

The Spatial Distribution of International Students in Türkiye: an Analysis through the Core–Periphery Approach

Türkiye’de Uluslararası Öğrencilerin Mekânsal Dağılımı: Merkez-Çevre Yaklaşımıyla Bir Analiz

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Abstract: While studies on the spatial distribution of international students in Türkiye are increasing, there remains a lack of systematic analysis examining this distribution through the lens of the established inequalities of center–periphery theory. This study aims to fill this gap and reveal the structural dynamics underlying students’ settlement patterns. A composite centrality index was developed based on five weighted and standardized parameters—population size, number of universities, total student population, number of international students, and share of international students nationwide—using the Z-score method. Through this index, provinces were classified as “core,” “semi-core,” or “periphery.” The level of inequality in the spatial distribution of international students was measured using the Gini coefficient (0.854) and the Lorenz curve, while spatial dependence and clustering patterns were analyzed using Moran’s I test and Local Indicators of Spatial Association (LISA). Findings reveal that international students are predominantly concentrated in highly populated and socioeconomically developed provinces such as İstanbul, Bursa, Eskişehir, and Sakarya, whereas peripheral provinces host significantly fewer students. Comparisons with SEGE-2017 socioeconomic development data indicate a positive relationship between socioeconomic status and international student density. The study highlights spatial inequalities in Turkish higher education and provides a data-driven framework for designing international student policies in alignment with regional development goals.

Keywords: international students, core–periphery theory, higher education, Türkiye, spatial distribution

Özet: Uluslararası öğrencilerin Türkiye’de mekânsal dağılımı üzerine yapılan çalışmalar giderek artmasına rağmen, bu dağılımı merkez-çevre teorisinin belirlediği eşitsizlikler perspektifinden inceleyen sistematik bir analiz eksiktir. Bu çalışma, bu boşluğu doldurmayı ve öğrencilerin yerleşim kalıplarının ardındaki yapısal dinamikleri açığa çıkarmayı amaçlamaktadır. Araştırmada illerin nüfusu, üniversite sayısı, toplam öğrenci sayısı, uluslararası öğrenci sayısı ve ülke çapındaki uluslararası öğrenci payı gibi göstergelere dayalı olarak Z-skoru yöntemi ile standartlaştırılmış ve ağırlıklandırılmış beş parametreden oluşan bileşik bir merkezilik endeksi geliştirilmiştir. Bu endeks aracılığıyla iller “merkez”, “yarı-merkez” ve “çevre” olarak sınıflandırılmıştır. Analizlerde, uluslararası öğrencilerin mekânsal dağılımındaki eşitsizlik düzeyi Gini katsayısı (0,854) ve Lorenz eğrisi ile ölçülmüş; mekânsal bağımlılık ve kümelenme örüntüleri ise Moran’s I testi ve Yerel Mekânsal Otokorelasyon Göstergeleri ile değerlendirilmiştir. Bulgular, uluslararası öğrencilerin İstanbul, Bursa, Eskişehir ve Sakarya gibi nüfus yoğunluğu ve sosyoekonomik gelişmişlik düzeyi yüksek illerde toplandığını; çevre illerde ise düşük yoğunlukta kaldığını ortaya koymaktadır. SEGE-2017 sosyoekonomik gelişmişlik verileriyle yapılan karşılaştırmalar, sosyoekonomik durum ile uluslararası öğrenci yoğunluğu arasında pozitif bir ilişki olduğunu göstermektedir. Araştırma, Türk yükseköğretimindeki mekânsal eşitsizlikleri vurgulamakta ve uluslararası öğrenci politikalarının bölgesel kalkınma hedefleriyle uyumlu biçimde tasarlanabilmesi için veri temelli bir çerçeve sunmaktadır.

Anahtar Kelimeler: uluslararası öğrenciler, merkez-çevre kuramı, yükseköğretim, Türkiye, mekânsal dağılım

1. Introduction

Recent advances in transportation, communication,

and information technologies have significantly reduced physical boundaries between countries, resulting in in-

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creased human mobility worldwide. In higher education, this mobility is most visibly reflected in the process of “internationalization.” Knight (2003, p. 2) defined internationalization as “the process of integrating international, intercultural, and global dimensions into the purpose, functions, or delivery of postsecondary education.” Over time, this concept has expanded to include a wide range of areas, from student mobility to research collaborations, from the language of instruction to diplomatic influence, and from campus design to curriculum development. This expansion reflects the increasingly complex and multifaceted realities of internationalization in the 21st-century academic environment (Knight & De Wit, 2018; De Wit & Altbach, 2021).

Within this broad spectrum, international students—defined by the OECD (2021, p. 194) as “students who left their country of origin and moved to another country for the purpose of study”—remain one of the most fundamental and visible dimensions of higher education internationalization. Students from diverse cultural and academic backgrounds contribute not only to the educational and research capacity of universities but also to economic sustainability, cultural exchange, and public diplomacy. For instance, approximately 285,000 self-funded international students in Türkiye generated an estimated USD 2.5 billion in expenditures as of 2023, 72% of which was spent on essential items such as tuition, housing, food, and beverages (Baydemir & Bolat, 2024). This demonstrates that the presence of international students in Türkiye has evolved into a strategic economic asset, extending far beyond its academic dimensions.

Beyond immediate financial contributions, the internationalization of higher education also serves as a powerful instrument of soft power. Soft power, defined as the ability of a country to influence the preferences and behavior of others through attraction rather than coercion (Nye, 1991), is cultivated through educational and cultural diplomacy. By attracting large numbers of international students, Türkiye invests in a global network of future leaders, professionals, and policymakers who develop a deep understanding of its culture and values. These alumni often act as voluntary cultural ambassadors upon returning home, thereby strengthening Türkiye’s global reputation, economic relations, and diplomatic influence. From this perspective, the geographical distribution of international students is not simply a demographic phenomenon, but a strategic mechanism shaping academic collaboration, economic ties, and international visibility.

Yet, the global mobility of international students is far from evenly distributed. Certain countries and regions—

most notably the United States, the United Kingdom, and Canada in the global West, alongside emerging hubs such as Australia and China—attract the majority of international enrollments (OECD, 2023). By contrast, institutions in the Global South often remain peripheral in this system. This imbalance, shaped by historical ties, institutional reputation, and economic opportunity, reflects the broader global structure of core and periphery regions (Altbach & Knight, 2007). A similar dynamic is observed within Türkiye: while some cities (İstanbul, Eskişehir) host tens of thousands of international students, others attract virtually none (Hakkâri, Tunceli, Şırnak, Muş). The inability of peripheral provinces to attract or retain students can often be traced to the absence of key assets such as highly ranked universities, diverse labor markets, and adequate infrastructure, which are concentrated in metropolitan centers. Consequently, the spatial distribution of international students becomes a proxy for regional inequalities, mirroring broader patterns of socio-economic disparity.

The core–periphery approach provides a useful theoretical framework for analyzing these dynamics, as it explains the unequal flow of resources, investment, and opportunities toward dominant regions while marginalizing others (Altbach & Knight, 2007). In Türkiye, provinces positioned in the “core” offer advanced infrastructure, diverse academic programs, and rich cultural amenities, whereas peripheral areas lack such opportunities. Understanding international student distribution through this framework allows us to move beyond simple geographic descriptions to uncover the structural forces driving inequality.

Against this backdrop, this study critically examines the spatial distribution of international students across Türkiye through the lens of the core–periphery approach. It aims to fill a significant gap in both the literature and current policy debates. Despite Türkiye’s ambitious internationalization agenda and the rapid growth in student numbers, there has been little systematic analysis of where international students are concentrated, what drives this clustering, and how it reflects national development disparities, as highlighted by recent reviews of the internationalization literature in Türkiye (Çalikoğlu, 2023). By applying the core–periphery model, this study reveals previously undocumented regional imbalances and policy blind spots in student recruitment and integration, thereby offering actionable insights for more regionally balanced strategies.

Rather than analyzing universities in isolation, this study adopts provincial centers as the unit of analysis. Universities are embedded in reciprocal relationships

with their host cities, where they provide knowledge, skilled graduates, and cultural diversity, while benefiting from the socio-economic infrastructure, international connectivity, and quality of life that cities offer. International student preferences are thus shaped as much by urban environments as by institutional quality. Focusing on provinces allows for a more holistic assessment of how spatial inequalities intersect with higher education internationalization.

Finally, this study makes both a conceptual and empirical contribution to the literature. While prior research on international students in Türkiye has primarily focused on socio-cultural adjustment, academic success, or economic impact (Topal & Tauscher, 2020; Sarıahmetoğlu & Kamer, 2021; Mete & Özgenel, 2021; Baydemir & Bolat, 2024; Derman, 2010; Ağaoğlu & Yurtkoru, 2014; Sarier, 2016; Yardımcıoğlu et al., 2017), few studies have examined their distribution within a core–periphery framework. The closest example is Tekin’s (2022) spatial analysis of international student mobility at global and national scales, which revealed concentration in developed countries globally and in western and central-western provinces within Türkiye. Building on this foundation, the present study applies the core–periphery model at a national level, employing a composite index to classify provinces as core, semi-core, or periphery. This classification is then compared with the socioeconomic development levels in the SEGE 2017 Report as a consistency test. By offering theoretically grounded and statistically tested findings, the study provides a novel framework for understanding uneven spatial development in Türkiye’s capacity to attract international students and supplies policymakers with evidence to design more equitable and effective internationalization strategies.

