. 1–12). Ovidius University Romania.
- Wolff, A. T. (2014). Crafting a NATO Brand: Bolstering Internal Support for the Alliance through Image Management. *Contemporary Security Policy*, 35(1), 73–95. <https://doi.org/10.1080/13523260.2014.885708>
- Wolfgram, M. A. (2008). Democracy and propaganda: NATO's war in Kosovo. *European Journal of Communication*, 23(2), 153–171. <https://doi.org/10.1177/0267323108089220>
- Yakovenko, N., & Piskorska, G. (2023). Transformation of NATO public diplomacy. *American History and Politics*, 5, 197–206. <https://doi.org/10.17721/2521-1706.2018>
- Zaharna, R. S. (2022). *Boundary spanners of humanity: Three logics of communication and public diplomacy for global collaboration*. Oxford University Press.
- Zavoneau, R.-G. (2013). The role and importance of public diplomacy: Romania case study in the context of integration into NATO. *European Scientific Journal*, 9(19), 468–475.

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A Historical Analysis of Tourism Development Under Apartheid: The Case of Ciskei

ABSTRACT

In recent years, a new focus in South African tourism studies has emerged, emphasizing historical research to better understand past tourism geographies. This paper contributes to this field by examining a neglected aspect of tourism during the apartheid era, specifically the development of casinos in rural Ciskei. The study employs a historical approach, drawing on archival materials and existing literature to analyse the evolution of tourism in the region. Prior to its independence, little was known about Ciskei as a tourism destination in Southern Africa. Economic development policies during apartheid prioritized industrialization as the primary engine of growth, while tourism received limited attention. Nevertheless, Ciskei experienced a notable shift toward tourism development, with policy focus gradually increasing in the early 1980s as the casino and hotel sectors expanded. However, allegations of corruption among regional leaders cast a shadow over this growth.

Keywords: casino tourism, apartheid tourism policy, Ciskei, historical tourism, political economy of tourism.

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INTRODUCTION

A growing body of South African tourism research has begun shifting its focus toward historical tourism geographies, marking a significant turn in the way the past is examined. Rogerson and Visser (2020, p. 5) explain that:

The emergence of a scholarship concerning tourism geographies of the past is one of the most distinctive facets of the vibrant literature produced in South Africa for the period 2015–2019. Until 2015 the majority of tourism geography writings have been ‘present minded’ with the consequence that the research record on the historic development of tourism in South Africa is sparse.

Historical geography is largely absent from tourism scholarship (Rogerson & Sixaba, 2024), although a significant body of literature has emerged focusing on the historical development of tourism. The growing recognition that the imprint of the past shapes the landscape of the present has prompted a reappraisal, leading to the emergence of a distinctive body of literature in historical geography (Rogerson, 2025). An analysis of this literature reveals a variety of research themes. These include studies of early developments in accommodation establishments, such as the evolution of seaside coastal resort development in small towns (Rogerson, 2019) and the history of the hotel industry in Johannesburg (Rogerson, 2018; Rogerson, 2020). Additional historical research on hotel geography also examines the evolution of ‘non-White’ accommodations, which involved hotel segregation along racial lines (Rogerson, 2020). Recently, Rogerson and Rogerson (2022) examined the rise of Southern Sun, one of South Africa’s leading hotel groups. Their analysis provided context regarding the business environment for tourism development during apartheid. Further studies on the evolution of the accommodation sector include research on the development of caravan parks from the 1930s until the democratic transition in 1994 (Rogerson & Rogerson, 2021).

Another research theme concerns the blue economy and coastal and marine tourism, which has also been featured in tourism histories. The publication by Bickford-Smith (2009) focuses on the evolution of South Africa’s coastal cities and analyses coastal leisure spaces, particularly in major urban areas such as Cape Town and Durban. Moreover, the work by Gupta (2015) explores ‘leisure port spaces’, which are connected to the historical roots of cruise tourism. The most recent study was conducted in Mossel Bay, Western Cape, and examined the local historical transitions that shaped and reshaped the coastal settlement of this town. Another strand of historical tourism scholarship on coastal tourism involves the themes of space and place and focuses on the evolution of resorts. Rogerson and Rogerson (2020) provide insight into the development of seaside resorts in South Africa, with particular attention to Hermanus in the Western Cape. Further research on the histories of coastal tourism examines racism and the politics of beaches around South Africa’s major coastal centres. Rogerson (2017) highlights the segregation of tourism landscapes and racial segregation on South African beaches during the apartheid period. Other investigations of tourism spaces focus

on the histories of urban tourism. Steinbrink (2016) offers a historical perspective on slum tourism, examining the origins of urban poverty tourism with examples of township tourism in South Africa.

Further studies on public history and tourism include the work by Witz et al. (2004), which sheds light on how South Africa's past is packaged for tourist consumption and the tourist gaze of cultural stereotypes. The study analyses how tourist images of South Africa have been constructed through colonial nostalgia. Other aspects of tourism historical research involve heritage tourism. Drummond et al. (2021) significantly contribute to the historical geography of tourism heritage studies, focusing on the development of heritage tourism in Mahikeng and tracing the historical evolution of the town's cultural and heritage assets. Similarly, Hughes (2007) analyses the politics of heritage in South Africa and examines how heritage creation and tourism growth converge. The most recent work on heritage histories examines Kliptown, a heritage site and township in Soweto, focusing on its role in hosting the 1955 Congress of the People and the adoption of the Freedom Charter (Rogerson, 2024).

Other specific niches, such as adventure tourism, have been explored. Drummond et al. (2022) investigated adventure tourism during the apartheid period and presented historical evidence from Mmabatho, the capital of Mahikeng and a former homeland of Bophuthatswana. Their findings show that skydiving was an important niche offering, contributing to the town's economy. The most recent historical study on niche tourism examines the early development of mountain tourism from the mid-19th century to the early 1950s. The study traces the origins of mountain tourism to Table Mountain and the Drakensberg Mountains, revealing that it is rooted in colonial history and European settlement (Rogerson & Rogerson, 2024). Another niche investigation explores the historical development of a small town as a Health and Wellness Tourism destination, conducted in Caledon, Western Cape (Rogerson & Rogerson, 2023). Similarly, the investigation on the thermal springs of Montagu during the apartheid period, a town that was declared a health resort and emerged as a popular holiday destination in the Western Cape (Rogerson & Rogerson, 2024). Additionally, studies on the history of wildlife tourism include Carruthers (1995), who examines the social and political creation of Kruger National Park (KNP), arguing that the idea of the game reserve was a white invention that elevated wildlife above humanity and served as an instrument of land dispossession. Similarly, Dlamini (2020) examines alternative histories of conservation in Africa, focusing on the early history of black tourism and the presence of black tourists in Kruger National Park. Against this backdrop, the present study seeks to further understand the historical geography of tourism in the homelands of South Africa, focusing on the politics surrounding casino development in Ciskei during the apartheid years.

METHODS

This study draws on existing literature on homeland development in combination with archival sources. Archival research encompasses a range of activities used to investigate documents and textual materials, which constitute the core of historical documentary sources: "documents created at

some point in the relatively distant past, providing us access that we might not otherwise have to the organizations, individuals, and events of an earlier time” (Ventresca & Mohr, 2017, p. 805).

The archives consulted in this study were located across various depots in the Eastern Cape. Materials included newspaper articles from the *Daily Dispatch* in East London, government documents from the Eastern Cape Provincial Archives and the Amathole Museum in King William’s Town, and records from the Cory Library in Makhanda. At both the *Daily Dispatch* and the Cory Library, an online search engine was employed to locate articles using relevant keywords such as ‘casino,’ ‘Ciskei tourism,’ and ‘Sol Kerzner.’ At the Amathole Museum and Eastern Cape Archives, the senior archivist was consulted to identify pertinent documents.

Selection criteria were based on the relevance of the material, the time period covered, and the geographical location. Data analysis involved organizing the materials chronologically and thematically, guided by the existing literature.

The study unfolds in two sections: the first provides a background on the creation of the Homelands, including their economic development, and the second provides an overview of tourism developments in Ciskei, particularly how hotel and casino development shaped the territory’s tourism landscape.

RESULTS

The Creation of the Homelands

After the establishment of the Union of South Africa in 1910, colonial laws were implemented, particularly with the passing of the 1913 Native Land Act, which racially divided the land on which blacks and whites could live and own. This led to the creation of ‘native reserves’ in 1936, which served as the building blocks for the later establishment of Bantustan regions in South Africa (Phillips, 2017; Rogerson, 2022). The formation of these native reserves and the transfer of power to traditional authorities during the colonial period facilitated the making of the homelands. The apartheid government used the traditional tribal structure as the foundation for separate development.

The evolution of the homelands was an integral component of planning for apartheid, which followed the electoral victory of the National Party (NP) in 1948 (Southall, 1983). The formal establishment of the homelands began in 1948 with the implementation of racial laws by the National Party. A key element of the National Party’s apartheid policy was to spatially divide the black and white populations of South Africa, thereby granting autonomous authority to create African ‘ethnic’ areas known as ‘homelands’ (Wotshela, 2018, p. 3). In 1950, the Commission for the Socio-Economic Development of the Bantu Areas within the Union of South Africa, chaired by Professor F.R. Tomlinson, was established to investigate all aspects concerning the economic and social development conditions of black areas. The commission considered the ‘so-called Native question’ to be “undoubtedly the most formidable and urgent of South Africa’s problems” (Trevisan, 1984, p. 49). Its findings recommended

that “the separate development of the European and Bantu should be striven for” (Trevisan, 1984, p. 49).

The Tomlinson Commission proposed the constitution of seven territories designated for Black people, territorially consolidated and based on ethnic origins. This meant that the Black population was to be divided into different ethnic groups, each with distinct languages and traditions. Under Prime Minister Verwoerd, the National Party’s policy for separate development prioritized that Blacks pursue economic and political development within their designated areas (Trevisan, 1984). The establishment of the Bantu Authorities Act of 1951 confirmed that in South Africa, areas set aside for the homelands (designated for blacks) constituted only 13% of the land, while the remaining 87% was designated exclusively for whites (Southall, 1977).

The primary goal of the homeland policy was to guarantee the white minority’s existence and supremacy in South Africa. Secondary goals included deepening African divisions through tribalism, allowing ethnically defined groups direct responsibility over their designated regions (Halbach, 1988). The homelands were created without consultation with the populations involved. They comprised ten autonomous, ‘self-governing,’ and partly ‘independent’ state-like entities established in unstructured rural settlement regions of South Africa (Halbach, 1988). These rural settlements divided the black population into ethnic units, namely the Gcaleka Xhosa, Rharhabe Xhosa, Zulu, Swazi, Ndebele, Northern Sotho/Pedi, Southern Sotho, Venda, Shangaan, and Tswana. Four of the ten established homelands—Bophuthatswana, Venda, Transkei, and Ciskei—would eventually achieve ‘independence.’

The formation of Ciskei resulted from land conflicts, during which Africans surrendered to colonial authority. A boundary was established within the Xhosa nation in South Africa’s Eastern region, dividing the land based on which side of the Kei River the Xhosa occupied (Laurance, 1976). The territory on the Cape side of the Kei River was called Ciskei, while the area on the far side was known as Transkei. Both territories became early examples of the homeland policy (Laurance, 1976; Wotshela, 2018). The Ciskei was an overcrowded and underdeveloped region, resulting from forced removals and mass resettlement programmes. It experienced increasing levels of poverty, and overall standards of living were low (Hirsch, 1986). Ciskei received its ‘self-governing’ status in 1972 and gained ‘independence’ in 1981 (Ciskei Development Information, 1984; Wotshela, 2005). The Ciskei territory included Zwelitsha Township bordering King William’s Town, Keiskammahoek, Middle-drift, and Peddie (Wotshela, 2005). Its political leader and President was Lennox L. Sebe of the Ciskei National Independence Party (CNIP) (Peires, 1992; Wotshela, 2005).

After 1973, when Sebe became the leader of Ciskei, he was trained as a teacher at Lovedale Mission School. Sebe’s rise to power involved ousting Justice Mabandla, under whom he had held a ministerial portfolio. Sebe fabricated his chieftaincy to legitimize his influence, rapidly advancing through the political ranks and eventually becoming President of Ciskei (Wotshela, 2025). He was described as admiring projects of high standards for his personal gain, making him a target for foreign fraudsters (Peires, 1992).

Economic Development of the Homelands

From an economic standpoint, the homelands were overcrowded and situated in peripheral, poverty-stricken regions. Their economic development was reduced to serving as labour reservoirs and mere dumping grounds for surplus labour, with no real economic reform (Halbach, 1988). The homelands obtained the majority of their funding for public sector expenditures from the apartheid government, which resulted in the government controlling their fiscal policy (Nattrass & Nattrass, 1990). Arguably, the homelands were a political construct with no independent economic base. For the most part, they were dependent on South Africa for employment and government grants or loans, administered by the ruling homeland elites and leaders (Nattrass & Nattrass, 1990). This dependence was exhibited through the migrant labour system, low levels of economic growth, and the high proportion of South African grants in their budgets. Families were entirely dependent on migrant labour and cash income earned outside the homeland areas. As a result, most of the national income was generated through labour exports (Nattrass & Nattrass, 1990). Much of the migrant labour population settled in densely populated border towns (Halbach, 1988), as industrial entrepreneurs were encouraged by the white apartheid government to establish industrial enterprises in regions near the homelands. The homelands maintained their traditional function as workforce reservoirs to an increasing extent (Halbach, 1988). Economically, the homelands were turned into a service industry for white metropolitan areas, and the export of labour in the form of migrant workers became the homelands' most essential commercial product (Halbach, 1988).

Before 1948, the economies of the 'native reserves' were highly dependent on agriculture. By the 1970s, rural production levels had declined, and the ability of the homelands to support their populations was inadequate and eventually collapsed. The decline in agricultural activity resulted from the profitability of the migrant labour economy. Migrant labour earnings exceeded the returns of traditional agriculture, leading to a preference for investment in potential migrants (Halbach, 1988). The Bantu Self-Government Act of 1951 was established to address economic development issues, alongside the report of the Tomlinson Commission. The report highlighted that "a programme of industrial development will, therefore, occupy a central position in the general programme of development for the Bantu areas" (Union of South Africa, 1955, p. 131). From the 1950s through the early 1980s, the government focused on regional industrial development programmes in an attempt to create economic legitimacy in the homelands. It was not until the 1970s that the apartheid government realized that the decentralisation programme was not achieving its desired objectives (Rogerson & Rogerson, 2023). It is argued that all attempts at development began too late and were too limited to initiate autonomous growth, given the extent of underdevelopment, unemployment, and dependence in the homelands (Halbach, 1988).

Another critical aspect of the Ciskei economy was the Swart Commission's proposal for an economic development framework. The Commission recognized industrialisation as one of Ciskei's indispensable pillars for economic development. Industrialisation, financed by foreign capital, was



considered the leading sector to tackle unemployment and alleviate poverty (Jones, 1984). The failure of the agricultural sector led the Swart Commission to identify industrial development as the basis for economic growth. The commission recommended industrial development as providing the ‘spearhead’ for economic growth and job creation, thereby acknowledging the failures of Sebe’s initial agricultural plans to fulfil this role (Cadman, 1986).

Furthermore, the apartheid government established several institutions to encourage economic development and remedy the economic situation in the homelands. For instance, the South African Bantu Trust was a fund created by the South African government, managed by a financial unit under the Ministry of Bantu Administration and Development (South African Institute of Race Relations, 1969). The Trust, established with reference to the Native Trust and Land Act of 1936, was used to purchase land for black settlements, establish townships, and support development projects in black areas (South African Institute of Race Relations, 1969). The Bantu Investment Corporation of South Africa (BIC), based on the Bantu Investment Corporation Act of 1959, represented the first attempt to directly support black-owned businesses, with support strictly confined to the homelands (Hart, 1972).

In 1966, a key step toward development was the establishment of the Xhosa Development Corporation (XDC), specifically dedicated to the economic development of the Ciskei and Transkei (Stultz, 1980). The XDC was created to coordinate, finance, promote, plan, and execute the economic development of the Xhosa homelands (Xhosa Development Corporation Limited, 1969, 1973). Later, separate corporations were created for each Xhosa homeland. For the Ciskei, the Ciskei National Development Corporation (CNDC) was established, with the sole purpose of stimulating economic growth and attracting investors (Wotshela, 2018). Other financial agencies aiding development in Ciskei included the Ciskei People’s Development Bank (CPDB), which primarily provided loans to finance businesses. The CPDB was also directly involved in hotel development in Ciskei, managing some of the tourist resorts, including the Hamburg Hotel (CPDB, 1987). The operations of these development corporations were later overshadowed by widespread allegations of corruption and mismanagement of funds (Phillips, 2017).

Tourism Development in Ciskei

The National Party showed little interest in tourism development, and generally, tourism was not a priority for the apartheid government. This is reflected in the socio-economic planning report undertaken by the Tomlinson Commission. Policy development surrounding tourism promotion in the homelands began only in the 1960s (Drummond et al., 2022). It was during the early 1970s, when the failures of apartheid industrial decentralisation programmes in the homelands became apparent, that signs emerged of the government’s interest in promoting tourism in these areas (Rogerson, 2022). Arguably, the concession of ‘independence’ to certain homelands marked a turning point for tourism development in these regions (Drummond et al., 2022). Before Ciskei achieved its ‘independent’

status, little was known about it as a tourism destination, regardless of the number of tourism assets it possessed. Upon gaining independence, new structures for tourism and tourism development were introduced. Overall, the Ciskei government recognised the tourism industry as an integral sector for improving the quality of life of its citizens. Tourism was seen as a means to create jobs, improve transport and communication infrastructure, and offer entrepreneurial opportunities.

Ciskei was primarily rural, and the government aimed to develop these areas through tourism projects that would create networks of growth within rural communities. The Ciskei government acknowledged that tourism in the region could not succeed in isolation; instead, it had to collaborate with neighbouring countries to remain globally competitive. Tourism was confined to a specific geographic area and relied on white urban centres. The Ciskei government adopted strategic policies and sought ways to attract tourists via Ciskei's coastal roads, particularly for those traveling from Durban to Cape Town and from Johannesburg to East London. During the apartheid era, traveling to these locations was often challenging, with limited access and few accommodation options.

Regarding tourism assets, Ciskei was renowned for its scenic beauty, particularly its coastline, which served as the primary tourist attraction. Nature-based tourism sites included mountain ranges, forests, and wildlife. Heritage and cultural tourism attractions also existed, such as historical sites like the grave, kraal, and cave of King Mgolombane Sandile Ngqika, along with the NtabaKaNdoda monument. Figure 1 illustrates the spatial patterns of tourism development in Ciskei, as well as the distribution of leisure tourism attractions, depicted on an official map created by the Ciskei government in the mid-1980s (Sixaba, 2022).

The Casino Hotel Industry in Ciskei

The prohibition of gambling in South Africa was implemented by the apartheid government in 1965 through the South African Gambling Act (van der Merwe, 2017). The ban was advocated in Parliament by the National Party and its leader, John Vorster, who argued, "Afrikaners should combat the evil of gambling, for it undermines the morale of any nation" (van der Merwe, 2017, p. 11). These gambling restrictions did not apply within the homelands, as they were self-governing states with limited autonomy under the Bantu Homelands Constitution Act, No. 21 of 1971. Sol Kerzner capitalized on this legal situation and established casino resorts in four homelands—Bophuthatswana, Transkei, Venda, and Ciskei—dominating the casino and hotel industry in Southern Africa (van der Merwe, 2017). Kerzner, a hospitality mogul and founder of Sun International (later Southern Sun), was of Jewish-Ukrainian descent and was affectionately known as "the Sun King" (van der Merwe, 2017). He was renowned for his wealth, influence, and ability to cultivate relationships with homeland leaders and the apartheid government. In 1983, the National Party recognized him as a leader in South Africa's tourism and hospitality industry, cementing his dominance over the Southern African hospitality sector (van der Merwe, 2017). Kerzner maintained close ties with both apartheid authorities and homeland leaders. Van der Merwe (2017, p. 27) describes this as a "mutually beneficial triangular

relationship.” For example, in Bophuthatswana, President Lucas Mangope was set to be a shareholder in SunBop, which developed the Sun City hotel and casino in the homeland (Venison, 2025). While these relationships were mutually advantageous, Kerzner’s enterprise benefitted the most (van der Merwe, 2017).

Figure 1. Ciskei Tourist Attractions



Source: Government of the Republic of Ciskei and Development Bank of Southern Africa, 1985

In Ciskei, the government promoted tourism growth through infrastructure development. With Ciskei's attainment of 'independence', tourism entrepreneurs were presented with new opportunities for hotel, casino, and resort development. Despite its stigma as leisure for "forbidden fruit," casino tourism was recognized as a key feature of rural tourism development in the homelands (Briedenhann & Wickens, 2004). The establishment of 'independent' states in the 1960s and 1970s was immediately followed by the entry of foreign multinational hotel chains into the casino sector (Stern, 1987). This surge in casino development was encouraged by government policies designed to attract foreign investment and generate rapid financial returns. Casinos were established outside South Africa, where gambling was legal. The market targeted wealthy white patrons rather than the international tourist market. The two dominant hotel companies were Holiday Inn and Southern Sun. Existing casino types included hotel-linked casinos operated by Holiday Inn and casino complexes with hotel and leisure facilities operated by Southern Sun. Hotel-linked casinos were small-scale operations located in urban centres, whereas casino complexes were situated within the homelands near South African urban markets, offering luxury hotels, sports and entertainment facilities, and conference services. These complexes were primarily associated with gambling and adult entertainment and included the Wild Coast complex in the Transkei, the Mmabatho Sun Inn in Bophuthatswana, and the Amatola Complex in Ciskei (Stern, 1987). The penetration of multinational hotel groups into the 'independent' states was viewed as a form of economic development (Rogerson, 1982). Holiday Inn initially capitalized on the apartheid government's gambling restrictions (Winai-Strom, 1975), followed by Southern Sun's entry into the casino business, facilitated by homeland political developments. The collusion between the apartheid state and tourism capital "gave added weight to attempts by the [apartheid] state to legitimise 'independence' in international forums" (Crush & Wellings, 1983, p. 692).

Competitive tensions existed between Holiday Inn and Southern Sun until their 1983 merger into a single hotel group (Stern, 1987). Holiday Inn, owned by the South African conglomerate Rannies, operated casino hotels in neighbouring countries, Swaziland and Lesotho, accessible to South African citizens who crossed the border for weekend gambling and banned entertainment (Venison, 2025). Before the infusion of foreign tourism capital, tourism in the homelands was negligible. Homeland leaders actively pursued deals, allowed foreign investment, and took substantial cuts from casino profits. The private sector's involvement was crucial to achieving national tourism goals, and the 'independent' states became heavily reliant on the casino sector (Stern, 1987).

Tourism entrepreneurs and the homeland government leveraged 'independence' to bypass South Africa's restrictive gambling laws. In Ciskei, licensing for casino development was granted to Southern Sun, under Sol Kerzner's ownership, which became a central feature of tourism development. Southern Sun opened four casinos during Ciskei's 'independent' period.

The first casino resort was the Amatola Sun Hotel and Casino in Bisho, constructed immediately after Ciskei gained 'independence'. It was a joint venture between Sun International and the Ciskei People's Development Bank (CPDB). The hotel sparked public controversy regarding financing and Sun International's involvement ("Hotel to employ," 1981). Sun International denied plans to build a



hotel-casino in Ciskei (“Hotel to employ,” 1981), raising questions about secrecy between the Ciskei government, President Lennox Sebe, and Sol Kerzner regarding casino deals. Despite controversy, the Amatola Hotel significantly contributed to Ciskei’s economy, employing 130 citizens and offering managerial training programs (“Hotel to employ,” 1981; “Bisho Casino,” 1987). However, its success negatively impacted other local accommodations (“New hotel hits,” 1982).

The Mpekweni Marine Resort followed, also marred by corruption and fraud allegations. Constructed by the CPDB in 1985 as Ciskei’s first coastal tourism development (“Hoogendyk rejects,” 1985), it was later leased for 20 years to Sun International in 1988. President Sebe justified this privatisation as protecting the Ciskei economy and preventing mismanagement (“Resort to be,” 1989). The government retained substantial net income for other development projects (“Resort to be,” 1989).

Another key hotel was the Mdantsane Hotel, founded in 1974 in Mdantsane Township near East London to serve black travellers (“Good response,” 1983). Initially funded by the XDC and later refurbished by the CNDC, the hotel allowed Ciskei citizens to purchase shares, fostering the black middle class (“Ciskeians get chance,” 1983). The hotel was later sold to Sun International in 1988 by the CPDB.

In 1984, the Ciskei government and CPDB entered negotiations with Sun International for a new casino near Fish River Mouth (“Second casino,” 1984). Prior plans for a Hamburg casino financed by Hong Kong and U.S. businessmen were withdrawn on Kerzner’s advice, as Sun International held exclusive casino rights (“Casino: Sol to see,” 1984). The resulting Fish River Sun Hotel and Casino, launched in 1989, became Ciskei’s fourth Sun International resort (“Sebe opens,” 1989).

Patronage Networks and Tourism Development

By the 1990s, the homelands had developed extensive webs of economic and political patronage, closely tied to the apartheid NP government (Wotshela, 2025). The newly available resources, coupled with new forms of governance, created an environment conducive to patronage, personalised power, and corruption within the homelands. Homeland politics revolved around access to new assets; the ruling elite changed over time, and white businesses were gradually replaced by a growing class of local black entrepreneurs, many of whom were supported by development corporations (Streek & Wicksteed, 1981; Beinart, 2012). Consequently, patronage became the defining feature of the homeland states (Twala & Ndlovu, 2025).

The increase in resources available to the so-called ‘independent’ homelands created economic exclusion for the poor citizens, whose conditions remained largely unchanged, most of whom did not support independence. The primary beneficiaries of independence were the ruling elite and political ‘collaborationists’, including traditional chiefs and headmen, the emerging bourgeoisie of middle- and high-ranking civil servants, black entrepreneurs, and commercial farmers. This group actively supported the decision to pursue independence (Trevisan, 1984).

Beinart (2012, p. 15) observes that “the local state was a vehicle for support and controlled opportunities through licensing. Arguably, the homelands were the original site of a form of ethnicised BEE (Black Economic Empowerment).” He further argues that corruption occurs where power can be translated into financial gain, where a culture of entitlement exists, and where there is no separation between state and private wealth. Homeland leaders, politicians, chiefs, and bureaucrats were educated in a system where these processes took root and where state controls over efficiency weakened (Beinart, 2012).

Accounts of corruption in the homelands involved traditional leaders and a group of modern elites, including teachers, bureaucrats, entrepreneurs, and other professional groups with personal stakes in the homeland regime. These elites acquired wealth and security through the state. Homeland leaders became known for their luxury lifestyles, corrupt dealings, and mismanagement of state funds (Streek & Wicksteed, 1981). Presidents and ministers used their power to transfer white-owned farms and enterprises for personal gain and were branded as stooges collaborating with the apartheid government (Twala & Ndlovu, 2025). Even the ruling political party, the Ciskei National Independence Party (CNIP), was predominantly composed of traditional authorities—chiefs and headmen—who leveraged control over scarce resources such as land, jobs, and housing to secure loyalty to the Sebe government (Cadman, 1986).

Ciskei’s most significant tourism developments during the ‘independence’ period were linked to the construction of casino resorts, taking advantage of gambling bans in ‘white’ South Africa. These developments were surrounded by controversy due to corruption and the close relationships between homeland leaders and the casino enterprises. Sol Kerzner’s casino ventures created opportunities for patronage and corruption among Ciskei’s black elites.

CONCLUSIONS

The paper provides a historical perspective on tourism development in Ciskei during the apartheid period. It reviews the relatively limited historical research on tourism in South Africa. Furthermore, the study contextualises the creation of the homeland system and highlights the economic development of the homelands. Adopting a historical geography approach, the study details casino development in Ciskei.

An indication of a growing tourism sector in Ciskei was marked by its ‘independent’ status, which coincided with the failure of the industrial decentralisation policy to achieve its intended objectives. The Ciskei government sought to promote tourism through infrastructure development, including the expansion of casino and resort facilities. New opportunities were provided to tourism entrepreneurs, and the Ciskei government capitalised on gambling rights, as gambling was prohibited in ‘white’ South Africa.

However, little attention has been given to homeland patronage networks, collusion with capital, and the apartheid state’s role in tourism development in Ciskei, particularly in the casino sector. Further



research is warranted to uncover the complex political dynamics shaping this industry. Moreover, examining the administration of land and tourism development would shed light on the sociological impacts of tourism initiatives. Arguably, this historical perspective provides a critical foundation for understanding and analysing contemporary tourism development issues in the Eastern Cape.

REFERENCES

- Beinart, W. (2012). Beyond 'homelands': Some ideas about the history of African rural areas in South Africa. *South African Historical Journal*, 64(1), 5–21.
- Bickford-Smith, V. (2009). Creating a city of the tourist imagination: The case of Cape Town, the fairest cape of them all. *Urban Studies*, 46(9), 1763–1785.
- Bisho Casino develops local staff programme. (1987, December 16). *Daily Dispatch*.
- Briedenhann, J., & Wickens, E. (2004). Rural tourism—meeting the challenges of the new South Africa. *International Journal of Tourism Research*, 6(3), 189–203.
- Brooks, P. E. J., & Thomas, C. J. (1977). Statutory background to the economic development of the black homelands and peripheral areas in South Africa. *Comparative and International Law Journal of Southern Africa*, 10(2), 131–149.
- Cadman, V. (1986). States of independence: Sebe's Ciskei. *Indicator South Africa*, 3(4), 7–14.
- Carruthers, J. (1995). *The Kruger National Park: a social and political history*. Pietermaritzburg: University of Natal.
- Casino: Sol to see Sebe (1984, October 1). *Daily Dispatch*.
- Ciskei Development Information Government of the Republic of Ciskei and Development Bank of Southern Africa. (1984). Vol. 1 & 2
- Ciskei Peoples Development Bank. (1987). *11th Annual Report*.
- Ciskeians get chance to Bay Hotel shares. (1983, March 17). *Kei Mercury*.
- Crush, J., & Wellings, P. (1983). The southern African pleasure periphery, 1966–83. *The Journal of Modern African Studies*, 21(4), 673–698.
- Dlamini, J. S. (2020). *Safari Nation: A social history of the Kruger National Park*. Ohio University Press.
- Drummond, J., Drummond, F., & Rogerson, C. M. (2021). Latent opportunities for heritage tourism in South Africa: Evidence from Mahikeng and surrounds. *African Journal of Hospitality, Tourism and Leisure*, 10(5), 1591–1609.
- Drummond, J., Rogerson, C. M., & Drummond, F. (2022). Adventure tourism in the apartheid era: Skydiving in Mafikeng–Mmabatho. *African Journal of Hospitality, Tourism and Leisure*, 11(1), 578–594.
- Good response to buy shares in Ciskei Hotel. (1983, April 28). *Kei Mercury*.

- Gupta, P. (2015). Consuming the coast: Mid-century communications of port tourism in the Southern African Indian Ocean. *Comunicação Mídia e Consumo*, 12(35), 149–170.
- Halbach, A. J. (1988). The South African homeland policy and its consequences: An evaluation of separate development. *Development Southern Africa*, 5(4), 508–526.
- Hart, G. P. (1972). *Some socio-economic aspects of African entrepreneurship* [Doctoral dissertation, Rhodes University].
- Hirsch, A. (1986). Investment incentives and distorted development: Industrial decentralization in the Ciskei. *Geoforum*, 17(2), 187–200.
- Hoogendyk rejects criticism of resort. (1985, November 25). *Daily Dispatch*.
- Hotel to employ 130 Ciskeians. (1981, October 8). *Kei Mercury*.
- Hughes, H. (2007). Rainbow, renaissance, tribes and townships: Tourism and heritage in South Africa since 1994. In S. Buhlungu, J. Daniel, R. Southall, & J. Lutchman. *State of the nation, South Africa* (pp. 266–288). Human Sciences Research Council,
- Jones, T. (1984). Entrepreneurial talent and the call for deregulation: A critical response to the Swart Commission's proposals for Economic Development in the Ciskei. *Indicator South Africa*, 2(2), 8–10.
- Laurance, P. (1976). *The Transkei: South Africa's politics of partition*. Raven Press.
- Nattrass, N., & Nattrass, J. (1990). South Africa, the homelands and rural development. *Development Southern Africa*, 7(sup1), 517–534.
- New hotel hits king trade. (1982, July 8). *Kei Mercury*.
- Peires, J. B. (1992). The implosion of Transkei and Ciskei. *African Affairs*, 91(364), 365–387.
- Phillips, L. (2017). History of South Africa's Bantustans. In *Oxford Research Encyclopaedia of African History*. <https://doi.org/10.1093/acrefore/9780190277734.013.80>
- Resort to be leased to hotel group. (1989, May 26). *Daily Dispatch*.
- Sebe opens R47M Casino at Fish River. (1989, May 25). *Daily Dispatch*.
- Second casino for Ciskei. (1984, August 7). *Daily Dispatch*.
- Rogerson, C. M. (1982). Multinational corporations in Southern Africa: A spatial perspective. In M. Taylor & N. Thrift (Eds.), *The Geography of Multinationals* (pp. 179–220). St. Martin.
- Rogerson, C. M. (2020). Apartheid hotels: The rise and fall of the 'non-white hotel in South Africa. *Geographies of Tourism and Global Change* (pp. 33–54). Springer Nature.
- Rogerson, C. M. (2022). Tourism evolution in rural South Africa: From native reserve to apartheid bantustans c 1920–1994. *GeoJournal of Tourism and Geosites*, 40(1), 120–128.
- Rogerson, C. M. (2024). Planning urban regeneration through heritage tourism: The case of Klip-town, South Africa. *Modern Geografia*, 19(2), 71–89. <https://doi.org/10.15170/MG.2024.19.02.05>



- Rogerson, C. M. (2025). The inhospitable city: Historical racial segregation in Johannesburg c. 1890–1970. *Modern Geográfia*, 20(1), 83–106. <https://doi.org/10.15170/MG.2025.20.01.05>
- Rogerson, C., & Rogerson, J. (2024). Past niche tourism: The First chapter of mountain tourism in South Africa. *Studia Periegetica*, 45(1), 23–43.
- Rogerson, C. M., & Rogerson, J. M. (2018). The evolution of hotels in Johannesburg 1890-1948: A Case of Historical Urban Tourism. *GeoJournal of Tourism and Geosites*, 23(3), 738–747.
- Rogerson, C. M., & Rogerson, J. M. (2020). Racialized landscapes of tourism: from Jim Crow USA to apartheid South Africa. *Bulletin of Geography. Socio-Economic Series*, 48, 7–21.
- Rogerson, C. M., & Rogerson, J. M. (2021). Mundane urban tourism: The historical evolution of caravan parks in South Africa 1930–1994. In C. M. Rogerson, J. M. Rogerson (Eds.), *Urban tourism in the global South: South African perspectives* (pp. 93–112). Springer Science and Business Media B.V.
- Rogerson, C. M., & Rogerson, J. M. (2022). Hotel histories of apartheid South Africa: The emergence and expansion of the Southern Sun Hotel Group c. 1960–1983. *Studia Periegetica*, 39(3), 39–58.
- Rogerson, C. M., & Rogerson, J. M. (2023). The historical development of South African small towns as spa resorts. In *Socio-Spatial Small Town Dynamics in South Africa* (pp. 225–242). Cham: Springer Nature Switzerland.
- Rogerson, C. M., & Rogerson, J. M. (2023). Historical geographies of coastal tourism: Mossel Bay, South Africa c. 1850–1988. *Bulletin of Geography. Socio-economic Series*, 61, 7–17.
- Rogerson, C. M., & Rogerson, J. M. (2024). The evolution of small town spa resorts in the global South: The historical pathway of Montagu, South Africa. *Modern Geográfia*, 19(3), 99–116. <https://doi.org/10.15170/MG.2024.19.03.08>
- Rogerson, C. M., & Rogerson, J. M. (2025). Racial discrimination in tourism: The record of apartheid Cape Town. *Modern Geográfia*, 20(3), 47–67. <https://doi.org/10.15170/MG.2025.20.03.03>
- Rogerson, C. M., & Rogerson, J. M. (2023). The Bantustans of apartheid South Africa: Transitioning from industry to tourism. *Revistă Română de Geografie Politică*, 25, 1–16.
- Rogerson, C. M., & Sixaba, Z. (2024). Rural tourism in South Africa's apartheid bantustans: An historical view. *Modern Geográfia*, 19(4), 67–83. <https://doi.org/10.15170/MG.2024.19.04.04>
- Rogerson, J. M. (2017). Kicking sand in the face of apartheid: Segregated beaches in South Africa. *Bulletin of Geography. Socio-economic Series*, 35, 93–109.
- Rogerson, J. M. (2019). The Evolution of Accommodation Services in a Coastal Resort Town: Hermanus, South Africa. *African Journal of Hospitality, Tourism and Leisure*, 8(5), 1–16.
- Rogerson, J. M. (2020). Johannesburg's iconic hotels: The life and death of the two Carltons. In D. K. Müller, J. Saarinen, C. Funck (Eds.), *New Directions in South African Tourism Geographies* (pp. 55–74). Springer Nature.

