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The dynamic relationship between the transportation modes used by foreign tourists and economic growth: An econometric analysis with evidence from the last 50 years of the Turkish Republic

Yabancı turistlerin kullandığı ulaşım türleri ile ekonomik büyüme arasındaki dinamik ilişki: Türkiye Cumhuriyeti'nin son 50 yılından kanıtlarla ekonometrik bir analiz

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ABSTRACT: This article aims to reveal the relationship between the Turkish economy and tourism, with a retrospective evaluation of the 100th anniversary of the Republic. In attempting to determine this relationship, the question is asked whether the tourism-led growth (TLG) hypothesis or the economy-led growth hypothesis through the expansion of tourism is valid based on the last 50 years of the republican period. The ARDL approach (Autoregressive Distributed Lag) investigates the interaction between variables. A cointegration relationship was found between the variables and a positive relationship between the tourists arriving by air and sea and economic growth in the long run. The Granger causality test was applied to determine the presence and direction of causality between tourists arriving in Turkey and GDP. The results show that economic growth is the Granger causality for tourist arrivals. Relating these results to the variables studied and the study period for the Turkish economy confirms the validity of the hypothesis of tourism expansion based on economic growth rather than the hypothesis of tourism-induced growth.
Keywords: Economic-Led Growth, Tourism-Led Growth, Cointegration, Causality, ARDL Bound Test.

ÖZ: Bu makalenin amacı, Cumhuriyetin 100. yıl dönümünün geriye dönük bir değerlendirmesiyle, Türkiye ekonomisinin turizmle olan ilişkisini ortaya koymaktır. Bu ilişki tespit edilmeye çalışılırken Cumhuriyet döneminin son 50 yılı temel alınarak, turizme dayalı büyüme hipotezinin (TLG) mi yoksa ekonomik büyümeye dayalı turizm genişlemesi hipotezinin mi geçerli olduğu sorgulanmaktadır. Gecikmesi Dağıtılmış Otoregresif Sınır Testi (ARDL) yaklaşımını kullanan analiz, değişkenler arasındaki ilişkiyi araştırmaktadır. Analiz bulgularına göre değişkenler arasında bir eşbütünleşme ilişkisi tespit edilmiş olup, uzun dönemde hava ve denizyoluyla gelen turist sayısı ile ekonomik büyüme arasında pozitif bir ilişki ortaya konmuştur. Türkiye'ye gelen turistler ile GSYİH arasında nedenselliğin varlığını ve yönünü belirlemek amacıyla Granger nedensellik testi uygulanmıştır. Sonuçlar, ekonomik büyümenin yabancı turist gelişlerinin Granger nedeni olduğunu göstermektedir. Bu sonuçların Türkiye ekonomisi için incelenen değişkenler ve çalışma dönemi ile ilişkilendirilmesi, turizm kaynaklı büyüme hipotezinden ziyade ekonomik büyümeye dayalı turizm genişlemesi hipotezinin geçerliliğini doğrulamaktadır.
Anahtar Kelimeler: Ekonomi Odaklı Büyüme, Turizm Odaklı Büyüme, Eşbütünleşme, Nedensellik, ARDL Sınır Testi.

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GENİŞLETİLMİŞ ÖZET

Giriş

Ulaştırma sistemleri ulusal ekonomilerin ayrılmaz bir parçasıdır. Etkin ulaştırma sektörlerine sahip ülkeler daha iyi bir yatırım ortamına sahip olacağı için rekabet güçleri artarak, ekonomik kalkınmaları hızlanacaktır. Ulaşım sayesinde bölgesel erişilebilirlik teşvik edilmekte ve toplumdaki bireylerin refah düzeyinin artmasına katkı sağlanabilmektedir (Li ve DaCosta, 2013: 56). Ulaşımla yakından ilişkili olan turizm de birçok ülkenin ekonomik büyüme potansiyelini artıran önemli bir sektördür. Türkiye'de turizm, ekonomik kalkınmanın itici gücü olan sektörlerden biridir. Cumhuriyet'in ilanıyla birlikte hızlı kalkınma çabalarının gerçekleştirildiği ilk dönemde turizm ve ulaştırma sektörleri göz ardı edilmemiştir. Bu bağlamda 1923 yılından itibaren hem turizm, hem de ekonomi ve ulaştırma altyapılarını geliştirmeye yönelik birçok girişim bulunsa da turizm alanında özellikle 1980 itibariyle önemli gelişmeler yaşanmıştır. 1982'de uygulamaya konan Turizm Teşvik Kanunu'nun ardından da sektör, hızlı gelişim ve büyüme göstermiştir (Çoban ve Özcan, 2013: 244; Yılmaz, 2023: 258). Oldukça önemli bir turizm potansiyeli bulunan Türkiye'de turizm sektörünün ülke ekonomisindeki etkilerinin değerlendirilmesi son derece önemli bir konudur. Bu anlamda bu çalışma ile Türkiye Cumhuriyeti'nin kuruluşundan günümüze kadar geçen dönemin yaklaşık son yarım yüzyılına yönelik olarak Türkiye'de turizme dayalı büyüme hipotezinin mi yoksa ekonomiye dayalı turizm genişlemesi hipotezinin mi geçerli olduğu araştırılmaktadır. Araştırmada son yarım yüzyılın temel alınmasının iki nedeni bulunmaktadır. Bunlardan ilki ve en önemlisi turizmin 1980 sonrası hızlı bir gelişme göstermesi ikincisi ise veri kısıtı olmasıdır. Farklı ulaşım türlerinin turizm kaynaklı büyümeye katkısı, turizm sektöründeki faaliyetlerine, ülkenin turizm kaynaklarına ve turistlerin seyahat tercihlerine bağlı olarak değişebilmektedir. Turizm sektöründeki büyümenin genel ekonomik büyümeyi desteklediğini savunan turizm odaklı büyüme hipotezinin ulaşım modları açısından belirlenmesi, bu sektördeki farklı ulaşım modlarının ekonomik büyümeye katkısının anlaşılmasına yardımcı olacaktır.

Turizm sektörünün ülke ekonomisine sağladığı katkı ve turist sayısındaki artışın ekonomik büyüme üzerinde önemli etkisi bulunmaktadır. Bu çalışmanın temel amacı bu etkiyi ulaşım türleri açısından ortaya koymaktır. Herhangi bir ulaşım aracıyla ülkeye gelen yabancı turist sayısı ile ekonomik büyüme arasında anlamlı bir bağlantı olmasa bile ulaşım sayesinde artan turist sayısının sektördeki büyümeye ve dolayısıyla turizme katkı sağlayacağı açıktır. Bu anlamda ulaşım modları açısından ortaya çıkacak sonuçlar, bu sektörün ekonomiye katkısının arttırılmasına yönelik uygulanabilecek politika önerilerinin geliştirilmesi açısından önemlidir. Literatürde ulaşım ve turizm bağlamında pek çok çalışma bulunmasına rağmen tüm modların etkilerini ayrı ayrı değerlendiren, uzun ve kısa vadeli ilişkileri inceleyen çalışmalar Türkiye ekonomisi ve turizm sektörü açısından oldukça sınırlıdır. Cumhuriyet'in 100. yılında ülkemizin ulaşım ve turizmde ulaştığı önemli noktalar dikkate alındığında, çalışmadan elde edilecek sonuçlar ile alandaki bu boşluğu doldurulmasına katkı sağlaması umulmaktadır.