2. Theoretical and Contextual Framework

2.1. Core–Periphery Approach: a Conceptual Discussion

The core–periphery theory is a model developed in the social sciences to explain economic and political inequalities among people on a global scale. Although its roots date back to the structuralist economics approach initiated by Latin American economist Raul Prebisch (Prebisch, 1950) and later developed by scholars such as Celso Furtado (Furtado, 1964), its current form derives from the world–systems theory proposed in the 1970s by the renowned American sociologist Immanuel Wallerstein. Wallerstein’s theory frames the capitalist

world economy within three main hierarchical zones: the core, the semi-core¹, and the periphery, thereby situating inequalities within a global context. The core consists of areas where technology, capital, and political power are concentrated regions that import raw materials from the periphery, process them to generate profit, and produce high-value-added goods. The periphery comprises regions that supply raw materials to the core, depend on low-technology production, provide “cheap labor” within core-controlled global supply chains, and remain trapped in a cycle of trade deficits and debt. The semi-periphery acts as an intermediary between the core and the periphery-economies that exploit the periphery while themselves being exploited by the core (Wallerstein, 2004).

Wallerstein’s dichotomous approach should not be interpreted solely on an economic level, as the center–periphery relationship also encompasses cultural and political dimensions, as illustrated in Edward Said’s work *Orientalism*. In this study, it is emphasized that the West’s construction of the East represents a form of central cultural domination. This situation leads peripheral countries to refer to norms defined by the center, even when defining themselves (Said, 1978). Another theorist who examines the concept beyond its economic context is American sociologist Edward Shils. According to Shils, the “center” represents the area where a society’s core values, sources of legitimacy, and authority relations are concentrated, while the “periphery” consists of social units that are either strictly bound to these values or occasionally in opposition to them (Shils, 1975). Shils’s understanding of the center should be read not as a physical geographic location, but as a symbolic space where cultural and political power is concentrated. Every society has a “center,” and this center maintains its influence over the periphery through norms, symbols, and institutional structures that uphold social order (Shils, 1982). While the center represents stability and continuity, the periphery feeds dynamics of change through its demands or reactions to exclusion. In this context, the center–periphery relationship is not merely a hierarchical structure but also a driving force of social transformation. As the periphery becomes integrated into the center, social cohesion is achieved; however, when the periphery is excluded or the center becomes corrupt, the risk of social disintegration increases (Shils, 1975).

Shils’s approach also inspired sociologist and political scientist Şerif Mardin, who studied political and cultural polarization in modern Türkiye. Analyzing the Republican society that adopted a centralist modernization model during the transition from the Ottoman Empire

¹ While analyzing the spatial distribution of international students, Wallerstein’s concept of “semi-periphery” has been interpreted as “close to the center” or “between the center and the periphery.” Therefore, in this study, the term “semi-core” has been used instead of “semi-periphery.”

to the Republic, Mardin used Shils’s conceptual framework to argue that the secular, Western-oriented, and elitist structure of the center occasionally clashed with the traditional and religious elements of the periphery. According to him, the ideological reconfiguration of the center during the founding period—based on Westernism, secularism, and modernism—gave rise to conflicts with the traditional, religious, and local cultures in the periphery. This conflict constitutes the sociological basis of political polarization in Türkiye (Mardin, 1973). A similar approach can be found in the works of Turkish economic historian Çağlar Keyder, who analyzed power relations within the nation-state. According to Keyder, cities such as Istanbul and Ankara function as the “center,” while the Eastern and Southeastern Anatolia regions or provincial towns are positioned as the “periphery” (Keyder, 1987). This geographical distinction is not only spatial but also results in inequalities in areas such as access to administrative resources, educational opportunities, and cultural representation.

Another thesis that can be addressed within the center–periphery context is Huntington’s famous “Clash of Civilizations” thesis. Although Huntington’s thesis offers an analytical framework based primarily on cultural differences, the underlying structure reveals a hierarchical world order that overlaps with Wallerstein’s center–periphery distinction. In this theoretical framework, Western civilization is placed in a central position, while other cultures and civilizations—such as Islam and China—are presented as threats or opposing forces to the West (Huntington, 1996). In this respect, Huntington’s approach can be read as a cultural reconstruction of the center–periphery relations that Wallerstein structurally defined in the capitalist world system. In other words, the “clash of civilizations” thesis contains a center–periphery division reproduced in the cultural realm. However, unlike Wallerstein’s structural–systemic explanation, this division is the product of a West-centered ideological construction.

Although the center–periphery approach offers a strong and fundamental conceptual framework in the social sciences for explaining inequalities and hierarchical relationships between social structures, it has also received various criticisms considering recent developments. For example, processes such as digitalization, migration movements, and the multipolar world order indicate that traditional center–periphery distinctions have become increasingly blurred (Castells, 1996). Another critique from postcolonial theories is the assumption that the periphery is always passive, inert, and positioned as a “victim” in relation to the center (Spivak, 1988). Furthermore, contemporary developments such

as the rise of China and competition over “renewable raw materials” in Africa compel us to rethink this theory. Despite these criticisms, the center–periphery approach remains relevant today, especially in the context of growing social polarization and identity-based divisions at both global and national levels. It continues to serve as an indispensable analytical tool, demonstrating that global inequalities are not “natural” but are produced through historical and structural dynamics, and enabling us to analyze these inequalities at the geographical level.

2.2. International Students in Higher Education from a Core–Periphery Perspective

Although the internationalization of higher education is often presented as an egalitarian and global collaboration, it also contains the potential to turn into a mechanism that reproduces global inequalities. The primary reason for this is that internationalization in higher education involves a process based not on equal power relations among actors, but rather on asymmetry and dependency. In this context, countries such as the United States, Australia, Canada, and the United Kingdom, along with elite universities in these countries—such as Harvard, Stanford, MIT, Oxford, and Cambridge—can be considered the “center,” while developing countries and their universities occupy the “periphery.” In such an environment, the production of knowledge, academic standards, evaluation criteria, and the language of instruction and publication are defined by the center, while the periphery is compelled to adapt to them. Consequently, the flow of international student mobility is directed from the periphery toward the center, with peripheral countries functioning as a reserve workforce that meets the center’s human capital needs. Thus, internationalization in higher education can be interpreted not as an egalitarian and global exchange movement, but as a center–periphery relationship structured around knowledge and labor (Altbach, 2007; Stein, 2021).

In addition, recent studies have transformed Wallerstein’s hierarchical center–periphery model into a multi-layered, network-based structure within the context of higher education internationalization. For instance, Zahl-Thanem and Rye (2024) highlights the spatial inequalities created by urban–rural differences in access to higher education, while Janik (2023), through network analysis of international student mobility, demonstrates that the center and periphery can be defined not only geographically but also relationally. Similarly, Worsham et al. (2023) analyzes the effects of spatial disadvantages on academic achievement, drawing attention to the social consequences of spatial inequality. These findings indicate that international

student mobility is influenced not only by economic and institutional power asymmetries but also by differences in spatial accessibility, relational ties, and social capital. Glass and Cruz's (2023) study further supports these observations, revealing that over the past two decades, international student mobility has evolved toward a multi-centered network structure.

The paradoxical nature of international student mobility can be observed not only at the global level but also at the national level. In other words, just as in the global system, each country's higher education system contains its own center-periphery distinctions based on institutional, regional, and socio-economic factors. For example, in Türkiye, well-established and well-funded universities located in central cities such as Istanbul and Ankara—Hacettepe, Middle East Technical University (METU), Boğaziçi, Istanbul Technical University (ITU), Koç, Sabancı, and Bilkent—are considered the “center,” while newly founded universities, provincial institutions, and those with limited financial and academic capacity occupy the “periphery.” When visualizing the center-periphery structure of higher education in Türkiye, Istanbul, Ankara, and Izmir emerge as central provinces with high institutional prestige and international recognition; cities such as Eskişehir, Konya, and Bursa represent the semi-core; and provinces in Eastern and Southeastern Anatolia, where universities have more limited resources,

represent the periphery. This structure also affects the distribution of international students: central universities attract more students due to their institutional appeal; peripheral universities, with limited infrastructure and lower visibility, attract fewer; and semi-core universities function as an “intermediary space” between these two extremes. Moreover, while the general tendency of international students is to gravitate toward the center, the selectivity of central universities often forces them to enroll in peripheral institutions.

2.3. International Students in Türkiye: Historical, Spatial, and Socioeconomic Context

As of 2023, Türkiye hosted approximately 350,000 international students, ranking among the top 10 countries worldwide in this regard (YÖK 2024–2028 Internationalization Strategy in Higher Education, 2025: p. 5). The historical development of international student mobility in Türkiye—shaped by domestic and foreign policy as well as global dynamics—can be divided into four key periods: the Early Republican Period (1923–1950), the Cold War Period (1950–1980), the Ministry of National Education (MEB) and Grand Student Project (BÖP) Period (1980–2010), and the YTB (Presidency of Turks Abroad and Related Communities), Türkiye Scholarships, Foreign Student Exam (YÖS) and TR-YÖS Exam Period (2010–2025).