- Rogerson, J. M., & Visser, G. (2020). Recent trends in South African tourism geographies. In D. K. Müller, J. Saarinen, C. Funck (Eds.), *Geographies of Tourism and Global Change* (pp. 1–14). Springer Nature. https://doi.org/10.1007/978-3-030-29377-2_1
- Sixaba, Z. (2022). *Small medium and micro enterprise development: Black ownership of tourism products in the Eastern Cape*. University of Johannesburg.
- South African Institute of Race Relations. (1969). *The African reserves of South Africa*. South African Institute of Race Relations.
- Southall, R. J. (1983). *South Africa's Transkei: The political economy of an "independent" Bantustan*. Monthly Review Press.
- Southall, R. J. (1977). The beneficiaries of Transkeian 'independence'. *The Journal of Modern African Studies*, 15(1), 1–23.
- Steinbrink, M. (2016). 'We did the slum!'—Urban poverty tourism in historical perspective. In F. Frenzel & K. Koens (Eds.), *Tourism and Geographies of Inequality* (pp. 19–40). Routledge.
- Stern, E. (1987). Competition and location in the gaming industry: The 'Casino States' of Southern Africa. *Geography*, 72(2), 140–150. <https://doi.org/10.1080/20436564.1987.12452057>
- Streek, B., & Wicksteed, R. (1981). *Render unto kaiser: A Transkei dossier*. Ravan Press.
- Stultz, N. M. (1980). *Transkei's half loaf: Race separatism in South Africa*. Cape Town: David Philip.
- Trevisan, I. (1984). Independent homelands: An analysis of selected issues in South Africa-homeland relations [Masters Thesis, University of Cape Town].
- Twala, C., & Ndlovu, A. S. (2025). 'Dangling the land as a carrot': The bantustans and the territorial extension under the apartheid regime in South Africa. *Histories*, 5(1), 1–12.
- Union of South Africa. (1955). Summary of the report of the commission for the socio-economic development of the Bantu areas within South Africa. Pretoria: Government Printer, UG61/1955.
- Van der Merwe, N. S. (2017). Gambling in the Bophuthatswana Sun: Sun City and the political economy of a Bantustan Casino: 1965–1994 [Masters Thesis, University of the Witwatersrand].
- Ventresca, M. J., & Mohr, J. W. (2017). Archival Research Methods. In J. A. C. Baum (Ed.), *The Blackwell Companion to Organizations* (pp. 805–828). Blackwell.
- Venison, P. (2025). *Sol: my friend and adversary, Sol Kerzner*. Ride or Die Press.
- Winai-Stom, G. (1975). The influence of multinational corporations on Lesotho's politics and economics. *African Review*, 5(4), 473–497.
- Witz, L., Rassool, C., & Minkley, G. (2004). Repackaging the past for South African tourism. In G. Corsane (Ed.), *Heritage, Museums and Galleries* (pp. 340–353). Routledge.
- Wotshela, L. (2005). Asiyi eCiskei ['We are not going to the Ciskei']: Removals and resistance in the border region, 1972–1988. *South African Historical Journal*, 52(1), 140–169.

- Wotshela, L. (2018). *Capricious patronage and captive land: A socio-political history of resettlement and change in South Africa's Eastern Cape, 1960 to 2005*. UNISA Press.
- Wotshela, L. (2025). Ciskei's demise and the tricky first decade of Reintegration into the Eastern Cape Province. *Journal of Southern African Studies*, 50(6), 955–974. <https://doi.org/10.1080/03057070.2024.2513791>
- Xhosa Development Corporation Limited. (1969). *Annual Report and Accounts*.
- Xhosa Development Corporation Limited. (1973). *Annual Report and Accounts*.

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Vara, Bálint¹

Unique Patterns of Population Growth in Qatar: Changes and Prospects of Immigration-based Policies in the Light of Social Divide

ABSTRACT

This study examines the transformation of Qatar's total population over the past century and accounts for the external and internal factors influencing it (e.g., the distribution of birth numbers). The relevance of the topic lies in the unique patterns of extreme immigration processes in the country, which can be instructive for understanding what strategies a small, narrowly defined social group (in this case, Qatari citizens) may adopt to maintain effective power despite being the demographic minority. The unbalanced situation that emerged by the 2020s is a direct long-term consequence of local political decisions. The research was carried out by aggregating and visualizing data from the Qatar Statistics Bureau (QSB) and the World Bank. The study aims to identify the risks and the most important societal shaping factors that have influenced rapid population growth, its potential consequences, and the processes that may affect the leadership's policy choices in the future. The results partially confirm my hypothesis that the population strategy is unsustainable in the long term within the current framework due to economic and legal reasons. In Qatar, the majority of newborns are not local citizens, and the number of people born and raised in the country will increase in the coming generations, which could place additional pressure on the government.

Keywords: demography, Qatar, population policy, citizenship

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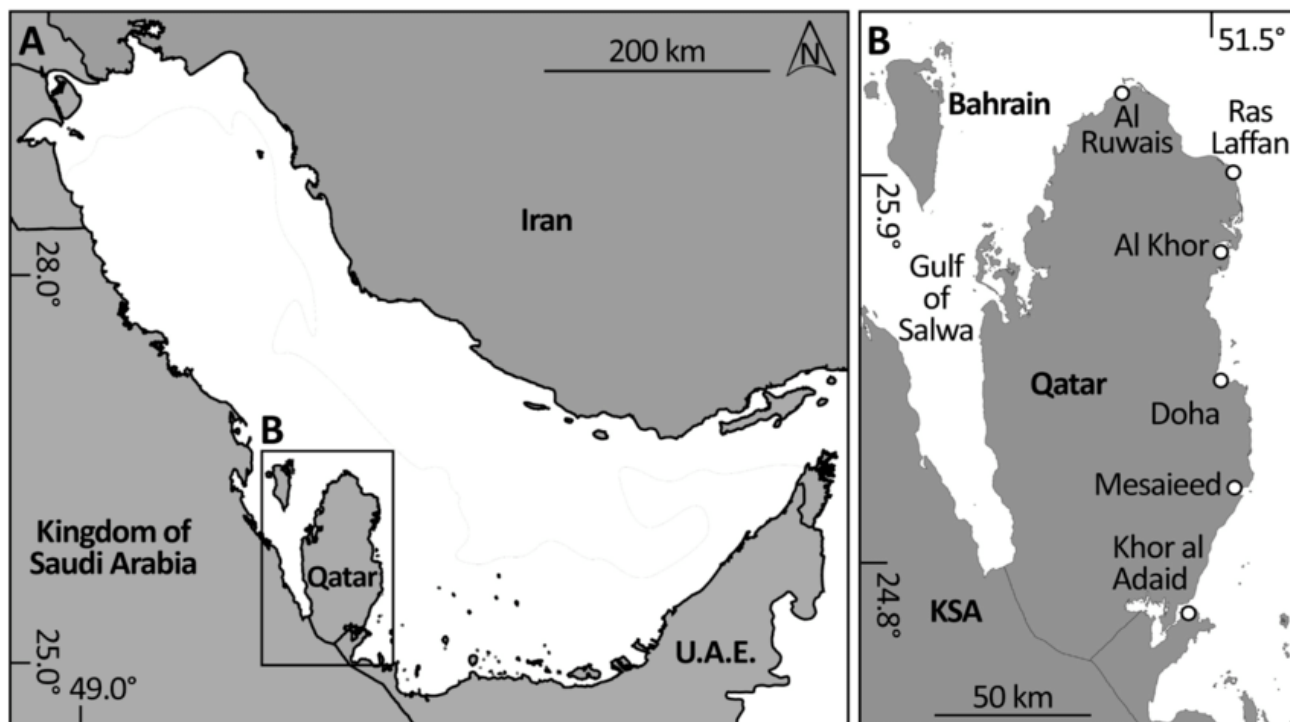
INTRODUCTION

The societies on the western coast of the Persian Gulf have undergone a globally unique level of development since the middle of the 20th century in all aspects of life. As a result of the economic boom, the population multiplied, cities grew rapidly, modern infrastructure was built, and multicultural metropolises emerged. Qatar's case is a special example in the region, as the young country, located on a small peninsula (Figure 1), stands out in several respects. First and foremost, the government's policy plays a major role, and it also possesses easily available, almost inexhaustible natural resources.

The study provides a detailed analysis of Qatar's demographic processes, which present a unique demographic pattern in terms of social changes. By using available birth and death data to create a closed population model, it projects the future size of the country's native population (Smith et al., 2013). Located on the western coast of the Persian Gulf, on a protruding peninsula, the country's population has increased approximately a hundredfold in just over a century without any territorial expansion (Figure 1). In 1908, the total population on the peninsula was estimated at 27,000; this number swelled to 2.773 million by 2020. Doha had a dispute with Saudi Arabia in 1992 over the exact course of the border, but this was eventually settled peacefully. Furthermore, the question of the belonging of the sparsely populated Hawar Islands was concluded with Bahrain at an international court (Okruhlik & Conge, 1999; Wiegand, 2012). The country has also received increased international attention recently due to its state-sponsored sports development, which is part of Doha's economic diversification. The country of three million people hosted the FIFA World Cup in 2022, which, from multiple perspectives, represented the greatest geopolitical achievement in Doha's history so far. At the same time, it stepped out of its previous classification within the international system and achieved broader influence (Faust, 2023). This strategy has directly contributed to the country's population explosion.

Policymakers have attracted masses of immigrants to satisfy labour market demands, which presents a multi-layered challenge for the government. This study aims to understand the impact of rapid population growth based on immigration and the kinds of social and political challenges it may cause. Some research already envisions a global demographic collapse, and in this context, one of the smallest countries in the Arab world can serve as a vivid example (Pearce, 2010). For tracking annual population data, I relied on local statistical records as well as data from the UN and the IMF. To present demographic trends, the analysis of the country's policy documents and laws provides an interpretive supplement to the existing specialist literature. The study first illustrates the growth trends of the country's population, followed by an examination of its composition and the issues surrounding citizenship and guest workers. The analysis sheds light on the conceptual difficulties caused by the factors that complicate forecasting in the Qatari context. One of the pillars of the country's vision up to 2030 is building a competitive, knowledge-based society. Due to the complexity of the problem, this represents a simultaneous demographic, legal, historical, and socio-cultural challenge (MDPS, 2018).

Figure 1. Location of Qatar in the Persian Gulf.



Source: Butler, J. et al. (2020).

The rate of population growth raises the question of where the limit lies, how long the rising trend can be sustained, and what factors influence it. The aim of the analysis is to provide answers to the problems of social division arising from explosive population growth, as well as its political and, tangentially, potential economic consequences, primarily relying on statistical databases. For an accurate representation of trends, I am conducting a thorough demographic analysis that provides a detailed picture of the unique demographic patterns experienced in Qatar and their potential consequences.

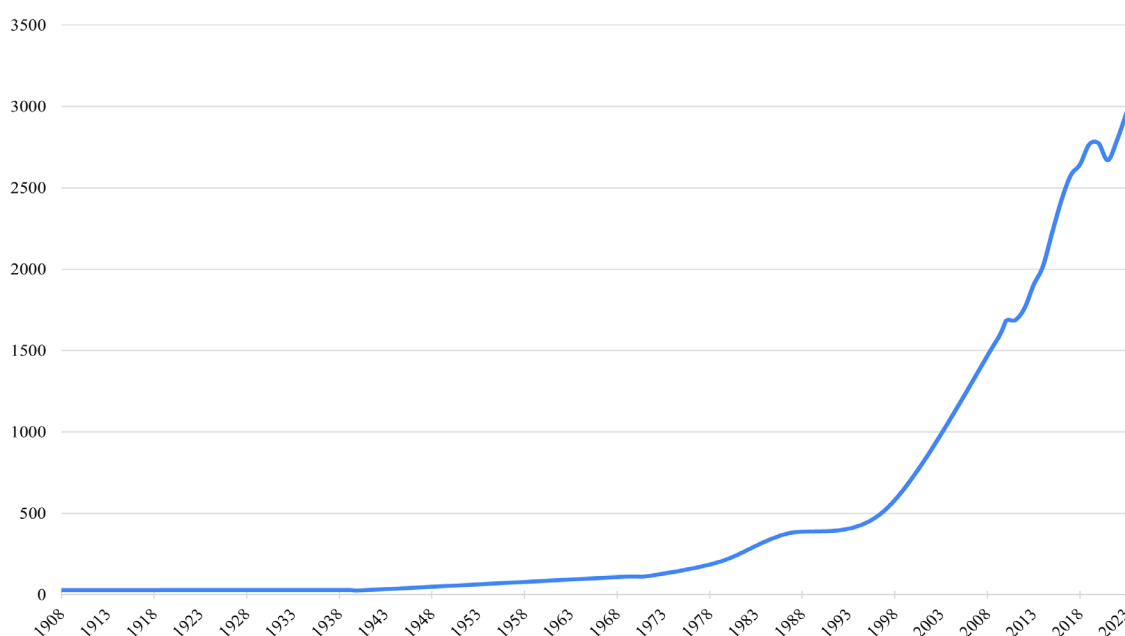
LITERATURE REVIEW

In the early 20th century, only a few tens of thousands of people lived in Qatar. A frequently cited starting point is the 1908 estimate of 27,000 people by British diplomat and historian John Gordon Lorimer (Lorimer, 1908). Accurate data cannot be found before the 1970 census, as the underdeveloped administration did not keep records of the population size; therefore, the main points of reference are the accounts of Western (primarily British) travelers and administrators. Reports on the small-town size of the total population are consistent in all cases, and this saw no significant change until the 1950s. The economic crisis that hit the region in the 1920s shook the local apparatus based on pearl diving (Kucsera, 2020). As making a living became difficult, the population began to decline. In 1944, the number of people living in Qatar was estimated at just 16,000 (Fromherz, 2012). The exploitation

of oil reserves launched an economic boom and immigration that, by the 2020s, transformed the monarchy into a country with a population of over 3 million. Between 1944 and 2024, Qatar achieved a nearly two-hundredfold increase in population, which is double the previously mentioned figure; the difference is due to the temporary negative peak. According to a 2023 World Bank report, life expectancy increased from 58.9 years in 1960 to 81.6 years in 2022, which also contributed to the growth.

Population growth in Qatar accelerated in the second half of the 2000s, with annual increases of over 10 percent registered between 2005 and 2009. This trend placed a significant burden on infrastructure and, moreover, proved to be a self-perpetuating process: the country's basic network had to be expanded for the growing population, which required more immigrant workers. Incoming migrant workers necessitated the construction of new residential buildings, a process that in turn demanded additional labour. In 2008, the rate of expansion rose to a unique level even globally, reaching 18.11 percent. A year later, it moderated somewhat but still remained at a notable 13.19 percent, after which it fell back to single digits (Babar, 2015). The rapid growth was temporarily halted by the coronavirus crisis, when travel rules made it impossible to replace lost labour, and many workers returned to their home countries (Figure 2). Due to seasonal home visits, the number of residents fluctuates by several hundred thousand within any given year. This trend also shows that the demographic situation in Doha is neither static nor predictable.

Figure 2. Changes in Qatar's Population Between 1908 and 2024.



Source: early estimates and Qatar Statistical Bureau, own editing

In the 21st century, predominantly low-skilled labour has flowed into the peninsula, typically arriving from Southeast Asia, thereby creating a diverse society. All of this may enhance the country's diplomatic and soft power capabilities (Sempa, 2012). The entire immigration process operates through the kafala

system, a sponsorship framework widespread across the Middle East, with most contracts lasting two or three years (Hussain, 2014). The Qatari political perspective supports the idea that low-skilled workers should return to their home countries after their contracts expire (Babar & Gardner, 2016). Officially, the government abolished the practice in 2019, but the heavily criticized system has not changed in essence. The majority of the incoming workforce consists of manual labourers over the age of 20, which significantly alters the age structure; for the entire population, there are 281 men for every 100 women (PPC, 2023).

Due to the atypical gender and age distribution of its resident population, traditional population scenario models cannot be applied in the country (Ali & Cochrane, 2024). This is supported by the fact that several previous forecasts made significant errors by underestimating population growth. A 1995 World Bank publication estimated Qatar's population would be 693,000 by 2010 and 769,000 by 2020 (World Bank, 1995). A 2004 report by the UN Population Division projected a population of 874,000 on the peninsula by 2050 (UN, 2004). In 2009, a U.S. Census Bureau study predicted a population of 1.1 million for Qatar in 2020 (IDB, 2013). The Gulf Research Center estimated Qatar's population at 1.9 million for 2015, while the QSA [Qatar Statistics Authority] forecast 2.5 million for 2030. However, the authors of these studies emphasized that the accuracy of the forecast was highly uncertain due to population growth based on incoming foreigners (MEED, 2010). According to Al-Thani et al. (2019), following the 2022 FIFA World Cup, Qatari development policy would shift away from the previous mindset of intensive investments, leading to a correction in population. However, the demographic trend did not evolve as expected after the event; no decline occurred. Two years later, in December 2022, no significant decrease in the country's population was perceptible. More recent calculations now take into account that future population numbers are more difficult to project due to migration variances. UNICEF projected in 2019 that 3.2 million people would live in Qatar by 2030, and 3.8 million by 2050 (UNICEF, 2019).

Thanks to the large number of immigrants, the country's population will likely reach the figure projected for 2030 much sooner. Euromonitor went even further in its February 2024 report, forecasting a population of 3.7 million for Qatar by the end of the decade, attributable to the settlement of guest workers. The UN's 2024 projection placed Qatar's population at 3,012,000 in 2024 and forecast a continuously growing society. The prediction already accounted for the significant migratory surplus based on immigrants in the country. The forecast estimates 3.69 million people by 2040 and 4.14 million by 2050 for Qatar. Expectations are that the wave of migration will subside within a few years, after which natural population growth will determine the country's demographics. The World Health Organization's (WHO) 2024 projection anticipates that population growth in Qatar will remain on a stable upward trajectory. According to their study, 3.3 million people will live in the country in 2030, and 4.2 million in 2050. The forecast includes an age pyramid, showing that the age structure is stabilizing, with a peak in the working-age population, particularly among men. According to the organization's assessment, no significant difference in the country's population distribution is expected over the next 26 years.

METHODS

For decades, the issues of migration, citizenship, employer policies, as well as reception and belonging have been considered central challenges of state nation-building and identity on the western coastline of the Persian Gulf. Qatari authorities regularly publish detailed data on the total population but only release partial data on the citizen population. The reason for this gap is not a statistical anomaly but a conscious decision by the leadership, as such information is considered sensitive in the country. Evidence of this is that while the country's statistical datasets previously recorded the number of Qatari and non-Qatari citizens above the age of 10, by 2025 these figures are missing from the monthly published reports, and past documents have also been retroactively altered. Consequently, the number of citizens can only be inferred from the annual calculation of birth and death data. It is not unusual for a government to withhold certain information about its own population; there can be several reasons for this (Anderson, 1991). In the case of weak states, adequate records may not exist due to deficiencies in the state apparatus. In other countries, certain data are not collected due to the segregation of different strata of society. In Qatar, the situation is different: the state possesses the data but presumably does not make it available due to national security and strategic considerations. The alteration of Qatar Statistical Authority (QSA) tables and the subsequent correction of previously published reports demonstrate a deliberate state policy, based on which the sharing of previously available data was discontinued. The fact that census information has also been retroactively adjusted indicates a comprehensive transformation. This procedure makes estimating the number of citizens more difficult, although the possibility of calculation using the closed population model based on birth and death data remains.

The study examines Qatar's demographic dilemmas through concepts such as total population, migrant population, citizens, native population, and residents. To understand these definitions, it is worthwhile to briefly elaborate on their meanings. The total population refers to all people living in the country, including both Qataris and guest workers. Qatari society is predominantly composed of guest workers from other countries, who possess limited rights. Among non-Qataris, there are several distinct smaller social groups, such as seasonal and permanently settled guest workers, or multi-generational immigrants. Legally, there is no official distinction between them, although the country's system primarily favors higher-skilled, intellectual workers—typically European residents—placing them in a more advantageous position. Citizens, who constitute a narrow minority within the total population, enjoy a privileged status both legally and in terms of income. In Qatar, according to the nationality law enacted in 1961, those who can prove that they or one of their direct ancestors lived in the country's territory before 1930 can obtain citizenship. The native population is essentially a synonym for the concept of citizen, referring to the indigenous, locally born people. The definition of resident refers to permanently settled people, which is identical to the total population.

The research assumes that decision-makers are continuously faced with strategic crossroads regarding the shaping of society, the long-term consequences of which will involve slow reforms. The

study presents demographic processes through the exploration of the total fertility rate (TFR), birth and death numbers, and immigration processes. In Qatar, an accurate picture of all these cannot be formed without describing the legal situation and the government's related policies, so this is also part of the analysis. The meaning of TFR, according to the Population Reference Bureau's formulation, is as follows: *The average number of children a woman would have, assuming that current age-specific birth rates remain constant throughout her childbearing years (usually considered ages 15 to 49)* (PRB, 2021).

RESULTS

Determining the Exact Number of Qatari Citizens

Determining the exact number of Qatari citizens requires a historical overview. Until the mid-20th century, the peninsula was a British protectorate with low population density, low levels of modernization, and poor infrastructure. The population consisted mainly of traders, fishermen, nomadic pastoralists, and pearl divers, with most administrative tasks handled by British officials. The oil and natural gas reserves discovered in the 1930s drastically changed Qatar's situation, leading to an intense population boom following a brief initial decline. In an effort to control these processes, Doha enacted the citizenship law in 1961, which divided society into citizens and foreigners. The first census was held in 1970, one year before gaining independence. It provided information on the precise number of citizens, stating that 45,039 Qataris lived in the country. The census was assumed to be inaccurate as it undercounted the local population; the actual number was likely around 47,700 (Winckler, 2015). From the 1970s onwards, demographers published various estimates on the country's demographic situation, which reflected slow growth. According to an estimate by demographers J. S. Birks and C. A. Sinclair, Qatar's citizen population reached 60,300 by 1975, representing a 34 percent growth compared to the official 1970 census results (Birks & Sinclair, 1979). According to Winckler's (2015) assessment, these calculations likely assumed an improbably high natural reproduction rate, and the realistic number was probably closer to 56,000 at that time. Based on the closed population model, he concluded that, contrary to official communication, Doha regularly naturalized foreign male citizens.

After the 1970s, the number of Qatari citizens grew faster than could be estimated based on birth data. The reason for this was that the country's naturalization policy was still in its formative stages, and many women were able to obtain citizenship papers even if they were born abroad, as long as they married Qatari men. Due to a lack of data, the exact population of Qatari citizens cannot be precisely determined for the 1980s. The naturalization of foreign-born individuals is indicated by the rapid increase in the number of women of childbearing age, which was subsequently followed by a rise in the number of births among citizens, even while the TFR was continuously declining. A data gap between the 1986 and 1997 census figures also points to hidden naturalization practices. The data

normalized between the 1997 and 2004 censuses; by this time, the proportion of those born earlier had indeed reached the number published by the statistical office.

The year 2005 brought a significant change for the Qatari citizen population, as the ruler decided to revoke the citizenship of approximately 6,000 members of the Al-Murra tribe. The decision was based on suspicions of disloyalty to the Emir and the ruling family (Fandy, 2007). This caused a temporary decline, as the clan members had their Qatari papers reinstated in February 2006. The family's name resurfaced in connection with the 2017 blockade as a group supporting Qatar's rivals, leading to further reprisals against them, often involving the revocation of citizenship. There are no precise figures on the number affected, but this case confirms that, depending on the prevailing political situation, the elite has individual influence over the final number of the country's citizens.

According to the 2010 census, the population of Qataris was slightly above 240,000 (GLMM, 2025). An anomaly is also apparent here compared to the figures from six years earlier, as the number of births did not align with the published data between the two periods. This discrepancy was likely due to weaknesses in the local civil registration system and the potential abuse of state benefits provided for children. According to Winckler (2015), numerous parents registered their children multiple times as newborns to receive government financial support. His study concludes that the practice of naturalization contributed to the numbers, and the correction of weaknesses in the former system was also carried out late. Nevertheless, estimates must still be relied upon when determining the number of citizens, which has led to differing calculations. Matthew Gray estimated the number of Qataris at 280–300 thousand in the early 2010s, Mehran Kamrava at 250 thousand, while the GLMM calculation estimated the population at 243,073. Using a closed population model based on birth and death data, Winckler estimated the country's population at 245,770 for 2010. According to census data, the number of Qatari citizens aged 15 and over was 208,486 in 2020, while the total number of foreigners was 2,188,318 at the same time (ILO, 2022).

Furthermore, another QSA [Qatar Statistics Authority] table reveals that the number of Qataris older than 10 years was 246,256 in 2020 (QSA, 2020). By adding the natural population increase of Qataris after 2011 to this data, the population grew by 76,829 people, thus bringing the total number of citizens to approximately 323,000. This growth is primarily due to low mortality rates. While the annual number of deaths does not reach 1,000, the number of births has stabilized around 6–7 thousand, meaning the total population of Qataris increases by approximately 5–6.5 thousand people per year (and in some years, by as many as 7 thousand). The record was set in 2015 when, thanks to a high birth rate and relatively lower mortality, the number of citizens in the country grew by more than 7,500 people. Due to the low base number, this growth continues to allow only a slow increase in the total number of Qatari citizens.

By applying the data from previous calculations and natural increase rates within a closed population model, it can be determined that the number of citizens in Qatar grew to over 328,000 by 2022 (Table 1). This method is primarily used to estimate the number of Qataris, as it remains unknown how many people are granted citizenship. Nevertheless, it is suitable for illustrating trends, assuming the

political leadership continues its previous practice of granting papers to a few people each year, which exerts a slight distorting effect on the methodology (QCF, 2024). The country's strict legal framework limits the number of people who can be granted citizenship to 50 per year (Babar, 2014; Qatari Legal Portal, 2023). Under the assumption that this quota was filled to its maximum every year, it distorts the obtained values in a positive direction by approximately 600 people, thus increasing the estimated number of Qatari citizens to around 329,000. This figure is roughly consistent with the number of Qataris counted in the 2020 census and the total from the preceding decade. Within the context of the rising total population, these increasing numbers suggest that the proportion of Qatari citizens within the country has grown slightly in recent years, yet it remains extremely low at just 11.7 percent. Winckler (2015) projected that by 2030, the number of Qataris could reach approximately 440–470 thousand, with their share of the total population rising to 13–14 percent. It can be stated that, on a demographic basis, Qataris will continue to remain a significant minority in their own country.

Table 1. Population Growth in Qatar Based on Natural Increase.

Qatar data	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Number of births among citizens (persons)	7592	7807	7807	7954	8244	7938	7944	7803	7496	7098	7814	6243
Number of deaths among citizens (persons)	673	659	698	741	680	695	705	756	691	731	840	917
Natural increase among citizens (persons)	6919	7148	7109	7213	7564	7243	7239	7047	6805	6367	6974	5326
Closed population model (persons)	252689	259837	266946	274159	281723	288966	296205	303252	310057	316424	323398	328724
Annual growth rate		2.83%	2.74%	2.70%	2.76%	2.57%	2.51%	2.38%	2.24%	2.05%	2.20%	1.65%

Source: Qatar Statistical Bureau (QSB), own editing

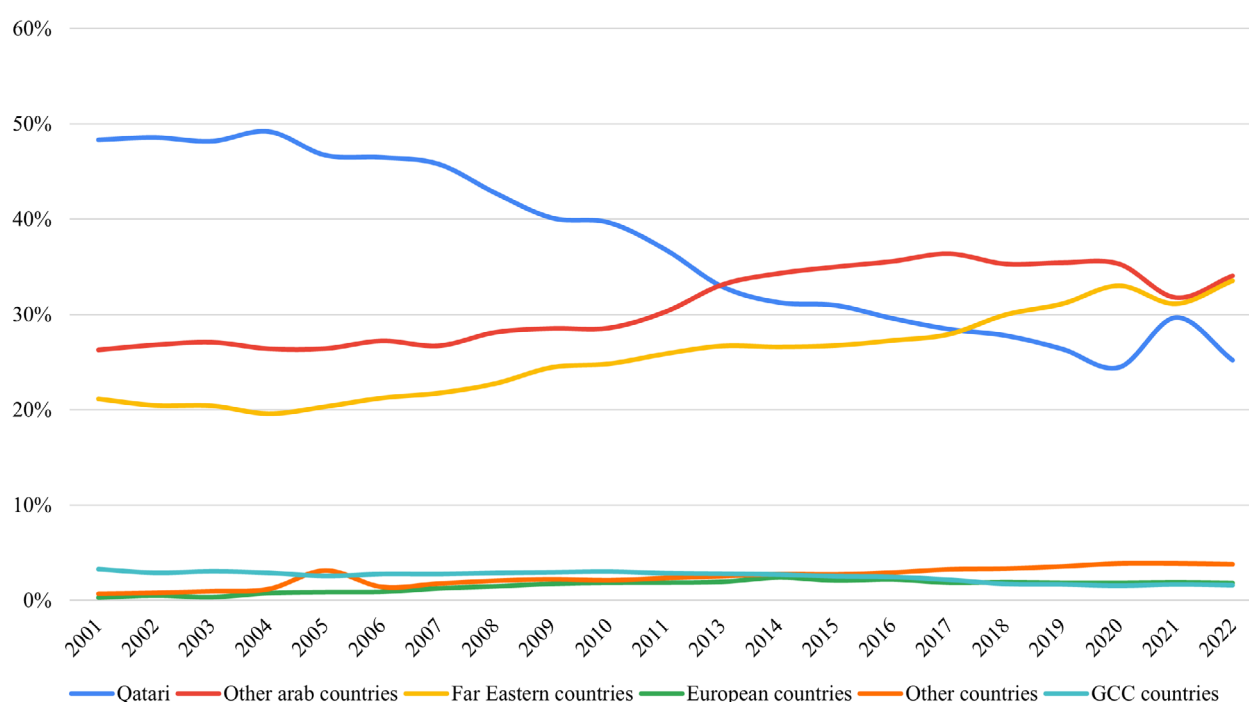
The Status of Immigrants

In the country, the overwhelming majority of the population consists of immigrants, primarily for economic reasons. Foreign labor began arriving in the mid-20th century to exploit the oil reserves, which Doha initially considered a temporary solution. To sustain development, the number of guest workers had to be increased further, and the practice evolved into an economic model. The shift in proportions is demonstrated by the fact that by 2022, foreigners made up 88.3 percent of the total population. Despite the pressure from the migrant population, obtaining citizenship has not been made easily accessible—even for Sunni Arabs from the region—in order to preserve the legitimacy of the ruling family, which relies on the loyalty of the indigenous population, and to maintain a homogeneous citizenry (Shah, 2009). The laws are very strict: foreigners find it difficult to obtain citizenship, even if they were born in the country. If a foreign man marries a local woman, he is not entitled to local documents. The only opportunity to obtain documents is if a foreign woman marries a Qatari man. In exceptional, individual cases, the necessary certificates can be acquired differently (Fargues, 2011). For children, the father's citizenship is decisive. In the case of a Qatari man and a foreign woman, the children will be Qatari. The opposite is not true: if only the mother is Qatari, the offspring receive

the foreign father's papers or become stateless. In such cases, the state provides some rights to the children, and they also enjoy preferential treatment during the naturalization process (Babar, 2014).

The procedure was modified by Citizenship Law No. 38 of 2005. Before this, within non-formalized frameworks, it depended solely on the Emir's decision whether someone could obtain the country's papers. After the law, although under strict conditions, it became possible to acquire citizenship without marriage. This requires meeting four criteria: 20 years of continuous residence in Qatar, knowledge of the Arabic language, a clean criminal record, and a lawful, stable income.

Figure 3. Percentage of Children Born in Qatar by Nationality, 2001–2022.



Source: QSB, own editing.

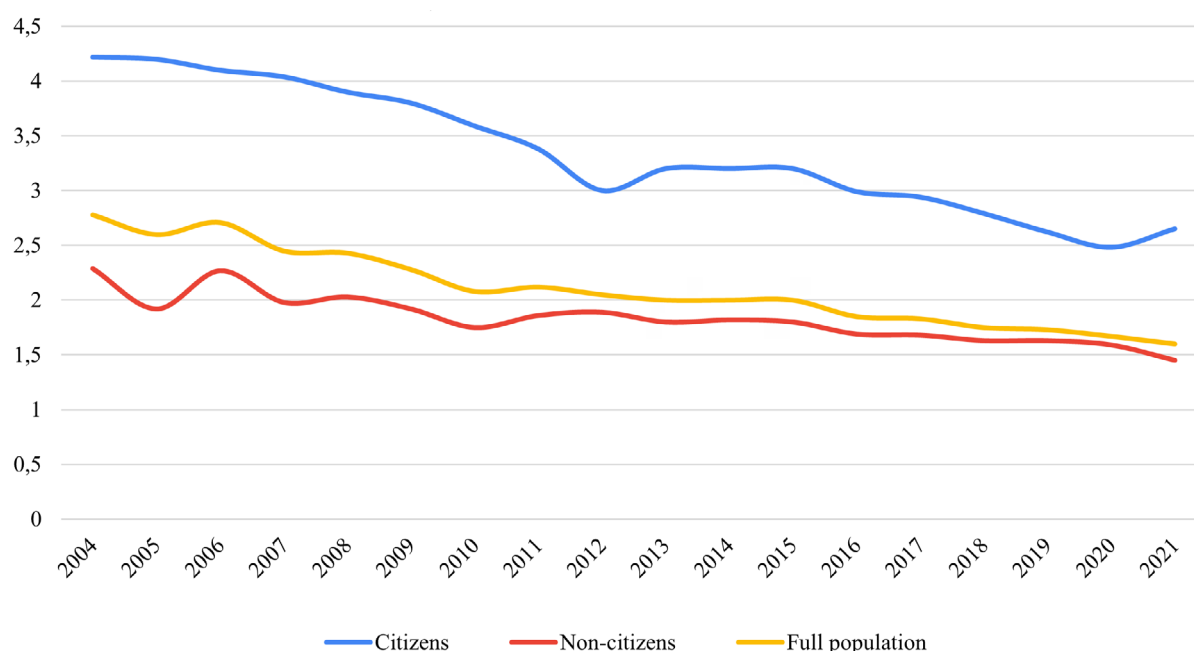
There is no available data on the length of stay of foreigners in Qatar, and their rotation period is unknown. Local authorities do not share information on this matter, so one must primarily rely on survey-based inquiries and academic estimates. The available statistical data from the QSB (Qatar Statistics Bureau) shows a significant increase in the number of migrants who reside in the country permanently and start families. The most telling data series comes from the nationality statistics of those born in Qatar, which shows the proportion of citizens and foreigners having children in the country. Figure 3 reveals a declining trend in local births, which coincides with the period of population explosion. Until the late 1990s, the number of births to citizens was higher than that of non-Qataris; this changed in 2000, after which the ratios continuously shifted in favor of guest workers. After 2015, the proportion of Qatari newborns fell below 30 percent, and by 2022, it barely exceeded 25 percent.