Literatür taraması

Literatür gözden geçirildiğinde, ekonomik büyüme ile turizm arasındaki ilişkiyi inceleyen çalışmaların farklı sonuçlara ulaştığı görülmektedir. Ampirik araştırmaların bulguları çeşitlilik gösterirken, bazıları ekonomik büyümenin turizmi etkilediği sonucuna varmışken, bazıları da turizmin ekonomik büyümeyi etkilediği sonucuna ulaşmıştır. Farklı bir bakış açısıyla, bazı çalışmalar ise bu iki değişken arasında karşılıklı etkileşim olduğunu öne sürmektedir. Turizm faaliyetlerindeki genişleme ile ülke ekonomilerinin büyümesi arasındaki bağlantının boyutuyla yönü politika yapıcılar için son derece önemlidir. Bu iki değişken arasında ekonomiye dayalı turizm genişlemesi hipotezi geçerliyse, sektörün gelişmesi için ekonomik büyümeye ihtiyaç duyulacaktır. Turizm genişlemesine dayalı ekonomik büyüme hipotezi geçerli ise de, turizmin ekonomik büyümeye katkı sağladığı, dolayısıyla bu sektörü geliştirmeye yönelik politikaların desteklenmesinin gerekli olduğu ortaya çıkacaktır. Karşılıklı bir ilişki tespit edilmesi durumunda ise her iki unsuru da teşvik eden politikaların geliştirilmesi faydalı olacaktır (Oh, 2005: 40). Bu nedenle birçok ülke ekonomisi için turizm ve ekonomik büyüme konularını ele alan çalışmalar bulunmaktadır. Araştırma kapsamında literatürdeki çeşitli çalışmalar bu iki temel hipotez ekseninde incelenmiştir.

Yöntem

Bu çalışmanın iki temel amacı bulunmaktadır. İlk olarak, ekonomik büyüme ile Türkiye'ye gelen yabancı turist sayıları arasında, farklı ulaşım şekilleri özelinde eşbütünleşme ilişkisinin varlığını araştırmaktadır. Bu çerçevede, incelenen değişkenler arasında uzun ve kısa dönemli ilişkilerin varlığının belirlenmesi hedeflenmektedir. Ayrıca ulaşım türleri açısından turizm kaynaklı büyüme hipotezi belirlenirken değişkenler arasında nedensellik ilişkisinin varlığı da araştırılmaktadır. Bu iki amaç doğrultusunda iki temel araştırma hipotezi oluşturulmuştur. İlk hipotezin geçerliliğini test etmek için Gecikmesi Dağıtılmış Otoregresif Sınır Testi (ARDL) çeşitli avantajlarından dolayı tercih edilmiştir. Araştırma kapsamında cevaplanması amaçlanan ikinci hipotezi test etmek için ise Granger Nedensellik Testi uygulanmıştır.

Bulgular ve tartışma

Bu çalışma çerçevesinde, 1977:1-2022:4 dönemlerine ait üç aylık zaman serisi verileriyle yapılan analiz sonuçlarına göre ARDL sınır testiyle değişkenler arasında eşbütünleşme ilişkisi tespit edilmiştir. Eşbütünleşmenin varlığının belirlenmesinin ardından uzun ve kısa vadeli ilişkiler araştırılmıştır. Araştırmanın temel bulgularına göre, yabancı turistlerin havayolu ve denizyolu ulaşım modlarıyla gelişi ile GSYİH arasında uzun dönemli pozitif ilişki bulunmuştur. Ayrıca, kısa dönemde havayoluyla gelen yabancı turistlerin Türkiye'ye gelişi ile GSYİH arasında pozitif bir ilişki bulunurken, karayoluyla gelen yabancı turist sayısı ile GSYİH arasında negatif bir ilişki tespit edilmiştir. Değişkenler arasındaki nedensel ilişkinin belirlendiği Granger Nedensellik Testi sonuçlarına göre; Türkiye'de ekonomik büyümenin gelen yabancı turist sayılarının Granger nedeni olduğu belirlenmiştir. Tek yönlü nedensellik, daha açık bir ifade ile ekonomik büyüme kaynaklı turizm genişlemesinin Türkiye'ye gelen yabancı turist sayısı için geçerli olduğu bulunmuştur.

Sonuç ve öneriler

Uzun ve kısa vadeli sonuçlar birlikte değerlendirildiğinde ortaya konan bulgular, ülkeye gelen yabancı turistlerin Türkiye'deki ekonomik büyümedeki önemini ortaya koymaktadır. Turizm sektörünün gelişmesinin ülke ekonomilerine olumlu etkileri literatürde birçok çalışmaya konu olmuştur. Ancak turizm ile ekonomik büyüme arasındaki nedensellik ilişkisi ve bu iki değişken arasındaki nedenselliğin yönü konusunda fikir birliğine varılamamıştır. Nedensellik konusunda iki temel argüman bulunmaktadır. Bunlardan biri turizmin yönlendirdiği ekonomik büyüme hipotezi bir diğeri ise ekonomik büyümenin yönlendirdiği turizm genişlemesi hipotezidir. Araştırma kapsamında elde edilen temel bulgulara göre, ülkeye gelen yabancı turist sayısı Türkiye'de turizm genişlemesinin bir göstergesi olarak değerlendirildiğinde, ekonomik büyümeye dayalı turizm genişlemesi hipotezinin geçerli olduğu ortaya konmuştur.

Ekonomik büyüme ile turizmin karmaşık ve dinamik ilişkisi literatürde birçok çalışmanın konusu olmasına rağmen ortaya konan bulgularda henüz keskin bir görüş birliği sağlanamadığı görülmektedir. Bu anlamda incelenen ülke, seçilen değişkenler ve ele alınan dönemlere göre araştırma sonuçları farklılık göstermektedir. Turizm ve ekonomi arasında ilişki olmadığını ortaya koyan araştırmalar, ilişkinin yönü farklı da olsa uzun dönemli bir ilişki tespit eden araştırmalara kıyasla oldukça sınırlı sayıdadır. Bu anlamda turizm ile ekonomik büyüme arasındaki ilişkinin varlığı birçok ampirik araştırma bulgusuna göre yadsınamaz bir gerçektir. Bu iki değişken arasındaki ilişki çeşitli faktörlerden etkilenmektedir. Ulaştırma modları ile ekonomik büyüme arasındaki ilişkiyi etkileyebilecek en önemli faktörlerden biri altyapı yatırımlarıdır. Ulaşım altyapısının iyileştirilmesi, yabancı turistlerin ülke içinde de seyahat etmesini kolaylaştıracak ve konforlu hale getirecek, böylece turizmin gelişmesini ve ekonomik büyümeyi hızlandıracaktır. Bir diğer önemli faktör ise hükümet politikaları ve düzenlemeleridir. Örneğin, sürdürülebilir turizm gelişimini teşvik eden politikalar, turizmin faydalarının birkaç sektörde yoğunlaşması yerine ekonominin geneline yayılmasını sağlamaya yardımcı olabilir. Ayrıca farklı ulaşım modlarının varlığı, turizm ile ekonomik büyüme arasındaki ilişkiyi etkileyebilmektedir. Örneğin, havayolu ulaşım yönteminin artan bilet fiyatları yabancı turistlerin bir ülkeyi ziyaret etme olasılığını etkileyebilecek bir faktördür. Bu durum ekonomik büyüme üzerinde olumsuz etki yaratabilecektir.

Introduction

Transport systems do indeed play a very important role in national economies. In keeping with the economic growth theory, advances in transport infrastructure are intricately linked to the economic progress of nations (Barro, 1990). Indeed, the connection between transportation and the economy is a topic extensively explored in various scholarly works and literature. Since countries with efficient transportation sectors will have a better investment environment, their economic development can be accelerated by increasing their competitiveness. Thanks to transportation, regional accessibility is promoted and can contribute to improving the welfare level of individuals in society (Li and DaCosta, 2013: 56).

Tourism, which is closely related to transportation, is a major sector that increases the economic growth potential of many countries. Tourism activities have indisputable economic benefits. Among these benefits; providing foreign currency inflow to the country, alleviating balance of payments problems, creating employment, preventing large-scale unemployment, increasing income, and contributing to economic growth (Lim, 1997: 835). Tourism activities provide added value to the country's economy, creating demand for investment, income, exports, and activities in other sectors.

The tourism sector can have a direct or indirect impact on many sectors. There are many sectors such as transportation, entertainment, and shopping that are closely pertaining to tourism. In this way, tourism plays an extremely major role in the economic development not only of developed countries but also of developing countries (Britton, 1982: 332; Copeland, 1991: 515; Hazari and Sgro, 1995; Hao, Var and Chon, 2003: 33). Not only does tourism hold the potential to attract investment and create export opportunities, but it also contributes significantly to the inflow of foreign exchange into a country. In addition to these economic benefits, tourism plays a major role in job creation, making it a crucial aspect of job creation. In many countries, tourism contributes significantly to national income, thus supporting overall economic growth (Bahar, 2006: 138; Uzun, 2009: 25).