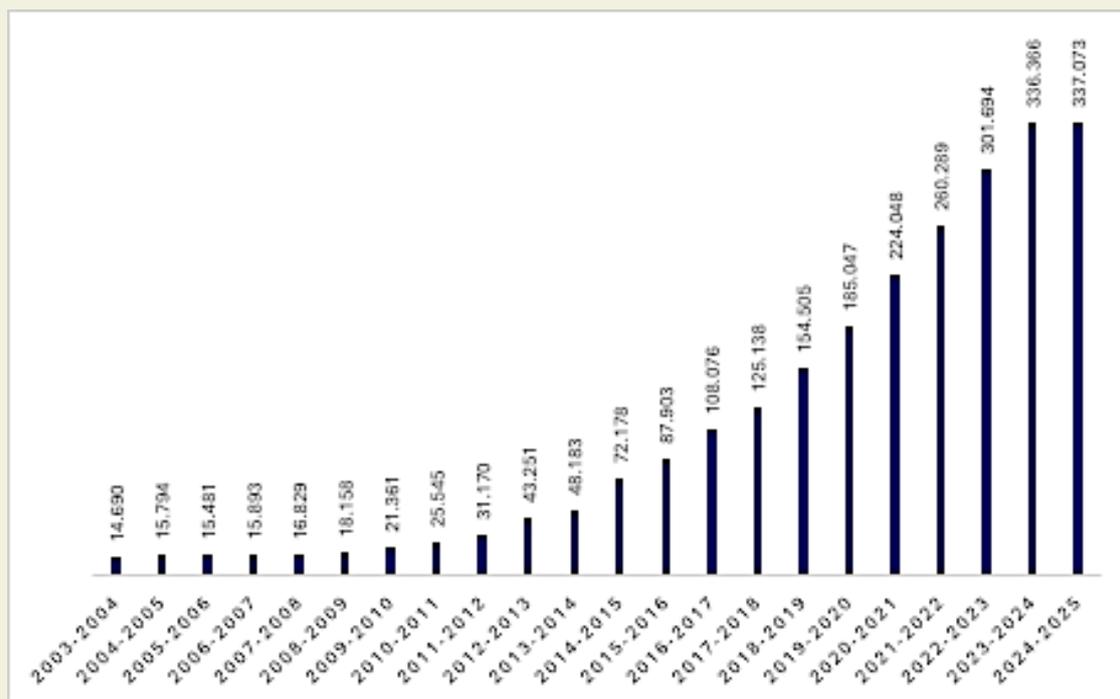


Figure 1. Number of International Students in Türkiye by Year (2003-2025)

Source: Compiled from Şimşek & Bakır, 2016, p. 524; YÖK Higher Education Statistics



Figure 2. Cities and their populations

Source: The map was prepared based on the data from Turkish Statistical Institute's Address Based Population Registration System (ABPRS) of 2024.

During the early Republican period, the limited number of higher education institutions—only three universities by 1950—and the disruption caused by World War II prevented significant international student inflows. The Cold War era saw the establishment of 16 new universities, including the Middle East Technical University (METU) in 1956, which was designed as an English-medium institution attracting students from the Middle East. (Günay & Günay, 2011; Erken, 2017). However, political unrest in the late 1970s led to stagnation. The period from 1980 to 2010 was marked by political stability, a rapid expansion of universities, including Türkiye's first private or foundation institution (Bilkent University) and the launch of the Grand Student Project (BÖP) in 1992, which brought more than 32,000 students from nearly 60 countries by 2010 (Günay & Günay, 2011, pp. 5–6; Özoğlu et al., 2012, p. 63).

Since 2010, Türkiye has experienced accelerated growth in international student numbers with the introduction of the Türkiye Scholarships Program, attracting over 120,000 applications annually by 2024, and the implementation of the centralized TR-YÖS exam. Over the past two decades, the international student population has increased nearly twentyfold (►Figure 1). While students from Syria², Azerbaijan, Turkmenistan, Iran, and Iraq account for about 60% of the total, future growth targets—such as the goal of reaching 500,000 students by 2027–2028 Academic Year (YÖK 2024–2028 Internationalization Strategy in Higher Education, 2025, p. 43) will require expanding recruitment to more distant

markets, including China and India.

To better contextualize these goals, it is useful to briefly outline Türkiye's demographic and geographical structure. With a land area of approximately 800,000 km² and a population of 85 million as of 2025, Türkiye consists of 81 provinces spread across seven distinct geographical regions. The population profiles of these provinces vary significantly. For example, İstanbul, Türkiye's largest city, has a population exceeding 15 million, whereas Artvin, located in the Eastern Black Sea region, has only about 36,000 inhabitants (►Figure 2). In general, cities with larger populations are in a more advantageous position compared to smaller ones in terms of public investment, infrastructure and transportation facilities, service sector opportunities, employment conditions, and sociocultural amenities. This, in turn, limits the development potential of less populated provinces and encourages especially the younger population to migrate to larger cities.

In addition to population profiles, the levels of development of Türkiye's provinces also differ. However, such internal disparities are not unique to Türkiye; rather, they align with global observations where economic and developmental differences persist even within developed nations, often resulting in marked core–periphery structures (OECD, 2018; Rodríguez-Pose, 2018). These well-documented regional inequalities within Türkiye are highly relevant to our spatial analysis of international student distribution.

² The high proportion of Syrian students can be explained by the mass influx of refugees following the Syrian civil war, as well as by the scholarship opportunities provided to Syrians under temporary protection (Güngör & Soysal, 2021).

In the literature on the socioeconomic development levels of Türkiye's provinces and regions, numerous studies can be found (Çetin & Sevüktekin, 2016, p. 41). However, the Socioeconomic Development Ranking of Provinces and Regions (SEGE-2017), prepared by the Ministry of Industry and Technology's General Directorate of Development Agencies, is a notable reference. This study analyzed all 81 provinces in Türkiye using 52 different indicators across various fields, including education, health, employment, income, industry, finance, housing, accessibility, and quality of life. Based on the analyses, the provinces were divided into six different levels of development (►Table 1). In the ranking, western provinces such as İstanbul, Bursa, and İzmir emerged as the most developed, whereas eastern provinces such as Ağrı, Hakkâri, and Şırnak ranked among the least developed.

These data provide important insights for understanding and addressing spatial inequalities in the higher education system. In highly developed provinces, both public and foundation universities are more numerous. These universities typically have a wide range of undergraduate and graduate programs and possess high research and publication capacity. Major cities such as İstanbul, Ankara, and İzmir host Türkiye's leading research universities... In contrast, less developed provinces often have only a single newly established public university that focuses primarily on teaching rather than research, which directly affects their academic potential (Yolsal & Yorulmaz, 2019). The attractiveness of higher education institutions is linked not only to academic resources but also to various infrastructural factors in the cities where they are located—such as housing, transportation, cultural facilities, and social life. Universities in more developed provinces, thanks to these advantages, are more appealing to both national and international students. These urban factors, including social environment, safety, and cultural amenities, are documented as significant pull factors in the choice of Turkish universities (Yılmaz

& Güçlü, 2021, p. 248).

3. Methodology

3.1. Research Hypotheses and Methodological Approach

The main hypothesis of this study is: “International students in Türkiye exhibit a spatial distribution differentiated according to the position of cities as being core or periphery.”

Based on this central hypothesis, two sub-hypotheses were formulated as below:

H1: City population size is a pull factor for international students.

H2: The level of socioeconomic development of cities is a pull factor for international students.

These two sub-hypotheses were specifically formulated because they represent the primary, measurable discriminators that establish a city's function as either a “core” (center) or “periphery” in spatial analysis.