These processes indicate that citizens are being naturally displaced within the age structure, demonstrating the long-term permanence of foreign guest workers. The proportion of children born

to migrant workers from other countries (~75%) does not reach the proportion of migrants living in Qatar (~88.3%). This suggests that a significant number of workers are present who do not start families locally but return to their home countries after a few years of employment. The abnormal spikes in the age structure support this, as the number of men living in the country is multiple times higher than the number of women, which motivates repatriation.

The number of Qatari child births peaked in 2015 and has shown a slight decline since, while the number of deaths in the country has been increasing modestly. For the latter, there was a 36.7 percent increase between 2011 and 2022; due to the low base number (673 people), this does not yet pose a serious risk to the population. A slow demographic rebalancing is indicated by the fact that in 2011, births outnumbered deaths by more than elevenfold among Qataris, while by 2022 this figure had fallen to less than sevenfold.

Figure 4. Changes in Qatar's TFR Between 2004 and 2021.



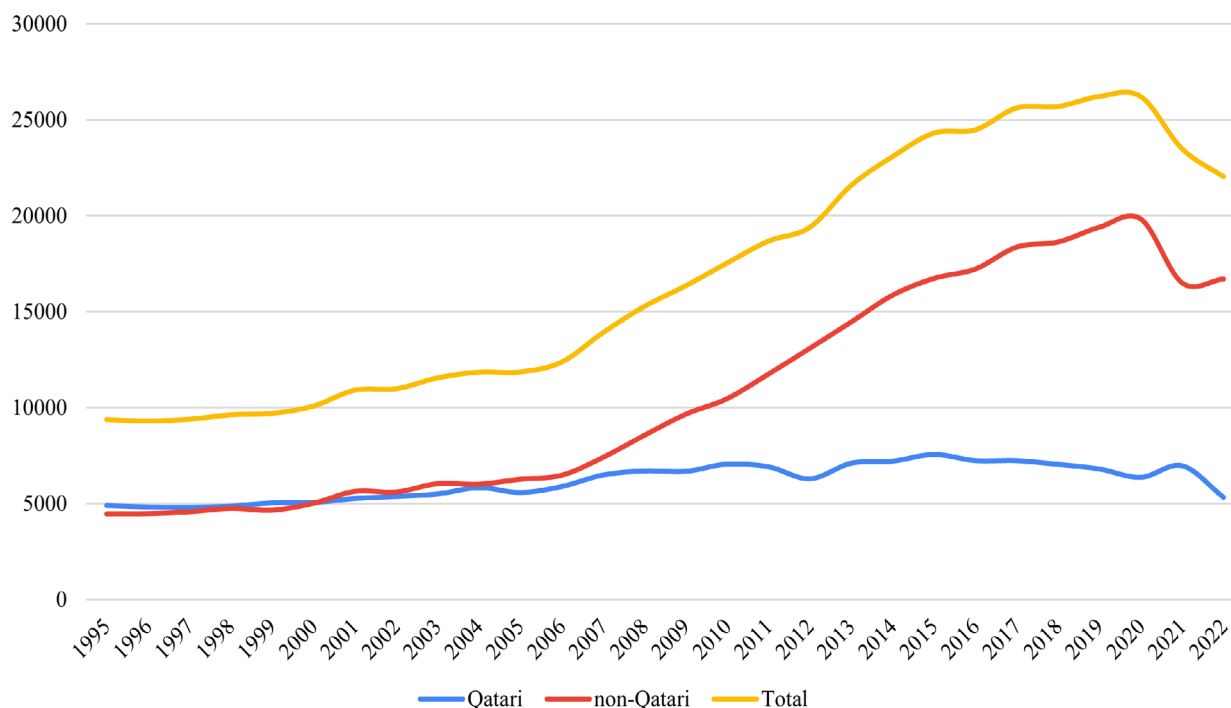
Source: QSB, own editing.

Demographic Change

A declining trend is emerging in the TFR. In 2004, the figures for both immigrants and Qatari nationals exceeded the value of 2.07, which is necessary for natural reproduction. The native population, with a value of 4.22, strongly pulled the national average of 2.78 upwards, but the trend was downward for all three indicators (Qatari, foreign, total population). For non-native citizens, the TFR first fell below 2 in 2007, and by 2021, a value of just 1.45 was observed (Figure 4). The sharp jump in the number of immigrants explains why the number of children born increased during the study period despite the decline in the rates. The inclination to have children has decreased among local citizens, and the TFR

has not reached 3 since 2016. The lowest point was in 2020, when a rate of just 2.48 was measured for native women, which increased slightly the following year.

Figure 5. Natural Increase in Qatar Between 1995 and 2022.



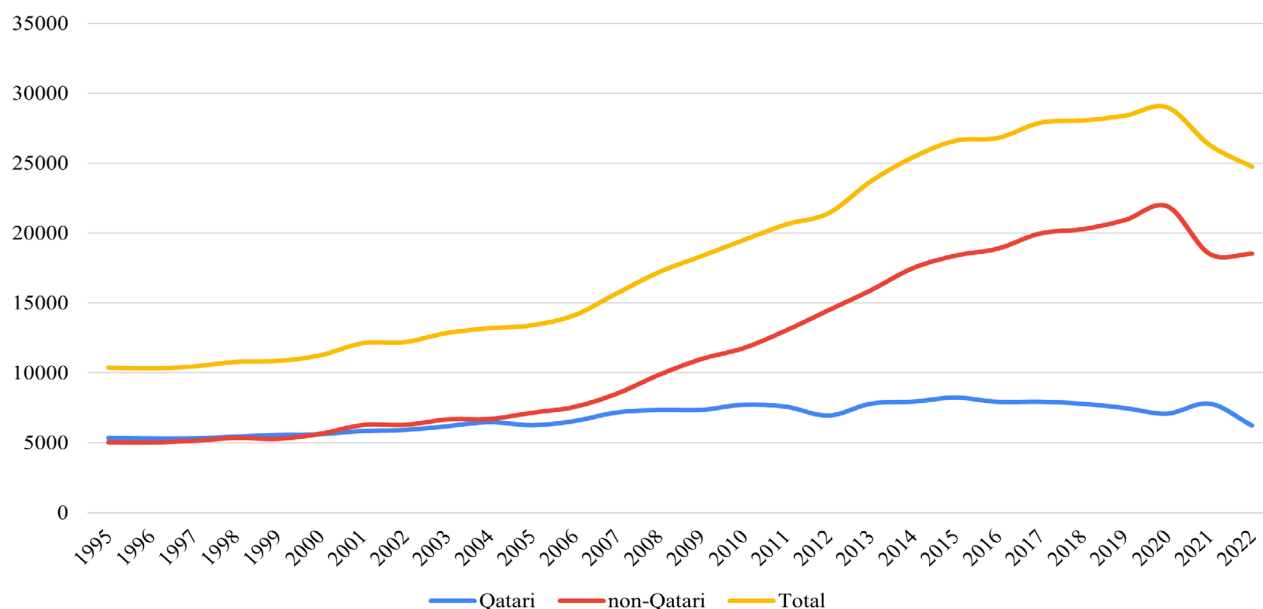
Source: QSB, own editing.

The surge in birth numbers led to a continuously growing natural population surplus in the country, which contributed to the total population growth at an increasing rate. Before 2000, the surplus from the difference between births and deaths remained below 10,000 per year, but by 2017 it had risen to over 25,000, primarily due to childbearing non-Qataris (Figure 5). The numbers declined during the 2020 pandemic; a trend contributed to by both Qatari and foreign citizens. Figure 6 shows the number of registered births, revealing the same trend as seen in the natural increase. This indicates that the country's age structure is very young, and few people died, as the number of deceased only minimally affected the indicators.

In recent years, Qatar has introduced easing measures allowing foreigners to purchase real estate or acquire ownership stakes in companies. However, this in itself can be considered more of an economic measure rather than a structural factor acting as a transformation of the socio-cultural setup (Ali & Cochrane, 2024). Despite the disadvantageous legal environment, guest workers may remain a permanent part of Qatari society due to the state's dependency on them (Kenny, 2021). This fact could pose a problem for the political leadership, as citizens, who have become a minority of the population, enjoy significantly more rights and socio-social advantages than foreigners. The many generations of non-Qatari population born in the country may begin to demand that the ruling powers alleviate their disadvantaged position. The leadership in Doha has taken only very cautious steps on this sensitive

issue, which could perpetuate the current ratios in the long term, as the natural population growth of Qataris itself is unlikely to change them substantially for decades to come.

Figure 6. Number of Registered Births in Qatar Between 1995 and 2022.



Source: QSB, own editing.

The Spatial Structural Transformation of Qatar

The masses of immigrants and population growth have also altered the spatial structure and territorial disparities in Qatar. Qatar's capital is Doha, a city that is the country's unquestionable center in every aspect. Within its administrative boundaries lives 41.6 percent of the total population, though its real influence is far greater. The populations of the adjacent areas—Al Wakrah, Al Rayyan, Umm Slal, and Al Daayen—live in an urban agglomeration merged with the capital; collectively, the capital and its immediate catchment area account for 88.8 percent of the population (Cochrane & Al-Hababi, 2023). The country is divided into eight administrative units (in Arabic: baladiya), seven of which experienced significant population growth over a 10-year period, while the number of residents decreased in the Al Khor and Al Thakira (this is one unit) district (NPC, 2025).

In the country, the National Planning Council (NPC, 2025) shares detailed demographic data in an interactive format, making it possible to compare the results of the 1986 and 2020 censuses zone by zone. The area and division of these zones have not changed between the two surveys, although they did not belong to the same larger units or municipalities. During the 2004 census, there were still 10 such units, but this was modified to 8 following the abolition of 4 units and the creation of 2 new ones. However, the standardized geographic database makes it possible to compare even older data series despite these administrative changes.

Table 2. Change in Qatar's Population Between 1986 and 2020 According to Censuses.

Municipality	Population 1986 (in persons)	Population 2010 (in per- sons)	Population 2015 (in persons)	Population 2020 (in persons)	Population growth 1986 - 2020 (%)
Al Dayeen	2408	43176	54339	100083	4156%
Al Khor and Al Thakira	9968	193983	202031	140453	1409%
Al Rayyan	74048	392661	605712	826786	1117%
Al Shamal	4339	7975	8794	16730	386%
Al Sheehaniya	12841	62962	187571	161240	1256%
Al Wakra	21273	141222	299037	265102	1246%
Doha	234754	796947	956457	1186023	505%
Umm Slal	9448	60509	90835	149701	1584%
Total	369079	1699435	2404776	2846118	771%

Source: Qatar National Planning Council (NPC), own editing

Table 3. Distribution of Population in Qatar by Municipality 1986–2020.

Municipality	Population rate 1986	Population rate 2010	Population rate 2015	Population rate 2020
Al Dayeen	0.65%	2.54%	2.26%	3.52%
Al Khor and Al Thakira	2.70%	11.41%	8.40%	4.93%
Al Rayyan	20.06%	23.11%	25.19%	29.05%
Al Shamal	1.18%	0.47%	0.37%	0.59%
Al Sheehaniya	3.48%	3.70%	7.80%	5.67%
Al Wakra	5.76%	8.31%	12.44%	9.31%
Doha	63.61%	46.89%	39.77%	41.67%
Umm Slal	2.56%	3.56%	3.78%	5.26%

Source: Qatar National Planning Council (NPC), own editing

The total population increased nearly eightfold between 1986 and 2020, rising to 771 percent of its 1986 census figure (Table 2). This growth was reflected to varying degrees in the demographic trends of the municipalities. The sparsely populated Al Shamal grew the least, while in contrast, Al Dayeen grew forty-one-fold. Population density data shows the predominance of Doha, where population concentration rose from 1,003.22 people/km² to 5,068.47 people/km², making it significantly higher than in all other municipalities (Table 4). In the remaining municipalities, the figures are much lower but show a consistently rising trend.

In terms of national distribution, Doha's dominance decreased from over 63 percent in 1986 to 41 percent, while Al Rayyan increased from 20 to 29 percent (Table 3). The demographic weight of Al Khor and Al Thakira, Al Sheehaniya, and Al Wakra shows a more volatile picture, displaying some decline after a temporary increase. What is less perceptible from the distribution of municipal data is that it is primarily the agglomerations of the capital city that have achieved significant growth in population share. The overwhelming majority of the population in several municipalities comes from zones that have merged with Doha, which is why Qatar has, in practice, transformed into a city-state.

Table 4. Distribution of Population Density in Qatar by Municipality 1986–2020.

Municipality	Population density 1986 (ppl/km ²)	Population density 2010 (ppl/km ²)	Population density 2015 (ppl/km ²)	Population density 2020 (ppl/km ²)
Al Dayeen	7.91	141.89	178.57	328.90
Al Khor and Al Thakira	6.18	120.26	125.25	87.08
Al Rayyan	30.22	160.27	247.23	337.46
Al Shamal	5.05	9.28	10.23	19.46
Al Sheehaniya	3.88	19.03	56.69	48.73
Al Wakra	8.25	54.79	116.01	102.84
Doha	1003.22	3405.76	4087.42	5068.47
Umm Slal	29.67	190.04	285.29	470.17
Qatar average	31.64	145.67	206.13	243.96

Source: Qatar National Planning Council (NPC), own editing

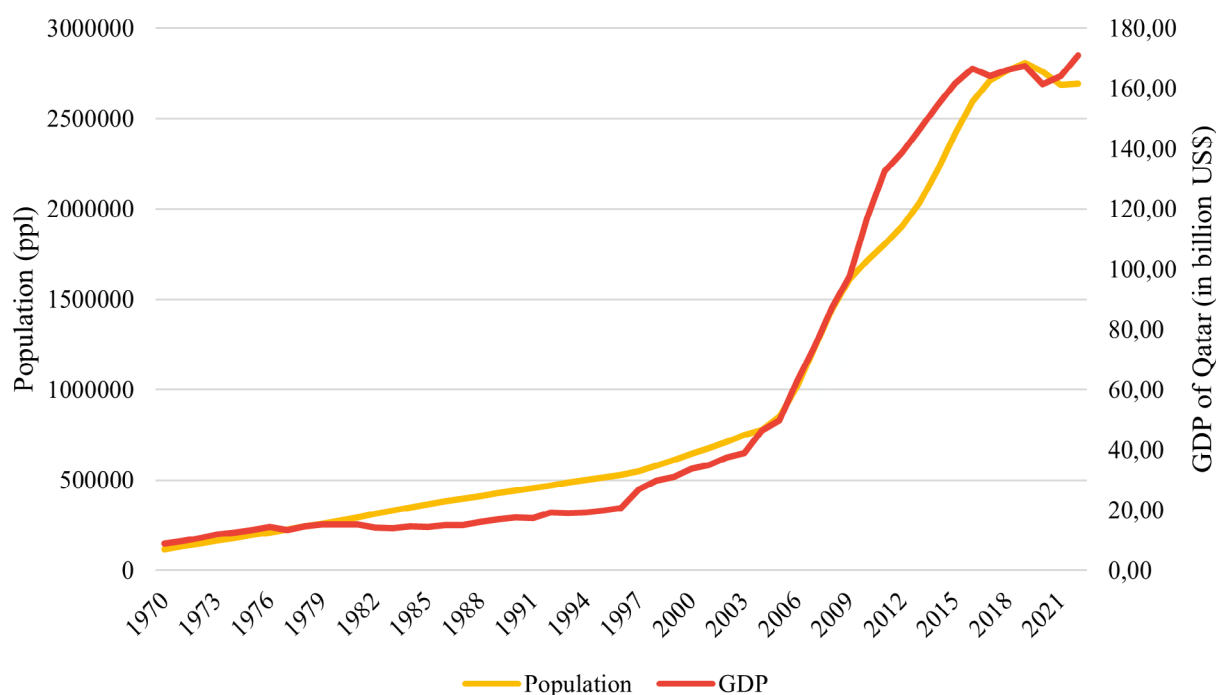
Factors Affecting Population Growth

The steep population growth observed in Qatar since the 2000s has been significantly driven by the country's labor market needs. The construction industry, in particular, relies heavily on foreign guest workers, with low-wage construction work mostly carried out by immigrants from the Far East. The country, which is contemplating megaprojects, faces the dilemma of how long the current intensive construction-based economic model can be sustained and precisely who the future users of these new buildings will be.

A physical limitation is certainly imposed on construction by the country's land area, although artificial land reclamation projects, common in the region, demonstrate that this is not an insurmountable obstacle; such a project has been realized in Doha (e.g., The Pearl-Qatar islands). Another option, also typical for wealthy Persian Gulf states, is to pursue vertical expansion in architecture instead of a horizontal approach. Despite this upward drive, the size of urban areas increased by an average of 5.45 percent annually from 1987 to 2016, amounting to a total of 315 km² (Shandas et al., 2017). However, based on the goals set out in the Qatar National Vision 2030 (QNV 2030), supporting the unreasonable sprawl of Doha is not an objective. Instead, modern urban development principles focusing on environmentally friendly and efficient land use are prioritized.

The largest investment in the country's history to date was hosting the 2022 FIFA World Cup. In its bid, Doha committed not only to building the sports facilities but also to creating the entire supporting infrastructure. This represented a series of massive, nationwide investments, as the existing capacity was insufficient to adequately meet the needs of the hundreds of thousands of tourists arriving for the event. To service these demands, a public transportation system, an airport, ports, hotels, and other service units had to be built, significantly increasing the number of construction workers.

Figure 7. Qatar's Population and Economic Growth Curves Between 1970 and 2022.

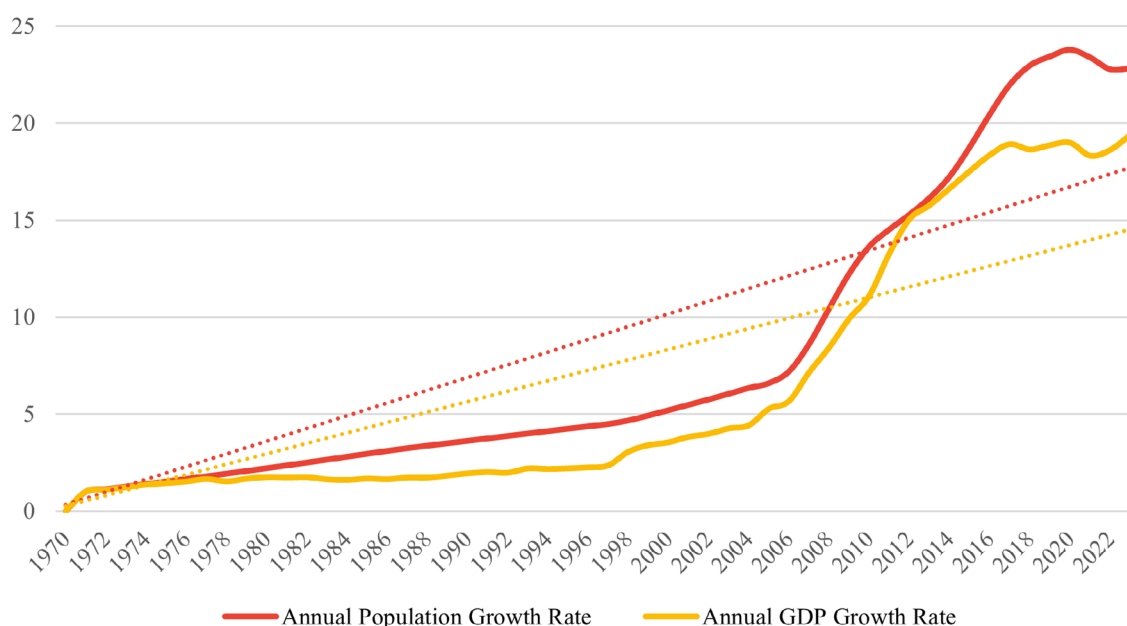


Source: World Bank, own editing

The number of foreigners working in construction is 660,000 out of a total of 1,934,000 guest workers, meaning approximately every third immigrant (34.12 percent) was employed in this sector. This is followed by wholesale and retail trade, with nearly 242,000 people. The contrast is particularly striking when considering that only 1,500 locals (Qatari nationals) work in construction. It is also characteristic that guest workers are predominantly employed in the private sector, though they also appear in small numbers in domestic work and government jobs. The same cannot be said for citizens: the overwhelming majority (72.2 percent) work in public administration. Out of the 113,500-strong Qatari workforce, only 7.4 percent were employed in the private sector.

The foundation of the Qatari economy and its boom is provided by the mega-project-based development model, which phases the pace of growth; this strategy became part of state policy after 1995 (Rahman, 2015). Large-scale developments stimulated economic growth, while the population continuously increased due to rising job opportunities. A particularly large jump occurred after the 2000s, followed by a decade-long period of steep increase; then, stagnation and stabilization can be observed in both GDP and population figures (Figures 7 and 8). These figures are based on World Bank data, so there are some discrepancies compared to the data repository of the Qatar Statistical Authority (QSA). The trends can be clearly read from the figures: the rise in population and the economy are parallel processes that mutually reinforce each other. A slight divergence in favor of the population can be observed, leading to the conclusion that population growth contributes to the economic boom.

Figure 8. Qatar's Population and Annual GDP Growth Rate Between 1970 and 2022, 1970 Base, in Percent. Dashed Trend Lines are Shown.



Source: World Bank, own editing

Following the initial period of the population explosion, Qatari decision-makers recognized the need for a slower rate of population growth, as the sectors serving society were unable to keep pace with the dramatic increase. The influx of foreign workers led to a shortage of housing and office space at that time, which in turn caused a rise in rental prices. Due to the 2008 global financial crisis, investors approached real estate developments with significantly more caution than before, resulting in a serious housing shortage in Qatar. Doha's policy then encountered paradoxes: it sought to improve the situation with a housing construction program, but the arrival of the population needed for construction further exacerbated the housing problems. The rapidly growing number of foreigners also strained the country's supply systems, resulting in long waiting lists at various social institutions. Towards the end of the 2000s, one had to wait months for the delivery of a new car. The social pressure only subsided slowly, thanks to a significant expansion of capacity (MEED, 2010).

Decision-making Prospects Influencing the Society's Vision of the Future

The steeply rising population curves appear to be unsustainable in the long run, yet no radical change is visible in demographic or citizenship strategy. Historical reasons underlie this. Before the formation of the nation-state, societies on the peninsula were defined largely by tribal rivalries, so the primary challenge was to reduce internal fault lines (Galeeva, 2023). The prosperity brought by hydrocarbon extraction preserved these structures, but the influence families wielded over power diminished. The

transformation meant that different clans now compete for the best positions necessary to govern the country, with the accepted path to this being through demonstrating loyalty to the ruling family. This does not mean that family ties have disappeared in Qatari society; rather, their nature has transformed and become much more economically oriented. Maintaining this mosaic is in the interest of the ruling family, which also limits the possibility of obtaining citizenship.

The evolution of Qatar's population size is influenced by three main factors:

- Natural reproduction rate: It is questionable how Doha can effectively encourage childbirth. According to Winckler (2015), policy is unlikely to significantly influence this, as families already receive substantial financial support. In 2015, he concluded that the Total Fertility Rate (TFR) of citizens could stabilize at 3–3.2 in the future. This forecast proved incorrect, as by 2025, values had fallen well below the projection. The government intends to pay greater attention to family policy measures. Her Excellency Ms. Mariam bint Ali bin Nasser Al Misnad, Minister of Social Development and Family, confirmed this policy direction at the Demographic Summit in Budapest in 2023 (MSDF, 2023).
- Changes in the age structure: Despite declining fertility rates, the number of citizens may continue to grow because the age structure is pyramidal: the youngest cohorts are the most populous, and the population size gradually decreases with older generations. This means the population is young, so the number of deaths is currently low and will only increase gradually as larger generations age. The culmination of the demographic transition, coupled with further fertility decline, will eventually halt natural population growth.
- The naturalization question: Qatar strongly restricts the naturalization of foreigners, although in the past, some individuals obtained citizenship outside the normal queue based on the Emir's decision.

Qatar follows a pronatalist policy, striving to encourage women's willingness to have children and to increase the proportion of the native population. Decision-makers recognized the importance of population policy and, to address these challenges, established the Permanent Population Committee (PPC) in 2004 (PPC, n.d.). The committee includes specialists from various ministries and government agencies, as the issue requires a multidisciplinary approach. Using background studies, participants developed Qatar's official population strategy, outlining the concept for the first time in an initial document covering the period 2009–2014. They defined six main pillars: labor market, education, healthcare, equal opportunity, environmental protection, and statistical databases.

After the document's expiration, a multi-level monitoring system was used to review the results achieved, involving both relevant ministries and the general public through questionnaires. The committee evaluated the findings and used them to define new medium-term population plans and goals (PPC, 2024). The third cycle, currently running, covers the period 2023–2027. The committee identified declining birth rates as a potential risk factor. Therefore, to reduce the proportion of foreign guest workers or multi-generational immigrants, the state pursues a pro-birth policy among Qatari families (GLMM, 2019).

Despite the efforts of the Doha government, it is not foreseeable in the long term—without a radical change in naturalization policies—that the number of citizens will approach the amount of foreigners living in the country. This means that the leadership must regard the skewed social ratios and the potential sources of tension that come with them as a permanent challenge.

CONCLUSIONS

The population growth of Qatar has been explosive over the past century, accelerating particularly rapidly in the 21st century. This expansion faces both physical and social limits, the signs of which are already beginning to show. The process is driven by an economic model based on immigration, relying heavily on infrastructure expanded through massive construction projects. The number of incoming foreigners is multiple times that of the local population, and significant wage disparities exist between the two groups.

Despite the Doha government's family-friendly, pro-natalist policies, overall birth rates have begun a slow decline alongside a decreasing Total Fertility Rate (TFR). In the future, the Qatari share of the population may see only slow growth, as the childbearing propensity of foreigners is even lower than that of locals. The issue of demographics receives heightened attention within the government, which is planning along long-term strategies. One implicit government decision is not to share precise data on the proportional differences between citizens and non-Qataris, as these figures could be politically sensitive.

Demographic trends present a multifaceted challenge for the Qatari political leadership. Doha aims to significantly increase the proportion of Qataris within the total population; however, despite these efforts, substantial change is not expected. Consequently, the leadership must address the problem of the continuously growing share of non-citizens born in the country. Foreigners already account for the majority of births, with only about one-quarter of all births being Qatari. The rising proportion of people with multi-generational presence, strong local embeddedness, and a local identity further pressures the Doha leadership to pursue a cautious citizenship policy.

Economic and population growth in Qatar have been closely correlated, so social problems arising from demographic divisions could negatively impact the country's competitiveness in the future. Another difficulty in changing legislation and social policy is that the effects of any single modification may only be felt years later. These dynamics also represent a security concern, as Qatar is heavily dependent on immigrant workers; virtually the entire economic setup relies on the presence of foreigners, especially within the boom model based on mega-projects. This limits government policy options, preventing overly strict or exclusionary measures, as these could encounter significant resistance from the majority foreign population.

The government therefore aims for a cautious balancing act: mild legislative relaxation combined with the maintenance of stability and strongly restricted rights for foreigners. Looking ahead, the

Qatari leadership will need to reconsider its social integration policies, as internal fault lines could easily lead to tension if left unaddressed.

REFERENCES

- Ali, A., & Cochrane, L. (2024). Residency and citizenship in the Gulf: Recent policy changes and future implications for the region. *Comparative Migration Studies*, 12(1). <https://doi.org/10.1186/s40878-024-00376-1>
- Al Meezan. (2024, March 17). *Qatar legal portal*. <https://www.almeezan.qa/ClarificationsNoteDetails.aspx?id=7870&language=en>
- Al-Thani, S. K., Amato, A., Koç, M., & Al-Ghamdi, S. G. (2019). Urban sustainability and livability: An analysis of Doha's urban-form and possible mitigation strategies. *Sustainability*, 11(3), 786. <https://doi.org/10.3390/su11030786>
- Anderson, B. (1991). *Imagined communities: Reflections on the origin and spread of nationalism* (Rev. ed.). Verso.
- Babar, Z. (2014). Citizenship construction in the State of Qatar. *Middle East Journal*, 68(3), 403–420.
- Babar, Z. (2015). Population, power, and distributional politics in Qatar. *Journal of Arabian Studies*, 5(2), 138–155. <https://doi.org/10.1080/21534764.2015.1113680>
- Babar, Z., & Gardner, A. (2016). Circular migration and the Gulf States. In C. Solé, S. Parella, T. Sordé, & S. Nita (Eds.), *Impact of circular migration on human, political and civil rights* (pp. 45–62). Springer. https://doi.org/10.1007/978-3-319-28896-3_3
- Birks, J. S., & Sinclair, C. A. (1979). The International Migration Project: An enquiry into the Middle East labor market. *International Migration Review*, 13(1), 122–135. <https://doi.org/10.2307/2545275>
- Cochrane, L., & Al-Hababi, R. (Eds.). (2023). *Sustainable Qatar: Social, political, and environmental perspectives*. Springer.
- Fandy, M. (2007). *(Un)civil war of words: Media and politics in the Arab world*. Praeger.
- Fargues, P. (2011). Immigration without inclusion: Non-nationals in nation-building in the Gulf States. *Asian and Pacific Migration Journal*, 20(3-4), 273–292. <https://doi.org/10.1177/011719681102000302>
- Faust, A. (2023). Concepts of world order and their implications for regional power research. *Modern Geografía*, 18(1), 79–96. <https://doi.org/10.15170/mg.2023.18.01.05>
- Fromherz, A. J. (2012). *Qatar: A modern history*. I.B. Tauris.
- Galeeva, D. (2023, December 18). *Qatar-Bahrain relations: Prioritizing progress despite complicated history*. Gulf International Forum. <https://gulfif.org/qatar-bahrain-relations-prioritizing-progress-despite-complicated-history/>
- Gray, M. (2013). *Qatar: Politics and the challenge of development*. Lynne Rienner Publishers.

- Gulf Labour Markets and Migration (GLMM). (2019). *Empowering women and fostering fertility: Two conflicting policy goals in Qatar?* (Policy Brief No. 1/2019).
- Gulf Labour Markets and Migration (GLMM). (2025). *Qatar: Population by nationality (Qatari / non-Qatari) at dates of census (1970-2020)*. <https://gulfmigration.grc.net/qatar-population-by-nationality-qatari-non-qatari-at-dates-of-census-1970-2020/>
- Hussain, Z. (2014, October 29). *Kafala neither guarantees nor cares for guest workers in the Gulf*. World Bank Blogs – End Poverty in South Asia. <https://blogs.worldbank.org/en/endpovertyin-southasia/kafala-neither-guarantees-nor-cares-guest-workers-gulf-0>
- International Labour Organization (ILO). (2022, March 11). *Qatar country profile: Assessment of labour migration statistics*.
- Kamrava, M. (2013). *Qatar: Small state, big politics*. Cornell University Press.
- Kenny, C. (2021, April 28). *The Gulf migration model: Can it be sustained?* Center for Global Development. <https://www.cgdev.org/blog/gulf-migration-model-can-it-be-sustained>
- Kucsera, E. (2020). A Perzsa-öböl-menti légitársaságok története, gazdasági háttere és működési mechanizmusa [The history, economic background and operational mechanism of Gulf airlines]. *Modern Geográfia*, 15(2), 29–45. <https://doi.org/10.15170/mg.2020.15.02.02>
- Ministry of Development Planning and Statistics (MDPS). (2018, July). *The Qatar National Vision 2030: Human development pillar*. Government Communications Office. <https://www.gco.gov.qa/en/state-of-qatar/qatar-national-vision-2030/human-development/>
- MEED. (2010, February 3). *Megaprojects push Qatar's population up*. <https://www.meed.com/megaprojects-push-qatars-population-up/>
- Miles, H. (2005). *Al-Jazeera: The inside story of the Arab news channel that is challenging the West*. Grove Press.
- Ministry of Municipality and Urban Planning (MMUP). (2014). *Qatar national development framework 2032*.
- Ministry of Social Development and Family (MSDF). (2023, September 17). *Qatar supports established family policies to achieve societal security*. <https://www.msdf.gov.qa/en/media-center/news-list/qatar-supports-established-family-policies-achieve-societal-security>
- Morland, P. (2021). *The human tide: How population shaped the modern world*. John Murray.
- Okruhlik, G., & Conge, P. J. (1999). The politics of border disputes: On the Arabian Peninsula. *International Journal*, 54(2), 230–248. <https://doi.org/10.2307/40203374>
- Pearce, F. (2010). *The coming population crash: And our planet's surprising future*. Beacon Press.
- Planning and Statistics Authority (PSA), Qatar. (2024). *Qatar monthly statistics*. <https://www.psa.gov.qa/en/statistics/Pages/qms.aspx>

- Planning and Statistics Authority (PSA), Qatar. (n.d.). *Qatar atlas*. https://gis.psa.gov.qa/QatarAtlas/StatisticalSector.aspx?Left_Menu_DIV=POP_Census1986_2020&Left_Menu_DIV_SubItem=MenuItem_Population_0
- Planning and Statistics Authority (PSA), Qatar. (2021). *Census 2020*. <https://www.psa.gov.qa/en/statistics/Statistical%20Releases/Population/Census/2020/Pages/default.aspx>
- Population Committee (PPC), Qatar. (n.d.). *Population policy development process*. <https://www.ppc.gov.qa/en/PopulationPolicy/development/Pages/default.aspx>
- Population Committee (PPC), Qatar. (2023). Qatar's third national population policy (2023-2027). *PPC Sukan*, 53, 8–9. https://www.ppc.gov.qa/Admin/sukkannewsletter/PPC_Sukan_2023_issue53_EN.pdf
- Population Reference Bureau (PRB). (2021). *2021 World population data sheet* [Letter booklet]. <https://www.prb.org/wp-content/uploads/2021/08/letter-booklet-2021-world-population.pdf>
- Qatar Company Formation (QCF). (2024). *Qatar citizenship*. <https://qatarcompanyformation.com/qatar-citizenship/>
- Rahman, A. A. (2015). The impact of globalization on labor market in Qatar. *Journal of Emerging Issues in Economics, Finance and Banking*, 4(1), 1426–1441.
- Sempa, F. P. (2012). Population in the study of geopolitics. In S. Yoshihara & D. A. Sylva (Eds.), *Population decline and the remaking of great power politics* (pp. 59–77). Potomac Books.
- Shah, N. M. (2009). *The management of irregular migration and its consequence for development: Gulf Cooperation Council* (ILO Working Papers). International Labour Organization, Regional Office for Asia and the Pacific.
- Shandas, V., Makido, Y., & Ferwati, S. (2017). Rapid urban growth and land use patterns in Doha, Qatar: Opportunities for sustainability. *European Journal of Sustainable Development Research*, 1(2). <https://doi.org/10.20897/ejosdr.201711>
- Smith, S. K., Tayman, J., & Swanson, D. A. (2013). *A practitioner's guide to state and local population projections*. Springer.
- Sprout, H., & Sprout, M. (1945). *Foundations of national power*. Princeton University Press.
- U.S. Census Bureau. (2013). *International database: Qatar*. https://www.census.gov/data-tools/demo/idb/#/country?COUNTRY_YEAR=2013&COUNTRY_YR_ANIM=2013&FIPS_SINGLE=QA-&FIPS=QA&menu=popViz&POP_YEARS=2013
- United Nations (UN), Department of Economic and Social Affairs, Population Division. (2004). *World population to 2300*.
- UNICEF. (2019). *Investing in children and youth today to secure a prosperous region tomorrow: MENA Generation 2030 country fact sheet*.
- The World Bank. (1995). *World population projections, 1994-95 edition*. The Johns Hopkins University Press.