Turkey is known as a tourist paradise, and this sector is one of the driving forces for the economic development of the country, which has many tourist destinations. With the proclamation of the Republic, the tourism and transportation sectors were not ignored in the first period of rapid development efforts. “Türk Seyyahin Cemiyeti” (The Turkish Traveler's Association), a national and amateur tourism organization founded in 1923 by the instruction of Mustafa Kemal Atatürk, is the best example of this (İnan, 2009: 39).This society carried out very important activities in terms of providing services in this field at a time when the government did not have an official tourism organization (Andaç, 2004).Another example of the efforts to support tourism in the Republican era is the “Beynelmilel Turizm Kongresi” (International Tourism Congress) held in 1930 under the auspices of Atatürk (İnan, 2009: 40).The “Otelciler ve Hancılar Cemiyeti” (Hotelmakers and Innkeepers Association), which was established in 1933 in depending on the development of tourism, is another important development of the period (Gürsoy, 2004: 7).With the "Tourism Bureau", which started its activities under the Ministry of Economy established in 1934, tourism began to take place in public administration (Andaç, 2004). In summary, the studies on tourism in the first development period of the Republic; developments in tourism education, legal regulations in the field of law, archaeological studies, studies in the field of transportation can be counted. Since the transportation network that the Republic of Turkey took over from the Ottoman Empire was quite inadequate, a special focus was placed on the transportation problem and the development of the transportation infrastructure, as was the case in the tourism sector in the early period of the Republic. In the first two industrialization plans prepared in the first period of the Republic, the basic industries and the tourism sector were pioneered, and railway infrastructure investments were given importance for the development of both areas. In addition, it is seen that there are efforts and regulations for the development of all modes in the first period studies. The railway plans created after the proclamation of the Republic, the construction of new lines by nationalizing existing lines, and the provision of discounted tickets for transportation to tourism destinations are the main examples of development in the field of railways (İnan, 2009). Despite all these developments in the railway, it is seen that there is a more limited policy when the early studies on road transportation are examined. The main reason for this is that the road transport mode is seen as a system that will complement the railway. Road construction works can be specified in places of touristic importance in

terms of being related to tourism among the development activities for the highway within the limited policies. The use of cabotage right with the law that came into force in 1926 is one of the important developments in maritime transportation in the first period of the Republic According to the law, sea transportation on the coasts of the country is left to ships with the Turkish flag. Port services are only available to Turkish citizens (Özdemir, 2006). Policies supporting the railway were carried out in maritime transportation as well as on the highway, and in the first period, there was not much improvement in this mode of transportation. The last mode of transport to develop was the airline. One of the important developments in this field was the establishment of the "Türk Tayyare Cemiyeti" (Turkish Aircraft Society) in 1925.The "Tayyare Makinist Mektebi" (Aircraft Machinist School) was established in 1926, and this development was followed by the establishment of the first aircraft factory of the Republic of Turkey in 1926. The establishment of the "Havayolları Devlet İşletme İdaresi" (Airlines State Operations Administration) in 1933 and the important contributions of important names such as Vecihi Hürkuş and Nuri Demirağ in the development of civil aviation in this period can be counted among the airline transportation developments of the first period (Aydoğan, 2020).

In the first period of the Republic of Turkey, development policies for transportation and tourism were initiated. These policies continued throughout the next century. Tourism in Turkey, endowed with abundant tourism potential, stands as a substantial revenue stream for the country's economy at present. The tourism sector contributes directly and indirectly to the country's economy, thus creating demand by acting as a catalyst for employment, investment, export, and activities in other sectors. Millions of tourists visit Turkey every year, creating significant income for the tourism sector. According to 2022 data, 44.5 million foreign tourists visited Turkey and approximately 46.5 billion USD of tourism income was obtained (KTB, 2023a). In addition to the direct effects of tourism revenues on the economy, it's worth noting that economic growth can further increase tourism revenues. Rising expectations for growth rates create the potential for tourism revenues to increase. Given the significant importance of these factors, it is essential for policy-makers to comprehensively address the impact of tourism on the national economy.

The relationship between the transportation modes utilized by inbound foreign tourists and economic growth is intricate and dynamic. Undoubtedly, the arrival of foreign tourists in a country significantly bolsters both the tourism sector and the overall economy. While international tourism demand fluctuations stem from numerous factors, much of the research has concentrated on economic influences (Balaguer and Cantavella-Jorda, 2002; Oh, 2005; Brida and Rosso, 2010; Mishra and Rout, 2011). The contribution of the types of transportation chosen by the tourists to the GDP is manifested in many directions. The impact of various modes of transport on tourism-led growth may vary depending on their involvement in the tourism sector, a country's tourism assets and traveller preferences. Unravelling the TLG hypothesis, asserting that tourism sector expansion fuels broader economic advancement, concerning distinct transportation modes can shed light on their respective contributions to economic growth within this sector. The tourism industry's support to a nation's economy and the escalating tourist numbers significantly influence GDP. The primary aim of this study is to determine this effect in terms of transportation types. Even if a noteworthy correlation might not emerge between the count of foreign tourists arriving via specific transportation modes and economic growth, it's evident that an augmented influx of tourists due to enhanced transportation will bolster sectoral and economic growth. Consequently, the forthcoming findings concerning transportation modes will play a pivotal role in devising policy recommendations geared towards augmenting this sector's contribution to the economy. While the literature features numerous studies examining transportation and tourism, research that assesses the distinct modes independently and investigates both the long-term and short-term correlations remains insufficient, particularly for the tourism industry and Turkish economy. It is anticipated that the outcomes of this study will aid in bridging this gap in the field, offering valuable insights for future endeavours.

A parallel examination of transport and tourism shows that tourism activities have a locomotive effect on the country's development, especially after 1980.Following the decisions made on January 24, 1980, a policy of export-oriented industrialization was adopted, marking a turning point (Çoban and Özcan, 2013: 244).This economic shift in Turkey, spurred by the changes in 1980, ushered in policies aimed at

diminishing the state's role in the economy, promoting international trade liberalization, and encouraging foreign investments. In 1982, the "Tourism Encouragement Law" was issued and entered into force in Turkey. This law paved the way for policies to increase tourism revenues in the country (Yılmaz, 2023: 258). In Turkey, which has a very large tourism potential, it is an extremely important issue to determine the economic effects of tourism. In this context, evidence will be presented on the effectiveness of the economy-led growth (ELG) hypothesis in the expansion of tourism that has taken place in the last half century since the establishment of the Republic. First of all, the links between transportation, tourism and economy are explained and then the main transformations in tourism policies in Turkey are mentioned. Then, the main results of econometric studies examining the connections between these two variables are presented. Finally, the study is completed with the conclusion part by explaining the econometric analysis and its findings.

A brief overview of the development of tourism in Turkey

In the first years following the establishment of the Republic, when the internal and external problems were solved, although the potential of the tourism industry had not yet been fully recognised, infrastructure works began to develop the industry. Infrastructure investments such as the construction of roads and the strengthening of communication networks have enabled tourists to easily reach and move around the country. Turkey has started to shape its tourism policies since the 1950s. During this period, the contribution of the tourism sector to the socio-economic development of the country has been recognized and steps have been taken in this direction. Before the planned development period (1923-1962), institutions and organizations were established to support the progress of the sector in the future. The establishment of the Türk Seyyahin Cemiyeti (1923), and the Türkiye Teyyare Cemiyeti (1925) can be given as examples. In the early periods, an institutional development related to tourism was the inclusion of tourism in the public administration in 1934. On this date, the 'Tourism Bureau' was established as the first tourism unit created by the state. This office was renamed the 'Tourism Directorate' in 1939 (Babalık, 2019: 362). In the 1950s, government support in the sector decreased and incentives were given to the private sector. In this period, investments made especially in the field of transportation were increased (Ünlüönen and Kılıçlar, 2004: 3; Çallı, 2015: 19). Although there are some activities related to tourism, it is seen that in the period from the proclamation of the Republic to the 1950s, no tourism-related issue was touched upon in government programs (Esen et al., 2012: 23-24). The government changed in 1950, but the tourism topic was not included in the program of the newly established government. Although not in the government program, after the 1950s, in order to develop tourism in Turkey; Important steps have been taken, such as laws and economic incentives. Another development in the aforementioned period is the establishment of the Tourism Bank in 1955 and its commencement of operations (Arar, 1968; Babalık, 2019: 364). Tourism has started to develop in Turkey since the 1950s. The main important developments emerged after the 1980s. This progress is shown in the table with tourist arrivals and revenues from tourism.