The primary methodological challenge of this study is to determine the criteria testing hypotheses. In other words, establishing a comparative and objective assessment framework that allows for classifying cities as core, semi-core, or periphery in terms of their attractiveness to international students is one of the most critical steps in this study. Because population size, number of universities, number of university students, and number of international university students vary significantly between metropolitan and provincial cities in Türkiye. For example, the megacity İstanbul has a population exceeding 15 million, about 50 universities, nearly one million university students, and over 100,000 interna-

Table 1. Classification of Provinces in Türkiye by Level of Development (2017)

Development Rank	Development Level	Provinces (Alphabetical Order)
1	Most Developed (9)	Ankara, Antalya, Bursa, Eskişehir, İstanbul, İzmir, Kocaeli, Muğla, Tekirdağ
2	Developed (15)	Aydın, Balıkesir, Bilecik, Bolu, Çanakkale, Denizli, Edirne, Isparta, Karabük, Kayseri, Konya, Kırklareli, Manisa, Sakarya, Yalova
3	Upper-Intermediate (13)	Adana, Burdur, Düzce, Gaziantep, Karaman, Kırıkkale, Kütahya, Mersin, Rize, Samsun, Trabzon, Uşak, Zonguldak
4	Lower-Intermediate (14)	Afyonkarahisar, Aksaray, Amasya, Artvin, Bartın, Çorum, Elâzığ, Erzincan, Hatay, Kastamonu, Kırşehir, Malatya, Nevşehir, Sivas
5	Less Developed (14)	Bayburt, Çankırı, Erzurum, Giresun, Gümüşhane, Kahramanmaraş, Kilis, Niğde, Ordu, Osmaniye, Sinop, Tokat, Tunceli, Yozgat
6	Least Developed (16)	Adıyaman, Ağrı, Ardahan, Batman, Bingöl, Bitlis, Diyarbakır, Hakkâri, Iğdır, Kars, Mardin, Muş, Siirt, Şanlıurfa, Şırnak, Van

Source: T.R. Ministry of Development, 2017, pp. 38, 42, 46, 51, 56, 62.

tional students, whereas the provincial city of Artvin has a population of just 36,000, one university, about 10,000 university students, and only 83 international students. Moreover, in large cities such as Istanbul and Ankara, the population is so high that proportional calculations yield smaller ratios despite large absolute numbers, whereas in small cities, even a few international students can inflate the ratio. This can distort core–periphery analysis by creating misleading weightings. For this reason, relying solely on numerical data to test the hypotheses could be deceptive. Instead, a calculation method that accounts for all available data, balances the differences between them, and normalizes these disparities is required. This ensures more meaningful, balanced, and comparable results. To this end, a composite index was developed considering the population of cities, number of universities, number of national and international students in each city, and the total number of international students in the country.

This selection of parameters is explicitly grounded in both Core–Periphery theory and the established International Student Mobility literature, which emphasize that educational flows tend to concentrate in global knowledge hubs. The composite index thus measures a province’s capacity to function as an educational “core” by capturing multiple dimensions of its allure:

- **Population Size and Total Student Number** represent not only the region’s demographic scale but also its capacity to socially and economically absorb international students. Literature confirms that urban centers with large populations offer greater social diversity, cultural amenities, and improved employment prospects, all of which are critical pull factors for international students (Mazzarol & Soutar, 2002).
- **Number of Universities and the Share of International Students** quantify the region’s educational supply and proven global integration. These indicators align with Li & Bray’s work (2007) on regional educational concentration, where the density of institutions and existing international student success (performance) are key metrics for measuring a region’s status as an education hub.

The overall framework adheres to the spatial inequality concepts of Wallerstein (1974) and Friedmann (1966), demonstrating that concentration of knowledge, human capital, and institutional resources in core areas creates the gravitational force that shapes the geographical distribution of student populations. The indicators were therefore selected not arbitrarily, but because they are

scientifically validated proxies for measuring a region’s socioeconomic and educational centrality within the national system.

Following the determination of these theoretically and scientifically validated parameters, the subsequent step was to perform the necessary standardization and weighting for the composite index calculation. To this end, a composite index was constructed using five indicators, with different weights assigned according to their relative importance. Specifically, the index comprises five indicators: the first three reflecting the structural capacity of cities, and the last two reflecting their capacity to attract international students. In the calculations, greater weight was given to the fourth and fifth parameters since they were directly related to internationalization process.

Each indicator is defined using the following formulas³:

Indicator 1 – University Density in the Province: Ratio of the provincial population (P_p) to the number of universities (U_p) in that province.

$$I_1 = \frac{P_p}{U_p}$$

Indicator 2 – University Student Density in the Province: Ratio of the total number of university students (S_p) in the province to the provincial population (P_p).

$$I_2 = \frac{S_p}{P_p}$$

Indicator 3 – International Student Density in the Province: Ratio of the total number of international students (IS_p) in the province to the provincial population (P_p).

$$I_3 = \frac{IS_p}{P_p}$$

Indicator 4 – Share of International Students in the Provincial Student Body: Ratio of the number of international students (IS_p) in the province to the total number of university students (S_p) in that province.

$$I_4 = \frac{IS_p}{S_p}$$

Indicator 5 – Provincial Share of International Students Nationwide: Ratio of the number of international students (IS_p) in the province to the total number of international students in Türkiye (IS_T).

$$I_5 = \frac{IS_p}{IS_T}$$

Then, the Centrality Index (CI) was calculated as fol-

³ Technical support was provided by faculty members from the university’s Department of Mathematics to ensure the scientific accuracy and computational validity of the formulas and calculation procedures.

lows:

$$CI = (I_1 \times 0,15) + (I_2 \times 0,15) + (I_3 \times 0,15) + (I_4 \times 0,25) + (I_5 \times 0,35)$$

To ensure comparability of values measured on different scales, the Z-score method was used to standardize the data and bring them into the range of 0–1. The internal consistency of the constructed scale was tested using Cronbach's Alpha coefficient, which was calculated as $\alpha = 0.92$. This value indicates that the scale has a high level of reliability. This value indicates that the scale has a high level of reliability (Hair et al., 2018).

3.2. Data Sources and Analysis Methods

The data sources include the Higher Education Information Management System (YÖK Statistics, academic year 2024–2025) and the Turkish Statistical Institute's (TÜİK) 2024 Address Based Population Registration System (ADNKS). The classification of provinces as “core,” “semi-core,” or “periphery” was carried out based on the distribution of the centrality index values according to standard deviation.

To reveal the degree of inequality in the distribution of international students by province, the Gini coefficient and Lorenz curve were calculated. The Gini coefficient, which takes values between 0 (perfect equality) and 1 (perfect inequality), measures the extent of inequality in distribution (Gini, 1912; De Maio, 2007). The calculations were based on the cumulative ratios obtained by ranking the number of international students in ascending order. The Lorenz curve provides a visual representation of this distribution, where the distance between the equality line and the curve indicates the magnitude of inequality (Lorenz, 1905). All analyses and visualizations were conducted using Microsoft Excel (version 16.80, macOS), and the obtained data were visualized on a map of Türkiye.

Finally, Moran's I and LISA (Local Indicators of Spatial Association) analyses were applied in order to statistically test spatial dependence and clustering patterns (Anselin, 1995; Cliff & Ord, 1981). Moran's I measures whether the number of international students in a province is similar to those in neighboring provinces, thus testing for spatial autocorrelation (Moran, 1950). LISA identifies the specific provinces in which significant clusters or outliers occur (Anselin, 1995). Analyses were performed using GeoDa (version 1.22, macOS) software, with a Queen contiguity (first-order contiguity) spatial weight matrix, and statistical significance was assessed using 999 permutations. This approach enabled the development of a multidimensional analytical framework that considers not only quantitative differences but also spatial relationships.

3.3. Limitations of the Study

The study has three main limitations in terms of scope, time, and content. In terms of scope, it is limited to national and international students at the undergraduate level. Regarding time, as a cross-sectional study, it covers only the student numbers in Türkiye for the 2024–2025 academic year. In terms of content, it is restricted to publicly available statistical data and documents of certain public institutions such as YÖK, TÜİK, and the Ministry of Industry and Technology of the Republic of Türkiye. Beyond these limitations, it should also be noted that the weighting used in this study is based on a theoretical justification. Further research that use statistical methods to determine objective weights would benefit from re-evaluating this index and testing the findings.

4. Findings

4.1. Initial Descriptive Analysis and Inequality of Student Distribution

As of the 2024–2025 academic year, there are a total of 337,073 international students in Türkiye, coming from various countries. ► **Figures 3 and 4** present the provincial distribution of these students on a map of Türkiye and as a histogram chart, divided into intervals of 5,000 students. As can be seen from the first figure, the highest numbers of students are found in major provinces that can be defined as core—such as İstanbul, Ankara, İzmir, and Eskişehir. As exceptions to this pattern, Erzurum and Karabük also host a substantial number of international students. All these six provinces account for nearly 60% of all international students in the country. In contrast, there are no international students in Hakkâri, and provinces such as Muş, Sinop, Tunceli, Şırnak, and Artvin host only 345 students in total. The remaining students are unevenly distributed among the other provinces outside these 12 cities.

This spatial distribution of international students can also be viewed, from the perspective of the core–periphery approach, as a national reflection of inequality patterns observed globally. The concentration of international students in provinces such as İstanbul, Ankara, İzmir, and Eskişehir—identified as core—stems from their higher education infrastructure, level of economic development, transportation facilities, cultural diversity, and global visibility. The exceptional cases of Erzurum and Karabük suggest that local university policies, special scholarship programs, or bilateral agreements with specific countries can also lead to high concentrations of international students in non-core provinces. On the

other hand, the absence of students in Hakkâri and the very low numbers in peripheral provinces such as Muş, Sinop, Tunceli, Şırnak, and Artvin indicate a low level of attractiveness for international students. This is directly related to deficiencies in infrastructure, limited diversity of academic programs, and a scarcity of economic and social opportunities.

The histogram chart (►Figure 4) is used to show the intervals in which the values in the dataset are concentrated. According to the chart, many international students are concentrated in the 0–5,000 range in 70 provincial centers. The remaining students are distributed as follows: 5 provinces with 5,000–10,000 students, 3 provinces with 10,000–15,000 students, and 2 provinces with 15,000–20,000 students. Only İstanbul exceeds

30,000 international students, hosting a significant portion of the country’s total. This distribution reveals that, depending on factors such as the diversity of academic programs offered by universities, the city’s infrastructure, and social life, international students are largely directed toward certain “attraction centers,” while in most other provinces their numbers remain quite low.