- The World Bank. (2023). *Qatar: Human Capital Index 2023*. World Bank Human Capital Project. <https://humancapital.worldbank.org/en/economy/QAT>
- Wiegand, K. E. (2012). Bahrain, Qatar, and the Hawar Islands: Resolution of a Gulf territorial dispute. *The Middle East Journal*, 66(1), 78–95. <https://doi.org/10.3751/66.1.14>
- Winckler, O. (2015). How many Qatari nationals are there? *Middle East Quarterly*, 22(1), 1–16.
- World Health Organization (WHO). (2024). *Qatar: Health data*. <https://data.who.int/countries/634>

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Herczeg, Alexandra¹

Names, Power and Place: Reconsidering Geographical Identity in a Globalizing World

ABSTRACT

The book presented in this review, *Place Naming, Identities and Geography*, published by Springer in 2023 and edited by Gerry O'Reilly, comprises 27 English-language studies contributed by 48 scholars from around the world, including Hungary. O'Reilly, professor at Dublin City University, Ireland, has a broad range of research interests, with a primary focus on geopolitics. Over the course of his career, he has published numerous books, scientific articles, and studies; however, this is only the second volume he has edited. The collection spans more than 600 pages and addresses the issues, characteristics, and historical development of geographical names as examined by contemporary scholars. The volume is organized into five thematic chapters, reflecting a coherent structure. Given its substantial length, it is not feasible to discuss every contribution in detail. Consequently, the present paper provides a concise overview of the book's content, focusing on the studies that the reviewer found most noteworthy, and highlights their contributions to the international study of toponymy. This approach allows the reader to gain insight into the main themes and scholarly approaches represented in the volume while emphasizing the research that the reviewer considers particularly significant.

Keywords: book review, place naming, identity, culture, geography

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Challenging Conceptual and Theoretical Approaches to Place Naming

Published by Springer in 2023, *Place Naming, Identities and Geography*—edited by Gerry O'Reilly—brings together 27 studies grouped into five thematic chapters (O'Reilly, 2023a).

In the first chapter, the following researchers address diverse aspects of place naming and toponymic research. Sungjae Choo (*Assessing the Validity of Critical Toponymy Perspectives for Understanding Human Perception of Places: An Analytical Framework*), a South Korean geographer, explores how the validity of critical toponymy perspectives can be identified in the interpretation of human space, illustrated through the example of Volgograd/Stalingrad. Gerry O'Reilly (*Legacies and Place Naming: Perspectives from Korea and Japan*) investigates the role of cartography and digitization in globalization processes, with particular attention to Google's influence in the domain of place names and the geopolitics of emotions linked to toponymy and hydronymy in Japanese–Korean relations. Frédéric Giraut (*Place Naming and Neotonymy: French Experiences Through the Lens of a Theoretical Framework*), professor at the University of Geneva, examines the toponymic techniques employed in France at local and provincial levels, their responses to various political challenges, and the ways in which neotonymy manifests itself. Adriana Vescovo (*Geographical Names in Argentina: Present and Challenges*) analyzes place names in Argentina from a geographical perspective, focusing on current challenges related to politics, geoinformation management, and standardization.

In addition, Joan Tort-Donada and César López-Leiva (*Toponymy, Scale and the Change of Scale: A Geographical and Linguistic Challenge*) consider how toponymic mapping can be improved coherently by integrating three interrelated concepts—toponymy, mapping, and scale—drawing on examples from Spain. Tal Yaar-Waisel (*The Mystery of Hydronymy in the Land of Israel*) demonstrates how history, religion, and politics have shaped toponymy and hydronymy since the establishment of the State of Israel. Finally, Ferjan Ormeling, Helen Kerfoot, and Pier-Giorgio Zaccheddu (*United Nations Capacity Building in Toponymy*) present a pioneering discussion on how the United Nations Group of Experts on Geographical Names can advance the standardization of geographical name lists, training programs, and research methodologies at the national level.

Particular attention should be given to Gerry O'Reilly's study, in which he explores the relationship between digital cartography and Google's naming power in the context of globalization. He also examines place-name legacies through the examples of Korea and Japan, assessing the geopolitics of emotions surrounding place names in disputed territories. In the first part of the chapter, he outlines what geopolitics is and how this concept should be interpreted. He further discusses how technology has revolutionized cartography. Geographical naming is shown to be continuously evolving and

remains highly sensitive in the context of cultural geopolitics. The main differences between Japan and Korea concern the naming of seas and islands (O'Reilly, 2023b).

In the following section, the author notes that according to Google's guidelines, if a name is disputed between two or more countries, all versions should be listed. However, Google's Japanese clients, for instance, only display the name *Sea of Japan* to Japanese users, while Korean users see *East Sea*. The third part is divided into several subsections that present the guidelines established by various organizations (e.g., the UN, IHO) regarding the naming and publication of disputed territories. The final subsection discusses the political trends that influenced the two Korean states and Japan in geographical studies and curricula after World War II.

In the section *Maps and Realpolitik*, readers learn about the origins of the name *Japan Sea / East Sea*, which the author and various countries support with historical records and maps. It also discusses an island (Dokdo / Takeshima / Liancourt Rocks) known by Korean, Japanese, and European names; to this day, there is no consensus among the countries on what this place should be called. The final section, entitled *The Geopolitics of Emotions*, explains how both Korea (Dokdo Museum) and Japan (National Museum of Territory and Sovereignty) seek to assert their sovereignty over these sites through museums. Both countries emphasize that issues of geographical naming should be resolved through diplomatic channels, yet these efforts have so far reached an impasse.

Based on the information gathered during his research, the author reaches appropriate and insightful conclusions. It is clear what tasks lie ahead for the two countries in relation to place-name changes and the preservation of sovereignty, as well as what guidelines Google should follow to remain objective in the context of globalized mapmaking. The study provides excellent insight into digital cartography in today's globalized world and how major corporations "take a stand" on disputed place names. It also offers strong examples, such as the cases of Korea and Japan, which—due to their historical backgrounds—have still not reached a common agreement on the names of certain islands and seas. This situation is not unique, as disputes over geographical names exist in many parts of the world and often lead to conflicts between states.

The editor's writing style is clear and accessible, although the study would have benefited from the inclusion of visual and cartographic illustrations.

Approaches to Implementing Standardization of Place Names

In the second part of the volume, the contributors address the standardization of geographical names of countries, nations, and languages, along with the challenges associated with these processes. Drago Perko, Matjaž Geršič, and Matija Zorn (Standardization of Geographical Names on Land and Sea in Slovenia) discuss the standardization of geographical names on land and at sea in Slovenia following the country's independence in 1991, and examine how the official use of geographical names was regulated in multilingual areas. Neil Lindsay and Robin Kearns (The New Zealand Geographic Board and the Contested Nature of Place Names in New Zealand) analyse the political issues and practical

solutions surrounding New Zealand's toponymy, drawing on recent case studies. Tendai Mangena (Theorising Multiple Place Names in Southern Africa) explores the abundance of place names in Southern Africa, presenting specific examples from Zimbabwe and South Africa. She employs the metaphors of the palimpsest and the rainbow nation to illustrate the distinctive characteristics of toponymic diversity in these two countries.

The following two studies are authored by Spanish geographers. Ayar Rodríguez de Castro (Conflicts and Challenges in the Standardization of Geographical Names in Spain) analyses the conflicts and challenges related to the standardization of geographical names in Spain. Mar Batlle (Language Policies in the Field of Toponymy: Perspectives on Spain) examines bilingual autonomous regions and discusses the implementation of toponymic legislation in these provinces. The research conducted by Alpaslan Alişaoğlu and Abdullah Uğur (Urban Toponymy in Turkey) aims to present and analyse the findings of 25 studies on urban toponymy in Turkey. Finally, the monograph by Boris Avdić, Ranko Mirić, Nusret Drešković, and Marko Krevs (Cultural Crossroads in Toponymy: Case Study of Bosnia and Herzegovina) focuses on the toponymy of Bosnia and Herzegovina as a multicultural area. The authors explore how different ethnic groups and political events have shaped geographical naming throughout the country's history.

Of particular interest in the second chapter is the article by Tendai Mangena, *Theorising Multiple Place Names in Southern Africa* (Mangena, 2023), as the situation in South Africa is rarely discussed in a European context. Mangena is a professor at the University of the Free State in the Republic of South Africa. The author employs the metaphors of a "palimpsest" and a "rainbow nation" to illustrate the characteristics of multiple place names, using the examples of two Southern African countries, Zimbabwe and the Republic of South Africa. In her study, she investigates how the names used by indigenous peoples and the current official names coexist, and she examines what it means to refer to places by different names, as well as how traces of past names carry competing histories and discourses in postcolonial societies.

Mangena chose these two countries because they share a common history, borders, and languages, and because toponymic research is particularly active in both. She divides her study into four main parts. In the first, she makes it clear that to interpret the diversity of place names, it is necessary to go beyond the simple categorization of names as endonyms or exonyms and to reflect on the contradictory registers of place names created by (post)colonial political and cultural legacies. As examples, she cites the famous *Victoria Falls* and its various names, as well as the *Drakensberg Mountains* in South Africa.

In the next part, the researcher briefly interprets the concept of a *palimpsest*. She argues that this concept is closely related to toponymy, as it can be demonstrated in the territory of Zimbabwe that place names have been renamed and erased multiple times throughout history. The origin of the term "rainbow nation" is also presented, showing how this ideology has influenced the use of geographical place names.

The section entitled *Politics of Legacies in Zimbabwean Toponyms* discusses how political changes in the past have affected certain place names in Zimbabwe. The author provides excellent examples and examines both the official and unofficial use of place names. Various ethnic groups live in the country, each with their own language, and to preserve their culture they use names in their own languages, although these often do not appear in official records. During the colonial era, the British renamed many places, which were later “Africanized” by the indigenous population. Mangena also discusses the politics of memorial toponymy, noting that different political parties assign different names to the same places.

The country’s legislation on place names stipulates that the incumbent president must be commemorated, yet such geographical names evoke different—both positive and negative—feelings among residents. Through examples from Zimbabwe, we learn about the role that political legacies play in the development of place-name diversity.

The final chapter provides information about multilingual place names in the Republic of South Africa. Here, too, the author uses the *palimpsest* metaphor and discusses the recognition of names used by colonizers and indigenous peoples. In the post-apartheid period, many geographical names were changed to ensure that both indigenous and English names gained official status. This effort also aimed to strengthen the concept of a “rainbow nation.”

Based on the above, the author’s conclusions are well founded. The examples provided convincingly support the concepts of the *palimpsest* and the *rainbow nation*. A positive aspect of the study is that it offers deeper insight into toponymy in countries that are less familiar to European readers. Its structure is logical and consistent, and the text is easy to follow. The illustrations are effective, although the inclusion of “old maps” would have been beneficial. The conclusion suggests that the official use of multilingual names in multicultural, multi-ethnic countries is worthwhile, as it can help prevent numerous conflicts.

Geo-Histories, Legacies, and Toponymy Transitions

In this section, issues of historical geography and territoriality are addressed, beginning with the hypothetical question of whether a place name can truly be owned or erased by state authorities—particularly when it is centuries or even millennia old and regarded by citizens as part of their heritage. Yılmaz Arı (Giving Identity to Space Through (Re)Naming: Practice of Village Renaming in the Period of the Republic of Turkey) investigates the (re)naming of places in Turkey, drawing primarily on legal sources, official regulations, previous studies on renaming, and his own field observations. Building on similar questions of identity and spatial memory in a different regional context, Norbert Pap, Máté Kitanics, Marianna Ács, and Péter Reményi (Geo-History of the Toponymy of the Mohács Plain, SW Hungary) examine the geographical place names of the Mohács Plain, an area of major historical importance in Hungary. Their study also addresses the location of a now-vanished settlement that played a significant role at the time of the Battle of Mohács. Extending the focus further to an urban

setting shaped by twentieth-century development, Elša Turkušić Jurić and Velid Jerlagić (Recreating the Future: Modern Residential Neighbourhood and Existing Toponyms in Sarajevo) focus on two residential neighbourhoods in Sarajevo—Novo Sarajevo and Novi Grad—built in the mid-twentieth century. While retaining the earlier toponyms, these new neighbourhoods attributed new meanings to the former place names. The authors analyse the spatial and cultural dimensions of these changes, as well as cases of their subsequent disintegration under the influence of globalization.

John A. Schembri and Ritienne Gauci (Street Naming in Malta as a Geo-Cultural and Political Exercise as Seen from Local Sources) examine street naming in Malta through the lenses of geopolitics, social composition, and religion. Paulo Márcio Leal de Menezes and Manoel do Couto Fernandes (Toponymic Study of the Map of New Lusitania: A Portuguese Cartographic Monument from the Eighteenth Century) analyse four maps of Nova Lusitania from the eighteenth century, investigating how place names appear across different versions and how religion and ideology have shaped their interpretation in modern times. Finally, Taavi Pae, Ats Remmelg, and Jussi S. Jauhiainen (Names and Naming of Collective Farms in Soviet Estonia) explore the naming of collective farms in Soviet Estonia, focusing on the ideological pressure exerted by communist rule and the changes that followed the renaming processes after 1991.

The third section includes a Hungarian study written by Norbert Pap, Máté Kitanics, Marianna Ács, and Péter Reményi, researchers at the University of Pécs. Their paper, *Geo-History of the Toponymy of the Mohács Plain, SW Hungary* (Pap et al., 2023), is particularly noteworthy. Although published in an international volume, this research contributes to the *Mohács 1526–2026: Reconstruction and Memory* project, which has attracted great interest in Hungary.

The authors examine the characteristic forms and types of geographical names in the Mohács Plain. Among other aspects, they seek to answer questions such as how far the settlement boundaries of different ethnic groups extended, to what extent these influenced geographical names, and how political systems affected naming practices. The introduction explains why the plains play such an important role in Hungarian history and how the region became multicultural. Over the centuries, various ethnic groups have exerted differing levels of influence on place names, while the wars and Cold War events of the 20th and 21st centuries have reshaped the geographical landscape.

Subsequent sections describe the changes that settlements in the Mohács Plain have undergone since the Middle Ages—who inhabited them and when, and how their names evolved. The chapter then outlines the comprehensive research methods applied to support the investigation. Names from 19th-century cadastral maps were collected and classified into different categories, such as South Slavic, German, or names derived from geographical and physical characteristics, with numerous examples provided.

The study discusses in detail the name variations of the village of Földvár as a case study. This settlement, located at the center of the Battle of Mohács, is presented based on a 1700 map of the region. Since the map is multilingual, the authors trace the origin of the village's name (*Földvár*) by comparing it with several contemporary illustrations, as well as examining how the name is remembered today.

Using 18th- and 19th-century maps, they also explore whether the names of settlements destroyed during the Ottoman era persisted in the outskirts of the areas that once belonged to them.

The authors further discuss the origin of the name *Sátorhely*, which initially referred to both an Ottoman and a Christian memorial site. Later, the name was transferred to the manor center in Nagynyárád (which eventually became an independent settlement bearing the same name), while the memorial site itself came to be known simply as *Törökdomb*. Border changes at the beginning of the 20th century generated new geographical names, typically incorporating the word “border.” In the 21st century, the researchers also examined how the construction of a new fence along Hungary’s southern border influenced everyday language use.

The final section addresses the tradition of naming public spaces in Hungary and how successive political regimes have standardized and altered place names over the past century. As in every smaller region of the country, the Mohács Plain contains numerous names connected to local historical events—though they appear here in particularly large numbers. Based on their detailed analysis, the authors draw several insightful conclusions, thereby enriching our understanding of the historical geography of the plains. Written in a logical and accessible style, the study presents numerous examples and is illustrated with a wealth of high-quality images.

Toponymy: Narratives, Languages, Culture, and Education

The fourth section presents studies on toponymic narratives, language, culture, and education. It clarifies concepts such as identity, legal frameworks, and multilingualism. Jonathan Cherry, Brian Ó Raghallaigh, and Úna Bhreathnach (Reading Ireland’s Colonial and Postcolonial Toponymic Landscapes) present various Irish toponyms as integral components of the cultural landscape, offering unique insights into the social, political, and cultural perspectives and perceptions of those who have named or renamed places over time.

Similarly, Charles Travis (Translating Topographies: Brian Friel’s Approach to Language, Landscape, and Toponymy in Ireland) examines Brian Friel’s play *Translations*, set in the nineteenth century. The play depicts the mapping of Ireland by the English and the difficulties and conflicts encountered by the English cartographer. In another contribution, Jennifer Ballantine Perera (The Overlaid Past: The Politics of Space and Memory in Gibraltar’s “Doubling” Street Naming Principle) discusses resistance to the introduction of both traditional and official street names in Gibraltar. Likewise, Laura Cassi (From Historical to New Place Names: The Case of Italy) outlines the general geographical development of place-name research in Italy, providing numerous examples of preserved place names from the cultural heritage as well as new place names created through tourism, and analyzes their various interrelations.

Further broadening the scope, Multamia R. M. T. Lauder, Titi Bachtiar, and Cece Sobarna (Geographical Names as Indicators of the Environment: Case Study in Bandung Basin, West Java, Indonesia) use the example of the Bandung Basin in Indonesia to demonstrate the importance of

preserving geomorphological information from the past in hydronymy and to highlight the potential disasters that may arise when geographical place names are altered. Finally, Ruth McManus (*The Vital Question of Place Names and the Naming of Places in Geographical Education: Concepts, Activities, and Questions for Reflection*) provides resources in the concluding part of the chapter that encourage both readers and educators to reflect more deeply on the topics discussed throughout the volume and presents methodologies essential for further research.

Of particular note is the study by Ruth McManus, a lecturer at Dublin City University in Ireland, entitled *The Vital Question of Place Names and the Naming of Places in Geographical Education: Concepts, Activities, and Questions for Reflection* (McManus, 2023). In her article, McManus focuses on the important role that place names and their analysis play in geography education. The author argues that geographical names carry both negative and positive stereotypes, and that they not only serve to identify locations but also form part of our intellectual and cultural heritage. The study draws on the toponymic analyses published in the volume to help students better understand the fundamental issues of toponymy. McManus adopts a constructivist educational approach, meaning that students build their own theories based on prior knowledge and experiences. In my view, this is an effective teaching method, allowing students to learn from real events, draw their own conclusions, and engage with each other's ideas in collaborative discussion.

In the first chapter of the article, students are asked to answer fundamental questions such as: What do place names reveal? What is their meaning? Why is it important to collect place names? These questions aim to spark interest in the topic and demonstrate its connection to identity, power, and heritage. Following the introductory text, the author presents four blocks of tasks related to the topic: discovering place names in the local landscape; exploring the meanings of place names; collecting place names; and questioning perceptions. These tasks involve both field research and literature review.

In the next chapter, McManus lists the articles in the volume that address the transformation of toponyms referring to the past. She then outlines a task that helps students identify when place names were renamed or lost, by analyzing historical maps and other written records at selected locations. The third chapter deals with politically motivated name changes, also referencing relevant studies. In the first example task, students research the place names of Antarctica, which is interesting because multiple nations influenced the names despite the absence of indigenous peoples. The following task explores colonial and decolonial naming practices and the simultaneous use of such names. The third task helps students understand the relationship between place names and identity, with questions linked to the topics covered in the volume.

The fourth part addresses indigenous place names and how they are treated. In the first task, students investigate names created in New Zealand and the United States, using the study by Neil Lindsay and Robin Kearns to understand evolving naming practices in Aotearoa, and questions related to the activities of the U.S. Board on Geographic Names. In another task, based on a joint article by Multamia R. M. T. Lauder, Titi Bachtiar, and Cece Sobarna, students answer questions concerning the intellectual heritage of Indonesian place names.

The final section deals with resistance to place names, which are used by ruling elites for political purposes. The first example task is a debate, with written responses required. This task encourages students to explore conflicts surrounding place naming, helping them understand history, its relation to sustainable development, and develop debating skills. Next, an empathy game invites students to consider, from different perspectives, how someone might feel when a nearby place has multiple names. The last task involves role-play: for example, students act as mayors, planners, or potential residents and propose names for a newly built housing estate, justifying their choices using old documents and maps as reference tools.

Based on the above, I found McManus's study particularly engaging, as it presents a teaching method that enables students to work collaboratively, support arguments, and engage in discussion. Another positive aspect is that the sample tasks can be adapted for education from primary school onward, and can be supplemented with students' own examples.

The Relationship Between Geographical Naming and Cultural Politics

In the final chapter, Gerry O'Reilly reviews the positions and conclusions of 48 researchers working on geographical names. These researchers analyze place names from multiple perspectives, considering their significance in terms of perception, identity, culture, (geo)politics, sovereignty, and the creation and management of geoinformation databases. O'Reilly structures his article so that the content and chapter titles correspond to the overall structure of the volume.

Advances in Toponymic Studies

The book contains a range of diverse articles that help readers—whether laypersons or professionals in the field—gain a deeper understanding of the science of toponymy and its research methods.

The cover is clean and modern, and the title and subtitle effectively summarize the content and theme of the book. The structure and organization of the publication are easy to follow. The studies are well illustrated, which is particularly positive, as the figures are in color, enhancing clarity and supporting analysis, especially in the case of maps.

The book presents the findings of many accomplished researchers who have contributed to the advancement of toponymic studies. The articles are logically reasoned and written in accessible language. They provide insight into past and present conflicts, as well as solutions, in different countries arising from geographical names. The methodologies employed can be effectively utilized and extended to other, less-researched areas, and they also allow for cross-sectional analyses and the drawing of broader conclusions. Furthermore, these methods can be applied at all levels of education, thereby increasing students' interest in the subject of toponymy. Thus, the book not only contributes to the theoretical development of toponymic research but also offers practical insights that can inform educational and regional planning practices.

REFERENCES

- Mangena, T. (2023). Theorising multiple place names in Southern Africa. In G. O'Reilly (Ed.), *Place naming, identities and geography: Critical Perspectives in a Globalizing and Standardizing World* (pp. 259–276). Springer International Publishing. <https://doi.org/10.1007/978-3-031-21510-0>
- McManus, R. (2023). The vital question of placenames and naming of places in geographical education: Concepts, activities, and questions for reflection. In G. O'Reilly (Ed.), *Place naming, identities and geography: Critical Perspectives in a Globalizing and Standardizing World* (pp. 619–637). Springer International Publishing. <https://doi.org/10.1007/978-3-031-21510-0>
- O'Reilly, G. (Ed.). (2023a). *Place naming, identities and geography: Critical Perspectives in a Globalizing and Standardizing World*. Springer International Publishing. <https://doi.org/10.1007/978-3-031-21510-0>
- O'Reilly, G. (2023b). Legacies and place naming: Perspectives from Korea and Japan. In G. O'Reilly (Ed.), *Place naming, identities and geography: Critical Perspectives in a Globalizing and Standardizing World* (pp. 51–70). Springer International Publishing. <https://doi.org/10.1007/978-3-031-21510-0>
- Pap, N., Kitanics, M., Ács, M., & Reményi, P. (2023). Geo-history of the toponymy of Mohács Plain, SW Hungary. In G. O'Reilly (Ed.), *Place naming, identities and geography: Critical Perspectives in a Globalizing and Standardizing World* (pp. 383–411). Springer International Publishing. <https://doi.org/10.1007/978-3-031-21510-0>

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Unearthing Peripheral Brilliance: A Historical Geography of Talent in Three European Regions

ABSTRACT

This study examines the geography of talent in three peripheral NUTS3 regions—Jász-Nagykun-Szolnok County (Hungary), Altmarkkreis Salzwedel (Germany), and North Ostrobothnia (Finland)—from a historical-geographical perspective. It focuses on the spatial concentration, migration, and retention of talent, which are crucial to territorial development and socio-economic inequality. The findings demonstrate that spatial and social environments significantly shape the recognition, support, and success of talented individuals, particularly in peripheral regions where brain drain threatens the renewal of human capital. Using documentary analysis and comparative statistical methods, the study traces patterns of talent production from the Enlightenment to the new millennium. Results indicate that historically more developed regions with strong educational and social infrastructures have been more successful in retaining and attracting talent. In contrast, regions with weaker institutional backgrounds experience substantial outmigration, contributing to long-term socio-economic decline. This comparative historical analysis examines 150 individuals with outstanding achievements, specifically 50 from each peripheral region (Jász-Nagykun-Szolnok County, Altmarkkreis Salzwedel, and North Ostrobothnia). The talent pool was compiled using secondary sources, including professional literature, academic databases, and consultations with cultural organizations to ensure a broad and historically relevant sample. The analysis reveals distinct regional patterns in talent activity, reflecting differences in historical economic structures, cultural heritage, and mobility pathways. The study contributes to the geography of talent by investigating under-researched peripheral regions and by emphasizing the critical role of talent retention in sustainable regional development.

Keywords: talent geography, peripheral regions, human capital, talent retention, socio-economic development

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INTRODUCTION

According to the definition of the *Hungarian Dictionary*, talent is a “natural, innate tendency or ability to do something” (Bárczi & Ország, 1959–1962). A definition formulated after the new millennium describes talent as “individuals with high levels of human capital, measured as the percentage of the population with a Bachelor’s degree or higher,” and also states that talent is attracted by diversity (Florida, 2002).

In English, there are two terms commonly used for talent. The term *gift* refers to an (as yet) undeveloped talent (e.g., a young athlete), while *talent* denotes someone who has already achieved significant results in their career (Blurton, 1983; Mann et al., 2017).

In addition to the Western concept of talent, it is important to highlight the Eastern perspective, especially that rooted in Confucian traditions, which emphasizes communal and moral dimensions. In Eastern cultures, talent is not regarded merely as an individual trait but is understood within the context of social harmony and family responsibilities. This approach links the development of talent with community support and continuous self-improvement, stressing the importance of perseverance and learning alongside innate ability. Thus, the Eastern view of talent offers a more nuanced understanding that encompasses not only individual excellence but also social responsibility. According to Chinese beliefs, about 70% of intelligence depends on self-effort and learning, whereas in Western countries it is commonly thought that 80% is determined by heredity (MacRaild, 2011).

In this study, a *talent* is defined as an individual who has demonstrably developed their abilities and created an outstanding and widely recognized oeuvre. The criteria for inclusion in the sample reflect the historical dimension of the research: an individual was included if they met at least one of the following criteria in relation to the given NUTS3 region:

1. Born within the administrative boundaries of the region;
2. Spent the early, formative period of their life or career (childhood or a significant part of their education) in the region;
3. The most significant or defining period of their career, or the moment of recognition (e.g., place of death or principal workplace), is tied to the region.

A *retained talent* is defined as an individual who was both born and died in the region (i.e., where their career culminated). Conversely, *attracted* (or *returning*) talent refers to individuals who were not born in the region but created a significant part of their oeuvre or completed their life there. This distinction allows for the precise measurement of the regions’ talent attraction and retention capacities. The parameters of career and life stages were mapped for all 150 individuals in the sample, based on their places of birth, education, primary professional activity, and death.

There are relatively many talented individuals. For someone to “step up” (i.e., to become recognized as a talent), they need diligence, perseverance, favourable circumstances (family, school, friends), and, of course, luck. Their achievements are known and recognized at least nationally, and most often internationally (Ulrich & Smallwood, 2012; Hancock et al., 2022).



According to the authors, the Hungarian, German, and Finnish individuals analysed in this study all possessed outstanding abilities—as well as diligence and perseverance—and achieved at least national, if not global, recognition in their respective fields. Based on the above categorizations, they can all be considered *talents*, and not merely *gifted individuals*.

Many scientific disciplines examine the study of talent (e.g., geography, psychology, economics), but each approaches the issue from a different perspective (Lee, 2017; Comunian et al., 2021). From a historical-geographical standpoint, this research seeks to answer the following questions: what kinds of talents were born in each region, in which fields they excelled, whether they remained in their birthplace or migrated elsewhere, and what factors influenced these patterns. It has always been, and increasingly remains, a matter of survival for smaller (rural, peripheral) regions to retain their talents—and not only to retain them but also to attract educated people from other areas (Velkey, 2019). Regions that fail to do so cannot sustain social and economic development in the long term, lose their competitiveness, and experience population decline (Gu et al., 2024). Over decades, this process can lead to social and economic erosion and further peripheralization.

The study selected these areas not merely based on their administrative NUTS3 classification, but also in accordance with the principles of comparative methodology, focusing on functional similarity—specifically, the demonstrably persistent and multi-faceted peripheral status of all three regions. Jász-Nagykun-Szolnok County, North Ostrobothnia, and Altmarkkreis Salzwedel are linked by their location along centuries-old core–periphery fault lines, characterized by institutional weakness relative to metropolitan centres and high rates of talent outmigration. Thus, the comparison is grounded not in administrative categorization but in shared spatial and social challenges that are highly relevant to the phenomenon under study (talent geography and peripherality).

The three-century time frame (from the Enlightenment to the new millennium) is fundamental to this historical-geographical analysis. Clarifying the precise temporal distribution of the talents' births is crucial for demonstrating the sample's representativeness and uncovering interregional differences in temporal patterns. Table 1 presents the distribution of the 150 surveyed talents by birth year, region, and century. These data clearly illustrate how the temporal patterns of talent emergence differ across the three peripheral regions, providing essential context for the subsequent analysis of educational and socio-economic dynamics.

Table 1. Temporal Distribution of Selected Talents' Births by Region (18th–21st centuries)

Region	18 th century and before (No. of Talents)	19 th century (No. of Talents)	20 th century (No. of Talents)	Total
Jász-Nagykun-Szolnok	4	12	34	50
North Ostrobothnia	3	14	33	50
Altmarkkreis Salzwedel	15	14	21	50
Total	22	40	88	150

Source: Authors' own compilation, based on various online databases

The three areas—each with distinct historical backgrounds and socio-economic trajectories—were selected for the following reasons. The authors sought to identify the main historical characteristics and development opportunities of disadvantaged regions in:

- a country that has been under the direct or indirect influence of great powers for centuries and, although it has developed significantly in recent decades, still faces numerous social and economic challenges (Hungary);
- a country that was for a long time subject to a great power (Russia), but has since become one of the most developed nations in the world and has been a Western-style democracy since World War II (Finland); and
- a former socialist country that reunited with one of the most developed states in the world in 1990, gaining access to substantial resources for economic catch-up, yet where development has also slowed in recent years (Germany).

The Hungarian county of Jász-Nagykun-Szolnok can be regarded as an inner peripheral area—characterized by a declining population, mixed ethnic composition, and economic indicators below the national average (Kurucz, 2021). However, it is noteworthy that an examination of 20th-century data reveals that the rate of talent absorption in Jász-Nagykun-Szolnok County improved at an above-average pace compared to national trends (Győri, 2015).

In the case of Northern Ostrobothnia in Finland, population mobility toward the regional centre, Oulu, and population growth in the city can be observed, while at the same time, the peripheral areas continue to experience population loss (Luonila et al., 2024).

The Altmarkkreis Salzwedel subregion in Germany lies within the territory of the former GDR, which experienced German unification (1990) as an economic and demographic “loser,” and from which significant population outmigration was observed for decades (Prange, 2013). Its economic indicators also lag behind the German average.

During the research, the authors analysed social and economic indicators that may influence the rate of emigration, the economic structure, and the level of development of the given region—both in European and national contexts (Table 2). At the end of the study, they summarize how the talents of each region contributed to the development of their respective regions or countries, and how many of them stayed or left. The authors formulated the following research questions (RQs) and hypotheses (Hs):

RQ1: What differences can be observed in the distribution of talents by field of activity across the three peripheral regions, and how are these differences related to the socio-economic and educational characteristics of the regions?

RQ2: What is the relationship between the regions’ ability to retain and attract talent and the mobility patterns of talented individuals?

H1: Regions with historically more developed social and educational infrastructures are able to retain and attract talent to a greater extent than regions with more limited educational and scientific backgrounds.

H2: The distribution of talent by field of activity shows statistically significant differences between regions, and these differences are associated with variations in historical economic structures, cultural heritage, and opportunities for social mobility.

LITERATURE REVIEW

In connection with the research, the authors reviewed previous studies on the topic in English, German, Finnish, and Hungarian. They found that talent geography analyses have been conducted in all three countries, though not in large numbers at the national level, and only sporadically at the regional or local scale.

For Jász-Nagykun-Szolnok County, no research has so far been carried out that specifically focuses on the county as a whole. Only one study (available in English and Hungarian) has examined a part of the county—historical Greater Cumania. This research analysed the talents originating from Greater Cumania, their main spatial characteristics, and mobility patterns within a historical perspective (Mátyás et al., 2024; Kovács et al., 2025). Other studies either apply the results of national research to the county under study or focus on specific segments of talent, such as sports.

Jász-Nagykun-Szolnok County has also been examined within the framework of national-level analyses by, among others, Ferenc Győri, who investigated the territorial distribution of early-career scientific talents. His findings show that young people living in the county achieve relatively high placement rates in national secondary school academic competitions and that the county's talent output exceeds the national average (Győri, 2004, 2023). Based on the reviewed scientific databases, it can be concluded that a comprehensive talent geography analysis with historical-geographical relevance has not yet been carried out for Jász-Nagykun-Szolnok County.

The fact that Jász-Nagykun-Szolnok County stands out in terms of the number of talents among Hungarian peripheral regions (Mátyás, 2021; Kovács et al., 2025; Mátyás et al., 2024) is due to the relatively high number of nationally recognized talents produced compared to other Hungarian NUTS3 regions of similar size or peripheral status. This exceptional productivity can, according to our research, be attributed to the strong cultural and institutional heritage of the historical county centres and the temporary effects of 20th-century regional development efforts.

In the case of Finland, no talent geography analysis has been carried out specifically for the region under study, and only national-level research can be found in scientific databases. However, the issue of talent has attracted scholarly attention for more than half a century. A national school survey published in 1969 examined students' performance in various academic subjects and sports (Malinen & Lyytikäinen, 1969). Siljander analysed the situation and academic performance of students within the Finnish school system at the national level (Siljander, 2017). Sahlberg also discussed talent development in relation to the Finnish educational model, providing regional data on specific subjects in his book (Sahlberg, 2021). Overall, while the study of talent in Finland is extensive, historical-

geographical analyses are lacking, and the Finnish geographical research community has yet to address the specific region under study.

For Germany, similar observations can be made as in Finland and Hungary: no regional or historical-geographical talent geography research is available for the region under study, and existing analyses are limited to the national level. To fully understand the challenges faced by peripheral German regions, it is essential to situate them within broader European and international talent migration flows.

Talent mobility in geographical space has been examined by Cervantes and Goldstein, whose findings show that Europe often serves as the final stage of many talents' careers, with individuals moving permanently to the continent. This can be viewed positively from the European perspective but represents a talent loss for the sending countries (Cervantes & Goldstein, 2008). In the case of the Saxony-Anhalt region, it has been noted—albeit tangentially—that high unemployment, lower levels of infrastructure development compared to the rest of Germany, and the emigration of talents are key factors contributing to the region's growing divergence from the German national average (Wiest & Leibert, 2013).