Table 1: International tourism, number of arrivals and revenues (1953-2013)

	Number of Foreign tourists (Thousand People)	Tourism Revenues (Thousand $)
1953	91	8000
1963	198	7659
1973	1338	171477
1983	1506	411088
1993	6525	3959000
2003	13956	13854868
2013	34910	32308991

Source: (Çallı, 2015: 21; Ünlüönen and Kılıçlar, 2004: 3)

Although the subject of tourism was included in the government program for the first time in 1957, it does not seem possible to talk about a planned tourism activity under the supervision and control of the state until 1963, except for individual initiatives (Babalık, 2019: 367; Coşkun and Alkan, 2020: 48). Since 1963, the tourism sector has been included in all development plans implemented in Turkey. The

main arguments in the determination of tourism policies in the period from this date to the 1980s can be expressed as closing the current account deficit by obtaining foreign exchange income thanks to tourism, and reducing unemployment by contributing to employment in tourism activities. An important development in the field of tourism in these years was the establishment of the Association of Turkish Travel Agencies (1972) (Coşkun and Alkan, 2020: 49).

It should be noted that tourism activities in Turkey have developed rapidly since the 1980s.Since that time, tourism has been referred to as the driving force of economic development (Dilek and Kulakoğlu, 2017: 1104). Another development that emerged during this period was the enactment of the 'Tourism Promotion Law' in 1982.The most important goals of this law include shifting investments primarily to areas that develop the tourism sector and the efficient use of scarce resources (Yıldız, 2011: 57). The 1990s were the years when consumption patterns in tourism changed. Alternative tourism types to classical tourism movements have developed. In the 2000s, the demand for alternative tourism has increased. The tourism sector, whose importance is increasing day by day, has made significant progress in the period between 1950 and 2000. In parallel with these developments, Turkey entered the top ten countries with the highest tourism revenues in 2003 (Yiğitgüden, 2005). Recent data are included in the table.

Table 2: International tourism, number of arrivals and revenues (2013-2020)

	Number of Foreign tourists (Thousand People)	**Tourism Revenues (US$)**
2013	39861000	37984000000
2014	41627000	40028000000
2015	41114000	35648000000
2016	30907000	26505000000
2017	37970000	31993000000
2018	46113000	36791000000
2019	51747000	41415000000
2020	15971000	13771000000

Source: (World Bank Data)

As can be seen from the figures in the table 1 and table 2, although tourism demand and tourism revenues have increased in the last fifty years of the Republic's history, especially with the effect of the policies followed in the 1980s, this trend of increase has been observed from time to time by important events (Gulf Crisis, financial crises, earthquakes, terrorist incidents, Covid-19 pandemic, etc.) showed a slowdown with its effects. In Table 2, the effects of the pandemic that occurred in 2019 are clearly seen from the sharp decrease figures reflected in 2020.

Tourism, transportation and economic relations

Transportation stands as a fundamental pillar for the economic and societal advancement of nations. Enabled by transportation, logistics operations facilitate the dissemination of products to both domestic and global markets. Furthermore, transportation nurtures ancillary sectors including agriculture, industry, and commerce. Beyond enhancing foreign trade, transportation yields substantial contributions to a country's economy through the generation of tourism revenues (Özer et al., 2021: 1). Transport and tourism are two main sectors that are vital for a country's economic growth, development and international relations. In this part of the research, there are basic information in order to present an overview on the 100th anniversary of the Republic by focusing on Turkey's transport and tourism relationship.

Turkey has greatly improved and modernized its transport infrastructure in recent years. New airports, highways, railways and seaports were built. These infrastructure investments have given the country's tourism sector the capacity to attract more visitors. In addition, in Turkey, where progress has been made in integrated transportation systems, developments in this field have increased the connections between different regions and made it easier for tourists to travel throughout the country. In addition to

developing and changing infrastructure investments, Turkey is a country with rich history, culture and natural beauties. Owned historical sites, museums, natural parks and coastal areas are important tourist attractions. Turkey supports many different types of tourism, from historical tourism to nature tourism, from sea-sand-sun holidays to health tourism. This diversity offers the potential to attract tourists with different interests. Looking at all these facts as a whole, we find that the number of tourists arriving to Turkey has augmented from the past to the present. The number of tourists arriving to Turkey in 2022 augmented by 80.33% compared to the previous year and amounted to about 44.5 million (KTB, 2023b). To give an overview of the period under study, the table shows the distribution of foreign tourists at the beginning and at the end of the period among the different modes of transportation.

Table 3: Number of foreign tourists arriving by transportation modes

Variables	1977	1978	2021	2022
Seaway	393 150	422 029	207 606	1 653 603
Airline	422 488	505 230	20 326 854	33 889 650
Roadway	751 148	617 693	4 176 219	9 002 404
Railway	94 630	99 325	1 587	18 738
Total	**1 661 416**	**1 644 177**	**24 712 266**	**44 564 395**

Source: (Compiled from Ministry of Culture and Tourism Annual Bulletins, Border Entry-Exit Statistics)

Airline transportation mode, which interacts with tourism, contributes to the development of tourism by increasing the foreign tourist. Thanks to this means of transport, fast and convenient transportation is possible, and the of tourists arriving to the country increases. This increase has a positive impact on employment figures in this sector (Çelik, 2017: 86; Bakan and Ayaz, 2021: 3). Air transport is very important in the TLG hypothesis, because air transport is widely used in international tourism.

Rail tourism has gained importance in the world in recent years. Turkey has significant opportunities in this regard. Thanks to the means of road and rail transportation, tourists can travel between different destinations within the country. Foreign tourists coming to the country reach different places thanks to these modes, which in turn leads to spending in the tourism sector in different regions and ultimately contributes to economic growth. If we look at the development of railroads in Turkey, we can see that it's a more developed transport network, especially due to the heritage of the Republic. One of the important developments in this mode of transportation was the establishment of the Republic of Turkey State Railways Administration in 1953 (Babalık, 2019: 367).

Seaway generally comes to the fore in cruise tourism in the tourism industry. In Turkey, which has an important potential in terms of sea tourism, the arrivals of foreign tourists to the country with this mode contributes to economic growth in terms of increasing tourism revenues. With this type of tourism, although tourists contribute to the sector by traveling to different destinations, its effect remains at a lower level when compared to other modes.

Literature review

An examination of the literature to show that research findings examining the relationship between GDP and tourism vary. While some of the empirical research findings show that economic growth affects tourism, others state that tourism affects economic development. At a different point, some studies reach the results of mutual interaction. Both the direction and size of the links between tourism and GDP are important for policy makers in the country. The fact that there is a reciprocal linkages GDP with tourism shows that both economic growth is fed by tourism and economic growth is necessary for tourism to expand. In an inverse relationship, it is concluded that tourism contributes to GDP, and therefore, it will be necessary to support policies to improve this sector. If a mutual relationship is determined, it will be beneficial to develop policies that encourage both elements (Oh, 2005: 40). For this reason, there are studies based on the relationships between these two variables for different country economies. Various studies in the literature have been examined in these three axes.

Ghali (1976), who presented one of the first studies in this area in the literature, examined the additive of tourism and exports to Hawaii's growth and concluded that tourism accelerated growth the most. Bassil et al. (2015) examined the relationship between tourism and economy on the axis of the terrorist incidents that occurred in Lebanon for the period between 1995 and 2013 and the intensity of the terrorist incidents. In their research where they applied the Granger causality test, the main results show that, there is a positive one-way causality that leads from tourism expansion to economic growth in the short term. A study for Jamaica examined causal linkages between tourism, GDP, real exchange rate, changes in hurricanes, and structural changes. They applied The Johansen cointegration test and autoregressive distributed lag estimation methods in their empirical research. The study shows that the number of tourists or real tourist spending causes economic growth (Ghartey, 2013).