On the other hand, to illustrate the level of inequality in the distribution of international students across provinces in Türkiye, the Gini coefficient was calculated, and the Lorenz curve was plotted. The analysis revealed a Gini coefficient of 0.854. This high value indicates that the distribution of international students among provinces is highly unequal (Litchfield, 1999, p. 4). The Lorenz curve further shows that a significant portion of the



Figure 3. Distribution of International Students by province (2024-2025 academic year)

Source: The map was prepared based on the data from the Council of Higher Education’s Information Management System (2025).

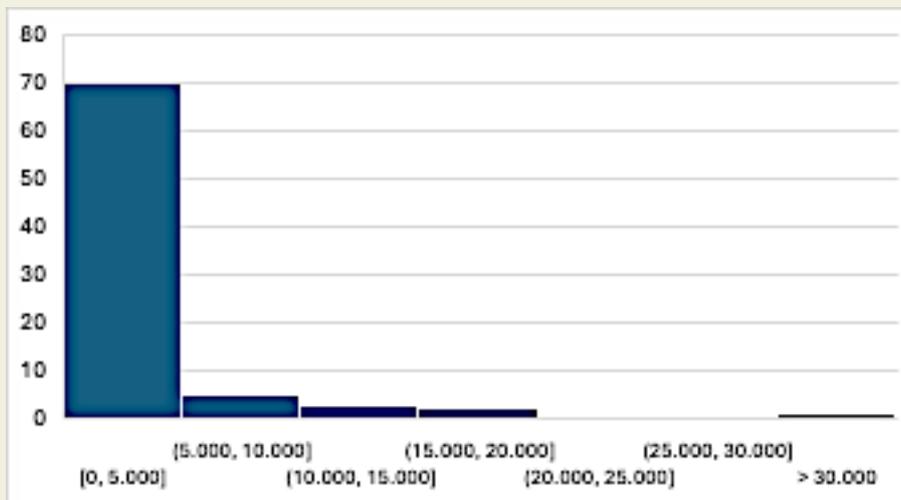


Figure 4. Distribution of International Student Numbers by Province in 5,000-Student Intervals (2024-2025 Academic Year)

Source: The histogram was developed with data retrieved from the Council of Higher Education’s Information Management System (2025)

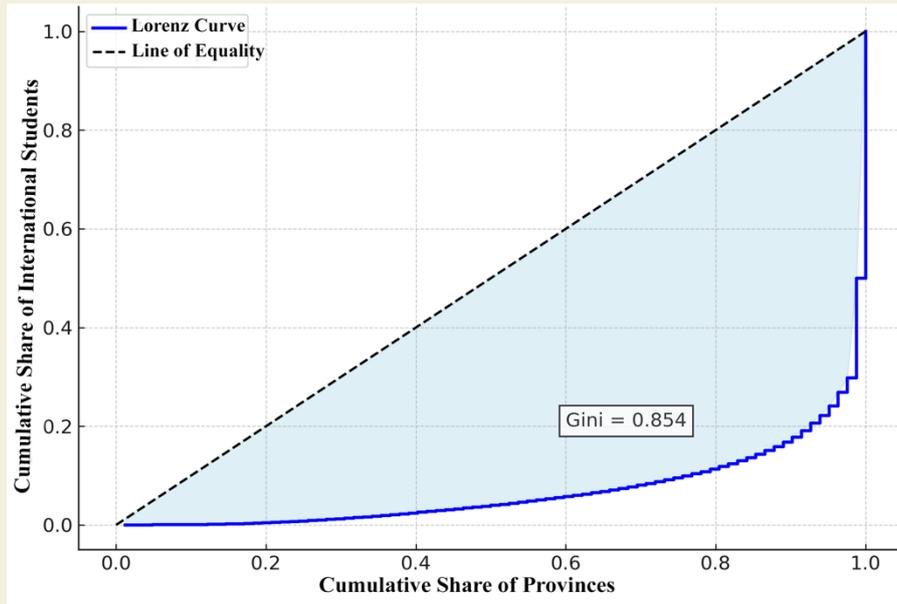


Figure 5. Lorenz curve and Gini coefficient for the provincial distribution of international students in Türkiye (2024–2025 Academic Year)
 Source: The curve was developed with data retrieved from the Council of Higher Education’s Information Management System (2025).

student population is concentrated in a small number of central provinces, while peripheral provinces have very low numbers of international students. This finding aligns with the spatial concentration phenomenon predicted by the center–periphery approach.

To assess whether the inequality revealed by the Lorenz curve is statistically significant from a spatial perspective, Moran’s I test was applied to both the distribution of international students and the centrality index values. The analyses yielded Moran’s I coefficients of 0.003 and 0.039, respectively. These values being close to zero indicate that there is no strong spatial autocorrelation at the specified levels. However, Local Indicators of Spatial Association (LISA) maps show that clustering tendencies are concentrated in a limited number of provinces nationwide. Provinces such as Istanbul, Ankara, and Karabük stand out as “high–high” clustering regions, while provinces like Hakkâri and Şırnak fall within the “low–low” clustering category. These findings spatially support the center–periphery differentiation observed in the inequality analysis, demonstrating the tendency of international students to concentrate in specific central areas (► **Figures 6.a, 6.b, 7.a, and 7.b**).

Both the numerical distributions depicted in the map of Türkiye and the histogram chart, as well as the other analyses conducted, clearly reveal the centralization trend of international students in higher education and demonstrate that the population and socio-economic differences between central and peripheral provinces

are also reflected in the internationalization process.

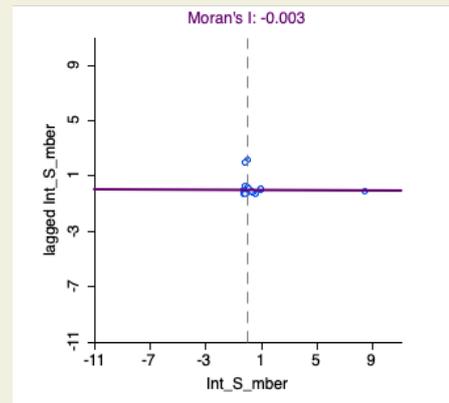


Figure 6.a Moran’s I for International Students

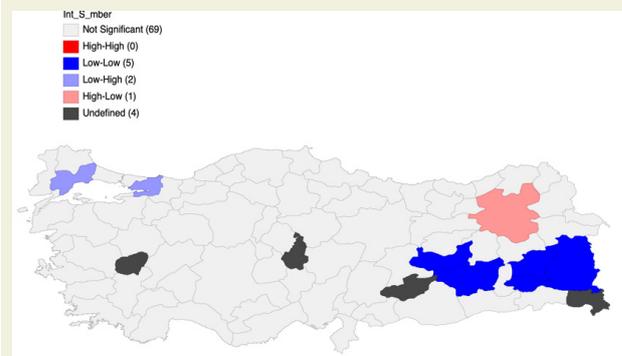


Figure 6.b LISA Map for International Students’ Distribution

4.2. Composite Index Scores and the Test of the Hypothesis

This section presents the analytical findings derived from the calculation of the Composite Centrality Index (CI) developed for this study. This index was constructed using Z-score standardization across five key attraction factors (as detailed in the Methodology section). The resulting CI scores, presented comprehensively in ►Table 2, are relative measures: a positive score indicates an attraction capacity above the national average, while a negative score signifies below-average capacity. This methodology ensures that the subsequent cluster analysis is based on objective, standardized metrics reflecting each province's relative pull factor. Following this methodological foundation, provinces are systematically classified into Core, Semi-Core, or Periphery based on predefined CI score thresholds.

As shown in ►Table 3, provinces are systematically classified as Core, Semi-Core, or Periphery, depending on their index scores. The classification of the 81 Turkish provinces using the Composite Centrality Index (CI) resulted in three clusters: Core (10 provinces), Semi-Core (52 provinces), and Periphery (19 provinces). The distribution confirms a severely concentrated and highly skewed spatial pattern in international student attraction.

The analysis reveals a profound concentration of international students in a minimal number of provinces, directly underscoring the severe structural inequality in Türkiye's higher education system:

Core Cluster Concentration: The 10 provinces classified as Core attract a staggering 62.32% of the total international student population. This confirms that, despite representing only 12.3% of all provinces, the Core group functions as the undisputed primary hub for international student attraction, validating its high mean CI score (1.1804).

Semi-Core Cluster Role: The vast Semi-Core cluster (52 provinces), comprising 64.2% of the provinces, collectively attracts 35.93% of the student body. This demonstrates that while these provinces are actively engaged in internationalization, their individual attraction power is moderate, contributing significantly to the national total but lacking the concentrated force of the Core group.

Periphery Cluster Marginalization: The Periphery cluster (19 provinces) attracts a negligible 1.75% of all the international student population. This finding quantitatively validates the conclusion that low CI scores and structural socio-economic barriers (SEGE Tier 5 and 6).