METHODS

We selected one Central European (Hungary), one Northern European (Finland), and one Western European (Germany) country as sample areas, each represented by a NUTS 3-level region (Figure 1, Table 2). Table 2 summarizes the key indicators of the three NUTS 3-level sample areas.

Table 2. Indicators of the Areas Studied (2024)

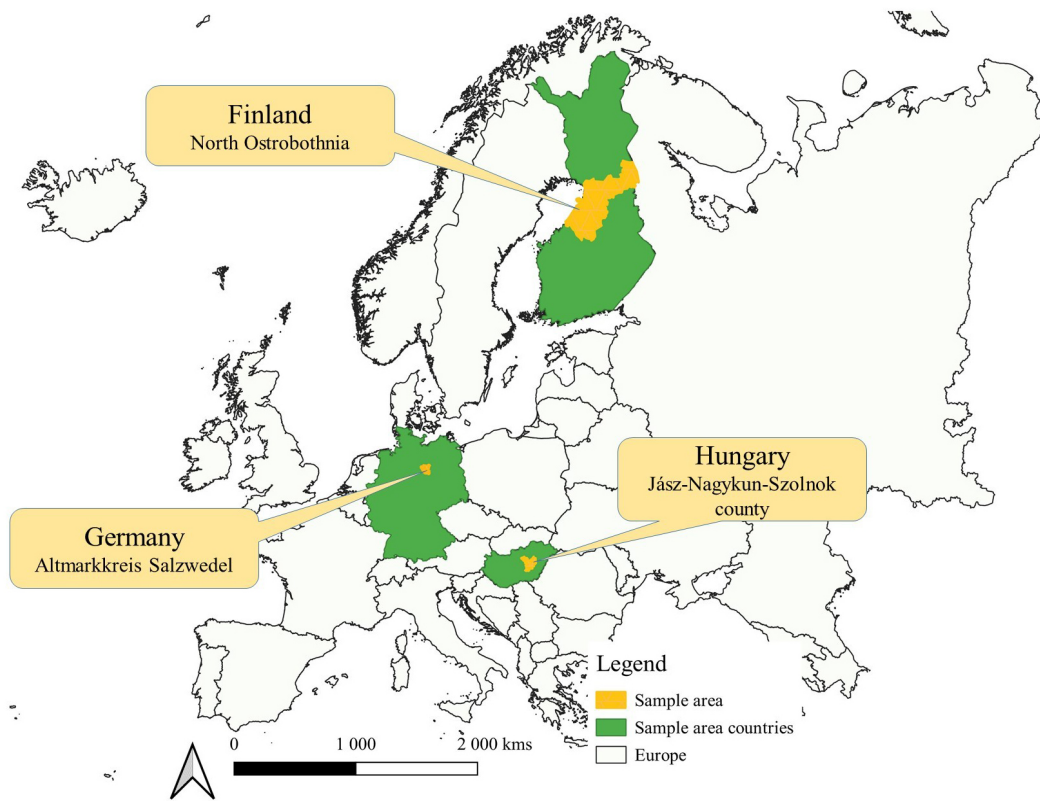
Region	Population (person)	Area (km ²)	Population density (person/km ²)	GDP compared to the national average	R&D&I expenditure as a % of GDP	Economic density (M Euro/km ²)	Migration difference (‰)
Jász-Nagykun-Szolnok County (HU)	347,200	5,581.71	69.0	64.3%	0.34%	0.260	- 6.4‰
North Ostrobothnia (FI)	412,727	37,149	11.1	93.5%	3.3%	0.068	+3.5‰
Altmarkkreis Salzwedel (DE)	83,236	2,294.6	36.3	78.2%	1.15%	0.184	-2.8‰

Source: Hungarian Central Statistical Office 2025, Statistics Finland 2025, Baden-Württemberg State Statistical Office 2025

The territorial and demographic changes that have occurred throughout history were not examined in this study; the talents analysed were considered at the currently valid NUTS3 level. All three research areas are characterized by a rural, peripheral location. In social sciences and geography, the term *periphery* refers to areas that are economically, socially, and infrastructurally less developed and are dependent on more advanced central regions. Thus, the concept of periphery does not refer solely to geographical location but also reflects the level of economic and social development and the

relationship to the centre. In this study, we treat it as evidence that no general agreement exists on the interpretation of territorial development versus backwardness, and that the concept carries a social value component that varies across space and time (Egri, 2024).

Figure 1. Presentation of the Sample Areas



The largest settlement in the Hungarian sample area, Jász-Nagykun-Szolnok County, is the county seat, Szolnok, which ranks as the 12th most populous settlement in Hungary (Hungarian Central Statistical Office, 2025). However, the county has experienced a continuous population decline since 1990. The county comprises a total of 78 settlements, of which 22 hold urban status. In 2024, the population density of the county is 69 people/km². Population decline is a pervasive feature of these settlements, generally reflected in a negative migration balance, with the majority of emigrants belonging to the 15–39 age group. Nevertheless, our previous research indicates that the Jász-Nagykun-Szolnok area is outstanding in terms of the number of talents (Mátyás, 2021; Kovács et al., 2025; Mátyás et al., 2024).

For the Finnish sample area, the focus was on the rural, peripheral region of North Ostrobothnia, which includes the city of Oulu. North Ostrobothnia is sparsely populated. While the growing population of Oulu serves as a significant migration destination—further augmented by the 2013 merger of Oulu with several surrounding municipalities (Haukipudas, Kiiminki, Oulunsalo, Yli-Ii), which substantially increased the urban population (ouka.fi)—the remainder of the region faces aging and depopulation.

In the German sample area, the Altmarkkreis Salzwedel region is the least densely populated district in Saxony-Anhalt (36 inhabitants/km²) and the second least densely populated district in

Germany (only the Prignitz area in Brandenburg is slightly less densely populated, with 35 inhabitants/km²). Since 1990, the region has experienced a continuous population decline. The regional reform implemented on 1 July 1994 established the Altmarkkreis Salzwedel, comprising the municipalities of Arendsee, Gardelegen, Kalbe, Klötze, and Salzwedel—which together encompass 99 smaller municipalities—and the Beetzendorf-Diesdorf municipal association.

When comparing the three peripheral regions, significant differences emerge in demographic, economic, and talent-related indicators. It is important to note that our results clearly demonstrate the strong attractiveness of Oulu both within the region and beyond, and that its central role strongly shapes the distribution of talent compared to the peripheral areas. From this perspective, the three regions differ to such an extent that straightforward comparability of results is limited, anticipating the emergence of significant differences during analysis.

A fundamental question is who can be considered a talent and what makes someone's life's work outstanding. In some cases, this is clear—for example, individuals who have received the most prestigious scientific awards, such as the Nobel Prize. In other cases, identifying an objective measure that defines what makes a person's life's work outstanding is more difficult. In the authors' interpretation—contrasting with talent considered “merely” a promise—a *talent* is an individual who has already developed their abilities, continuously enhanced their skills, and benefited from suitable circumstances. Their achievements are mostly recognized at the international level (Hancock et al., 2022).

For the compilation of the research sample, the authors drew on multiple secondary sources. They explored professional book databases (Mátyás, 2021), as well as scientific and university websites, journals, and professional books. Cultural organizations were also contacted to recommend outstanding talents. During the research, fifty individuals with remarkable oeuvres were examined in each region, their biographical data analysed, and conclusions drawn from these analyses. Overall, the sample for all three countries was constructed through the authors' background knowledge, previous studies, online databases, and contacts with cultural and scientific organizations. The results of these collections by region are summarized in Table 3.

Table 3. Talents of the Sample Areas (~1700 – ~2000)

Area of activity	Talents of Jász-Nagykun-Szolnok County	Talents of North Ostrobothnia	Talents of Altmarkkreis Salzwedel
Humanities	7	9	20
Natural Sciences	12	4	11
Sport	12	10	9
Arts	12	14	9
Other	7	13	1

Source: Own editing

Among the statistical methods, we used the Pearson correlation coefficient, which allowed us to determine the direction and strength of the linear relationship between two variables. If the correlation

value is 1, the relationship between the two variables represents perfect linear proportionality. If it is 0, there is no relationship between the two variables; they are independent. If it is -1 , the two variables are also perfectly aligned, but the nature of the relationship is inversely proportional. Pearson's correlation was applied to examine the relationships between the year of birth and fields of talent, as well as between the success locations of talents and the capital city. One of the classical assumptions of Pearson's correlation is normality, although its violation does not necessarily preclude analysis. However, when normality is not met—as was the case in our samples—it is advisable to apply more robust, non-parametric correlation tests. For this reason, we employed the Kruskal–Wallis test. The aim was to statistically demonstrate significant differences between the medians of regions or fields of activity. Since the data did not always follow a normal distribution, the classical analysis of variance (ANOVA) would not have been reliable. (In our research, we used Pearson's correlation primarily for exploratory purposes—to map the linear relationship between variables—and we acknowledge that Spearman's nonparametric rank correlation is a more suitable method when the measured data are ordinal or non-normally distributed. In future research, we intend to integrate Spearman's rank correlation alongside the chi-square test and contingency coefficient, which will further enhance the relevance and methodological soundness of the analyses.)

The Kruskal–Wallis test is designed to compare samples from three or more independent groups (in our case, regions or areas of activity). These samples represent measurements of the same dependent variable across several groups. The test assumes that the samples are non-normally distributed, and the dependent (tested) variable must be measured on either a metric or an ordinal scale. The Kruskal–Wallis test reveals significant differences between the samples. H_0 : the population medians are equal. H_1 : not all medians are equal. During the analyses, we tested the following hypothesis: H_0 : $p < \alpha$; $p = 0.05$. After collecting the data, we prepared and cleaned the database. Microsoft Office, IBM SPSS Statistics 29, and QGIS 3.24.0 software were used to process, evaluate, and present the results, including their geovisualization.

RESULTS

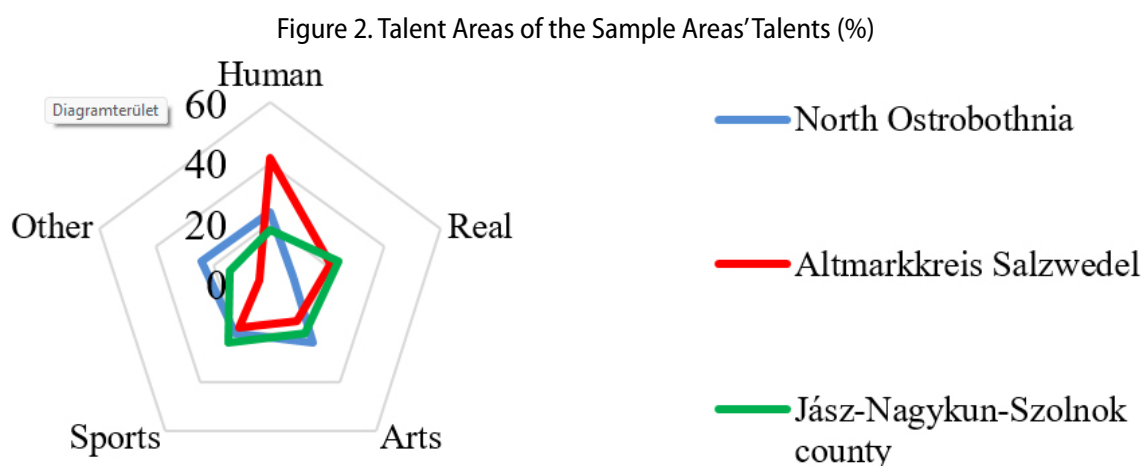
Talent Characteristics and Demographic Distribution

We examined the proportion of women among the analysed individuals by gender: in the case of Hungary, it is 6%; for Germany, 10%; and for Finland, 24%. The Hungarian and German values are almost identical (3 and 5 individuals, respectively), which cannot be considered a statistically significant difference. The relatively low German values may partly be explained by the high number of individuals born in the 18th century or earlier (Germany: 15 individuals; Hungary: 4; Finland: 3), which reflects the fact that Germany (the German principalities and kingdoms) had already been among the scientific centres of Europe for centuries, hosting numerous renowned universities (e.g. Halle, Leipzig, Heidelberg) that provided talented students with opportunities to develop their abilities.

In contrast, neither Finland nor Hungary possessed such an extensive higher education network at that time. Finland was under Swedish and later Russian rule until 1917, while Hungary was under Turkish and German (and later Soviet) occupation.

However, the above-average Finnish values clearly require explanation. Northern European countries have paid great attention to gender equality for more than a century, and various forms of positive discrimination existed in many areas of life, facilitating the advancement of women in science, art, politics, and other fields. This is also clearly visible in the values of the North Ostrobothnia region, where the proportion of women is outstanding.

Individuals were classified into fields of activity based on their occupation and the area in which they achieved outstanding results (Figure 2). These fields were as follows: humanities, natural sciences, sports, art, and other. For individuals who produced exceptional work in several fields, classification was based on the domain in which they created more enduring achievements (e.g. a clergyman whose literary work was more significant than his ecclesiastical activity was classified in the art category).



Source: Own editing

In the case of the humanities, the Hungarian and Finnish values are similar (18–24%), while the German value is exceptionally high (42%). This can be explained by the fact that, as a result of the Reformation in the German-speaking regions, there were already many renowned legal scholars and church figures centuries ago. Furthermore, in the 17th and 18th centuries, the natural sciences were still in their “revival” phase, and the field of sports did not yet exist; therefore, the humanities had a greater number of representatives.

In the case of the natural sciences, the highest rate is found in Hungary (24%) (Finland: 8%, Germany: 21%). The difference between the Hungarian and German values is almost negligible. Regarding the low Finnish value, it can be concluded that the proportion of representatives in the scientific field became below average as a result of Finland’s delayed social and economic development.

The proportions in the field of sports are nearly the same (Hungary: 24%, Finland: 20%, Germany: 18%). In all three countries, physical culture plays an important role in social life and community

formation. This is also clearly reflected in the number of Olympic gold medals per one million inhabitants—the values for Hungary and Finland rank among the highest in the world.

In the field of art, no sharp differences can be observed either (Hungary: 20%, Finland: 24%, Germany: 15%). Social welfare enables people to allocate resources to areas that are not directly economically “productive,” such as art. The difference between Germany and Hungary may appear to contradict this statement, since the German regions have been characterized by greater economic prosperity for centuries. In this case, however, the difference can likely be explained by the relatively small sample size; in a larger dataset, the German regions would presumably yield a higher value.

The “other” category included individuals who could not be classified in any of the four main fields—such as businesspeople, soldiers, politicians, and others. The Hungarian (14%) value can be considered relatively low, the German (4%) value very low, while the Finnish value is exceptionally high (24%). The North Ostrobothnia region has produced an above-average number of political figures, including two prime ministers, three presidents of the republic, one speaker of parliament, and numerous ministers and military leaders. The outstanding political representation of the North Ostrobothnia region results from Finnish political traditions, the agrarian social structure of the region, and political practices aimed at maintaining regional balance.

Among the limitations of our research, it should be noted that the identified differences are explained not only by the regional context and the specific core area under study but also—often more strongly—by general trends characteristic of the entire country. The reasons for this can be summarized as follows:

The social and economic processes of peripheral and rural regions are highly complex and cannot always be clearly distinguished from broader national dynamics. It is therefore both essential and scientifically justified to take national trends into account, as local processes are frequently embedded in, or a consequence of, national developments.

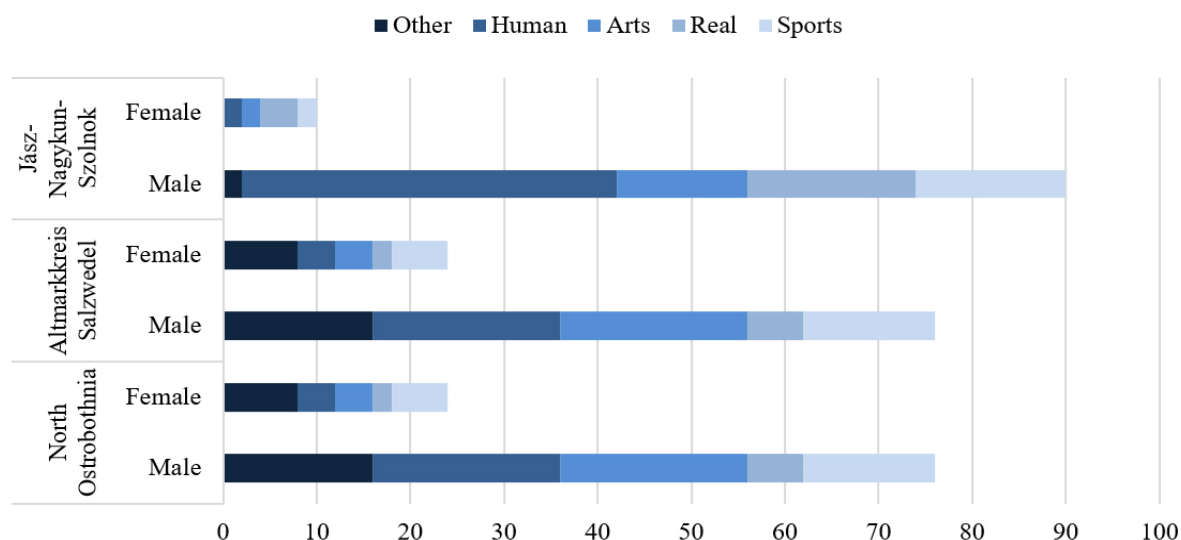
The article relies on available data sources and statistical analyses, which do not always permit a detailed exploration of every local characteristic. As a result, reference to broader national trends is, in part, necessary for demonstrating and interpreting correlations. The specific effects of local economic and social factors are included within the “other” category, ensuring that local characteristics are not overlooked.

The article adopts a complex historical and geographical perspective, which, as an initial step, enables the analysis of national trends. More in-depth local analyses are envisaged as the focus of future research. In Figure 3, we examined the gender ratio by field of activity.

It can be observed that there is a close parallel between Hungary and Finland. Men showed a strong interest in the humanities and the arts (20–20 percentage points), while these values are significantly lower among women, indicating an unbalanced interest profile. In Germany, men display a pronounced preference for the humanities (40%), whereas women show low values across all categories, with only a slight interest in the natural sciences (4%). Based on these data, it can be concluded that the

spectrum of interests among men is broader and more intense, while among women—particularly in Germany—interest is lower and concentrated in a narrower range of fields.

Figure 3. Gender Distribution by Area of Activity (%)



Source: Own editing

A correlation analysis was performed, and no significant relationship was found between gender and field of study ($r = 0.097$), i.e. the relationship between the two variables cannot be statistically demonstrated ($p = 0.237$).

The next area of analysis concerns the period of birth. The birth dates of the analysed individuals were divided into four periods: the 18th century (and earlier), the 19th century, the first half of the 20th century, and the second half of the 20th century. Based on these periods, we can state that for persons born in the 18th century and earlier, the Hungarian (8%) and Finnish (6%) values are almost identical, while the German value is several times higher (30%). This large difference is a consequence of the early German social and economic development discussed in detail above. In the case of the 19th century, the values become nearly identical (Hungary: 24%, Finland: 28%, Germany: 28%). Based on the data for the first half of the 20th century, the Hungarian percentage is the highest (46%), followed by the Finnish (36%) and German (22%) values. The reason for the lower German value must be sought primarily in the earlier period, which covered a longer time interval. In the second half of the 20th century, the highest proportion of individuals were born in Finland (30%), followed by Hungary (22%) and Germany (20%). The high Finnish value can be attributed to the post–World War II economic boom in Finland, which produced many internationally successful Finnish individuals.

We used Pearson's correlation to examine whether there is a relationship between birth date and field of talent. Our results ($r = 0.163$, $p = 0.047 \rightarrow$ significant at the 0.05 level) show that, on average, there are older participants in the humanities and natural sciences, while younger talents tend to be found in the arts, sports, and other fields. It should be noted that since the field of talent is not a continuous variable, Pearson's correlation is not the most suitable method for this type of analysis.

Therefore, we also performed a non-parametric test (Kruskal–Wallis), yielding the following result: $H = 33.03$, $p = 0.00000118$. The age (i.e. year of birth) of individuals belonging to different fields (e.g. humanities, natural sciences, arts, sports, other) differs significantly on average or by median. Those classified in the field of sports were, on average, younger (i.e. had higher years of birth), while those classified in the humanities or arts were older (i.e. had lower years of birth). The “other” group comprised individuals of very mixed ages.

Geographic Origin, Mobility, and Educational Background

Place of birth is one of the most important indicators in this research, as it reflects the extent to which a given area is able to retain and attract talent. In Jász-Nagykun-Szolnok County, 4 individuals (8%) were not born in the studied area. The county’s natives were born in 18 settlements, most of them in Szolnok (the county seat) (12 people), Karcag and Túrkeve (5 people each), and Jászberény (4 people).

Of the talented individuals in the North Ostrobothnia region, 1 person was born abroad, and 16 people (32%) were not born in the region. Most of the Finnish talents (10 people) were born in the regional centre, Oulu. The city of Nivala is also notable, with 8 individuals born there. This clearly shows that the Finnish region had a stronger capacity to attract talents than the Hungarian area.

In the German district of Altmarkkreis Salzwedel, the exact place of birth could not be determined for 1 person. A total of 42 individuals (84%) were born within the region, across eight settlements. This indicates a relative concentration—that is, they were born in relatively few settlements of the area. No one was born abroad. Most of the analysed individuals were born in the settlements of Gardelegen (19 people) and Salzwedel (13 people). Based on these data, we can conclude that the Hungarian values are the highest, which indicates that although the area has historically produced many talented individuals, its ability to retain talent is below average.

In addition to birth data, information on deaths can also serve as an informative indicator—especially the place of death, which shows how many individuals remained in, and how many left, their birthplace. If talented individuals migrate and die elsewhere, it implies that their birthplace did not provide sufficient opportunities, thereby depleting the local region of human capital while enriching the destination area. The date of death provides less relevant information than the place of death, but it is still worth examining.

In the Hungarian and Finnish regions, the number of individuals who died in or before the 18th century is low (Hungary: 1 person; Finland: 0), which can be explained by social, economic, and political factors. In contrast, the German value is higher (9 people), for reasons detailed earlier. A significant difference can also be observed in the number of individuals still alive at the time of the research: the proportion is lowest in Germany (6%), 22% in Hungary, and 40% in Finland.

Regarding place of death, the number and proportion of deaths are lowest in Jász-Nagykun-Szolnok County: only 4 people (8%) of local talents died within the county. Unfortunately, this clearly indicates the region’s persistent challenges—its weak talent retention capacity and high rate of emigration.

Sixteen percent of those born here died abroad, and 44% in Budapest (22 people), meaning that the capital's share is exceptionally high compared to overall Hungarian values. Hungary's scientific, economic, and artistic life is highly monocentric, with the capital serving as the unavoidable stage in the career of Hungarian talents (Győri, 2011). Moreover, many talented individuals not only worked but also died in Budapest.

The Finnish region presents a much more favourable picture. In contrast to the Hungarian case, only 3 individuals (6%) died abroad, and “only” 32% died in the capital. The analysis of the German region is made more difficult by the fact that for 6 individuals, the place of death could not be determined. Based on the available data, no one died abroad, which demonstrates the ability of the region—and the German-speaking area more broadly—to retain talent. Even if a smaller region (such as Altmarkkreis Salzwedel) cannot offer sufficient opportunities for talent development, other parts of the country can, meaning that individuals with outstanding abilities do not need to leave their homeland. Three people died within the region. The role of individual settlements within the settlement hierarchy is clearly illustrated by the relatively even distribution of deaths across German cities. Although the highest number of deaths occurred in Berlin (5 people), this does not represent a disproportionate concentration compared to other municipalities (those with at least two deaths were Borken /2/, Munich /2/, and Salzwedel /2/).

For individuals with above-average achievements, the analysis of career stages provides the most sensitive indicator of mobility and the retaining capacity of their region of origin. In this research, a career stage was defined as any location where an individual spent at least three months after completing higher education (or, for those without a degree, after secondary school).

Among the three nations, Hungarians display the greatest mobility. The reasons can be found partly in the factors mentioned above and partly in the long-standing absence of institutions in Jász-Nagykun-Szolnok County offering nationally or internationally competitive higher education. Consequently, individuals with above-average abilities had to leave the county to pursue their studies elsewhere. The limited number of scientific institutions (only one agricultural research centre in Karcag) also hindered return migration, as graduates had few opportunities to conduct research locally. A higher education institution was founded in the county seat, Szolnok, in 1979, but it provided only economically oriented college-level education (BSc) and did not substitute for natural or social science research institutions. The Jászberény Teacher Training College, established in 1917, likewise failed to bring real dynamism to the county's talent development.

Hungarians visited 19 countries, accumulating a total of 49 foreign career stages. This figure was 16 for Finns and only 11 for Germans. The classic destinations for Hungarian émigré intellectuals were German-speaking countries, where a total of 13 individuals spent time (Germany: 9 people; Austria: 4). For Finland, the most prominent destinations were the United States (5 people) and Sweden (3 people). In the latter case, geographical proximity and economic disparities have long made Sweden an attractive destination for Finnish talent (a total of 22 foreign career stages). The Finnish value is also raised by the Nobel Prize-winning President of the Republic, Martti Ahtisaari, who served as a diplomat in six countries. In Germany's case, there were no such distinguished “destinations”; for



example, only one person worked in the USA, and the United Kingdom was the only country that served as a career stage for at least two individuals (11 foreign career stages).

In the Hungarian region, 23 settlements and 85 domestic career stages were recorded. Budapest stands out, with 38 individuals (76%) spending part of their career there. Following the capital, Szolnok (7 people), Debrecen (5), Kolozsvár/Cluj (5), and Szeged (5) were the most common domestic career locations. The dominance of the capital is striking—more than three-quarters of the analysed individuals were connected to Budapest during their careers. Of the settlements within the region, only four could be registered as career stages (11 people).

In the North Ostrobothnia region, 28 Finnish settlements and 77 domestic career stages were recorded, a figure almost identical to that of Hungary. However, a notable difference is that the capital plays a smaller role (appearing in the careers of only 28 individuals), while the regional centre has greater significance (Oulu: 11 individuals). The former capital, Turku, appeared as a career stage for 6 individuals, while Tampere was reported for 5. The region's stronger talent retention capacity is clearly demonstrated by the fact that—compared to Jász-Nagykun-Szolnok County—22 talents had career stages in 7 local settlements.

The Altmarkkreis Salzwedel district displays the most favourable data. Thirteen regional career stages were identified, and the analysed individuals had careers in 58 German municipalities, accounting for a total of 100 domestic career stages. This indicator perhaps best illustrates the positive alternatives that Germany can offer its talented individuals. The most career stages were recorded in Berlin (15), Magdeburg (9), Salzwedel (6), Halle (4), and Dresden (3). It should be noted, however, that Salzwedel—being a significantly smaller municipality—hosts fewer career stages than the Hungarian or Finnish regional centres.

We used Pearson's correlation to examine how the success locations of talented individuals are related to the capitals, which serve as the political, economic, cultural, and scientific centres (Table 4). Only in the Hungarian sample does a very weak relationship appear, indicating that a higher proportion of Hungarian talents were successful in the capital, Budapest. However, the relationship is not statistically significant, meaning there is no evidence that this positive association is non-random.

Table 4. The importance of Talent Success Sites Related to the Capital

	North Ostrobothnia	Altmarkkreis-Salzwedel	Jász-Nagykun-Szolnok
Pearson correlation	-0,01	-0,199	0,215
Sig. (2-tailed)	0,942	0,166	0,133

Source: Own editing

From the point of view of talent retention, the existence of educational institutions is “a matter of life and death.” Without them, talents either become lost (i.e. they fail to develop their potential) or leave their homeland. In the case of secondary educational institutions, data were not available for all individuals, especially for those born in the 19th century or earlier. There is practically no difference between the three countries in terms of local secondary schools, as almost the same number of the

studied talents (16–18–18) attended local institutions. The same applies to secondary school graduates from abroad, as the proportion of those who graduated abroad is negligible in all three countries (1–1–0).

The dividing line is higher education: where there is no higher education institution (or one that does not offer a competitive alternative in the given historical period), retaining and later attracting talented young people appears almost hopeless.

There are two higher education institutions in Jász-Nagykun-Szolnok County (Szolnok and Jászberény), the former mainly offering economics-related programmes, while the latter provides pedagogical training. None of the individuals surveyed graduated from these two colleges; 34 obtained their degrees from Hungarian universities, and 8 from foreign universities. In the centre of the North Ostrobothnia region, Oulu, there is a wide range of higher education opportunities, offering a viable alternative to other Finnish universities. Eight individuals attended the University of Oulu during their studies, and 19 studied at other Finnish universities, mostly at the University of Helsinki. Seven individuals studied at foreign higher education institutions, which is almost identical to the Hungarian figure.

There is also no higher education institution in the Altmarkkreis Salzwedel district, but Germany is rich in universities and colleges; the individuals surveyed studied at 44 German universities located in a total of 19 cities. Only 3 individuals studied abroad. The most attractive destinations were Berlin (12 people), Halle (10 people) and Leipzig (3 people).

Talent Distribution and Regional Contexts: Interpretation of the Findings

RQ1: What differences can be observed in the distribution of talents by activity area in the three peripheral regions, and how are these differences related to the socio-economic and educational characteristics of the regions?

Statistically significant differences can be observed between the fields of activity of talents (Kruskal–Wallis test: $p = 0.00000118$), and these are closely related to the socio-economic history of the regions:

- Jász-Nagykun-Szolnok: The highest proportions of individuals who made a lasting impact are found in the fields of science (24%) and sport (24%). This is partly due to the development of education in the 20th century and partly to the social role of sport. The proportion in the humanities is lower.
- Altmarkkreis Salzwedel: The dominance of the humanities (42%) can be observed, which stems from the region's historical ecclesiastical and scientific traditions, particularly its proximity to the 18th-century German educational and religious centres (Halle, Leipzig, etc.).
- North Ostrobothnia: Presents a more balanced picture, but the “other” category (24%) stands out, including many politicians, presidents of the republic, and ministers. This clearly reflects the openness of Finnish social mobility and the strength of its state institutional system. The high female participation (24%) is also a result of Scandinavian gender equality policies.



Connection to the characteristics of the regions:

- A more developed educational infrastructure (e.g. the University of Oulu) and historical elite training traditions (Germany) are related to the types of talents that could develop.
- Where these were lacking (e.g. higher education developed late in Jász-Nagykun-Szolnok), many talents migrated, and the range of activity areas became narrower.

RQ2: What is the relationship between the ability of regions to retain and attract talent and the mobility patterns of talent?

Significant differences can be identified in talent retention and attraction capacities:

- Jász-Nagykun-Szolnok: Very low talent retention (only 8% died in the region), with 44% of talents dying in Budapest, demonstrating the capital's strong pull effect. Due to the limited higher education opportunities, mobility pressure was high.
- Altmarkkreis Salzwedel: 84% were born in the region, and no one died abroad. The mobility of talents within the country is high, but international migration is minimal—the German university network provided suitable opportunities for talented individuals.
- North Ostrobothnia: Exhibits the best balance between retention and mobility. Although 32% of talents were not born in the region, only 6% died abroad. The University of Oulu and the decentralized education system contributed to the region's strong talent retention.

Scientific proof of H1:

“Regions with historically more developed social and (higher) educational infrastructure are more likely to retain and attract talent...” Proven. Finland (especially Oulu) and Germany (through their national higher education network) demonstrate higher retention and attraction rates, while Jász-Nagykun-Szolnok shows significant emigration and low return rates.

Scientific proof of H2:

“The distribution of talent areas of activity shows statistically significant differences among regions...” Proven. Based on the Kruskal–Wallis test, there are significant differences in the distribution of activity areas ($p < 0.001$), which correspond to the historical-economic structures of the regions (e.g. German dominance in the humanities, Finnish predominance in politics, and Hungarian predominance in the natural sciences and sports).

Regional Talent Dynamics: Quantitative Overview

To clarify the application of the Kruskal–Wallis test: the categorical variable in our analysis was the field of activity (humanities, natural sciences, arts, sports, and other), while the continuous variable was the year of birth. The test compared the medians of birth years across activity categories to examine whether the emergence of talent types followed distinct historical and socio-economic trajectories. The result ($H = 33.03$, $p = 0.00000118$) confirmed statistically significant differences between the groups, substantiating that the development of talent fields was strongly influenced

by temporal and infrastructural factors. To quantify the retention and attraction capacities of the examined regions, we constructed a comparative indicator based on the share of locally born and locally deceased individuals within the total sample (Table 5).

Table 5. Talents and Their Place of Birth and Death

Region	Retention (%)	Attraction (%)	Died Abroad (%)	Died in Capital (%)
Jász-Nagykun-Szolnok (HU)	8	4	16	44
North Ostrobothnia (FI)	34	32	6	32
Altmarkkreis Salzwedel (DE)	84	0	0	10

Source: Own editing

The figures clearly highlight regional disparities. Germany demonstrates a high retention rate and negligible international outmigration, owing to its dense national university and research network, which provides internal mobility without a loss of talent abroad. Finland exhibits a balanced pattern, where the regional centre (Oulu) successfully attracts and retains talents despite its peripheral location, thanks to decentralised higher education and a strong welfare infrastructure. Hungary's Jász-Nagykun-Szolnok County, in contrast, shows very low retention and a strong capital orientation, reflecting the monocentric structure of the Hungarian spatial system.

A Talent Retention Ratio (TRR), defined as the proportion of individuals who were both born and died in the same region, further quantifies territorial embeddedness: $TRR_{HU} = 8\%$, $TRR_{FI} = 34\%$, $TRR_{DE} = 84\%$. These values demonstrate the varying regional capacities to preserve human capital and provide a concise quantitative measure of spatial concentration.

CONCLUSIONS

The patterns identified in this study are consistent with previous findings in the field of talent geography. Győri (2011, 2023) emphasised the exceptional centralising role of Budapest in Hungary, a trend our data fully support: almost half of Jász-Nagykun-Szolnok's talents completed or ended their careers in the capital. Wiest and Leibert (2013) similarly described persistent outmigration from East German rural districts, while Sahlberg (2021) demonstrated how Finland's decentralised education model effectively strengthens regional human capital. Our results therefore corroborate the broader theoretical claim that institutional density and educational decentralisation are critical determinants of both talent retention and attraction.

The overrepresentation of real and sport-related fields in Jász-Nagykun-Szolnok County indicates that these forms of talent development are less dependent on local scientific or infrastructural ecosystems and can emerge through individual performance and nationally mediated recognition. Conversely, fields such as the humanities or arts tend to cluster around cultural or academic centres where institutional support is stronger.

To render spatial concentration more tangible, a simple concentration index—the share of individuals both born and deceased in the same settlement—was applied. The resulting values (HU: 8%, FI: 34%, DE: 84%) illustrate clear gradients of regional embeddedness. While talent generation can occur across diverse geographical contexts, its retention depends largely on educational access, local research infrastructure, and the diversity of professional opportunities.

By integrating quantitative indicators and comparative interpretation, these additions strengthen the explanatory link between socio-economic structure and talent geography, enhancing the empirical grounding of our conclusions.

The study of the geographical distribution and flow of talents has always been important historically, and it has become increasingly decisive in the 21st century. Based on our findings, the geographical distribution and mobility patterns of talents are closely related to the historical socio-economic development, educational infrastructure, and historical characteristics of the regions. The example of the North Ostrobothnia region clearly shows that a strong regional centre (Oulu) can compensate for peripheral disadvantages. The proportion of women in the Finnish region is also much higher than in the other two areas, reflecting long-standing institutional support for gender equality.

In the German region, the role of historical heritage—especially 18th-century scientific and church centres—should be highlighted, while in Jász-Nagykun-Szolnok, the concentration of talents in the capital and the shortcomings of educational infrastructure appear to be critical factors. The high proportion of talents originating from the Hungarian region shows that the area has potentially high human capital, but emigration—especially toward Budapest—is prominent, which may further hinder regional development in the long term. The overrepresentation of sports and real-science fields in the Hungarian region suggests that these types of talent are less dependent on local scientific-infrastructure support.