A different study dealing with the links between economy and tourism in South Africa was handled in a linear and non-linear framework. In their studies regarding the period between 1995 and 2014; Engle and Granger (1987) made a comparison using linear cointegration and Enders and Granger (1998) nonlinear cointegration approaches. Tourist revenues and tourist arrivals were used as variables. The results were; while supporting the tourism hypothesis based on economic growth for tourist arrivals in a linear framework. The result of the study could not detect a non-linear causality with the two variables (Phiri, 2015). Similar to these results, Katircioglu (2009b) revealed the accuracy of both the TLG hypothesis and ELG reports for Malta via the bounds test for cointegration and Granger causality tests. There are studies that find a reciprocal causality with tourism expansion and growth of economy. In the research where Granger causality test was used, GDP and tourist arrivals were used as variables. For the causal linkages with tourism growth and economic development in Taiwan, a long-term balance linkages and one-way causality between the two factors have been demonstrated (Kim et al., 2006). In another study where one-way causality was found, the joint effects and causal relationships between the real exchange rate, GDP and tourism development were empirically analysed in a multivariate model. They used the new heterogeneous panel cointegration method for the period between 1990 and 2002. The causality between real GDP and tourism was found to be bidirectional (Lee and Chien, 2008).

In a study conducted in Spain, tourism revenues, real exchange rate and GDP variables were examined, and a unidirectional causality relationship was found between tourism and GDP. In the research where Johansen's cointegration method was used; international real tourism revenues, real effective exchange rate and real GDP variables were used (Balaguer and Cantavella-Jorda, 2002). Oh (2005), who used the Engle and Granger two-stage approach and a bivariate Vector Autoregression (VAR) model, reached similar results for the Korean economy. It has been shown that there is no cointegration linkages with tourism growth and GDP for the Korean economy, but there is a one-way causal linkage with the economy and expanding tourism. In other words, the TLG hypothesis has not been proven true for the Korean economy. Brida and Rosso (2010), in their research revealing one-way causality, reviewed the dynamic links between variables. In their research using annual data for the period between 1980 and 2006, they used the Johansen cointegration test and Granger causality test methods. As a variable, GDP, number of foreign visitors and the relative prices between South Tyrol and Germany are used. They found that the TLGH was empirically supported in the South Tyrol sample. In the region they studied, they concluded that while tourism promotes long-term economic growth, economic growth does not promote tourism. In another study that looked at the causal relationships between economic growth and tourism, the dynamics of the relationships between tourism expansion and economic growth in India were examined. In their research conducted with annual data for the period between 1978 and 2009; They used Johansen cointegration test and Granger causality test methods with foreign tourist arrivals, tourism foreign exchange earnings variables. According to the results, a long-term unidirectional causality between tourism and the country's economic growth was demonstrated (Mishra et al., 2011).

Gunduz and Hatemi-J (2006), who attempted to uncover the linkages between real GDP and tourism using the causality test, concluded in their analysis using the real exchange rate, real GDP and tourist arrivals that the TLG hypothesis is valid for Turkey. Ertuğrul and Mangır (2015), who reached the same conclusion using a different methodology, examined the period between 1998 and 2011 by using the variables of tourist arrivals and real GDP in their study. In their research; The bounds test approach developed by Pesaran, Shin and Smith, autoregressive distributed lag approach, Kalman filter method

and Granger causality analysis were applied. The results of the research support TLGH for Turkey. Terzi (2015), who used Granger causality, unrestricted VAR and Toda-Yamamoto VAR analyses, also concluded that the TLG hypothesis is valid for Turkey for the period 1963-2013. Husein and Kara (2011) used Johansen cointegration analysis and Granger causality tests for the period 1964-2006; They reached similar results in their study with real GDP, real exchange rate and tourism income variables.

There are many studies that reach the same results as these studies (Topallı, 2015; Kızılkaya et al., 2016; Özdemir and Öksüzler, 2006; Gökovalı and Bahar, 2006; Kırbaş and Kasman, 2004). There are also studies that cannot find a link between tourism and the economy. Öztürk and Acaravcı (2009) concluded in their study, in which they examined the linkages between real GDP and tourism for the Turkish economy for the period 1987-2007, that the TLG hypothesis is not valid. Yavuz (2006) concluded in her empirical study for the period 1992-2004 that there is no causal linkages with GDP and tourism revenues in Turkey. Similar results have been demonstrated in different countries (Hazari and Ng, 1993; Katircioglu, 2009a).

Data and econometric analyses

Data

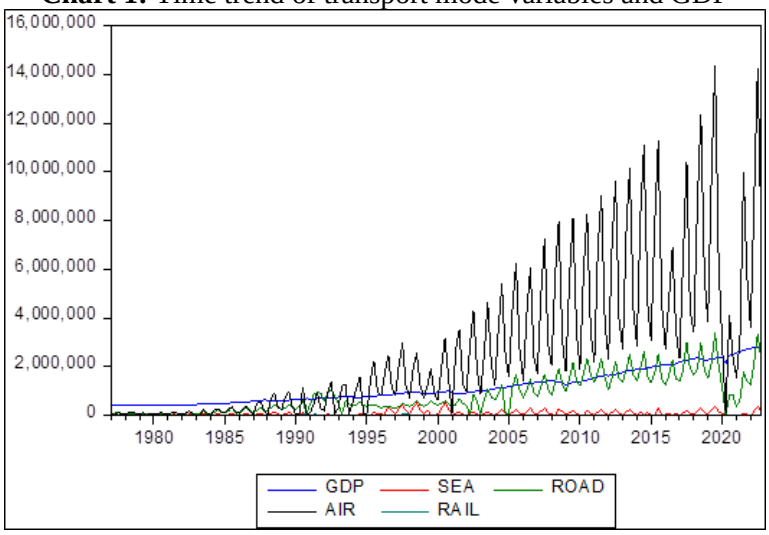
Within the framework of this research, the changes in variables such as how tourism demand affects economic growth or how fluctuations in the tourism sector affect economic growth are examined with quarterly time series data for the period between 1977:1 to 2022:4. Since there was not enough data to be able to make a century-old evaluation in the 100th anniversary of the Republic, the analysis period was limited to 1977, when the earliest data could be compiled. Another feature of the selected period is the rapid developments in tourism with the 'Tourism Incentive Law', which came into force at the beginning of this period. To express the tourism demand, the number of foreign tourists' arrival in Turkey has been handled within the framework of air, sea, road, and rail transportation modes. Total tourist arrivals have been used as an indicator of tourism expansion (Wang and Godbey, 1994). GDP (% change) is taken to represent economic growth. The table contains information about the variables examined.

Table 4: Variables

Variables	Symbol	Source
Gross Domestic Product	LGDP	OECD Stat
Foreign Tourist Arrival: By Airline	LAIR	Datastream
Foreign Tourist Arrival: By Railway	LRAIL	
Foreign Tourist Arrival: By Roadway	LROAD	
Foreign Tourist Arrival: By Seaway	LSEA	

Since the logarithmic values of the series are used, the '*L*' in the variable abbreviations indicates this. To consider the long-run relationship, 1977, the oldest period that can be obtained from data sources, was chosen as the starting year due to data constraints. The graph shows time trends for the variables examined.

Chart 1: Time trend of transport mode variables and GDP



Since the GDP series was taken from the database in a seasonally adjusted form, seasonal effects in the transportation series were eliminated by the CENSUS-13 Method.

Econometric analyses

The study has two main aims. First of all, the existence of a cointegration links between the number of foreign tourists according to economic growth and transportation mode is investigated. Accordingly, the aim is to determine whether there are long- and short-term connections for the variables examined. Moreover, while the TLG hypothesis is determined in terms of transportation types, it is investigated whether there is a causal links between the variables. The research hypotheses created for these two purposes are given in table 5.