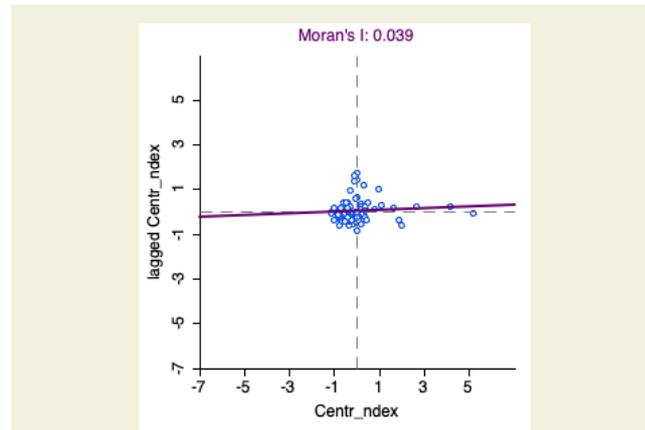


Figure 7.a Moran's I for Centrality Index

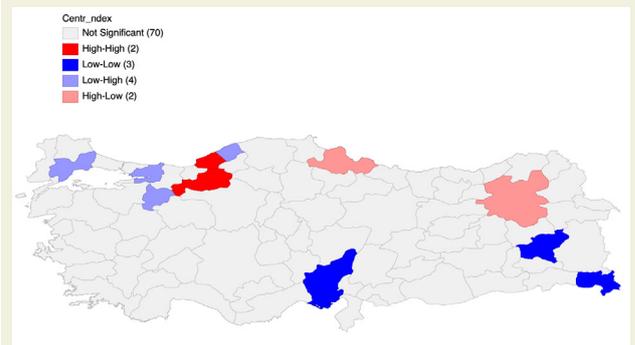


Figure 7.b LISA Map for Centrality Index

Source: The graphs and maps were prepared based on the data from the Council of Higher Education's Information Management System (2025).

severely limit a province's ability to compete in the international student market.

The findings unequivocally indicate a pronounced concentration of international students in provinces attaining high CI scores. This concentration is structurally aligned with the SEGE-2017 results, as the majority of the Core cluster provinces are classified within the two highest development tiers (Tier 1 and Tier 2). However, the spatial dynamics are complex: while high CI scores are mostly found in developed centers (e.g., İstanbul, Bursa), the success of Tier 5 provinces such as Erzurum and Gümüşhane demonstrates that the concentration is driven not just by development, but by specific strategic institutional advantages (the Factorial Override).

The analysis based on the Composite Centrality Index provides strong evidence supporting the central and sub-hypotheses, while simultaneously introducing crucial nuances that redefine the relationship between urban characteristics and student attraction.

Main Hypothesis: International students in Türkiye

Table 2. Centrality Index Calculation1 and the Centrality Level of Provinces

City	Population (P)	University Number (UN)	Population Per University (PPU)	Student Number (SN)	Student Per Population (SPP)	Int. Student Number (ISN)	Provincial level Int. Student Ratio (PLISR)	Country level Int. Student Ratio (CLISR)	Int. Student per Population (ISPP)	Centrality Index (CI)	Result
1 Adana	1.839.747	2	919.874	51.795	0,03	1.098	0,02	0,0033	0,0006	-0,0810	Semi-Core
2 Adıyaman	290.883	1	290.883	16.463	0,06	1.222	0,07	0,0036	0,0042	-0,1462	Semi-Core
3 Afyonkarahisar	328.319	2	164.160	38.073	0,12	1.775	0,05	0,0053	0,0054	-0,2309	Semi-Core
4 Ağrı	150.602	1	150.602	15.787	0,10	348	0,02	0,0010	0,0023	-0,4530	Periphery
5 Aksaray	324.816	1	324.816	18.827	0,06	1.114	0,06	0,0033	0,0034	-0,2074	Semi-Core
6 Amasya	151.058	1	151.058	17.056	0,11	136	0,01	0,0004	0,0009	-0,5304	Periphery
7 Ankara	5.290.822	21	251.944	335.731	0,06	19.447	0,06	0,0577	0,0037	0,1092	Semi-Core
8 Antalya	1.425.574	3	475.191	70.408	0,05	3.971	0,06	0,0118	0,0028	-0,0865	Semi-Core
9 Ardahan	42.146	1	42.146	6.990	0,17	231	0,03	0,0007	0,0055	-0,3171	Periphery
10 Artvin	36.071	1	36.071	12.712	0,35	83	0,01	0,0002	0,0023	-0,1459	Semi-Core
11 Aydın	308.551	1	308.551	46.781	0,15	591	0,01	0,0018	0,0019	-0,3030	Periphery
12 Balıkesir	375.778	1	375.778	29.179	0,08	2.695	0,09	0,0080	0,0072	0,1111	Semi-Core
13 Bartın	162.793	1	162.793	16.994	0,10	1.518	0,09	0,0045	0,0093	0,0090	Semi-Core
14 Batman	655.966	1	655.966	14.956	0,02	243	0,02	0,0007	0,0004	-0,3172	Periphery
15 Bayburt	83.676	1	83.676	13.952	0,17	493	0,04	0,0015	0,0059	-0,2648	Semi-Core
16 Bilecik	228.495	1	228.495	20.017	0,09	1.572	0,08	0,0047	0,0069	-0,0690	Semi-Core
17 Bingöl	173.856	1	173.856	18.578	0,11	886	0,05	0,0026	0,0051	-0,2577	Semi-Core
18 Bitlis	73.678	1	73.678	14.112	0,19	556	0,04	0,0016	0,0075	-0,1810	Semi-Core
19 Bolu	222.340	1	222.340	32.560	0,15	4.427	0,14	0,0131	0,0199	0,5590	Core
20 Burdur	118.234	1	118.234	34.854	0,29	1.071	0,03	0,0032	0,0091	0,0325	Semi-Core
21 Bursa	1.480.365	2	740.183	76.637	0,05	6.264	0,08	0,0186	0,0042	0,2906	Core
22 Çanakkale	204.454	1	204.454	44.661	0,22	2.311	0,05	0,0069	0,0113	0,1064	Semi-Core
23 Çankırı	98.972	1	98.972	16.990	0,17	1.161	0,07	0,0034	0,0117	0,0108	Semi-Core
24 Çorum	297.255	1	297.255	18.546	0,06	1.132	0,06	0,0034	0,0038	-0,2033	Semi-Core
25 Denizli	691.783	1	691.783	44.522	0,06	1.314	0,03	0,0039	0,0019	-0,1065	Semi-Core
26 Diyarbakır	1.164.940	1	1.164.940	41.885	0,04	1.019	0,02	0,0030	0,0009	0,1203	Semi-Core
27 Düzce	263.220	1	263.220	29.136	0,11	1.434	0,05	0,0043	0,0054	-0,1659	Semi-Core
28 Edirne	198.428	1	198.428	38.331	0,19	2.812	0,07	0,0083	0,0142	0,2102	Semi-Core
29 Elazığ	458.747	1	458.747	39.983	0,09	1.471	0,04	0,0044	0,0032	-0,1670	Semi-Core
30 Erzincan	168.093	1	168.093	23.505	0,14	910	0,04	0,0027	0,0054	-0,2391	Semi-Core
31 Erzurum	440.546	2	220.273	66.414	0,15	12.846	0,19	0,0381	0,0292	1,1398	Core
32 Eskişehir	821.315	3	273.772	67.754	0,08	18.850	0,28	0,0559	0,0230	1,5016	Core
33 Gaziantep	1.872.535	4	468.134	61.421	0,03	4.632	0,08	0,0137	0,0025	-0,0198	Semi-Core
34 Giresun	144.158	1	144.158	25.901	0,18	1.490	0,06	0,0044	0,0103	-0,0090	Semi-Core
35 Gümüşhane	54.341	1	54.341	21.625	0,40	2.359	0,11	0,0070	0,0434	1,0621	Core
36 Hakkâri	76.630	1	76.630	5.010	0,07	0	0,00	0,0000	0,0000	-0,7259	Periphery
37 Hatay	440.536	1	440.536	19.341	0,04	808	0,04	0,0024	0,0018	-0,2682	Semi-Core
38 Iğdır	152.454	1	152.454	14.053	0,09	450	0,03	0,0013	0,0030	-0,4155	Periphery
39 Isparta	272.797	2	136.399	60.087	0,22	2.373	0,04	0,0070	0,0087	-0,0318	Semi-Core
40 İstanbul	15.420.510	58	265.871	917.979	0,06	136.372	0,15	0,4046	0,0088	2,9223	Core
41 İzmir	3.087.047	10	308.705	190.270	0,06	10.019	0,05	0,0297	0,0032	-0,0718	Semi-Core
42 Kahramanmaraş	653.915	2	326.958	36.427	0,06	1.062	0,03	0,0032	0,0016	-0,3845	Periphery
43 Karabük	134.810	1	134.810	39.804	0,30	10.624	0,27	0,0315	0,0788	2,3467	Core
44 Karaman	263.056	1	263.056	19.605	0,07	572	0,03	0,0017	0,0022	-0,3950	Periphery
45 Kars	120.948	1	120.948	19.195	0,16	762	0,04	0,0023	0,0063	-0,2219	Semi-Core
46 Kastamonu	156.638	1	156.638	25.971	0,17	1.504	0,06	0,0045	0,0096	-0,0344	Semi-Core
47 Kayseri	1.177.802	4	294.451	66.165	0,06	3.742	0,06	0,0111	0,0032	-0,1966	Semi-Core
48 Kırıkkale	287.667	1	287.667	31.007	0,11	200	0,01	0,0006	0,0007	-0,4551	Periphery
49 Kırklareli	114.800	1	114.800	23.774	0,21	2.537	0,11	0,0075	0,0221	0,4462	Core
50 Kırşehir	163.349	1	163.349	21.381	0,13	2.312	0,11	0,0089	0,0142	0,2307	Semi-Core
51 Kilis	156.739	1	156.739	13.618	0,09	748	0,05	0,0022	0,0048	-0,2785	Semi-Core
52 Kocaeli	1.161.699	2	580.850	62.750	0,05	3.726	0,06	0,0111	0,0032	0,0106	Semi-Core
53 Konya	1.433.861	5	286.772	126.350	0,09	5.156	0,04	0,0153	0,0036	-0,1862	Semi-Core
54 Kütahya	275.111	2	137.556	48.955	0,18	6.507	0,13	0,0193	0,0237	0,6355	Core
55 Malatya	575.158	2	287.579	42.780	0,07	788	0,02	0,0023	0,0014	-0,4383	Periphery
56 Manisa	435.388	1	435.388	44.341	0,10	1.114	0,03	0,0033	0,0026	-0,2289	Semi-Core
57 Mardin	197.776	1	197.776	16.258	0,08	1.677	0,10	0,0050	0,0085	0,0484	Semi-Core
58 Mersin	1.084.789	3	361.596	48.341	0,04	3.352	0,07	0,0099	0,0031	-0,1177	Semi-Core
59 Muğla	124.825	1	124.825	40.696	0,33	928	0,02	0,0028	0,0074	0,0320	Semi-Core
60 Muş	202.012	1	202.012	14.186	0,07	31	0,00	0,0001	0,0002	-0,6169	Periphery
61 Nevşehir	161.293	1	161.293	21.139	0,13	1.016	0,05	0,0030	0,0063	-0,2000	Semi-Core
62 Niğde	240.283	1	240.283	26.010	0,11	1.179	0,05	0,0035	0,0049	-0,2179	Semi-Core
63 Ordu	234.628	1	234.628	18.181	0,08	109	0,01	0,0003	0,0005	-0,5561	Periphery
64 Osmaniye	282.645	1	282.645	16.669	0,06	105	0,01	0,0003	0,0004	-0,5579	Periphery
65 Rize	151.617	1	151.617	18.664	0,12	467	0,03	0,0014	0,0031	-0,3902	Periphery
66 Sakarya	282.078	2	141.039	73.982	0,26	9.293	0,13	0,0276	0,0329	0,9415	Core
67 Samsun	738.692	2	369.346	57.367	0,08	5.046	0,09	0,0150	0,0068	0,1263	Semi-Core
68 Siirt	181.118	1	181.118	17.176	0,09	1.875	0,11	0,0056	0,0104	0,1198	Semi-Core
69 Sinop	70.051	1	70.051	13.610	0,19	71	0,01	0,0002	0,0010	-0,4457	Periphery
70 Sivas	392.711	1	392.711	49.486	0,13	2.872	0,06	0,0085	0,0073	0,0494	Semi-Core
71 Şanlıurfa	1.097.061	1	1.097.061	28.971	0,03	1.543	0,05	0,0046	0,0014	0,2164	Semi-Core
72 Şırnak	105.908	1	105.908	6.282	0,06	81	0,01	0,0002	0,0008	-0,6414	Periphery
73 Tekirdağ	223.068	1	223.068	30.627	0,14	1.795	0,05	0,0053	0,0080	-0,0544	Semi-Core
74 Tokat	201.231	1	201.231	33.003	0,16	2.908	0,09	0,0086	0,0145	0,2358	Semi-Core
75 Trabzon	330.836	3	110.279	47.745	0,14	1.958	0,04	0,0058	0,0059	-0,2317	Semi-Core
76 Tunceli	41.380	1	41.380	9.599	0,23	79	0,01	0,0002	0,0019	-0,3667	Periphery
77 Uşak	265.063	1	265.063	23.727	0,09	1.567	0,07	0,0046	0,0059	-0,1124	Semi-Core
78 Van	653.630	1	653.630	29.153	0,04	311	0,01	0,0009	0,0005	-0,3025	Periphery
79 Yalova	157.499	1	157.499	17.288	0,11	1.083	0,06	0,0032	0,0069	-0,1614	Semi-Core
80 Yozgat	109.305	1	109.305	23.498	0,21	1.205	0,05	0,0036	0,0110	0,0065	Semi-Core
81 Zonguldak	116.325	1	116.325	31.426	0,27	1.664	0,05	0,0049	0,0143	0,1774	Semi-Core