The results of the Kruskal–Wallis test confirm a significant relationship between the field of activity and the period of birth, highlighting the effect of changing social contexts. Of the regions examined, Germany shows the highest talent retention rate, while Hungary exhibits the greatest willingness to move. Accordingly, fewer talents died abroad or in other countries in Germany, whereas in Hungary, the prominent role of Budapest underscores the capital’s centralizing effect.

One of the main goals of the research is not only to compare the examined regions relative to each other but also to assess the national significance of their talent output. While a full nationwide comparison exceeds the scope of this study, certain indicators—such as the number of Olympic gold medals—allow a relative evaluation. The German region is associated with 1 medal (1 individual), the Finnish region with 7 medals (4 individuals), and the Hungarian region with 20 medals (11 individuals).

Considering the region’s share of the national population and the ratio of gold medals linked to the region relative to the total national medal count, the following conclusions emerge:

- The Altmarkkreis Salzwedel region, with only one gold medal (0.33% of Germany’s total) but a small population (0.09% of Germany’s population), shows the highest talent density relative to population size.

- The Hungarian county of Jász-Nagykun-Szolnok ranks second, as the proportion of gold medals exceeds more than three times its share of the national population.
- The Finnish region, despite 7 gold medals, has a medal ratio below its share of the national population (7.3% vs. 4.79%).

Based on these data, the talent output of the Hungarian and German regions, in terms of Olympic gold medals, can be considered outstanding at the national level.

This study, based on a historical-geographical approach, demonstrates that the talent geography of peripheral regions depends heavily on historical, social, and economic contexts, as well as on educational and scientific infrastructure. The results indicate that the territorial distribution of talents is not solely a consequence of demographic or geographical factors, but must be interpreted within the broader context of social organization, educational policy, and national identity.

The example of North Ostrobothnia shows that a decentralized, well-functioning regional knowledge centre can retain and develop talents. In Germany, a nationally developed educational network allows talents to remain in the country even if the region of origin cannot offer adequate opportunities. In contrast, Jász-Nagykun-Szolnok exhibits significant brain drain due to educational shortcomings and the dominance of Budapest, which may exacerbate the region's historical disadvantages in the long term.

The research confirms that retaining talent requires targeted educational policy and economic development interventions at the regional level, especially in areas lacking competitive higher education centres. Our study contributes to the scientific profession by providing a toolkit for historical comparative talent geography, shedding light on talent production and retention, gender ratios, and professional and spatial mobility in peripheral European regions—including Jász-Nagykun-Szolnok County, North Ostrobothnia, and Altmarkkreis Salzwedel. By examining historical, social, and economic drivers behind interregional differences, this research enhances understanding of territorial inequalities in talent distribution and may inform future regional talent policy strategies. Additionally, by analysing gender differences, professional divisions, and mobility patterns, it contributes to research at the intersection of history of science, social geography, and educational policy.

The scientific novelty of this study lies in the comparison of three regions representing distinct structural and institutional approaches to peripheral challenges. Altmarkkreis Salzwedel, at the intersection of former East Germany and reunified Germany, is affected by strong economic shocks and is seeking ways to retain talent. Jász-Nagykun-Szolnok County exemplifies the Hungarian inner periphery, where continuous migration of talents to the central agglomeration hinders regional convergence. North Ostrobothnia, as a case of the Scandinavian welfare model, demonstrates how targeted educational and regional development policies—particularly technological development in Oulu—can mitigate peripheral disadvantages and foster a regional innovation centre. This comparative approach not only documents the phenomenon of brain drain but also provides valuable lessons on best practices in talent management across different socio-economic systems.

REFERENCES

- Baden-Württemberg State Statistical Office. (2025). „Startseite.”, Statistikportal.de. <https://www.statistikportal.de/de>
- Bárczi, G., & Országh, L. (Eds.). (1959–1962). *A magyar nyelv értelmező szótára* [The explanatory dictionary of the Hungarian language]. Akadémiai Kiadó. <https://mek.oszk.hu/adatbazis/magyar-nyelvertelmezo-szotara>
- Blurton, C. (1983). Science talent: The elusive gift. *School Science and Mathematics*, 83(8), 654–664. <https://doi.org/10.1111/j.1949-8594.1983.tb10155.x>
- Cervantes, M., & Goldstein, A. (2008). Talent mobility in the global economy: Europe as a destination. In M. Beine, M. F. Docquier, & H. Rapoport (Eds.), *The international mobility of talent: Types, causes, and development impact* (pp. 298–337). Oxford University Press.
- Comunian, R., England, L., Faggian, A., & Mellander, C. (2021). *The economics of talent: Human capital, precarity and the creative economy*. Springer Nature.
- Egri, Z. (2024). Bezáródás a perifériára – A hazai társadalmi-gazdasági elmaradottság tartós térbeli fennmaradása, 1960–2020 [Peripheral Entrapment—The Persistent Spatial Continuity of Socio-economic Backwardness in Hungary, 1960–2020]. *Területi Statisztika*, 64(2), 177–211. <https://doi.org/10.15196/TS640203>
- Florida, R. (2002). The economic geography of talent. *Annals of the Association of American Geographers*, 92(4), 743–755.
- Győri, F. (2004). „Pályakezdő” tudományos tehetségek területi eloszlásának jellemzői Magyarországon alföldi aspektusból [Spatial distribution patterns of early-career scientific talents in Hungary: A Great Plain perspective]. In G. Barton & G. Dormány (Eds.), *A magyar földrajz kurrens eredményei: II. Magyar Földrajzi Konferencia / Táj, tér, tervezés: Geográfus Doktoranduszok VIII. Országos Konferenciája* (pp. 558–574).
- Győri, F. (2023). A Tóth József témavezetésével PhD-fokozatot szerzett tanítványok – a földrajz talentumai, avagy a talentumok földrajza [Students who earned PhD degrees under the supervision of József Tóth—The talents of geography, or the geography of talents]. *Modern Geográfia*, 18(4), 23–40. <https://doi.org/10.15170/MG.2023.18.04.04>
- Győri, F. (2011). *Tehetségföldrajz: Magyarországi vizsgálatok* [Talent geography: Studies from Hungary]. Egyesület Közép-Európa Kutatására.
- Győri, F. (2015). Mérlegen az Alföld talentumai – tehetségföldrajzi modellek lexikonadatok alapján [The talents of the Great Plain on balance—Talent geography models based on lexicon data]. In Tésits, R.; Alpek, B. L. (Eds.), *A mi geográfiánk: Tóth József emlékezete* (pp. 83–95). Publikon Kiadó.

- Gu, H., Wang, J., & Ling, Y. (2024). Economic geography of talent migration and agglomeration in China: A Dual-driver framework. *China Economic Review*, 86, 102180. <https://doi.org/10.1016/j.chieco.2024.102180>
- Hancock, D. J., Vierimaa, M., & Newmann, A. (2022). The geography of talent development. *Frontiers in Sports and Active Living*. <https://www.frontiersin.org/articles/10.3389/fspor.2022.1031227/full>
- Hungarian Central Statistical Office. (2025). *Annual settlement statistics in the 2024 settlement structure*. Hungarian Central Statistical Office.
- Kovács, T., Vasvári, M., & Mátyás, Sz. (2025). Exploring talent geography in an underdeveloped Hungarian region. *Ecocycles*, 11(1), 59–73.
- Kurucz, L. (2021). *Milyen jövő vár rájuk? A Jász-Nagykun-Szolnok megyei települések helyzetelemzése a fejlesztési dokumentumok alapján* [What future awaits them? An analysis of settlements in Jász-Nagykun-Szolnok County based on development documents]. <https://dea.lib.unideb.hu/items/4c814934-c31d-47d9-a6d6-74a3e01069dd>
- Lee, N. (2017). Psychology and the geography of innovation. *Economic Geography*, 93(2), 106–130. <https://doi.org/10.1080/00130095.2016.1249845>
- Luonila, M., Renko, V., Ruusuvirta, M., & Sokka, S. (2024). *Towards Oulu2026 – European Capital of Culture*. Center for Cultural Policy Research Cupore. <https://www.cupore.fi/en/publications/towards-oulu2026-european-capital-of-culture-2/>
- MacRaild, J. (2011). Confucianism and its impact on talent development [A review and discussion of key themes in the development of talent arising from Chua, A. (2011), *Battle Hymn of the Tiger Mother*]. *TalentEd*, 27(1), 68–74.
- Malinen, P., & Lyytikäinen, V. (1969). National Analysis: Finland. *International Review of Education*, 15(2), 154–162.
- Mann, D. L., Dehghansai, N., & Baker, J. (2017). Searching for the elusive gift: Advances in talent identification in sport. *Current Opinion in Psychology*, 16, 128–133. <https://doi.org/10.1016/j.copsyc.2017.04.016>
- Mátyás, Sz. (2021). *A Kárpát-medence talentumföldrajza* [The talent geography of the Carpathian Basin]. Mátyás Szabolcs és Társa.
- Mátyás, Sz., Birtók, V., Vasvári, M., & Kovács, T. (2024). Talentumföldrajzi kutatások egy belső perifériás magyar régióban – nagykunsági esettanulmány [Talent geography research in an inner periphery of Hungary – A case study from the Nagykovács Region]. *Tér és Társadalom*, 38(3), 118–139.
- Prange, C. (2013). The „Altmark” as a low developed touristic region in Germany. In *Актуальные проблемы гуманитарных наук* [Aktualnye problemy gumanitarnykh nauk] (pp. 92–93). <https://www.elibrary.ru/item.asp?id=20385745>

- Sahlberg, P. (2021). *Finnish Lessons 3.0: What Can the World Learn from Educational Change in Finland?* Teachers College Press.
- Siljander, P. (2017). School in Transition: The Case of Finland. In *Schools in Transition: Linking Past, Present, and Future in Educational Practice* (pp. 191–212). SensePublishers.
- Statistics Finland (2025). *Population structure 2024*. Statistics Finland. <https://stat.fi/en/publication/cl8lprraorrr20dut5a0tywm5>
- Ulrich, D., & Smallwood, N. (2012). What is Talent? *Leader to Leader*, 2012(63), 55–61. <https://doi.org/10.1002/ltl.20011>
- Velkey, G. (2019). A térbeli-társadalmi egyenlőtlenségek és újratermelésük az alapfokú oktatás hazai rendszerében [Spatial and social inequalities and their reproduction in the primary education system of Hungary]. *Tér és Társadalom*, 33(4), 104–131. <https://doi.org/10.17649/TET.33.4.3191>
- Wiest, K., & Leibert, T. (2013). Wanderungsmuster junger Frauen im ländlichen Sachsen-Anhalt – Implikationen für zielgruppenorientierte Regionalentwicklungsstrategien [Migration Patterns of Young Women in Rural Saxony-Anhalt—Implications for Target Group-oriented Regional Development Strategies]. *Spatial Research and Planning*, 71(6), 455–469.

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Ridesharing Services in Urban Zimbabwe: Impacts and Challenges

ABSTRACT

Urban mobilities across Sub-Saharan Africa are undergoing a transition and rapid change due to the rise of ridesharing services as part of the expanding sharing economy. The novel contribution of this paper is to examine the impacts and challenges associated with the introduction of ridesharing services in Bulawayo, Zimbabwe's second-largest city. The research draws on 27 semi-structured interviews conducted with drivers and passengers participating in the city's ridesharing economy. Key impacts identified include enhanced accessibility to transport services, job creation, the provision of affordable transport options, a convenient and reliable mode of travel, improved safety and security, and reduced travel times. Nevertheless, important challenges to operating ridesharing services in urban Zimbabwe include weak and unreliable internet connectivity and poor, deteriorated road infrastructure.

Keywords: ridesharing; sharing economy; urban mobility; urban tourism; Zimbabwe

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INTRODUCTION

Over the past decade, there has been major growth in ridesharing platforms within urban transport systems (Ivaldi & Palikot, 2023; Shaikh et al., 2025). These platforms represent an example of the ‘sharing economy’, an innovative business model that encourages rental instead of purchase and facilitates transactions over an interactive digital platform, such as a smartphone application or website (Zhang et al., 2023; Lekgau et al., 2025). Among others, Giddy (2020, p. 113) maintains that the “sharing economy has transformed the travel, tourism and hospitality sectors significantly in recent years”. Geographers have responded actively to this transformation, producing a surge of research exploring various dimensions of the sharing economy (Dudas et al., 2020; Giddy, 2020, 2021; Baum & Giddy, 2021; Frenzel et al., 2022; Giddy, 2022; Carmody et al., 2024; Lekgau et al., 2025; Louw & Nomdo, 2025).

Arguably, ridesharing services—also known as carpooling, on-demand services, ride hailing, and e-hailing, among other terms—have radically reshaped the conventional transportation landscape by integrating digitalisation into driver–passenger interactions (Herjanto et al., 2024; Shabur & Ali, 2024). The ridesharing business involves three main actors: the drivers, the online platform owners, and the passengers (Zhang et al., 2023). The system utilises internet-based technologies to offer a broad range of real-time services to customers (Cselóvszki-Soltész & Zilahy, 2023). Smartphones, mobile payment applications, and other digital technologies enable these sharing platforms to provide diverse and differentiated services to passengers (Jena & Ghadge, 2023). Leading global players in the ridesharing industry include Uber, Didi, Lyft, Ola, TaxiForSure, Grab, BlaBlaCar, and Taxify/Bolt (Baum & Giddy, 2021; Carmody et al., 2024; Cheng et al., 2024; Jena & Ghadge, 2023; Herjanto et al., 2024).

Ridesharing companies are widely recognised for transforming how people in urban areas travel and commute (Lin et al., 2025). In particular, they make it easier for people to live, visit, and work in areas that were previously difficult to access (Norris & Xiong, 2019). With increasing tourism activity in urban areas in the post-pandemic era, ridesharing services have become critical to urban mobility (Radic et al., 2025). Giddy (2019) contends that the tourism and hospitality sectors are the greatest beneficiaries of the rise of e-hailing services. Ridesharing significantly enhances the appeal of urban tourist destinations (Herjanto et al., 2024), including emerging urban tourism hubs in the Global South (Rogerson & Rogerson, 2021). In addition, it enables greater freedom of movement at a reduced cost compared to traditional metered taxis (Giddy, 2020).

Ridesharing companies have significantly influenced the transport marketplace in more than six hundred cities globally (Norris & Xiong, 2023). The sharing economy is most prevalent in Global North contexts, driven largely by flexible pricing models, idle vehicle capacity, and changing consumer preferences and lifestyles. In the African context, ridesharing services are still limited and concentrated in only a few countries (Diallo & Dvořáková, 2024). They began to emerge around 2013, when Uber entered and became dominant in the South African market (Giddy, 2019). Uber has

since expanded into several other African countries, including Nigeria, Kenya, Tanzania, and Uganda (Agyemang, 2020; Ceslik et al., 2020). In addition, a number of indigenous African companies have emerged, including Littlecabs in Kenya, Taxify/Bolt in South Africa, SafeBoda in Uganda, Digital Matatus in Kenya, and Oga Taxi in Nigeria, alongside other international firms such as Uber, Bolt, and InDrive (Banya et al., 2022; Diallo & Dvořáková, 2024; Otieno et al., 2021). Within the context of Sub-Saharan Africa, research interest in ridesharing services has expanded rapidly. Most existing literature focuses on South Africa (Giddy, 2019, 2020, 2021; Carmody et al., 2024; Louw & Nomdo, 2025), with more limited coverage of other African countries (Anwar et al., 2022; Diallo & Dvořáková, 2024; Shereni, 2019; Shereni & Ndhlovu, 2024). While the potential of ridesharing services in African urban destinations is considerable, high levels of urban informality across many countries mean that the challenges and opportunities they present remain only partially understood (Anwar et al., 2023).

The novel contribution of this study is to investigate the impacts and development challenges of ridesharing services in urban Zimbabwe. The sharing economy in Zimbabwe remains in an early growth phase, despite the proliferation of peer-to-peer marketplaces in both the transport and accommodation sectors (Shereni & Ndhlovu, 2024). In 2023, InDrive, an international company headquartered in the United States, began piloting its services in Harare, the national capital of Zimbabwe. InDrive aligns with what Nielsen et al. (2015) identify as organisation-based ridesharing services, in which rides are centred around an organisation and technology plays a crucial role in matching drivers and riders via a third-party internet platform. By 2024, the company had expanded its operations to four Zimbabwean cities, including Bulawayo, the country's second-largest city and the geographical setting for this study. Currently, InDrive is the only company offering ridesharing services in Bulawayo. Population estimates for Bulawayo are contested: official census figures suggest around 650,000 residents, whereas the City Council estimates a population closer to one million (Ngwenya & Moyo, 2024). The findings of this study are relevant to destination managers, urban planners, and policymakers, offering insights into the impacts and policy challenges surrounding ridesharing services in urban environments of the Global South.

LITERATURE REVIEW

Ridesharing services have expanded in popularity and are positively impacting urban destinations worldwide (Cetin, 2017; Herjanto et al., 2024). Their growing popularity is influenced by several advantages, including convenience, flexibility, user-friendliness, and time efficiency (Shabur & Ali, 2024; Shaikh et al., 2025). Users find ridesharing services appealing due to features such as easy booking through mobile apps, real-time tracking, and cashless payments. The ability to access transportation quickly and efficiently, particularly in unfamiliar locations, is a significant advantage of ridesharing services (Giddy, 2022). Ridesharing services allow consumers to have greater control over their transportation options, as they can book rides at any time and from any location, thus increasing their mobility. In addition, ridesharing services can offer cost advantages over traditional

taxis or rental cars, especially for shorter trips or in areas with high taxi fares (Wang & Noland, 2021). The cost-effectiveness of ridesharing services derives from their ability to leverage existing resources rather than build and maintain an entirely new infrastructure, making it more feasible for companies to pass cost-saving benefits to users.

Research has shown that ridesharing can improve transportation access for remote communities, including areas with limited public transport options. In such cases, ridesharing helps bridge transportation gaps and enhance residents' mobility (Norris & Xiong, 2023). By providing a reliable and convenient alternative, ridesharing services enable residents to connect with essential services, employment opportunities, and social activities, thereby fostering social equity and inclusion (Li et al., 2021). Moreover, this can enhance social cohesion by ensuring that people can readily access social services, educational institutions, healthcare facilities, and community centres, fostering a sense of connectedness within the city.

At a societal level, ridesharing services create opportunities for social interactions between drivers and passengers, enabling them to maintain long-term social and economic relationships (Zhang et al., 2023). The social significance of ridesharing services in cities is also reflected in cultural exchange and diversity. Ridesharing brings together people from diverse backgrounds, cultures, and communities. These interactions can promote cultural exchange, understanding, and appreciation, contributing to a more inclusive and diverse urban environment. Furthermore, ridesharing can facilitate community engagement by connecting residents with local businesses, events, and activities. In such social settings, drivers who are familiar with their city's offerings can serve as informal guides, recommending local attractions, restaurants, and events to passengers.

From a sustainability perspective, ridesharing services are said to have a lower environmental impact compared to other modes of transportation (Sofi Dinesh et al., 2021). They reduce the need for tourists to rent cars or rely on private vehicle ownership, leading to reduced traffic congestion and lower carbon emissions. They may also incentivise individuals to reduce reliance on personal vehicles, thereby alleviating congestion, especially during peak hours (McClaren & Agyeman, 2015). Reduced congestion can lead to shorter travel times, increased fuel efficiency, and lower greenhouse gas and pollutant emissions, contributing to improved air quality and reduced environmental impact. Overall, ridesharing services are reshaping travel behaviour and transforming urban destinations. Nonetheless, planning and infrastructure improvements are required to support their expansion. Infrastructure needs include both physical facilities, such as dedicated lanes for ridesharing vehicles, and information infrastructure, such as data-sharing platforms.

Chen et al. (2018) highlight the staffing challenges associated with ridesharing and identify three key issues: driver recruitment, driver retention, and driver satisfaction. Companies such as Uber and Lyft often face difficulties recruiting drivers due to precarious work conditions, low wages, lack of benefits, and safety concerns (Giddy, 2022). Eldabi and Budde (2018) raise key employment issues in the ridesharing sector, including the absence of fixed wages, limited incentives, and reduced control over working conditions. Staffing challenges faced by gig workers in the ridesharing industry include

limited control over working conditions, unstable income due to price fluctuations, and lack of access to benefits such as paid leave or healthcare coverage (Baum & Giddy, 2021). Many of these challenges stem from the fact that drivers are classified as independent contractors rather than employees (Giddy, 2022).

Security and safety issues for both drivers and passengers have been identified as major concerns in ridesharing (Louw & Nomdo, 2025). Perceived safety and security are critical considerations in service use. Safety concerns for passengers include risks of assault and robbery, as well as the possibility of being stranded in unsafe areas; for drivers, there is a risk of assault by passengers and the potential for financial fraud. Ridesharing companies have implemented measures to address these concerns. Features such as driver and vehicle identification, real-time tracking, and in-app emergency assistance are now common to enhance security for riders.

Ridesharing services face various regulatory challenges as they have disrupted traditional transportation models. Given their distinct business model compared to traditional taxi services, it has been argued that ridesharing should not be subject to the same regulations as taxis. Consequently, regulatory authorities in many countries have established new regulations or modified existing ones to accommodate the ridesharing sector. These regulations include creating a category for ridesharing services and outlining requirements related to driver qualifications, vehicle safety standards, insurance coverage, and background checks. Some countries have introduced legislation to establish a framework for operating ridesharing services within existing transportation systems (Jiang, 2017). Arguably, urban Sub-Saharan Africa is the latest frontier for the expansion of ridesharing services (Giddy, 2020; Anwar et al., 2022; Giddy, 2022; Anwar et al., 2023).

METHODS

The study context, Bulawayo, located in the southwestern part of Zimbabwe, is the second-largest city and one of the two metropolitan provinces in the country (Moyo, 2016; Ngwenya & Moyo, 2024). Figure 1 shows the location of Bulawayo in the context of other cities, including the capital Harare. Bulawayo was established by the Ndebele Kingdom in 1870 and attained municipal status in 1897 (Muleya, 2020). Bulawayo has a rich precolonial and colonial cultural heritage, making it a vibrant cultural tourism destination (Matura & Mapira, 2018; Tapfuma et al., 2024; Woyo & Woyo, 2019). The city was once an economic hub for the country; however, it has experienced widespread deindustrialisation in recent decades, which has pushed the majority of its residents into unemployment and the informal economy (Moyo, 2021). InDrive, therefore, presents employment opportunities for unemployed residents, particularly the youth.

A qualitative case study research design was adopted to provide an in-depth understanding of ridesharing services in urban Zimbabwe. This research design was chosen because it allows the researcher to draw conclusions from multiple meanings of individual experiences that are socially and historically constructed (Creswell, 2003). This approach enables the collection of data from various

sources and the use of these data to explore issues within the case study context (Baxter & Jack, 2008). Semi-structured interviews were conducted with selected drivers and users of ride-hailing services in Bulawayo. The sample comprised drivers offering ridesharing services and passengers frequently using these services. Purposive snowball sampling was applied to select participants because of its ability to identify individuals in contexts where they are not easily accessible. Initial participants were purposively selected and asked to recommend others through continued chain referral. The final sample included 17 drivers and 10 passengers.

An interview guide was developed to frame the data collection process. Open-ended questions were asked to allow participants to express themselves freely. The interviews were audio-recorded and transcribed verbatim. Data were analysed through thematic analysis, which involves “identifying, analyzing, and reporting patterns (themes) within the data” (Braun & Clarke, 2006, p. 6). Six stages were followed in the data analysis process: (1) data familiarisation, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. For ethical reasons, only age, gender, and participant role (driver or rider) are reported as identifiers.

Figure 1. Map of Zimbabwe showing the location of Bulawayo



Source: Authors

RESULTS

The Impact of Ridesharing Services

At the outset, research participants were asked to share their thoughts on how the introduction of ridesharing services has impacted urban mobility. Several issues were raised, including improved accessibility of transport services, employment creation, provision of affordable means of transport, a convenient and reliable way of travelling, improved safety and security, and reduced travel times. In general, both drivers and users suggested that there was a positive and undeniable impact brought about by the introduction of ridesharing services in Bulawayo.

Most participants expressed views related to the improved accessibility of transport services and the urban destination at large. Typically, this was explained as follows: “As a driver, I have witnessed how they have improved accessibility and provided reliable transportation options for both locals and visitors” (32-year-old male driver). A similar sentiment was shared by users: “Certainly, ridesharing services have had a transformative effect on urban mobility in Zimbabwe, improving connectivity and making transportation more accessible to all” (33-year-old female rider). A 30-year-old male rider also noted: “Ridesharing services have increased the accessibility of transportation in urban areas. They provide a convenient and reliable option for residents, especially in areas with limited public transportation coverage.” This stance was reinforced by a 37-year-old male driver who stated: “Ridesharing services have expanded the accessibility of tourist destinations, making it easier for visitors to reach places that may have been challenging to access through traditional transportation options or limited public transport.” Easier access for both Bulawayo residents and tourists was highlighted: “Ridesharing services have increased the access to destinations that needed personal cars to access and have made them easy to get to for both the tourists and the residents” (32-year-old male rider).

A significant share of participants cited the benefit of employment creation. This is significant given the prevailing high unemployment rate in Bulawayo and Zimbabwe as a whole. With official estimates of around 20% unemployment and the majority of people in informal employment, ridesharing presents income opportunities to drivers, most of whom are not formally employed. One driver expressed the following sentiment: “It has provided me with an everyday job which is not easy to find, especially if you are just a holder of an ‘A’ level certificate like me, and having to get money on a daily basis is an advantage for me” (39-year-old male driver). Both riders and drivers acknowledged the capacity of ridesharing services to stimulate employment. One rider said: “Ridesharing services have created economic opportunities for residents. Many people have become ridesharing drivers, earning additional income by providing transportation services to fellow residents” (30-year-old male rider). Another driver emphasised the advantages of self-employment offered by the ridesharing business, allowing flexibility to participate in multiple income-generating activities: “Ridesharing services have given me the freedom to be my own boss and manage my work-life balance effectively, which has greatly improved my daily life because I can now focus on having different streams of income” (32-year-old male driver).

A critical theme that arose during the interviews was the increased affordability of transport services. In Bulawayo, ridesharing services are considerably cheaper compared to traditional taxi services. Respondents made this clear: “Absolutely, ridesharing services have revolutionised urban mobility in Zimbabwe; they have offered an easy and affordable way for transportation” (32-year-old male rider). Similarly, several participants repeatedly emphasised that ridesharing services provide an affordable and easily accessible means of transport. This is reflected in statements such as: “It has widened the convenience in transport in that it is readily available and very affordable” (38-year-old male driver). Another user opined: “It has made it easy to reach some places which one had to take two or more taxis to get to the place in one ride at a lower cost” (33-year-old female rider). Other users discussed affordability in the context of pricing transparency, since riders are shown the fare before travel, allowing them to choose the cheaper option: “Ridesharing services have provided affordable transportation for tourists where the price of the fare is already shown hence they cannot be taken advantage of” (31-year-old male driver). Ridesharing services are also vital for operators of local businesses who do not own cars, as they offer delivery options and ensure fragile goods reach customers intact: “I transport fragile luggage as part of my work so using public transportation will not be the best option if I want to get my goods in one piece so it’s a reliable transportation for me which is very affordable” (38-year-old female rider).

Convenience and reliability were another key theme emerging from the data. Bulawayo users can request a ride on demand from anywhere in the city and easily obtain transport at any time, even at short notice. This reduces waiting time common with public transport and eliminates the need to walk to access transport. Importantly, ridesharing services offer convenience to tourists, reducing the “hustles” often associated with navigating an unfamiliar destination. As one participant noted: “Ridesharing services offer flexibility in travel, allowing residents to request rides on demand in groups or individually. Businesses can request to transport their business partners for conferences and so on, and ridesharing services provide tourists with a convenient and reliable mode of transportation” (30-year-old male driver). Ridesharing services were viewed as allowing people to plan and adjust plans easily. One user remarked: “The availability of ridesharing services has increased my flexibility in planning my daily activities, as I can easily request a ride whenever I need one” (32-year-old female rider). Others highlighted convenience and quick pick-up times: “The convenience of ridesharing services, such as quick pick-up times and door-to-door service, enhances the overall travel experience for tourists, saving them time and effort” (32-year-old male rider). Another rider explained: “Ridesharing services offer flexibility in terms of adjusting itineraries and making spontaneous changes to travel plans, allowing tourists to optimise their time and explore different areas at their own pace” (30-year-old male rider).

Improved safety and security was another prominent theme. Participants emphasised that ridesharing services add a layer of safety because of the digital footprint created during the booking process, allowing transparency as participants can view the driver or rider profile and trips made. Features such as dashboard cameras and tracking devices enhance safety for both drivers and users. One

interviewee stated: “Tourists feel safer and more secure when using ridesharing services, especially in unfamiliar cities or countries. The driver and vehicle information, GPS tracking, and in-app emergency assistance features provide added peace of mind during travel” (32-year-old male driver). For people visiting unfamiliar places or participating in Bulawayo’s night-time economy, ridesharing offers a safe travelling option: “Using ridesharing services has provided me with a sense of safety and security, especially during late-night outings or in unfamiliar areas” (30-year-old male rider). Background checks conducted by ridesharing companies before engaging drivers were considered important: “Background checks on drivers have made it easy to gain trust from the riders because they will have a sense of their safety being taken as a serious issue” (34-year-old female rider).

In Zimbabwe’s second-largest city, ridesharing has reduced travel times because it cuts waiting time and vehicles do not follow the fixed routes taken by public transport: “Well I can say that I can go from one place to the next without fear of being not on time with my scheduled timetable due to transport factors like taking the longer route because of the need to accommodate others who are not going on the same route” (32-year-old male rider). The rider continued: “They cover a last mile which traditional taxis have made a norm that it has to be covered on foot” (32-year-old male rider). The enhanced speed of travel was highlighted by several respondents; a typical statement was: “Ridesharing services have contributed to shorter travel times for residents. With the ability to request a ride through a click of a phone, residents can avoid waiting for buses or walking long distances to reach their destinations” (32-year-old female rider).

Challenges Facing Ridesharing in Urban Destinations of Sub-Saharan Africa

The study further sought to examine the challenges facing ridesharing developments in the city of Bulawayo. Themes identified included issues of internet connectivity, poor road infrastructure, conflicts with traditional taxi operators, price variations, and lack of public awareness of ridesharing services. Several participants highlighted the issue of unreliable internet connectivity in the city, which disrupts the operations of ridesharing services. Considering that communication between drivers and riders occurs online, strong and reliable internet service becomes critical. As one respondent explained: “Dependency on internet connection is a drawback because sometimes the internet may be bad” (30-year-old female rider). In agreement, another driver stated: “Unstable internet is sometimes an issue, especially considering how our internet service providers have been bad, with poor network coverage” (39-year-old male driver). Similarly, another respondent echoed these sentiments: “Access to reliable internet connectivity can be a challenge and this can affect the availability and functionality of the apps” (32-year-old male rider).

Poor road infrastructure also emerged as an important issue. Zimbabwe as a whole is burdened with a dilapidated road network that makes certain areas inaccessible and causes vehicle damage. The deteriorating road infrastructure affects the efficient provision of ridesharing services. One user observed: “Poorly maintained roads are the worst if you consider the money that is charged for the

journey to the damage that the car will go through by transporting a passenger...” (33-year-old female rider). Beyond poor road networks, one driver highlighted issues of road signs and parking facilities, particularly in Bulawayo’s CBD: “Poorly maintained roads, lack of street signage, and limited parking facilities are a challenge” (37-year-old male driver).

A third theme that emerged was the conflict between ridesharing drivers and traditional taxi operators. Tensions arise as traditional taxi operators feel that ridesharing takes away their business. Conflicts frequently turn violent and pose risks to both riders and drivers. As one participant shared: “The competition with traditional taxis often leads to tensions and conflicts between the two groups which may tamper with the safety of the riders” (33-year-old female rider). This viewpoint was supported by drivers: “The safety of residents is compromised as traditional transportation drivers create conflicts and fights with ridesharing drivers at pick up or drop off of riders without care of who gets hurt in the process” (34-year-old male driver). As a result, certain places in Bulawayo become ‘no-go’ areas for ridesharing drivers: “Safety, safety, safety, safety, is a concern because there are certain places where you cannot access InDrive. You cannot get the driver to pick you up from certain places... You cannot because the traditional taxi drivers in some cases fight the InDrive driver and as a person, as a passenger you can be caught in a cross fire and get hurt” (32-year-old male rider).

The issue of price variations also featured prominently in interviews. Ridesharing services generally do not have a standard price; instead, demand and supply influence fares. When demand for a particular destination is high, fares increase, affecting riders’ ability to plan. One participant stated: “High prices are charged when there is high demand or during peak hours and there can be instances of cancelled rides especially during periods of high demand, inconveniencing urban residents who rely on ridesharing for their daily transportation needs” (32-year-old female rider). Another remarked: “The surge in pricing is a challenge for riders, especially during high-demand periods. The sudden increase in fares can make rides more expensive and less affordable” (34-year-old female rider). The impacts of price variations were further elaborated: “Inconsistencies in pricing or frequent changes in fare structures can create confusion and dissatisfaction among riders” (32-year-old male rider).

The final theme concerned the challenge of lack of public awareness. Ridesharing is relatively new not only in Bulawayo but in Zimbabwe as a whole. One participant noted: “Residents are not aware of these services hence we have few drivers and riders” (39-year-old male driver). Some Bulawayo residents were even sceptical of trying ridesharing services: “Most of the residents in Bulawayo are not aware of the ridesharing services and their affordability, most of the people are even afraid to try them” (34-year-old female driver). Another challenge relates to reluctance to change, often associated with limited technological knowledge of how to access ridesharing services. One respondent explained: “All I would say is people are reluctant to change, so maybe they are used to public transport, you know, so telling a person that there is this thing, you know, people are reluctant to change, then secondly, I think it would be the issue of technology for the elderly, not only for the elderly but also our ages, 30s and 40s, are not like compatible with some applications on the phone. So technology-wise it will be a problem” (36-year-old male driver).

Assessing Ridesharing Effects and Constraints in Urban Contexts

This research sought to scrutinise the impacts and challenges associated with the introduction of ridesharing services in urban Zimbabwe. The study highlights that ridesharing has improved accessibility to transport services, generated employment (albeit precarious), provided affordable means of transport, offered a convenient and reliable way of travelling, enhanced safety and security, and reduced travel times. In many respects, these findings reinforce those reported in other destinations, where ridesharing services offer advantages including affordability, increased accessibility, convenience, and employment creation (Ayaz et al., 2021; Giddy, 2019). For example, van Wyk (2016) argues that ridesharing makes transportation “just a tap away”, increasing flexibility and convenience for users. Relatedly, Boateng et al. (2022) inform that African governments are granting licences to global ridesharing companies to address inefficiencies in urban transportation as well as to counter escalating concerns surrounding youth unemployment. In the same vein, Hall and Krueger (2016) state that ridesharing services can provide a source of income through employment creation. Even though concerns persist regarding the quality of work, described as “no-so-decent work” by Giddy (2022), offered by the ridesharing sector, there is no doubt that it represents a source of employment opportunities, particularly for the informalised workforce in Sub-Saharan Africa (Anwar et al., 2023; Anwar et al., 2022). With regard to safety issues, features such as GPS-enabled tracking make ridesharing trips traceable, increase the safety of both drivers and passengers, and facilitate the recovery of lost items (Boateng et al., 2022). In addition, Cselóvszki-Soltész & Zilahy (2023) found that perceived security, speed, cost, and comfort play a critical role in the appeal and growth of ridesharing services.