Table 5: Research hypotheses

Hypotheses 1	H_{1a}- There is a cointegration links: LROAD and LGDP.
	H_{1b}- There is a cointegration links: LSEA and LGDP.
	H_{1c}- There is a cointegration links: LRAIL and LGDP.
	H_{1d}- There is a cointegration links: LAIR and LGDP.
Hypotheses 2	H_{2a}- TLG hypothesis is valid.
	H_{2b}- ELG hypothesis is valid.

In the studies on the linkages between tourism expansion and GDP, there are numerous studies in the literature that deal with both long- and short-run connections between the two variables (Gündüz and Hatemi (2005); Kim et al. (2006); Lee and Chien (2008); Brida and Risso (2010); Mishra et al. (2011); Yamak et al. (2012); Ghartey (2013); Bassil et al. (2015); Phiri (2015); Topallı (2015)). In these studies, VAR (Vector Autoregression) analysis, which is one of the econometric methods, is widely used. There are also studies using the Johansen cointegration test, ARDL cointegration analysis, Granger causality test and impulse-response analysis (Katırcıoğlu (2009); Öztürk and Acaravcı (2009); Savaş et al. (2010); Tang and Abosedra (2012); Karamelikli and Erkuş (2016); Kızılkaya et al. (2016); Esen and Özata (2017); Aratuo et al. (2019)). ARDL cointegration analysis, which is one of the widely used methods, constitutes the main method of this study. Granger causality test is applied for causality relationships such as how it affects the industry.

Cointegration analysis is used to analyse the long-run connections of the variables with each other. Cointegration analysis, which is used to determine the long-run relationships between the variables under study, is expressed as 'statistical representation of the long-run relationships between economic variables' (Sevüktekin and Nargeleçekenler, 2010: 481). Tests such as Engle-Granger (1987), Johansen (1988, 1991), and Johansen-Juselius (1990) are the most widely used tests for cointegration. In the

approach of According to Engle-Granger (1987), determining whether a cointegration linkages exists between two variables depends on the equilibrium deviation that results from the estimated long-run equilibrium. Phillips and Loretan (1999) proposed the ARDL model as a cointegration links because ignoring the lagged values of the variables causes specification error (Sevüktekin and Nargeleçekenler, 2010: 500). It is used as an alternative to cointegration approaches. While traditional methods require that variables be integrated in the same order, the ARDL model does not. The main constraint in this method is that no variable should be integrated into two or more orders (Çağlayan, 2006: 427). long-run parameters can be estimated together. Another advantage is that it can be applied to small samples. It provides consistent and reliable results even with a limited number of observations (Esen and Özata, 2017: 48). Because of these advantages, the ARDL model is preferred, and it is an appropriate model to test for the presence of cointegration between variables.

$$\Delta LGDP_t = \propto_0 + \sum_{i=1}^{m} \propto_{1i} \Delta LGDP_{t-i} + \sum_{i=0}^{m} \propto_{2i} \Delta LAIR_{t-i} + \sum_{i=0}^{m} \propto_{3i} \Delta LRAIL_{t-i} + \sum_{i=0}^{m} \propto_{4i} \Delta LSEA_{t-i} + \sum_{i=0}^{m} \propto_{5i} \Delta LROAD_{t-i} + \lambda_1 \mathrm{LGDP}_{t-1} + \lambda_2 LAIR_{t-1} + \lambda_3 LRAIL_{t-1} + \lambda_4 LSEA_{t-1} + \lambda_5 LROAD_{t-1} + \varepsilon_t$$

LGDP stands for the logarithm of Gross Domestic Product. LAIR, LRAIL, LROAD, and LSEA indicate the logarithmic values of the number of foreign tourists arriving from abroad by air, rail, road, and sea transportation modes, respectively. α_0, represents the constant term, while ε_t, represents the error term. Δ is the first difference operator. The coefficients λ_1, λ_2, λ_3, λ_4, λ_5 indicate long-run relationships between the variables, while the coefficients α_1, α_2, α_3, α_4, α_5 indicate short-run relationships. (H_0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$, no cointegration).

Empirical results

Unit root test results

In ARDL cointegration analysis, the stationarity of the series must first be determined. In the ARDL model, the series should not be integrated to the same degree. Additionally, it should not integrate in I(2) and above. Therefore, a stationarity test must be performed before analysis. ADF (Augmented Dickey-Fuller) unit root test, which is widely used in the literature, was applied to ensure that the series examined were not integrated at I(2) and above. The results are in table 6 and table 7.

Table 6: ADF Unit root test results (Level)

	Constant		Constant, Linear Trend	
Series	**t-statistic**	**Prob.***	**t-statistic**	**Prob.***
LAIR	0.088356	0.0000	-2.108979	0.5367
	1% level -3.468980 *5% level -2.878413* *10% level -2.575844*		*1% level -4.012944* *5% level -3.436475* *10% level -3.142358*	
LRAIL	-3.149852	0.0248**	-3.522737	0.0400**
	1% level -3.466994 *5% level -2.877544* *10% level -2.575381*		*1% level -4.010143* *5% level -3.435125* *10% level -3.141565*	
LSEA	-2.779746	0.0633***	-3.297731	0.0700***
	1% level -3.467851 *5% level -2.877919* *10% level -2.575581*		*1% level -4.011352* *5% level -3.435708* *10% level -3.141907*	
LROAD	*-0.959983*	0.7668	-2.171128	0.5022
	1% level -3.468749 *5% level -2.878311* *10% level -2.575791*		*1% level -4.012618* *5% level -3.436318* *10% level -3.142266*	

	3.610546	1.0000	*0.115606*	0.9972
LGDP	*1% level -3.466377* *5% level -2.877274* *10% level -2.575236*		*1% level -4.009271* *5% level -3.434706* *10% level -3.141318*	

MacKinnon (1996) one-sided p-values. Lag length automatic-based on SIC, maxlag=13, maximum lag length is taken as 13 for LAIR series, 4 for LRAIL series, 8 for LSEA series, 12 for LROAD series and 1 for LGDP series. ** is significant at the 0.05 significance level, * is significant at the 0.10 significance level.*

According to the ADF unit root test, the main hypothesis (H_0) is "series has a unit root". When evaluated with level values, the test results for the LAIR, LROAD and LGDP series, respectively, are less than the critical values. Therefore, these series contain unit roots. The test results are greater than the critical values for the LROAD series at the 10% significance level and the LSEA series at the 5% significance level. It is concluded that these two series do not contain unit roots, that is, they are I(0).

The differences of series whose level values are not stationary may be stationary. Therefore, unit root tests were carried out by taking the first differences of the relevant series. The results are in table 7.

Table 7: ADF unit root test results (First differences)

	Constant		**Constant, Linear Trend**	
Series	**t-statistic**	**Prob.***	**t-statistic**	**Prob.***
	-10.11199	0.0000**	-10.36276	0.0000**
LAIR	*1% level -3.469214* *5% level -2.878515* *10% level -2.575899*		*1% level -4.013274* *5% level -3.436634* *10% level -3.142452*	
	-4.995634	0.0000**	-4.975885	0.0003**
LROAD	*1% level -3.468749* *5% level -2.878311* *10% level -2.575791*		*1% level -4.012618* *5% level -3.436318* *10% level -3.142266*	
	-16.36549	0.0000**	*-17.37281*	0.0000**
LGDP	*1% level -3.466377* *5% level -2.877274* *10% level -2.575236*		*1% level -4.009271* *5% level -3.434706* *10% level -3.141318*	

**MacKinnon (1996) one-sided p-values. Lag length automatic-based on SIC, maxlag=13, maximum lag length is taken as 13 for LAIR series, 11 for LROAD series and 0 for LGDP series. ** is significant at the 0.05 significance level.*

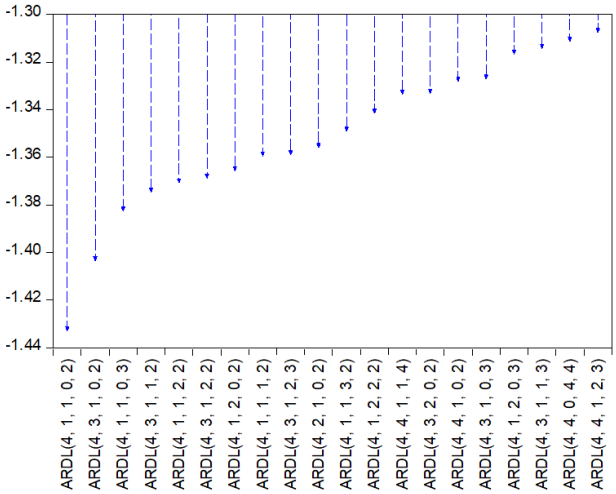
According to the ADF test results, the H_0 hypothesis, which is stated to be a unit root, is rejected and it is concluded that the series are difference stationary. According to the results in the tables, it is seen that the LAIR, LROAD and LGDP series become stationary at their first difference (I(1)). The analysed series were found suitable for ARDL analysis.