¹ A threshold value was determined using the standard deviation of the index: provinces exceeding the threshold were classified as "center", those below as "periphery", and those close to the average as "semi-core".

Table 3. Cluster Characteristics and International Student Distribution

CI Cluster	Number of Provinces	Share of Provinces (%)	Share of International Students (%)	Mean CI Score ¹	Primary SEGE 2017 Tier Overlap
Core	10	12.3	62.32	1.1803	Tier 1-2
Semi-Core	52	64.2	35.93	-0.0350	Tier 1-6
Periphery	19	23.5	1.75	-0.0473	Tier 5-6

¹ The CI scores were calculated using Z-score normalization, which means that the CI scores are interpreted relative to the national average (zero). The Core cluster's high positive mean (1.1804) indicates superior attraction capability, while the negative mean for the Periphery cluster (-0.4733) confirms that these provinces are significantly lagging, with attraction metrics nearly half a standard deviation below the mean.

exhibit a spatial distribution differentiated according to the position of cities as being core or periphery. The CI analysis unequivocally supports the main hypothesis. The clear statistical separation between the clusters confirms a pronounced spatial differentiation: The Core cluster (10 provinces) attracts a massive 62.32% of all international students, while the Periphery cluster (19 provinces) attracts a marginal 1.75%. Moreover, the calculated mean CI scores show a vast separation: Core (1.1804), Semi-Core (-0.0349), and Periphery (-0.4733). This statistical divergence proves that cities are clustered into distinct categories of attraction, directly validating the “core–periphery” framework.

Sub-Hypothesis H1: City population size is a pull factor for international students. The findings support H1, but show that population size is not the sole or defining factor of Core status. The presence of large metropolitan centers in the Core cluster (e.g., İstanbul and Bursa) suggests that large population size, which correlates with university scale and service infrastructure, is generally a powerful pull factor. However, The placement of six Highly Developed (Tier 1) metropolitan centers (Ankara, İzmir, Antalya) in the Semi-Core cluster demonstrates that large size alone is insufficient. Their under-performance relative to the Core group suggests that population size is a necessary but not a sufficient condition; it must be coupled with superior performance on other strategic CI factors.

Sub-Hypothesis H2: The level of socioeconomic development of cities is a pull factor for international students. The analysis finds strong evidence supporting H2 (The strong positive correlation between CI scores and SEGE-2017 rankings), but highlights a critical Factorial Override that modifies the hypothesis. Accordingly, socioeconomic development is the primary structural pull factor. The Periphery cluster's composition (overwhelmingly Tier 5 and Tier 6 SEGE provinces) further validates that lack of development is an absolute structural barrier. However, the most significant finding partially contradicts the primacy of H2. The inclusion of two Less Developed (Tier 5) provinces, Erzurum (SEGE Rank 61) and Gümüşhane (SEGE Rank 64), in the elite Core

cluster proves that strategic institutional factors can entirely overcome structural developmental weaknesses. Their success demonstrates that development is the most common pull factor, but specific CI components can function as a more powerful, strategic pull factor when effectively deployed.

On the other hand, the analysis identifies notable anomalies. Provinces such as Bolu, Karabük, Gümüşhane, and Erzurum—despite relatively lower SEGE rankings (3rd to 5th tiers)—were classified as Core or Semi-Core according to our Index. These cases suggest that socioeconomic development is not the sole determinant of international student attraction capacity. Factors such as targeted institutional recruitment strategies, specialized program offerings, or geographic positioning may also play a significant role.

Taken together, these findings both validate the central hypotheses and uncover important nuances in the geography of international student mobility in Türkiye. They highlight that while population size and socioeconomic development remain decisive factors, other institutional and contextual mechanisms also shape student distribution. This multi-dimensional pattern will be explored in greater depth in the subsequent discussion section, with particular attention to the institutional and policy drivers underlying these anomalies.