Several challenges limiting the impact of ridesharing were raised, including internet connectivity issues, poor road infrastructure, conflicts with traditional taxi operators, price variation, and limited public awareness of ridesharing services. Overall, Shabur & Ali (2024) aver that it is imperative to increase public awareness and education on the benefits of ridesharing in order to enhance its impact on urban mobility. Nevertheless, much of Sub-Saharan Africa lags behind the Global North in terms of digital infrastructure, which restricts the entry of ridesharing companies into certain countries (Diallo & Dvořáková, 2024). Ivaldi and Palikot (2023) note that price fluctuations remain an issue for users, particularly the higher charges applied during peak hours. According to Giddy (2019), this makes ridesharing costly and accessible only to a small segment of the urban population. Park et al. (2021) highlight that most African countries face challenges associated with underdeveloped transport systems, particularly inadequate infrastructure and poor maintenance of existing road networks. As noted in this Bulawayo investigation, turf wars between ridesharing service providers and traditional taxi operators are a common phenomenon, calling for strict regulations in order to “level the playing field” (Agyemang, 2020).

CONCLUSIONS

Although still lagging behind the Global North, economic and urban geographers indicate that Sub-Saharan Africa is increasingly embedded in the contemporary digital economy (Anwar & Graham, 2022; Carmody et al., 2024). One dimension of this change is the rise of the sharing economy and the spread of ridesharing operations, which are radically reshaping urban mobilities across Africa. Indeed, the advance of ridesharing in urban Africa is part of what has been described as the “uneven geographies of transition” in contemporary Africa (Carmody et al., 2024). The contribution of this paper has been to open up debates concerning ridesharing and its impacts in urban Zimbabwe. It represents a first insight into the issues surrounding its introduction into the country through analysis of the perspectives of both drivers and users in the city of Bulawayo.

The findings point to the potentially positive impacts that ridesharing services can have in urban Africa by spurring economic activity and providing convenience that can transform urban mobilities in environments where public transportation is limited. Arguably, policymakers in countries burdened by high rates of unemployment need to pay greater attention to ridesharing, including its impacts and challenges. In urban Zimbabwe, critical challenges remain the issues of weak and unreliable internet connectivity and the imperative to upgrade infrastructure such as roads, street lighting, and signage to enable ease of accessibility throughout urban areas. Evidence from Bulawayo also suggests that attention must be given to addressing the safety and security of both riders and drivers.

That said, while this study provides insightful findings, it is not without limitations, not least that it was restricted to the city of Bulawayo and a sample drawn only from riders and drivers. Further research is warranted in the context of other cities in Zimbabwe, and to incorporate the perspectives of other key stakeholders, such as government officials and representatives of the public transport sector.

REFERENCES

- Agyemang, E. (2020). “Uber is here to stay”: Exploring the policy implications of the Uber-Local taxis turf war in Accra, Ghana. *Case Studies on Transport Policy*, 8(1), 59–66. <https://doi.org/10.1016/j.cstp.2019.12.005>
- Anwar, M. A., & Graham, M. (2022). *The Digital Continent: Placing Africa in Planetary Networks of Work*. Oxford University Press.
- Anwar, M. A., Ong’iro Odeo, J., & Otieno, E. (2023). “There is no future in it”: Pandemic and ride-hailing hustle in Africa. *International Labour Review*, 162(1), 23–44. <https://doi.org/10.1111/ilr.12364>
- Anwar, M. A., Otieno, E., & Stein, M. (2022). Locked in, logged out: pandemic and ride-hailing in South Africa and Kenya. *Journal of Modern African Studies*, 60(4), 457–478. <https://doi.org/10.1017/S0022278X22000234>

- Ayaz, A., Waheed, A., Saleem, H., & Abid, M. M. (2021). Travelers' attitude towards carpooling in Islamabad. *Journal of Engineering and Applied Science*, 68: 23. <https://doi.org/10.1186/s44147-021-00023-x>
- Banya, R., Cieslik, K., & West, O. D. (2022). *Driving for platforms in Lagos and Abuja: Can e-hailing create decent jobs?* University of Cambridge.
- Baum, T., & Giddy, J. K. (2021). The gig economy and employment in tourism in Southern Africa: A global finger in the informal sector pie? In J. Saarinen & J.M. Rogerson (Eds.), *Tourism, Change and the Global South* (pp. 222–236). Routledge.
- Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, 13(4), 544–559.
- Boateng, F. G., Appau, S., & Baako, K. T. (2022). The rise of 'smart' solutions in Africa: a review of the socio-environmental cost of the transportation and employment benefits of ride-hailing technology in Ghana. *Humanities and Social Sciences Communications*, 9(1), 1–11. <https://doi.org/10.1057/s41599-022-01258-6>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Carmody, P. R., Murphy, J. T., Grant, R., & Owusu, F. Y. (2024). *The urban question in Africa: uneven geographies in transition*. Hoboken NJ. John Wiley and Royal Geographical Society.
- Çetin, T. (2017). The rise of ridesharing in urban transport: Threat or opportunity. In H. Yaghoubi (Ed.), *Urban Transport Systems* (pp. 191–202). Intech.
- Cheng, X., Bao, Y., de Vreede, T., de Vreede, G. J., & Gu, J. (2024). Ridesharing customers' self-protection motivation in the post-COVID-19 world. *International Journal of Contemporary Hospitality Management*, 36(4), 1114–1142. <https://doi.org/10.1108/IJCHM-09-2022-1096>
- Cieslik, K., Banya, R. & Vira, B. (2022). Offline context for online jobs: Platform drivers, decent work and informality in Lagos, Nigeria. *Development Policy Review*, 40(4), e12595. <https://doi.org/10.1111/dpr.12595>
- Creswell, J. W. (2003). Research Design: Qualitative, quantitative and Mixed Methods Approaches. In *Awkward Dominion*. SAGE publications. <https://doi.org/10.7591/9781501721144-016>
- Cselóvszki-Soltész, P., & Zilahy, G. (2023). Characteristics of a regional ride-share platform – Motivations and spatial properties in Hungary, 2020. *Regional Statistics*, 13(6), 1169–1201. <https://doi.org/10.15196/RS130607>
- Diallo, A., & Dvořáková, L. (2024). Sharing economy in the African context: a comprehensive literature review. *9th International Scientific Conference Business Trends*, 26–38.

- Dudas, G., Vida, G., & Boros, L. (2020). Miért választják a turisták az Airbnb-t? Motivációs tényezők vizsgálata magyar utazók körében [Why tourists choose Airbnb? Analysing motivation factors among Hungarian travellers]. *Modern Geográfia*, 15(2), 1–27. <https://doi.org/10.15170/MG.2020.15.02.01>
- Frenzel, F., Giddy, J., & Frisch, T. (2022). Digital technology, tourism and geographies of inequality. *Tourism Geographies*, 24(6–7), 1022–1039. <https://doi.org/10.1080/14616688.2022.214843>
- Giddy, J. K. (2019). The influence of e-hailing apps on urban mobilities in South Africa. *African Geographical Review*, 38(3), 227–239. <https://doi.org/10.1080/19376812.2019.1589732>
- Giddy, J. K. (2020). Travel patterns of Uber users in South Africa. In J.M. Rogerson & G. Visser (Eds.), *New Directions in South African Tourism Geographies* (pp. 113–127). Cham, Springer.
- Giddy, J. K. (2022). Uber and employment in the Global South - Not-so-decent-work. *Tourism Geographies*, 24(6–7), 1022–1039. <https://doi.org/10.1080/14616688.2021.1931955>
- Hall, J. V., & Krueger, A. B. (2018). An analysis of the labor market for Uber’s driver-partners in the United States. *ILR Review*, 71(3), 705–732. <https://doi.org/10.1177/0019793917717222>
- Herjanto, H., Amin, M., Ali, F., Coganogulu, C., & Djalil, M. A. A. (2024). Tourist acceptance of using ridesharing services in a tourism destination: hedonia vs eudaimonia and technophilia vs technophobia. *International Journal of Tourism Cities*, 1–20. <https://doi.org/10.1108/IJTC-04-2024-0090>
- Ivaldi, M., & Palikot, E. (2023). Sharing when stranger equals danger: Ridesharing during Covid-19 pandemic. *Transport Policy*, 141(July), 221–231. <https://doi.org/10.1016/j.tranpol.2023.07.005>
- Jena, S. K., & Ghadge, A. (2023). Price competition in ridesharing platforms: A duopoly supply chain perspective. *Computers and Industrial Engineering*, 183(August). <https://doi.org/10.1016/j.cie.2023.109507>
- Lekgau, R. J., Daniels, T., & Tichaawa, T. M. (2025). The Sharing Economy, Inclusive Tourism Development and Entrepreneurship: A Case Study from South Africa. *Modern Geográfia*, 20(1), 65–82. <https://doi.org/10.15170/mg.2025.20.01.04>
- Li, W., Pu, Z., Li, Y., & Tu, M. (2021). How does ridesplitting reduce emissions from ridesourcing? A spatiotemporal analysis in Chengdu, China. *Transportation Research Part D: Transport and Environment*, 95, 102885. <https://doi.org/10.1016/j.trd.2021.102885>
- Lin, B., Fan, Y., & Yang, R. (2025). The future of urban travel and tourism: a text mining analysis of robotaxi sentiment and adoption. *Journal of Travel and Tourism Marketing*, 42(4), 479–494. <https://doi.org/10.1080/10548408.2025.2469118>
- Louw, H., & Nomdo, G. (2025). Conversations through the rear-view mirror: Uber drivers’ narratives on the precarity of work, ‘belonging’ and violence. *African Geographical Review*. <https://doi.org/10.1080/19376812.2025.2456753>

- Matura, P., & Mapira, J. (2018). Tourism destinations, facilities, challenges and opportunities in Zimbabwe. *European Journal of Social Sciences Studies*, 2(11), 125–138. <https://doi.org/10.5281/zenodo.1217194>
- McLaren, D. & Agyeman, J. (2015). *Sharing cities: A case for truly smart and sustainable cities*. MIT Press.
- Moyo, L. (2021). *Local government as an enabler of local economic development: A case study of the Bulawayo City Council*. University of Western Cape. <http://etd.uwc.ac.za/>
- Moyo, S. S. (2016). *Residents' perceptions of the impacts of tourism in Bulawayo, Zimbabwe*. University of Johannesburg.
- Muleya, N. (2020). Public parks and leisure in the post-independence context of Bulawayo City. In A. Matamanda, V. Nel, & I. Chirisa (Eds.), *Urban Geography in Postcolonial Zimbabwe* (pp. 219–247). Springer Cham. <https://doi.org/10.1007/978-3-030-71539-7>
- Ngwenya, P., & Moyo, T. (2024). Covid-19 and managing urban marginality in Bulawayo. *Zimbabwe. Cities*, 150, 105029.
- Nielsen, J. R., Hovmøller, H., Blyth, P. L., & Sovacool, B. K. (2015). Of “white crows” and “cash savers:” A qualitative study of travel behavior and perceptions of ridesharing in Denmark. *Transportation Research Part A: Policy and Practice*, 78, 113–123. <https://doi.org/10.1016/j.tra.2015.04.033>
- Norris, J. J., & Xiong, H. (2023). Ridesharing and the geography of consumption industries. *Economic Journal*, 133(654), 2449–2482. <https://doi.org/10.1093/ej/uead034>
- Otieno, E., Stein, M., & Anwar, M. A. (2021). Ride-hailing Drivers Left Alone at the Wheel: Reflections from South Africa and Kenya. In P. Carmody, G. McCann, C. Colleran, & C. O'Halloran (Eds.), *COVID-19 in the Global South: Impacts and Responses* (pp. 95–104). Bristol University Press.
- Park, S. Y., Kim, J. Y., & Pan, B. (2021). The Influence of Uber on the Tourism Industry in Sub-Saharan Africa. *Journal of Travel Research*, 60(7), 1598–1611. <https://doi.org/10.1177/0047287520951638>
- Radic, A., Quan, W., Ariza-Montes, A., Koo, B., Kim, J. J., Chua, B. L., Gil-Marín, M., & Han, H. (2025). Do tourists dream of urban air mobility? Psychology and the unified theory of acceptance and use of technology. *Journal of China Tourism Research*, 21(1), 236–270. <https://doi.org/10.1080/19388160.2024.2326950>
- Rogerson, C. M., & Rogerson, J. M. (2021). The other half of urban tourism: Research directions in the Global South. In C. M. Rogerson & J. M. Rogerson (Eds), *Urban tourism in the Global South: South African perspectives* (pp. 1–37). Cham, Springer.
- Shabur, M. A., & Ali, M. F. (2024). Perspectives and possibilities for developing ridesharing services to promote sustainable mode of transport: Bangladesh perspective. *Heliyon*, 10(12), e33115. <https://doi.org/10.1016/j.heliyon.2024.e33115>

- Shaikh, A. A., Glavee-Geo, R., Zhakupbekova, G. E., & Turginbayeva, A. N. (2025). Driving change: Unravelling the landscapes of ridesharing and ridehailing services in a developing country. *Research in Transportation Business and Management*, 60, 101351. <https://doi.org/10.1016/j.rtbm.2025.101351>
- Shereni, N. C. (2019). The tourism sharing economy and sustainability in developing countries: Contribution to SDGs in the hospitality sector. *African Journal of Hospitality, Tourism and Leisure*, 8(5), 1–10.
- Shereni, N. C., & Ndhlovu, E. (2024). Prospects of peer-to-peer accommodation platforms in urban tourism in Zimbabwe. In E. Ndhlovu, K. Dube, & N. C. Shereni (Eds.), *Tourism and Hospitality for Sustainable Development* (pp. 75–86). Springer. https://link.springer.com/10.1007/978-3-031-63069-9_5
- Tapfuma, M. M., Musavengane, R., & Magwaza, R. (2024). The role of creative tourism through arts and crafts in promoting inclusive tourism in Zimbabwe. *Journal of Tourism and Cultural Change*, 22(1), 1–20. <https://doi.org/10.1080/14766825.2023.2231401>
- van Wyk, C. (2016). Uber Benefits for Tourists and Tourism. *Bizcommunity*. <https://www.bizcommunity.com/Article/196/747/141808.html>
- Wang, S., & Noland, R. B. (2021). *What is the elasticity of sharing a ride sourcing trip?* *Transportation Research Part A: Policy and Practice*, 153, 284–305. <https://doi.org/10.1016/j.tra.2021.09.008>
- Woyo, E., & Woyo, E. (2019). Towards the development of cultural tourism as an alternative for tourism growth in Northern Zimbabwe. *Journal of Cultural Heritage Management and Sustainable Development*, 9(1), 74–92. <https://doi.org/10.1108/JCHMSD-08-2016-0048>
- Zhang, J., Zhang, L., & Ma, B. (2023). Ridesharing platforms: the effects of online social interactions on loyalty, mediated by perceived benefits. *Journal of Research in Interactive Marketing*, 17(5), 698–713. <https://doi.org/10.1108/JRIM-01-2022-0012>

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Artificial Intelligence: New Horizons in Geography Education and Geographical and Earth Science Research

ABSTRACT

In recent years, the application of artificial intelligence (AI) has become increasingly widespread in scientific research, including geography and the Earth sciences, offering new opportunities while simultaneously raising methodological challenges. The concept of producing research results through algorithm- and model-based machine processing with diminishing levels of human intervention has been present in the Earth sciences for some time. The analysis of the rapidly growing volume of geographical data can now be supported in novel ways by artificial intelligence, which not only facilitates the automated identification of specific spatial patterns from satellite imagery but also contributes to the exploration and interpretation of complex spatial processes. Its application enables, for example, the prediction of dynamic processes and the reconstruction of the former states of certain regions. The aim of this paper is to provide an overview of the potential applications of artificial intelligence in geographical research and education, illustrated through both national and international examples. The analysis also highlights that many methodological approaches currently classified under the umbrella of AI in geography have already been in use for some time; however, the broader and more integrated application of AI may lead to dynamic developments in geographical and Earth science research, as well as in geography education. Given that the range of methodological possibilities offered by AI is continuously expanding, this study does not seek to present all potential applications. Instead, following a general overview, the topic indicated in the title is illustrated through a selection of representative examples from the field of geography.

Keywords: artificial intelligence, GeoAI examples, geography education, geoscience

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INTRODUCTION

The rapid spread of artificial intelligence (AI) in the twenty-first century has been facilitated by its ability to perform complex tasks efficiently (Norvig & Russell, 2023). Such tasks include, for example, the automation of processes without direct human intervention, as well as the replacement of human labour in time-consuming and monotonous activities, such as processing large volumes of data, identifying trends and patterns, making predictions, and detecting potential risks. Consequently, the application potential of AI is extensive, ranging from healthcare (e.g. diagnostic procedures) and economic analysis to the optimization of decision-making processes. AI-based statistical methods are widely employed not only by private companies but also by governmental bodies and institutions, for instance to enhance administrative efficiency. Today, artificial intelligence is also firmly embedded in the scientific domain, with numerous universities and research institutes actively engaged in its research and development (Janowicz et al., 2020).

The growing use of AI over the past 10–15 years can largely be attributed to its capacity to efficiently predict future trends in complex processes or to characterize areas with unknown attributes based on sample areas. This includes, for example, the identification of similar patterns within large datasets using data-characterized patterns observed in training areas (Hengl et al., 2017; Wadoux et al., 2020). In the present study, artificial intelligence (AI) is understood as a set of computer-based solutions built on algorithms and models capable of identifying patterns in data, generating predictions, and supporting complex decision-making tasks, with particular emphasis on the processing of spatial and spatio-temporal data (Li & Hsu, 2022).

Over the past decade, the application of AI has become increasingly influential across numerous subfields of geography, ranging from remote sensing and environmental modelling to urban and regional analysis (Bastin et al., 2025; Bui & Mucsi, 2021; Hengl et al., 2017; Kosuri et al., 2025; Lifelo et al., 2024; Szilassi et al., 2019; Tölgyesi et al., 2025; Wadoux et al., 2020). Drawing on examples from geographical research and education, this study outlines both the possibilities and the limitations of AI applications, with particular emphasis on methodological characteristics and interpretability. The aim of the following—by no means exhaustive—overview is not to provide a detailed technical description of specific AI-based algorithms, but rather to demonstrate how AI can be integrated into geographical thinking and to explore the role it may play in future research and educational practice.

This paper is a focused narrative review that maps how artificial intelligence (AI) is currently used in geographical and Earth science research, as well as in geography education, with an emphasis on methodological characteristics (data types, model families, interpretability, and validation constraints) and representative application domains (e.g., remote sensing, spatio-temporal prediction, hazards, soil and ecosystem modelling, urban analyses, and educational practice).

METHODS

The narrative review design deliberately prioritises conceptual synthesis and methodological comparability over exhaustive coverage. The literature base was assembled through a structured keyword search combined with iterative snowballing from reference lists and highly cited synthesis papers.

Search terms targeted both general and domain-specific labels, including artificial intelligence, machine learning, deep learning, GeoAI, spatial prediction, remote sensing, GIS automation, explainable AI, generative models, large language models, and AI in geography education. Inclusion criteria were: (1) peer-reviewed journal articles, scholarly books or handbooks, and authoritative institutional sources; (2) clear relevance to geospatial or Earth-science data and workflows, or to teaching and learning contexts in geography; (3) explicit discussion of methods, data, and/or evaluation (rather than general claims only); and (4) the inclusion, as illustrative examples, of selected results from our own research. Given the rapid acceleration of the field, the search prioritised recent work (primarily from the last 10–15 years), while also retaining seminal publications that anchor key concepts and research trajectories.

To ensure a balanced coverage of the literature used in the study, the final compilation deliberately combines the international literature with Hungarian and regional case studies that demonstrate the relevance of AI-based methods in the earth sciences, including geography and geography education, and exemplify the practical feasibility of these methods.

RESULTS

The Methodological Framework of AI in Geographical Research

The essence of an AI system lies in equipping computers with technical “knowledge” (i.e. software programs) that enables them to imitate aspects of human intelligence and behavioural patterns. A key characteristic of such systems is continuous learning (self-improvement), through which data processing can become increasingly efficient, allowing AI to autonomously automate and partially optimize tasks. For example, based on large volumes of data (big data), AI systems are able to construct their own models (algorithms), the application of which enables them to perform tasks in a partly autonomous manner. Moreover, through repeatedly executed algorithms, the system can learn and evolve over time, adjusting and refining its own models. In this way, AI becomes capable of recognizing patterns, forecasting processes, and developing new models without direct human intervention. Unlike earlier approaches, in which models were explicitly designed by human programmers, these models are now generated by AI systems themselves.

To understand the geographical and Earth science applications of artificial intelligence, it is essential to clarify the conceptual foundations of the most frequently used methodological approaches (Figure

1). In practice, the vast majority of solutions classified as AI fall within the methodological framework of machine learning (ML), which encompasses algorithms capable of identifying patterns in data and making predictions without the rule system being explicitly predefined. Classical ML algorithms commonly applied in Earth science and geographical research—such as decision trees, Random Forests, and support vector machines—have the advantage of operating efficiently with structured spatial data and relatively small datasets, while maintaining a relatively high level of interpretability.

Deep learning (DL) is a specific subfield of machine learning based on multilayer artificial neural networks (ANNs). It is important to emphasize that not every neural network qualifies as a deep learning model; however, all deep learning approaches are based on neural networks. DL methods are particularly effective when large volumes of data are available and are especially well suited to image-based and complex pattern-recognition tasks, such as the processing of satellite and drone imagery (e.g. Sentinel-2 MSI, Sentinel-1 SAR, WorldView-2/3; RGB, multispectral, and hyperspectral drone sensors). As a result, deep learning has gained a prominent role in applications related to remote sensing and urban geography; however, the interpretability of DL models is often more limited than that of classical ML approaches.

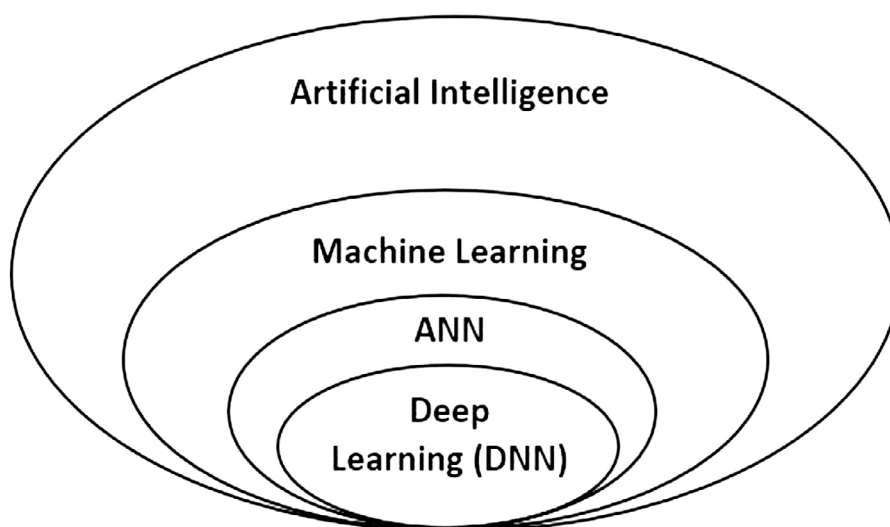
In geographical research practice, machine learning and deep learning should be regarded as complementary rather than mutually exclusive toolsets. The choice of method is determined by the nature of the geographical problem, the type and volume of available data, and the required level of interpretability of the results. These methodological foundations also underpin the most recent generative and language models (Large Language Models, LLMs), which can be considered specialized applications of deep learning and primarily offer new opportunities for processing textual, visual, and multimodal data. Generative and language models thus constitute a complementary toolkit for geographical research and education rather than a replacement for classical GIS or remote sensing analyses. Their role is mainly associated with enhancing the efficiency of information processing and knowledge transfer (Edureka, 2019; Lavallin & Downs, 2021).

Many forms of deep learning rely on neural networks, large volumes of data, and substantial computational capacity to learn how to recognize patterns across a wide range of fields, from economics and the natural sciences to some of the most widely used language-based applications (e.g. OpenAI, Midjourney.ai, Anthropic.ai, Fireflies.ai). Among software solutions capable of analysing images or social relationships, the language models developed by OpenAI were among the first to achieve widespread adoption (from 2018 onwards) and have therefore become the most widely known (<https://openai.com/chatgpt>).

The meaning of GPT (Generative Pre-trained Transformer) indicates, on the one hand, that the model is *generative*, meaning that it is capable not only of processing, translating, and answering questions based on existing texts, but also of creating new textual content. On the other hand, the term *pre-trained* refers to the fact that these capabilities are based on prior training using sample texts or, more broadly, predefined training domains. The extremely rapid diffusion of language-based

applications can be explained by the availability of several hundred thousand books' worth of digitised textual data used to train deep learning language models.

Figure 1. The Relationship Between Artificial Intelligence, Machine Learning, Artificial Neural Networks (ANN), and Deep Learning (Deep Neural Networks, DNN).



Source: Lavallin & Downs, 2021; Ramlakhan et al., 2022

The technological foundation of deep learning lies in neural networks—algorithms designed to mimic, in a highly simplified manner, the functioning of the human brain's neural system and its neurons. In simplified terms, a language application operates by taking an initial keyword, letter, or textual unit (token) and continuing text generation by selecting the most probable subsequent letter or word. Through this iterative process, new text is produced. Using the same logic, such models are also capable of interpreting and analysing relationships within existing texts.

To illustrate this with a geographical example, if the word “*Alföld*” (Great Hungarian Plain) is entered as a prompt on chatgpt.com, together with a few key concepts, the system may generate a coherent text of 3,000–5,000 characters describing the region's location, relief, climatic conditions, economic characteristics, cultural and historical traditions, settlement patterns, and related features. Naturally, this presupposes the availability of sufficiently large word-based datasets (e.g. geography textbooks, regional descriptions, and geographical studies) used to train the underlying deep learning algorithms.

However, AI-based methods also have certain limitations. For instance, there is no inherent weighting of input information: all data are treated as equally important, with mathematical optimisation taking precedence, while domain-specific expertise is not explicitly embedded in the process. The verification and validation of AI-generated results may therefore be problematic, as these tasks cannot be delegated to the AI itself. In addition, copyright-related issues arise, particularly with regard to the ownership of texts or images generated by AI-based systems.

The Most Widely Used AI-based Methods in Geography and Earth Sciences

AI methods applied in geography can be classified into numerous categories; however, in simplified terms, computer-based simulation is more effective than manual calculation, and analytical workflows based on AI algorithms are even more efficient. One of the most common application domains is image analysis, which includes image segmentation as well as the recognition and identification of objects within images. Convolutional neural networks (CNNs)—which operate on the similarity of images or image patches and on convolution operations (essentially a generalisation of averaging)—are widely used to address problems such as the identification of areas threatened by inland excess water (Kajári et al., 2024).

The use of traditional artificial neural networks is well established in geographical research, for example in the monitoring of inland water bodies (van Leeuwen, 2012), while classical machine learning approaches (e.g. support vector machines and artificial neural networks) have been successfully applied to the identification of invasive plant species at the individual level (Papp et al., 2021).

One of the most widely used neural network architectures is the fully connected neural network, which is capable of capturing complex non-linear relationships between input and output variables (Figure 2). However, this architecture has two major limitations. First, input nodes often need to be defined manually, which may require substantial expert knowledge and preprocessing effort. Second, to achieve adequate predictive performance, multiple neural layers must be stacked in order to learn increasingly complex non-linear relationships between the independent (input) and dependent (output) variables.

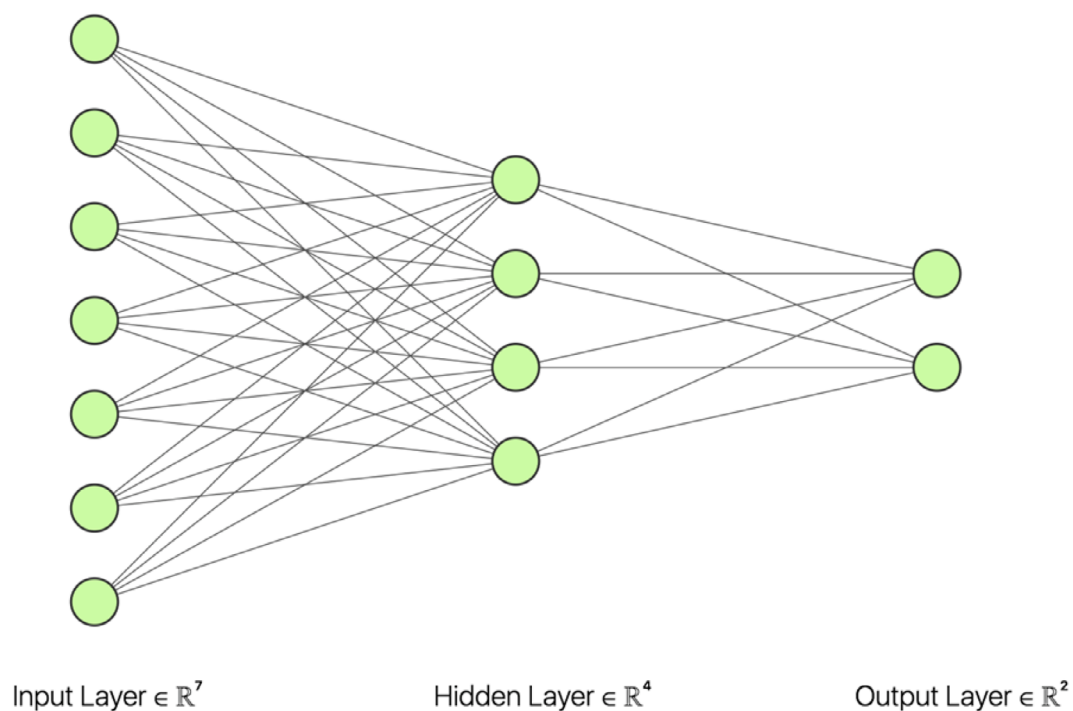
In the application of neural networks, it is also possible to analyse how computational models enable the retrieval of visually similar images from the internet simply by uploading a reference photograph. Such functionalities are typical examples of computer vision. Recurrent neural networks (RNNs) are designed to process sequential (temporal or ordered) data, as they take into account not only the current input at each step but also the hidden state from the previous step. A specific variant of this architecture is Long Short-Term Memory (LSTM), which is capable of learning long-term dependencies and is therefore particularly suited to time-series analysis. These methods operate on univariate or multivariate time-series data to learn recurring patterns (Brownlee, 2018). Typical applications include the forecasting of river water levels, meteorological parameters, or the future evolution of inland excess water coverage.

Generative adversarial networks (GANs) are paired AI systems whose designation reflects the adversarial competition between two networks involved in the generation of artificial data (Nelson, 2020). GANs represent a branch of machine learning in which neural networks are able to generate new data and images based on existing datasets (e.g. image databases). A GAN consists of two opposing components: a generator and a discriminator. The discriminator's task is to determine whether an output is real or artificially generated, while the generator continuously produces increasingly realistic synthetic data until the discriminator can no longer reliably distinguish generated outputs from



original data. Common applications include image-to-image translation, such as converting sketches or drawings into photorealistic images (Isola et al., 2018), text-to-image generation, and image editing. In geographical research, these methods can be applied, for example, to the comparison of current and projected images (scenarios) of urban environments, the analysis of landscape change, or various forms of image enhancement.

Figure 2. A Feed-Forward Artificial Neural Network With Three Fully Connected Layers: Input Layer With 7 Nodes (A), Hidden Layer With 4 Nodes (B), and Output Layer With 2 Nodes (C) for Binary Classification



Source: After Li-Hsu 2022

Artificial intelligence technologies are applied not only in geography but also across other Earth science disciplines, including the analysis of geological structures, atmospheric dynamics, and hydrological and water-system characteristics. AI substantially enhances traditional geographical capacities for data collection, analysis, and integration, for instance through the application of neural network-based methods. Early applications of AI focused on traffic monitoring, urban planning, and cartography; however, with the advancement of deep learning, cartography has also benefited from the precise identification of the spatial positions of historical geographical features on scanned historical maps (Jakab et al., 2025). Within cartography, AI further enables the automation of cartographic generalisation workflows, including polygon simplification and aggregation, as well as the simplification and connectivity-based integration of road networks (Zhou, 2023).

For professional spatial data analysis, LLM-based tools such as Google Geospatial Reasoning can be applied; for geoinformatics solutions, tools such as GeoGPT; and for research support, applications including NotebookLM.

Table 1. Main Types of Artificial Intelligence and Their Typical Application Domains in the Geosciences

Classical machine learning (Machine Learning)	Environmental modelling, soil science and agricultural research, ecological analyses	Analysis of structured spatial data, prediction, relatively good interpretability
Deep learning (Deep Learning)	Remote sensing, urban analysis, disaster and risk research	Image and pattern recognition, handling large volumes of data
Graph-based learning (Graph AI)	Hydrology, urban planning, geological networks	Modelling spatial, topological, and relational structures
Spatio-temporal models (Spatio-temporal AI)	Climate modelling, hydrology, mobility and traffic analysis	Forecasting time-varying spatial data
Bayesian and probabilistic AI	Environmental modelling, geology, decision support	Handling uncertainty, risk analysis
Generative and language models (GANs, LLMs, diffusion models)	Automated GIS processing, data imputation, visualisation	Generation of synthetic spatial data and descriptions
Hybrid GeoAI systems	Complex Earth science and environmental systems	Integrated application of multiple AI approaches

The aim of the present study is to provide a structured—though by no means exhaustive—overview of the AI-based research trends most commonly applied in geography and the Earth sciences. A detailed discussion of individual AI-based methods is not attempted, both because of their rapid and ongoing development and due to the length constraints of this paper. Accordingly, the examples presented do not focus on specific algorithms but rather on broader methodological directions, which are supported by an extensive international body of literature and by numerous applications in the Earth sciences published in leading international journals.

Some Case Studies of AI in Geographical and Earth Science Research

According to many scholars, the use of AI is transforming geographical research and may herald a new golden age for the discipline (Kantor, 2024). There is little doubt that AI provides highly effective tools for exploring complex relationships, such as interactions between landscape-forming factors or the comprehensive geographical analysis of intertwined natural and social processes. Geography underwent a similarly promising transformation in the 1990s, when the rapid diffusion of geographic information systems (GIS) and remote sensing techniques fundamentally reshaped the field. The expansion of geoinformatics from the 1990s onwards opened new horizons in geography and the Earth sciences, comparable in significance to the invention of the microscope in biology or the telescope in astronomy. Thus, geography has relied on computer-based technologies, particularly GIS methods, for nearly three decades; however, the development of artificial intelligence may further expand the possibilities for the processing and analysis of spatial data.

Building on this perspective, an integrative initiative aimed at strengthening the links between the Earth sciences and artificial intelligence was launched in the United States under the name

Geospatial Artificial Intelligence (GeoAI) (American Geographical Society, 2022). In brief, GeoAI refers to the integration of geospatial data and artificial intelligence methods (Li & Hsu, 2022). Its primary objective is to enable more efficient and faster analysis of geographical information, as well as to support the production of more accurate predictive maps and climate scenarios.

Different application domains within GeoAI are distinguished primarily not by the algorithms employed, but by the nature and scale of the geographical problems under investigation. GeoAI should therefore not be regarded as an independent methodological paradigm, but rather as an integrative framework within geographical research, linking large-volume spatial datasets with the analysis of complex environmental and social processes (Table 2).