Once it is determined that none of the variables to be used in the analysis are I(2) and have different degrees of integration, the ARDL model can be estimated. Before model estimation, appropriate lag lengths are determined with the help of information criteria. The ranking of suitable models according to Akaike Information Criteria (AIC) is given in the figure.

ARDL analysis results

In the model determined as ARDL (p, q, r, s, v), p represents the lag length of our first variable, LGPD. The others are the lag lengths of LAIR, LRAIL, LSEA, and LROAD, respectively. Using the AIC, it was determined that the appropriate model was ARDL (4, 1, 1, 0, 2) model. Accordingly, 4 lags of LGDP, 1 lag of LAIR and LRAIL, and 2 lags of LROAD are included in the model.

Chart 2: Top 20 models by AIC



The ARDL boundary test takes place in two stages. First of all, whether there is a cointegration links between the variables is tested with the boundary test. If a cointegration links is detected, equations are estimated using the ARDL model. Before determining the long-run coefficients of the ARDL model, the boundary test was applied to determine the cointegration links between the variables.

Table 8: Bound test results

Signif.	I(0)	I(1)
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37
F-statistic = 3.210220		

If the F statistical value determined according to the test result is larger than the upper limit values (I(0)), the H_0 hypothesis (no level relationship) is rejected. As seen in the test results in the table, H_0 is rejected because the F-statistic value (3,21) is greater than I(0).Accordingly, it is concluded that there is a cointegration links between the variables examined. In other words, there is a long-run links between GDP and the number of foreign tourists arriving to Turkey using air, sea, road and railway transportation modes.

After the cointegration links between the variables used in the analysis was determined by the Bound test, the long-run coefficients of the model selected according to AIC were determined. In the ARDL model, the dependent variable is LGDP, and the dynamic regressor is the number of tourists according to the modes. Model findings are given in the table 9.

According to the model result, the F test (0.0051) was statistically significant and the model was found to be significant as a whole. According to the model results, statistically significant LAIR is positive and significant at a 10% significance level. Other factors being equal, a 1% increase in the number of foreign tourists arriving by air will increase GDP by 1.85% in the long run. LSEA was found to be significant at the 5% significance level. Accordingly, a 1% increase in the number of foreign tourists arriving by sea will increase GDP by 1.23% in the long run, while other factors are constant. This results shows that the LAIR and LSEA in Turkey has a positive effect on GDP. LROAD and LRAIL coefficients were not statistically significant. Accordingly, it is concluded that the long-term link LGDP and LROAD and LRAIL variables is weak.

Table 9: Long-run coefficients of the ARDL (4, 1, 1, 0, 2) model

Variable	Coefficient	t-Statistic	Probability*
LAIR	1.850101	1.887366	0.0816***
LRAIL	-1.711014	-1.713084	0.1104
LSEA	1.234587	2.223872	0.0445**
LROAD	-0.754546	-1.171953	0.2622
R-squared=0.809802 *Adjusted R-squared=0.634235* *Prob(F-statistic)=0.005149* *Durbin-Watson stat=1.643558*			
EC = LGDP - (1.8501*LAIR-1.7110*LRAIL+1.2346*LSEA-0.7545*LROAD)			

It is statistically significant at the **5% and *% 10 significance level.*

The short-run links the variables were examined with the error correction (ECM) model based on the ARDL bounds test approach.

$$\Delta LGDP_t = \propto_0 + \sum_{i=1}^{m} \propto_{1i} \Delta LGDP_{t-i} + \sum_{i=0}^{m} \propto_{2i} \Delta LAIR_{t-i} + \sum_{i=0}^{m} \propto_{3i} \Delta LRAIL_{t-i} + \sum_{i=0}^{m} \propto_{4i} \Delta LSEA_{t-i} + \sum_{i=0}^{m} \propto_{5i} \Delta LROAD_{t-i} + \propto_{6i} ECM_{t-1} + \varepsilon_{2t}$$

The coefficient of the ECM and the short-run coefficients of the ARDL (4, 1, 1, 0, 2) model are given in the table.

Table 10: ARDL (4, 1, 1, 0, 2) error correction regression

Variable	Coefficient	t-Statistic	Prob.
C	-0.047214	-2.409422	0.0315
D(LGDP(-1))	0.779410	3.093427	0.0086
D(LGDP (-2))	0.621381	3.156415	0.0076
D(LGDP (-3))	0.486503	3.546099	0.0036
D(LAIR)	0.910956	2.873083	0.0131
D(LRAIL)	-0.364873	-1.258645	0.2303
D(LROAD)	-0.075646	-0.308279	0.7628
D(LROAD(-1))	-0.927029	-3.976597	0.0016
CointEC(-1)*	-0.976863	-5.000898	0.0002
R-squared=0.913256 *Adjusted R-squared=0.872436* *Prob(F-statistic)=0.000000* *Durbin-Watson stat=1.643558*			
Diagnostic Tests Results; Breusch-Godfrey Serial Correlation LM Test=0.6071 Heteroskedasticity Test: Breusch-Pagan-Godfrey=0.8758 Normality Test: Jarque-Bera= 0.583638(0.746904) Ramsey RESET Test=0.7916			

CointEC represents the one period lagged value of the series of error terms obtained from long-run connections. The coefficient of the EC term shows the rate of return and adjustment to the long-run equilibrium against a shock in the short-run. The negative sign indicates how much of the imbalances between the variables in the short run will be balanced in the long-run. This coefficient is expected to

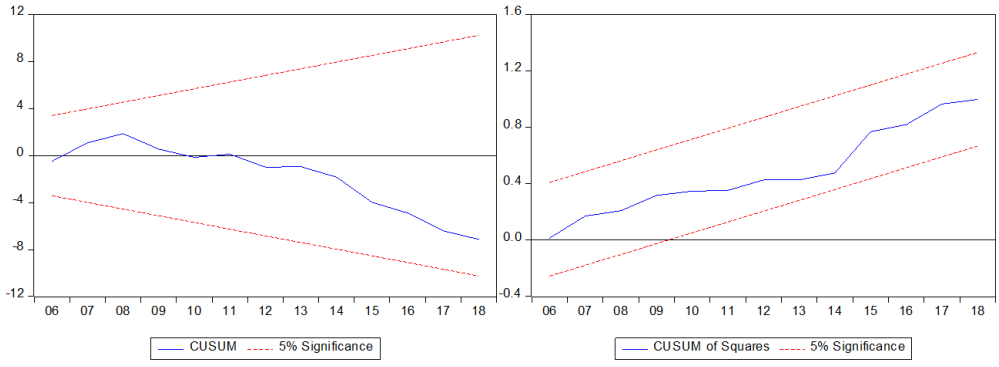
have a negative sign. CointEC is negative and the corresponding coefficient estimate is -0.976863. This result indicates that 0.97% of any imbalance movement is corrected within a period of time. Accordingly, it is concluded that 0.97% of the short-run deviations between the variables acting together in the long-run are corrected. It also means that after 1.03 (1/0.97) years, the long-run balance will be restored.

According to the short-run coefficients, LAIR and LROAD were found to be statistically significant. It has been found that foreign tourists arriving by air have a positive effect on economic growth in the short term. While foreign tourists arriving by road are statistically insignificant and negative in the long-run, a lagged value in the short-run is statistically significant and again negative. It appears to be consistent with long-run results.