5. Discussion

The core findings conclusively confirm a Core–Periphery logic in the distribution of international students in Türkiye. The concentration is severe: 62.32% of all international students are clustered in just the 10 Core provinces, providing a significant evidence for Hypotheses H1 (population size) and H2 (socioeconomic characteristics). The clustering of students in several major metropolises such as İstanbul and Eskişehir largely supports H1 and H2, although exceptions like Ankara and Antalya indicate that population size and socioeconomic development alone are not sufficient for Core status. This result is highly consistent with the in-

ternational literature (Beaverstock, 2002; Findlay et al., 2012; Kondakçı, 2011) indicating that students globally tend to gravitate towards “gateway cities” that offer both academic prestige and significant socioeconomic opportunities, advanced infrastructure, and post-graduation pathways. Our analysis thus validates the “Global City Magnetism” theory (Mazzarol & Soutar, 2002) within the Turkish context, confirming that the student decision-making process is fundamentally driven by these macro-level urban attractiveness factors, which reflect the established regional development asymmetry in Türkiye (Ataç, 2017; Karahasan & Uyar, 2009).

Moving beyond the dominant core–periphery divide, our multi-tiered classification framework (Core/Semi-Core/Periphery) offers a conceptual contribution by revealing a complex multi-centric structure. This structure exposes a critical tension within the Turkish higher education system: the dichotomy between institutions of inherent prestige and those operating with limited resources in the periphery. The existence of the Internationalization of Turkish Research Universities (ITRU) - an elite group comprising institutions like Koç, Sabancı, METU, Bilkent, and Boğaziçi - confirms the structural presence of a quality-driven academic league that consistently ranks at the top nationally and within the global top 1,000 (<https://itrunetwork.org/about>, 2025). A key operational advantage reinforcing this prestige is that most ITRU members operate primarily in English, resulting in significantly higher levels of English-language proficiency among academic staff—a form of institutional capacity that is largely absent in resource-constrained periphery universities. Consequently, while these elite institutions and their metropolitan settings function as powerful magnets for international students, universities located in peripheral provinces remain structurally disadvantaged and poorly positioned to compete.

The finding that the majority of provinces fall into the Semi-Core category suggests that while internationalization efforts are geographically uneven, their capacity is not entirely marginalized across the country (Tekin, 2022). This pattern aligns with literature on regionalization effects (Mertcan, 2019), where policy-driven expansion has created multiple secondary hubs. While İstanbul remains the dominant global center, the predominance of Semi-Core provinces indicates that many possess a moderate, yet growing, capacity to host international students, positioning them as potential emerging regional hubs within the country (Maringe & Foskett, 2010).

Crucially, our analysis identified significant anomalies that temper the deterministic view of socioeconomic development as the sole driver. The classification of prov-

inces such as Bolu, Karabük, Gümüşhane, and Erzurum as Core or Semi-Core, despite their relatively lower rankings in the SEGE socioeconomic index, is a critical finding. These cases suggest that international student attraction is not determined solely by urban macro-factors, but is also powerfully influenced by institutional strategies, specific program specialization, and strong historical or cultural ties with particular source regions (Polat & Arslan, 2017). Being a long-standing institution (Atatürk University, founded in 1957) or having aggressive internationalization campaigns such as marketing and joining the international fairs (Karabük University) demonstrate that well-known institutional background and non-economic factors can act as effective counter-magnets against regional socioeconomic disadvantage, providing a crucial novel contribution to the “Institutional Reputation vs. Regional Development” debate (Altbach, 2016; Sarier, 2016). This strongly suggests that strategic, localized policy interventions can, in exceptional cases, partially mitigate the structural handicap of underdevelopment. Conversely, certain provinces like Aydın with higher SEGE ranks appear in Semi-Core rather than Core, illustrating that socioeconomic advantage alone is insufficient without strategic institutional pull factors (King & Raghuram, 2013).

In terms of policy implications, the structural inequalities highlighted by our findings suggest a critical tension in the national internationalization strategy framed by the Council of Higher Education (YÖK). While the success of core centers is tied to inherent socioeconomic advantage, the distinct success of institutions like Karabük stems from localized, often resource-intensive, strategies that may not be scalable without systemic national support. This disparity underscores a policy gap: a purely quantitative, volume-driven approach risks prioritizing numerical growth over sustained investment in quality-focused necessities such as pre- and post-arrival services, robust administrative support, and intercultural competence—systematic shortcomings frequently cited in the national literature (Polat & Arslan, 2017; Boduroğlu, 2025). Within this context, our analysis suggests that to achieve the national goal of raising quality standards and reducing regional inequality, policy must evolve from a singular quantitative focus to a multidimensional approach that strategically supports institutional differentiation and addresses systemic quality deficits.

6. Conclusion and Policy Implications

This study aims to analyze the spatial distribution of international students in Türkiye by determining the capacity of the 81 provinces to act as core, semi-core, or periphery attraction centers, thereby testing the validity

of the core–periphery model in the context of higher education internationalization. The findings conclusively affirm the central hypothesis: international student mobility in Türkiye is shaped by spatial asymmetry, with population size and socioeconomic development acting as important pull factors, although strategic institutional factors can in some cases override structural disadvantages.

The analysis provides three key theoretical contributions to the literature on international student mobility:

- The study moves beyond the binary core–periphery model by establishing a multi-centric structure, demonstrating that the majority of provinces cluster in a semi-core category. This finding supports the notion of “emerging regional hubs” (Maringe & Foskett, 2010), suggesting that while concentration persists in the West, many second-tier provinces possess a moderate, exploitable capacity for internationalization.
- The confirmation of H1 and H2 validates the “Global City Magnetism” theory (Mazzarol & Soutar, 2002) in the Turkish context. It confirms that macro-level urban factors—socioeconomic opportunities, sophisticated infrastructure, and perceived career prospects—are often more influential on student choice than purely institutional factors, especially in the context of dominant metropolitan centers. However, notable exceptions indicate that strategic institutional initiatives can sometimes override structural advantages.
- Most significantly, a critical anomaly observed—the presence of cities with lower socioeconomic status (Erzurum, Gümüşhane, Karabük and Bolu) in the “center” category—provides a novel theoretical insight. This demonstrates that strategic institutional factors such as long-standing reputation (Altbach, 2004), dedicated international recruitment strategies, and niche program specialization can successfully act as counter-magnets, mitigating the structural handicap imposed by a lower regional SEGE rank.

Crucially, this tension between institutional success and structural handicap highlights a fundamental policy gap in the national strategy: while the Council of Higher Education (YÖK) aims for international quality, the current volume-focused approach fails to systemically support the quality-focused necessities (adequate administrative support and intercultural competence) required to sustain regional growth, as repeatedly documented in the national literature. This policy imbalance, if unaddressed, jeopardizes the alignment of national

goals with institutional reality.

Based on the evidence of spatial asymmetry and the identified anomalies, the study offers the following policy recommendations for developing a more equitable and effective internationalization strategy:

- National policy must shift focus from primarily numerical goals (student volume) toward systemic quality improvements. Policymakers, primarily the YÖK, should prioritize establishing minimum quality benchmarks and incentivizing all institutions to meet them. This includes promoting the implementation of standardized pre- and post-arrival support, encouraging intercultural competence training for administrative staff, and supporting the enhancement of foreign language proficiency among service personnel. This cooperative approach is required to close the policy gap between strategic ambition and institutional reality.
- Policymakers, primarily YÖK, should move beyond passively observing student concentration in metropolitan centers and actively promote a regionalization strategy. Resources should be allocated to support semi-core provinces that already demonstrate moderate capacity, helping them evolve into robust regional hubs. This will enable a more balanced distribution of the economic, cultural, and academic benefits of international students.
- For peripheral provinces and those with lower socioeconomic development (SEGE), policy focus should shift from large-scale parity toward strategically investing in institutional niches. This includes targeted funding for high-demand programs (e.g., engineering, health), scholarships tied to specific source countries, and other market diversification strategies. Expanding academic capacity and program diversity, along with improving transportation, digital connectivity, and communication infrastructure, will further enhance the attractiveness of these regions.
- Although not directly measured in this study, the development of accommodation capacity, improving transportation and digital connectivity, language support, cultural orientation programs, and activities may enhance the attractiveness of peripheral provinces, complementing findings on structural disadvantages.
- A comprehensive database should be established to regularly track international student distribution, academic performance, economic contributions, and social integration indicators at the provincial

level. This will provide evidence-based insights to guide policy, institutional strategy, and the evaluation of regionalization initiatives.

This study offers a robust spatial framework but is limited by its focus on macro-level indicators. Future research should integrate these findings with micro-level student perspectives, such as satisfaction levels and academic adjustment (Topal & Tauscher, 2020). Specifically, qualitative studies are needed to explore the decision-making processes of students who choose lower-SEGE, high-attraction provinces (like Erzurum or Karabük) to fully understand the trade-offs between city status and institutional strategy.

Note

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Research Ethics

Not applicable.

Artificial Intelligence Use

The author states that generative AI tools (e.g., ChatGPT)

were used only for language editing during manuscript preparation. No AI-generated content was used for analysis or interpretation. The authors take full responsibility for the integrity and accuracy of the content.

Author Contributions

The author has accepted responsibility for the entire content of this manuscript and approved its submission

The author solely conducted all stages of this research.

Competing Interests

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