Table 2. Main Application Areas of Artificial Intelligence in Geographical Research

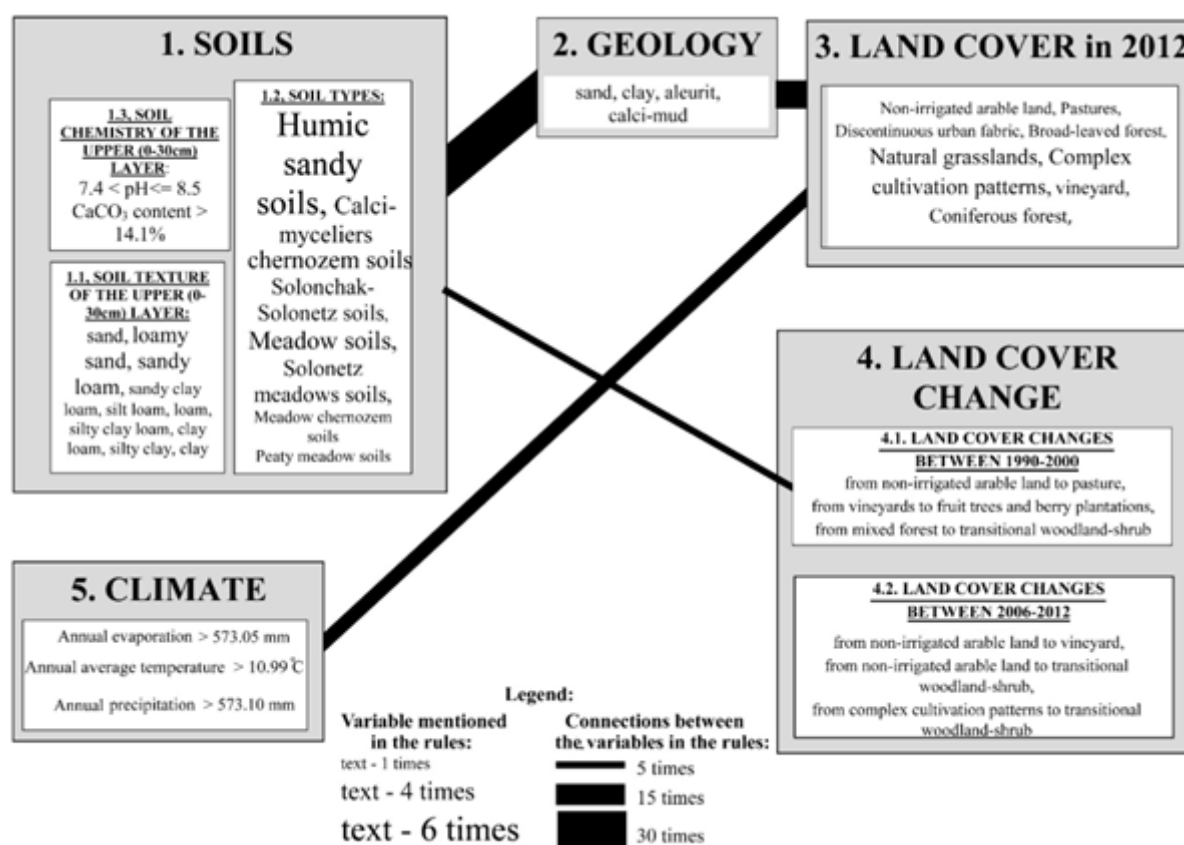
Remote sensing and Earth observation	Automatic interpretation of satellite and drone imagery; recognition of land cover and objects	CNN, U-Net, Vision Transformer	Land cover and land use classification, deforestation detection, analysis of urbanisation processes
Spatio-temporal prediction	Prediction of dynamic natural and social processes in space and time	LSTM, TCN, Graph Neural Networks	Air pollution and traffic forecasting, hydrological and flood modelling
Disaster and risk analysis	Identification of natural hazards; mapping vulnerability and risk	Deep learning, anomaly detection	Flood, wildfire and landslide susceptibility maps, damage assessment
Environmental and ecological modelling	Spatial assessment of ecosystems, soil conditions and carbon cycling	Random Forest, XGBoost, Bayesian models	Habitat and ecosystem modelling, estimation of soil organic carbon, prediction of soil degradation
Urban and regional modelling (Urban GeoAI)	Analysis of urban structure, mobility and environmental pressures	GNN, reinforcement learning, agent-based models	Urban growth trends, traffic regulation, energy management
Precision agriculture	Spatial optimisation of production processes	CNN, clustering, reinforcement learning	Crop yield prediction, crop condition and stress detection, input optimisation
Geological and geophysical analysis	Recognition of geological structures and patterns	CNN, graph-based models, unsupervised learning	Seismic data analysis, ore deposit potential estimation, lithological classification
Data fusion and multimodal integration	Joint processing of geospatial data from different sources	Multimodal learning, transfer learning, knowledge graphs	Integration of satellite, sensor and social data, digital twin systems
GeoAI-based decision support	Interpretation of predictions, uncertainty and impacts in decision-making	Explainable AI, ensemble modelling	Environmental risk maps, sustainability and land-use decision support
Automated GIS processing	Automation of GIS workflows	NLP, generative models (LLMs, diffusion models)	Metadata generation, automatic map description, generation of synthetic geospatial data

Several authors have synthesised the highly diverse geographical and Earth science applications of GeoAI in special journal issues (Janowicz et al., 2020), while others have addressed the topic in standalone volumes (Gao et al., 2023). Hungarian studies also demonstrate that GeoAI algorithms are capable of detecting changes on the Earth's surface—such as land-use transformations and shifts in environmental conditions—using satellite and drone imagery. For example, Bui and Mucsi (2021) applied AI-based methods to produce a large-scale land cover map of Hungary, while Farmonov et

al. (2023) employed similar approaches to estimate crop yields (Bui & Mucsi, 2021; Farmonov et al., 2023). In research on the impacts of climate change in Hungary, AI-based GIS analyses have likewise proven effective for forecasting certain meteorological patterns and modelling the long-term effects of climate change, including drought and inland excess water (Kajári et al., 2024).

GeoAI also provides valuable support for land-use planning by facilitating the selection of land-use types that best match specific landscape characteristics, such as soil properties and climatic conditions. Moreover, AI-based methods are well suited to exploring the geographical background and underlying causes of environmental and nature conservation issues, including the spread of invasive plant species or levels of urban particulate matter. These methods enable the identification of geographical factors influencing the magnitude and spatial distribution of such phenomena—such as the occurrence of invasive species or temporal variations in PM10 concentrations—the assessment of the relative importance (weight) of these factors (Figure 3), and the exploration of the relationships among them (Papp et al., 2021; Sohrab et al., 2024; Szilassi et al., 2019).

Figure 3. The Weight of Environmental Variables Affecting the Presence of an Invasive Plant (*Asclepias Syriaca*) and Those Variables' Relationship to One Another



Source: Papp et al. 2021

The application of GeoAI in the study of natural hazards is widespread worldwide, particularly in the spatial prediction of flood, landslide, and erosion risks, where machine learning enables the integrated evaluation of complex environmental factors (Akinci et al., 2022; Band et al., 2020; Choi et al., 2025).

AI-based modelling is also gaining increasing importance in the forecasting of large-scale environmental processes. A recent study provides a representative example: the future spatial distribution of four major ecosystem types was predicted using a Random Forest algorithm under different climate change scenarios (Tölgyesi et al., 2025). The model inputs primarily consisted of climatic, bioclimatic, and environmental variables, while the outputs represented the projected global redistribution of ecosystem types. Based on the AI-derived classification results, the authors subsequently estimated future global carbon sequestration potential, thereby demonstrating the extent to which ecosystem shifts may influence the Earth's carbon cycle. Similar AI-based approaches are increasingly applied in global-scale ecosystem and biosphere modelling, where machine learning supports the prediction of climate change impacts as well as the spatial dynamics of ecosystem functions and the carbon cycle (Ahlström et al., 2017; Bastin et al., 2025; Forkel et al., 2019; Huang et al., 2023).

GeoAI and machine learning are likewise becoming increasingly influential in soil science research, particularly in the fields of digital soil mapping and the spatial estimation of soil functions. Numerous recent studies have shown that Random Forest and other machine learning algorithms can be effectively applied to predict soil properties, soil organic carbon content, and related indicators by integrating large environmental covariate databases. AI-based models are able to capture complex non-linear relationships among soil characteristics, topography, and climate, often providing more accurate estimates than traditional statistical methods, even at regional and national scales (Csikós et al., 2023; Sohrab et al., 2025; Szatmári & Pásztor, 2025). These findings clearly demonstrate that GeoAI is not merely a descriptive mapping tool but also plays a crucial role in analysing future changes in soil conditions, soil functions, and carbon sequestration. At the international level, digital soil mapping and the modelling of soil functions represent one of the most dynamically developing areas of GeoAI application, where machine learning methods have consistently been shown to outperform conventional statistical approaches (Hengl et al., 2017, 2018; Sun et al., 2023; Taghizadeh-Mehrjardi et al., 2020; Wadoux et al., 2020).

GeoAI and AI-based geospatial data processing are also gaining increasing importance in the analysis of urban environments, particularly in the domains of urban green infrastructure and high-resolution spatial mapping. Several studies have introduced treetop detection methods based on airborne LiDAR data that reliably identify individual woody vegetation, even in low-resolution laser-scanned datasets and under complex, multilayered urban canopy conditions. The practical applicability of these methods is further enhanced by their availability as reproducible, open-source R packages. Other research has examined the effects of Structure from Motion (SfM) processing techniques and various UAS-based data acquisition strategies on the accuracy of urban land-use mapping, as well as evaluated the quality of orthophotos and digital surface models (DSM) using explainable AI metrics. GeoAI-based approaches are also increasingly applied in studies of the urban heat island effect, where machine learning models integrate satellite-derived land surface temperature data with urban structural parameters to reveal the non-linear relationships governing thermal stress,

thereby supporting climate adaptation strategies and urban planning decisions. Globally, AI-based urban environmental analysis is expanding rapidly, particularly through the integrated processing of high-resolution remote sensing data (LiDAR, UAS) and detailed urban structural information, opening new opportunities for the quantitative assessment of urban environmental processes (Chen et al., 2022; Kosuri et al., 2025; Lifelo et al., 2024; Xu et al., 2019; Zhang et al., 2025).

Within European Union research programmes, artificial intelligence now appears not only as an applied methodological component but also explicitly at the project title level, clearly indicating the institutionalisation of GeoAI. A prominent example is the *AI4SoilHealth* project (<https://ai4soilhealth.eu/>), which develops AI-based solutions for the spatial assessment and monitoring of soil condition, soil functions, and soil health by integrating diverse Earth observation, soil, and environmental data sources. A comparable initiative is the *AI4Copernicus* project (<https://ai4copernicus-project.eu/>), which prioritises AI-driven processing of Copernicus Earth observation data, enabling faster and more accurate spatial analyses of land cover change, environmental processes, and climate change impacts. These projects clearly demonstrate that AI is becoming a key integrative technology in European geographical and environmental research, particularly in the analysis of large-volume and complex spatial systems.

Finally, AI-based methods can also be effectively applied to the visualisation of maps and other types of spatial data, for example in the reconstruction of historical landscapes from archival cartographic sources such as the First Military Survey (Figure 4).

In recent years, AI-based literature search and research support tools have emerged and are increasingly applied in Earth science research. Tools such as Scopus AI and the Web of Science Research Assistant facilitate literature discovery, the preparation of thematic summaries, and the identification of key publications based on natural-language queries. Similarly, scite.ai analyses citation context by distinguishing between supporting, contrasting, and methodological citations, which is particularly useful for critical literature evaluation. In addition, AI-based research support functionalities have been integrated into the Nature portfolio, providing authors with assistance in literature exploration and manuscript preparation. However, these solutions are dependent on the underlying databases, their output is not fully transparent, and the generated summaries require careful verification; therefore, they should be regarded primarily as complementary rather than substitutive tools.

AI has thus become suitable for the semantic classification of texts—including scholarly articles, regional descriptions, textbook content, and news reports—as well as for the statistical analysis of the frequency of user-defined words and phrases, and for extracting generalisable relationships from such analyses. For example, by examining publications produced by geographers over recent decades, it is possible to identify changes in authors' publishing practices, shifts in the prevalence of specific research topics (e.g., landscape geography or environmental geography), temporal trends in particular research directions and methods, and developments in the philosophy of science (Boros et al., 2025; Szilassi et al., 2024).

Figure 4. Figure 4. Nagy-Nádas Swamp at Farnos before water regulations. (a) Detail of the First Military Survey (1782–1785) Map that Serves as a Compositional Model; (b) AI-generated Image



Source: Jakab et al., 2025

Primarily in human geography and integrative approaches, the 2023 AI volume (Gao et al., 2023) presents a wide range of practical applications. Moreover, Wang and colleagues analysed 1,516 human geography studies published over the past two decades and sourced from the Web of Science that employed GeoAI methods. This corpus includes a substantial number of interdisciplinary studies leveraging integrated research platforms, encompassing fields such as public health, environmental science, and medical science (Wang et al., 2024).

Challenges and Limitations of Applying AI in Geography and Earth Sciences

The geographical application of AI is accompanied by several generally recognised challenges and limitations, including issues related to model interpretability, potential biases, and limited suitability for specific research questions. AI models typically require region-specific data, and the availability and applicability of data across different areas often constitute major constraints. Because the quality of input data strongly influences the reliability of model outputs, problems frequently arise due to data errors, limited accuracy, restricted spatial or temporal validity, or insufficient alignment with the requirements of geographical analysis. From a results perspective, biased validation procedures may introduce additional uncertainty, which can be further amplified during algorithmic processing.

It is important to note, however, that AI does not necessarily function as a complete “black box” in which only inputs and outputs are observable while internal processes remain entirely opaque. Explainable AI (xAI) approaches have been developed precisely to enhance transparency; examples include methods such as LIME and SHAP, which are applied, for instance, in image analysis.

The current heightened interest in AI is likely partly attributable to its demonstrated success in applications such as weather forecasting and COVID-19 prediction. At the same time, many GeoAI

applications essentially perform operations that, from a GIS perspective, amount to spatial—and sometimes temporal—searches, that is, the identification of cases and patterns that satisfy predefined criteria. A limitation of such approaches is that they may amount to little more than a sophisticated form of reclassification. In some instances, GeoAI has been employed solely to generate visually compelling but scientifically limited representations of landscapes, contributing minimally to the advancement of geographical knowledge (Hu et al., 2024).

The use of GeoAI is further complicated by differences in legal and regulatory frameworks governing data access across countries; for example, a river and its catchment area may span multiple states, each with distinct data governance regulations.

Artificial Intelligence in Geography Education

When considering the application of AI in geography education, key questions include why AI should be taught, who it affects, which methods are most appropriate, and what content should be delivered. This overview is not intended as technical instruction at the university level; it does not focus on mathematical details but, building on secondary-level knowledge, aims to illustrate how subject-specific understanding can open new avenues for problem-solving and development in geographical applications.

As demonstrated in the examples above, AI in geography primarily supports the comprehension of patterns and relationships. A major contribution lies in the use of interactive visualisations and realistic simulations, which integrate geographical locations and natural phenomena into the learning process. The growing array of AI-based visualisation tools can make teaching and learning more efficient, intuitive, and engaging. Furthermore, incorporating AI into geography classes facilitates discussion of broader educational questions, such as the limits of knowledge transmission and the degree to which students and teachers are motivated to learn about and utilise AI, particularly GeoAI.

Teachers can leverage AI to design personalised learning plans, enhance educational experiences, provide intelligent learning analytics, and improve overall learning efficiency. However, the effective implementation of AI in geography education—including public education, where geography encompasses Earth sciences—requires the active engagement of all participants (teachers, lecturers, students, and pupils) and the availability of necessary resources, including hardware, software, data, and expertise. AI automation can reduce teacher workload and improve instructional effectiveness, for example by assisting in the evaluation of assignments and reports.

In traditional teaching, educators devote significant time to tasks such as question design, grading, performance evaluation, and test analysis. AI technologies—including image recognition, predictive systems, and virtual reality—can not only generate examination questions but also automatically grade homework and tests, thereby increasing assessment efficiency. Continuous assessment, feedback, and progress monitoring are particularly important for maintaining educational quality. While some educators may perceive AI as a potential threat to their professional role, it simultaneously

enables new pedagogical approaches, such as virtual field trips and immersive virtual classrooms. These approaches allow for the simulation of difficult-to-observe geographical processes and the visualisation of natural phenomena that are otherwise inaccessible (Rakuasa, 2023). In this way, AI functions as a powerful tool for supporting critical thinking, learning, and curriculum development.

AI-generated teaching materials can be customised to individual learners' needs, supporting personalised instruction. It is important to note, however, that not all topics benefit from AI integration, particularly certain social topics. Integrating AI into existing geography curricula represents a significant challenge, as curricula must remain flexible enough to accommodate emerging technologies. Teacher training—including the preparation of trainers—is therefore essential. AI can also support adaptive learning, adjusting the difficulty of materials, tasks, tests, and exercises to individual learners (Huang et al., 2021). Such adaptation should encompass both content and methodology, including data mining, intelligent tutoring systems, and learning analytics.

GeoAI, through cloud-based geospatial databases, enables students to quickly and efficiently access large volumes of geographical data and to explore realistic, visually represented maps, locations, natural phenomena, virtual fieldwork, and interactive simulations (Wilby & Esson, 2024).

Beyond curriculum content and infrastructure, a critical future consideration is whether teacher education equips educators with sufficient knowledge and experience to use AI effectively and responsibly. A clear limitation is exemplified by the widespread use of language models such as ChatGPT: although these tools can generate text, they often fail to properly address spatiality, territoriality, temporality, and scale—core concepts in geography. Their outputs are generated through probabilistic text continuation based on keywords rather than conventional scientific methods. Earlier limitations included the lack of access to real-time information, raising concerns about reliability. For these reasons, it is essential that students not only rely on AI tools but also understand the underlying geographical concepts and processes. Developing critical thinking skills among both students and teachers is therefore fundamental to avoid uncritical reliance on AI-generated outputs.

The use of AI in education also raises pedagogical, legal, and ethical questions. For AI-generated teaching materials, issues of authorship and intellectual property arise: who owns the curriculum, the lesson plan, or the content, and whose name should be associated with it? This also prompts organisational questions within educational institutions (Zawacki-Richter et al., 2019). Additional ethical concerns relate to ownership of AI-generated outputs, particularly in contexts where even a lecturer's voice can now be digitally cloned. Despite these challenges, LLMs present opportunities to reduce regional socio-economic disparities in educational quality.

CONCLUSIONS

The emergence of artificial intelligence in geography can be traced back to Dobson's 1983 work *Automated Geography* and Openshaw's 1997 volume *Artificial Intelligence in Geography*. One of the primary drivers of the rapid development of GeoAI over the past decade is the availability of

user-friendly Python and R libraries, which enable practical applications even for users with basic programming skills. Concurrently, AI-based applications have gained traction in human geography, particularly in research on settlements, mobility, the environment, and medical geography (Biljecki, 2023).

An interesting experiment involves asking ChatGPT to generate a summary of the ideas presented in this paper and comparing it with the authors' own text. The AI produced a text structured into two chapters based on a few keywords. One chapter, titled *Geographical Research*, focused on GIS (data processing and analysis, image recognition, forecasting and modelling, particularly of natural hazards), environmental monitoring (climate change, pollution), and urban studies (urban development, transport systems). The second chapter, titled *Geographical Education*, addressed interactive learning tools (virtual and augmented reality, smart maps), personalised learning (adaptive platforms, automated assessment), data visualisation, and interactive mapping.

Based on the national and international examples presented, several key trends in the application of AI in Earth sciences are evident. The most dynamic growth occurs in subfields of geography characterised by large volumes of spatially and temporally variable data, particularly remote sensing, urban studies, natural hazard research, and soil and ecosystem modelling. A common feature of current developments is the increasing use of data fusion, i.e., the integrated processing of datasets from diverse sources (satellite, field, sensor, statistical), as well as a growing emphasis on spatio-temporal prediction. Attention to uncertainty management and interpretability is also rising, as reflected in the proliferation of explainable AI approaches.

In this context, GeoAI represents not only a new analytical toolkit but also a broader shift in the epistemological orientation of Earth science research. Alongside descriptive mapping, process-oriented, function-oriented, and decision-support analyses are becoming increasingly prominent. From the perspective of education and research, AI should therefore not be viewed merely as a technological innovation, but rather as an integrative methodological framework that facilitates the understanding of complex spatial systems. We are confident that AI-based methods will collectively stimulate a rethinking of the role, focus, and objectives of geography in the 21st century.

REFERENCES

- Ahlström, A., Schurgers, G., & Smith, B. (2017). The large influence of climate model bias on terrestrial carbon cycle simulations. *Environmental Research Letters*, 12(1), 014004. <https://doi.org/10.1088/1748-9326/12/1/014004>
- Akinci, H., Zeybek, M., & Dogan, S. (2022). Evaluation of landslide susceptibility of Şavşat district of Artvin province (Turkey) using machine learning techniques. In *Landslides*. IntechOpen. <https://doi.org/10.5772/intechopen.99864>
- American Geographical Society. (2022). *GeoAI*. <https://legacy.ubiqueags.org/geoai/>

- Band, S. S., Janizadeh, S., Chandra Pal, S., Saha, A., Chakraborty, R., Melesse, A. M., & Mosavi, A. (2020). Flash flood susceptibility modeling using new approaches of hybrid and ensemble tree-based machine learning algorithms. *Remote Sensing*, 12(21), 3568. <https://doi.org/10.3390/rs12213568>
- Bastin, J.-F., Latte, N., Bogaert, J., Garcia, C. A., Berzaghi, F., Maestre, F. T., Svenning, J.-C., Assede, E., Barima, S., Besisa, T., Bouchoms, S., Crowther, T. W., de Haulleville, T., de Lame, H., Depoortere, P., Dufrêne, M., Hoek Van Dijke, A. J., Lhoest, S., Mahy, G., ... Lejeune, P. (2025). Global alternatives of natural vegetation cover. *Nature Communications*, 16(1), 6484. <https://doi.org/10.1038/s41467-025-61520-8>
- Biljecki, F. (2023). GeoAI for urban sensing. In *Handbook of Geospatial Artificial Intelligence* (pp. 351–366). CRC Press. <https://doi.org/10.1201/9781003308423-17>
- Boros, L., Kovalcsik, T., Mezősi, G., & Szilassi, P. (2025). A szintetizáló gondolat a földrajzban és annak korlátai. [The synthesizing approach in geography and its limitations] *Magyar Tudomány*, 186(6), 1203–1212. <https://doi.org/10.1556/2065.186.2025.6.21>
- Brownlee, J. (2018). *Deep Learning for time series forecasting: Predict the future with MLPs, CNNs and LSTMs in Python*. Machine Learning Mastery.
- Bui, D. H., & Mucsi, L. (2021). From land cover map to land use map: a combined pixel-based and object-based approach using multi-temporal Landsat data, a random forest classifier, and decision rules. *Remote Sensing*, 13(9), 1700. <https://doi.org/10.3390/rs13091700>
- Chen, S., Yang, Y., Deng, F., Zhang, Y., Liu, D., Liu, C., & Gao, Z. (2022). A high-resolution monitoring approach of canopy urban heat island using a random forest model and multi-platform observations. *Atmospheric Measurement Techniques*, 15(3), 735–756. <https://doi.org/10.5194/amt-15-735-2022>
- Choi, J., Yun, Y., & Chae, H. (2025). Forest fire risk prediction in South Korea using Google Earth Engine: comparison of machine learning models. *Land*, 14(6), 1155. <https://doi.org/10.3390/land14061155>
- Csikós, N., Szabó, B., Hermann, T., Laborczi, A., Matus, J., Pásztor, L., Szatmári, G., Takács, K., & Tóth, G. (2023). Cropland productivity evaluation: a 100m resolution country assessment combining Earth observation and direct measurements. *Remote Sensing 2023, Vol. 15, Page 1236*, 15(5), 1236. <https://doi.org/10.3390/RS15051236>
- Edureka. (2019). *AI vs machine learning vs deep learning*. <https://www.youtube.com/watch?v=WSb-gixdC9g8>
- Farmonov, N., Amankulova, K., Khan, S. N., Abdurakhimova, M., Szatmári, J., Khabiba, T., Makhliyo, R., Khodicha, M., & Mucsi, L. (2023). Effectiveness of machine learning and deep learning models at county-level soybean yield forecasting. *Hungarian Geographical Bulletin*, 72(4), 383–398. <https://doi.org/10.15201/hungeobull.72.4.4>

- Forkel, M., Drüke, M., Thurner, M., Dorigo, W., Schaphoff, S., Thonicke, K., von Bloh, W., & Carvalhais, N. (2019). Constraining modelled global vegetation dynamics and carbon turnover using multiple satellite observations. *Scientific Reports*, 9(1), 18757. <https://doi.org/10.1038/s41598-019-55187-7>
- Gao, S., Hu, Y., & Li, W. (2023). *Handbook of geospatial artificial intelligence*. CRC Press. <https://doi.org/10.1201/9781003308423>
- Hengl, T., De Jesus, J. M., Heuvelink, G. B. M., Gonzalez, M. R., Kilibarda, M., Blagotić, A., Shangguan, W., Wright, M. N., Geng, X., Bauer-Marschallinger, B., Guevara, M. A., Vargas, R., MacMillan, R. A., Batjes, N. H., Leenaars, J. G. B., Ribeiro, E., Wheeler, I., Mantel, S., & Kempen, B. (2017). SoilGrids250m: Global gridded soil information based on machine learning. *PLoS ONE*, 12(2). <https://doi.org/10.1371/JOURNAL.PONE.0169748>
- Hengl, T., Nussbaum, M., Wright, M. N., Heuvelink, G. B. M., & Gräler, B. (2018). Random forest as a generic framework for predictive modeling of spatial and spatio-temporal variables. *PeerJ*, 6, e5518. <https://doi.org/10.7717/peerj.5518>
- Hu, Y., Goodchild, M., Zhu, A.-X., Yuan, M., Aydin, O., Bhaduri, B., Gao, S., Li, W., Lunga, D., & Newsam, S. (2024). A five-year milestone: reflections on advances and limitations in GeoAI research. *Annals of GIS*, 30(1), 1–14. <https://doi.org/10.1080/19475683.2024.2309866>
- Huang, C., Chen, B., Sun, C., Wang, Y., Zhang, J., Yang, H., Wu, S., Tu, P., Nguyen, M., Hong, S., & He, C. (2023). Synergistic application of multiple machine learning algorithms and hyperparameter optimization strategies for net ecosystem productivity prediction in Southeast Asia. *Remote Sensing*, 16(1), 17. <https://doi.org/10.3390/rs16010017>
- Huang, J., Saleh, S., & Liu, Y. (2021). A review on artificial intelligence in education. *Academic Journal of Interdisciplinary Studies*, 10(3), 206. <https://doi.org/10.36941/ajis-2021-0077>
- Isola, P., Zhu, J.-Y., Zhou, T., & Efros, A. A. (2018). *Image-to-image translation with conditional adversarial networks*. <http://arxiv.org/abs/1611.07004>
- Jakab, G., Magyari, E., Jakab, B., & Timár, G. (2025). A powerful approach in visualization: creating photorealistic landscapes with AI. *Land*, 14(7), 1430. <https://doi.org/10.3390/land14071430>
- Janowicz, K., Gao, S., McKenzie, G., Hu, Y., & Bhaduri, B. (2020). GeoAI: spatially explicit artificial intelligence techniques for geographic knowledge discovery and beyond. *International Journal of Geographical Information Science*, 34(4), 625–636. <https://doi.org/10.1080/13658816.2019.1684500>
- Kajári, B., Tobak, Z., Túri, N., Bozán, C., & Van Leeuwen, B. (2024). Prediction of inland excess water inundations using Machine Learning Algorithms. *Water*, 16(9), 1267. <https://doi.org/10.3390/w16091267>
- Kantor, M. (2024). The rise of AI meets the golden age of geography. *Forbes*. <https://www.forbes.com/sites/esri/2024/03/22/the-rise-of-ai-meets-the-golden-age-of-geography/?sh=124650a56329>

- Kosuri, S., Kumar, B., Nagamalla, L., Sumithra, S., Rajan, S., & Khandelwal, V. K. (2025). AI-driven environmental monitoring: from data streams to ecosystem insights. *International Journal of Environmental Sciences*, 11(12s), 194–201. <https://doi.org/10.64252/bte24b02>
- Lavallin, A., & Downs, J. A. (2021). Machine learning in geography—Past, present, and future. *Geography Compass*, 15(5). <https://doi.org/10.1111/gec3.12563>
- Li, W., & Hsu, C.-Y. (2022). GeoAI for large-scale image analysis and machine vision: recent progress of artificial intelligence in geography. *ISPRS International Journal of Geo-Information*, 11(7), 385. <https://doi.org/10.3390/ijgi11070385>
- Lifelo, Z., Ding, J., Ning, H., Qurat-Ul-Ain, & Dhelim, S. (2024). Artificial intelligence-enabled metaverse for sustainable smart cities: technologies, applications, challenges, and future directions. *Electronics*, 13(24), 4874. <https://doi.org/10.3390/electronics13244874>
- Nelson, D. (2020). *Mi az a Generatív Versengő Hálózat (GAN)? – Unite.AI* [What-is-a-generative adversarial network (GAN) – Unite.AI]. <https://www.unite.ai/hu/what-is-a-generative-adversarial-network-gan/>
- Norvig, P., & Russell, S. J. (2023). *Mesterséges intelligencia II. kötet modern megközelítésben* [Artificial Intelligence, Volume II: A Modern Approach]. Panem.
- Papp, L., van Leeuwen, B., Szilassi, P., Tobak, Z., Szatmári, J., Árvai, M., Mészáros, J., & Pásztor, L. (2021). Monitoring invasive plant species using hyperspectral remote sensing data. *Land*, 10(1), 29. <https://doi.org/10.3390/land10010029>
- Rakuasa, H. (2023). Integration of artificial intelligence in geography learning: challenges and opportunities. *Sinergi International Journal of Education*, 1(2), 75–83. <https://doi.org/10.61194/education.v1i2.71>
- Ramlakhan, S., Saatchi, R., Sabir, L., Singh, Y., Hughes, R., Shobayo, O., & Ventour, D. (2022). Understanding and interpreting artificial intelligence, machine learning and deep learning in emergency medicine. *Emergency Medicine Journal*, 39(5), 380–385. <https://doi.org/10.1136/emermed-2021-212068>
- Sohrab, S., Csikós, N., & Szilassi, P. (2024). Effect of geographical parameters on PM10 pollution in European landscapes: a machine learning algorithm-based analysis. *Environmental Sciences Europe*, 36(1). <https://doi.org/10.1186/s12302-024-00972-z>
- Sohrab, S., Szabó, B., Pásztor, L., Makó, A., & Szatmári, G. (2025). Adjusting Bulk Density Observations in the Hungarian soil information and monitoring system using pedotransfer functions. *European Journal of Soil Science*, 76(6). <https://doi.org/10.1111/ejss.70245>
- Sun, Y., Sun, X., Wu, Z., Yan, J., Ma, C., Zhang, J., Zhao, Y., & Chen, J. (2023). Using a variety of machine learning approaches to predict and map topsoil pH of arable land on a regional scale. *Soil Science Society of America Journal*, 87(3), 613–630. <https://doi.org/10.1002/saj2.20525>

- Szatmári, G., & Pásztor, L. (2025). The impact of direct and indirect digital soil mapping approaches on spatial uncertainty. *Geoderma*, 460, 117448. <https://doi.org/10.1016/j.geoderma.2025.117448>
- Szilassi, P., Mezösi, G., Boros, L., & Kovalcsik, T. (2024). A táj- és környezetföldrajzi kutatások története Magyarországon az 1880-as évektől napjainkig a Földrajzi Közleményekben megjelent értekezések és az MTMT adatbázis bibliográfiai elemzése alapján [Landscape and environmental geography research in Hungary from the 1880s to the present based on the analyses of Hungarian science bibliography, and geographical review of Hungarian Geographical Society]. *Földrajzi Közlemények*, 148(2), 92–103. <https://doi.org/10.32643/fk.148.2.2>
- Szilassi, P., Szatmári, G., Pásztor, L., Árvai, M., Szatmári, J., Szitár, K., & Papp, L. (2019). understanding the environmental background of an invasive plant species (*Asclepias syriaca*) for the future: an application of LUCAS field photographs and machine learning algorithm methods. *Plants* 2019, Vol. 8, Page 593, 8(12), 593. <https://doi.org/10.3390/PLANTS8120593>
- Taghizadeh-Mehrjardi, R., Schmidt, K., Amirian-Chakan, A., Rentschler, T., Zeraatpisheh, M., Sarmadian, F., Valavi, R., Davatgar, N., Behrens, T., & Scholten, T. (2020). Improving the Spatial Prediction of Soil Organic Carbon Content in Two Contrasting Climatic Regions by Stacking Machine Learning Models and Rescanning Covariate Space. *Remote Sensing*, 12(7), 1095. <https://doi.org/10.3390/rs12071095>
- Tölgyesi, C., Csikós, N., Temperton, V. M., Buisson, E., Silveira, F. A. O., Lehmann, C. E. R., Török, P., Bátori, Z., & Bede-Fazekas, Á. (2025). Limited carbon sequestration potential from global ecosystem restoration. *Nature Geoscience*, 18(8), 761–768. <https://doi.org/10.1038/s41561-025-01742-z>
- van Leeuwen, B. (2012). *Artificial neural networks and geographic information systems for inland excess water classification* [PhD Dissertation, University of Szeged]. <https://doi.org/10.14232/phd.1520>
- Wadoux, A. M. J.-C., Minasny, B., & McBratney, A. B. (2020). Machine learning for digital soil mapping: Applications, challenges and suggested solutions. *Earth-Science Reviews*, 210, 103359. <https://doi.org/10.1016/j.earscirev.2020.103359>
- Wang, S., Huang, X., Liu, P., Zhang, M., Biljecki, F., Hu, T., Fu, X., Liu, L., Liu, X., Wang, R., Huang, Y., Yan, J., Jiang, J., Chukwu, M., Reza Naghedi, S., Hemmati, M., Shao, Y., Jia, N., Xiao, Z., ... Bao, S. (2024). Mapping the landscape and roadmap of geospatial artificial intelligence (GeoAI) in quantitative human geography: An extensive systematic review. *International Journal of Applied Earth Observation and Geoinformation*, 128, 103734. <https://doi.org/10.1016/j.jag.2024.103734>
- Wilby, R. L., & Esson, J. (2024). AI literacy in geographic education and research: capabilities, caveats, and criticality. *The Geographical Journal*, 190(1). <https://doi.org/10.1111/geoj.12548>
- Xu, Y., Du, B., Zhang, L., Cerra, D., Pato, M., Carmona, E., Prasad, S., Yokoya, N., Hansch, R., & Le Saux, B. (2019). Advanced Multi-Sensor Optical Remote Sensing for Urban Land Use and Land Cover Classification: Outcome of the 2018 IEEE GRSS Data Fusion Contest. *IEEE Journal of*

Selected Topics in Applied Earth Observations and Remote Sensing, 12(6), 1709–1724. <https://doi.org/10.1109/JSTARS.2019.2911113>

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>

Zhang, W., Chen, E., Anderson, M., Thompson, S., & Lee, J. (2025). Multimodal deep learning-based intelligent food safety detection and traceability system. *International Journal of Management Science Research*, 8(3), 71–76. [https://doi.org/10.53469/ijomsr.2025.08\(03\).09](https://doi.org/10.53469/ijomsr.2025.08(03).09)

Zhou, T. (2023). Application of artificial intelligence in geography. *Journal of Physics: Conference Series*, 2646(1), 012006. <https://doi.org/10.1088/1742-6596/2646/1/012006>

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