Diagnostic tests were performed for the model results. Breusch-Godfrey Serial Correlation LM Test was used to determine whether there is an autocorrelation problem in the model. The null hypothesis (H_0) for this test is that there is no autocorrelation in the model. According to the results, the H_0 cannot be rejected, that is, there is no autocorrelation problem in the model. The Breusch-Pagan-Godfrey test, which is one of the diagnostic tests, was used to determine whether there was a variable variance problem. The $H_0$for the test states that the residuals are homoscedastic. According to the test result, H_0 cannot be rejected. This indicates that the residues are homoscedastic at 10% significance. Jarque-Bera Normality Test was used to determine whether the error terms had a normal distribution. The H_0 for this test states that the error terms have a normal distribution. According to the result, H_0 cannot be rejected, that is, the error terms have a normal distribution. Ramsey Reset test was used to determine whether there was a specification error in the model. According to the test result, the H_0(there is no detection error in the model) cannot be rejected. The diagnostic test results show that there are no econometric problems with the analysed model.

CUSUM and CUSUMSQ tests were applied to test whether the model is stable and whether there are structural changes in the parameter estimation of the series. The dashed red lines in the figure showing the test results indicate the 95% confidence interval. The blue lines within this range indicate parameter estimates. The fact that the parameter prediction lines are within the confidence intervals indicates that the analysis can be continued. The figure shows the graphs of the test results.

Chart 3: Cusum and cusum of squares test



If the test statistics obtained according to the results (blue line in the graph) are between the level of significance (red lines in the graph), the H_0cannot be rejected. H_0, states that the model is stable. As can be seen in the figure, both test statistics are within the critical limits according to the 5% significance level. The estimated error correction model was found to be stable.

In summary, the results for hypothesis 1 formed within the scope of the research were determined by ARDL cointegration analysis. In this context, the hypothesis H_{1b} and H_{1d}, which can be interpreted as statistically significant as a result of the model, have been reached. A positive balance relationship has been determined in the long run between the number of tourists using sea and air routes on their arrival in Turkey and GDP. In addition, in the short run, a positive relationship was found between GDP and

the number of tourists coming to the country by air, and a negative relationship between foreign tourists coming by road.

Granger causality tests results

Granger Causality Tests were applied to test hypothesis 2, which is aimed to be answered within the scope of the research, and the empirical findings are given below.

Table 11: Granger causality tests results

Hypothesis	H_0:	F-Statistic	Prob.
H_{2a}, tourism-led economic growth hypothesis is valid	LTOTAL does not Granger Cause LGDP	0.19012	0.9030
H_{2b}, economic growth-led tourism expansion growth hypothesis is valid	LGDP does not Granger Cause LTOTAL	4.68216	0.0036*

**It is statistically significant at the 5% significance level.*

LTOTAL refers to the total number of foreign tourist arrivals in Turkey. A suitable lag length of 3 was chosen for the variables according to the Schwarz information criterion (SC) and the Hannan-Quinn information criterion (HQ). According to the Granger causality tests, hypothesis 2, H_{2a}, cannot be rejected. Accordingly, the total number of foreign tourists coming to Turkey is not the Granger causality of GDP. Accordingly, it is a one-way causality: it is not valid when GDP caused by tourism is evaluated in the context of the tourists arriving in Turkey. Hypothesis 2, H_{2b} is rejected. Accordingly, GDP is the Granger cause of the total number of tourists arriving in Turkey. In other words, economic growth in Turkey leads to increase in the number of tourists arriving in the country. In summary, the one-way causality, i.e., tourism expansion led by the economy, applies to the number of foreign tourists arriving in Turkey.

Results and recommendations

Although tourism issues were not fully included in the programs of the governments established after the proclamation of the Republic, studies were carried out to develop tourism activities. The establishment of institutions such as the Turkish Traveller's Society (1923), the Tourism Bureau (1934) and the Tourism Directorate (1939) can be counted among the important developments of the first period. Tourism has started to develop in Turkey since the 1950s. Since this period, governments have started to give importance to the formation and shaping of Turkey's tourism policy and have taken steps to expand tourism activities with legal regulations.

The tourism sector, especially for the last half century, is one of the sectors that attracts a lot of attention in both developed and developing countries. Considering its economic and social contributions, it is a sector that is constantly being developed with various incentives and investments. In this sense, it is extremely important to identify the links between tourism and the economy on a country-by-country basis. This research, conducted on the occasion of the 100th anniversary of the founding of the Republic of Turkey, aims to shed light on the relationship between economic growth and the tourism sector by highlighting the important developments in the development of the tourism sector in Turkey. Due to the data limitation caused by the tourism statistics of Turkey, the research dataset covers the last 50 years of our republic. The analysis, conducted since the 1980s when a rapid development of the sector started, attempts to clarify the links between tourism and the economy in relation to the different modes.

This study used the ARDL bound test to examine whether there is a long- and short-term relationship between GDP and the number of foreign tourists arriving in Turkey in terms of modes. The findings of the ARDL bounds test conducted for the 1977:1-2022:4 periods, representing the last 50-year period of the Republican period, proves that there is a cointegration links between the examined variables. After determining the existence of cointegration, long and short-run relationships were investigated. The results show that a long-term positive relationship was found between the arrival of foreign tourists by air and sea and GDP. In addition, while there is a positive links between foreign tourists' arrival by airway and GDP in the short-run, a negative links has been found between the number of foreign tourists' arrival by roadway and GDP. The links tourism and GDP support the findings of similar studies

conducted for different countries in the literature (Narayan, 2004; Katircioglu, 2009a; He and Zheng, 2011; Lee, 2012; Ahiawodzi, 2013; Wang and Xia, 2013; Ertugrul and Mangir, 2015; Bento, 2016). With the Granger Causality Test, it was investigated whether there was a causal links the variables. Accordingly, economic growth in Turkey leads to an enhancement in the number of foreign tourists coming to the country. Unidirectional causality: ELG hypothesis was found to be valid for number of foreign tourists arriving in Turkey. When the long and short-run findings are evaluated together, the results reveal the importance of tourists arriving in the country in GDP in Turkey. The positive effects of the development of the tourism sector on the national economies have been the subject of many studies in the literature. There are two main arguments for causality: the TLG hypothesis and the ELG hypothesis. According to the variables examined within the scope of the research and the findings of the period, it was concluded that the Turkey ELG hypothesis is valid. These results support the findings of similar studies conducted for countries in the literature (Oh, 2005; Kim et al., 2006; Vanegas and Croes, 2007; Lee, 2008; Payne and Mervar, 2010; Odhiambo, 2011; Jackman, 2012; Wang and Xia, 2013; Kyophilavong et al., 2018). An alternative outcome is identified for research that detects causality from tourism to economic growth between tourist arrivals and GDP (Tang and Abosedra, 2012; Kibara et al., 2012; Jayathilake, 2013). Apart from these two basic results, some studies detect a bidirectional relationship (Lorde et al., 2011; Ghartey, 2013).

The links between transport and economic growth is influenced by various factors. For example, infrastructure investments are one of the factors that can affect the link between these two variables. In this context, policies to be implemented for the improvement of transportation infrastructures will enable foreign tourists to move more comfortably during their arrival to the country and even during their travels within the country. Tourists, who can move more easily and comfortably, may cause an increase in tourism demand and increase their connection with economic growth, other factors being equal. Another important factor is the policies and various regulations that governments will implement. The link between tourism and economic growth is strengthened by better approaches to economic and transport policy. When this study is evaluated specifically, tourism expansion will be ensured with the measures to be taken in the direction of improving the economic policy. Considering the macroeconomic effects created by tourism, the positive effects of well-functioning economic policies will contribute positively to the national economies indirectly through the tourism channel. In this sense, it is very important for policy makers to develop these and similar studies specifically for the different modes of transportation in Turkey and present new findings with different variables.

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Ethical approval

This study is among the 'studies that do not require ethics committee permission' since no human, group or live animal was used in the research and the research was conducted on secondary data.

Conflict of interest

There is no potential conflict of interest in this study.