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Brain Drain from Turkey to the Usa and Europe: Historical Process and Current Trends

Türkiye'den ABD'ye ve Avrupa'ya Beyin Göçü Tarihsel Süreç ve Eğilimler

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ABSTRACT
This study investigates the historical evolution and current trends of brain drain from Turkey to the United States and Europe. Beginning in the 1960s, this migration has undergone significant transformations driven by socioeconomic and political shifts. Using data from TurkStat, the U.S. Department of Justice and Eurostat, the study highlights key developments such as the rise in H-1B and Green Card applications to the United States in the 1990s and the structured focus of Europe's Blue Card program on skilled labor. Migration to the United States is primarily associated with technological, scientific, and academic opportunities, whereas Europe's migration policies have evolved from labor agreements to selective skilled migration programs. This study comprehensively analyzes these dynamics, offering insights into how international opportunities have historically shaped Turkey's skilled workforce. It concludes with policy recommendations emphasizing academic collaborations, incentives for diaspora engagement and sustainable strategies to mitigate human capital losses and strengthen Turkey's global competitiveness.
Keywords: Skilled Migration, Brain Drain, Migration Movements in Turkey, Human Capital

ÖZ
Bu çalışma, Türkiye'den ABD ve Avrupa'ya beyin göçünün tarihsel gelişimini ve mevcut eğilimlerini incelemektedir. 1960'lardan itibaren şekillenen bu göç hareketi, sosyo-ekonomik, siyasi faktörlerin etkisiyle önemli dönüşümler yaşamıştır. TÜİK, ABD Adalet Bakanlığı ve Eurostat verilerinin kullanıldığı çalışmada, 1990'larda ABD'ye yapılan H-1B ve Green Card başvurularındaki artışlar ile Avrupa'nın Mavi Kart programının nitelikli işgücüne odaklanması gibi önemli gelişmeleri vurgulamaktadır. ABD'ye göç öncelikle teknoloji, bilim ve akademi alanlarındaki fırsatlarla ilişkilendirilirken, Avrupa'nın göç politikaları iş gücü anlaşmalarından seçici nitelikli göç programlarına doğru evrilmiştir. Çalışma, bu dinamikleri kapsamlı bir şekilde analiz ederek uluslararası fırsatların Türkiye'nin nitelikli işgücünü tarihsel olarak nasıl şekillendirdiğine dair içgörüler sunuyor. Çalışma, akademik iş birliklerini, diaspora katılımına yönelik teşvikleri ve beşeri sermaye kayıplarını azaltmak ve Türkiye'nin küresel rekabet gücünü güçlendirmek için sürdürülebilir stratejileri vurgulayan politika önerileriyle sonuçlanmaktadır.
Anahtar kelimeler: Nitelikli Göç, Beyin Göçü, Türkiye'de Göç Hareketleri, Beşeri Sermaye

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1. INTRODUCTION

Brain drain has emerged as a significant problem in high-skilled migration. The term "brain drain" was initially coined by the British Royal Society to describe the emigration of scientists and technologists from the United Kingdom to the United States and Canada in the 1950s and 1960s (Gibson and McKenzie, 2011: 107-108). Initially used in this context, the term has since been widely adopted to refer to the migration of skilled professionals from the UK during this period (Giannoccolo, 2009: 5). Brain drain has notable implications for both developed and developing countries. Developed nations benefit from an influx of highly skilled individuals, fostering innovation and economic growth. In contrast, developing countries experience a loss of potential economic growth due to the departure of skilled individuals. Despite facilitating global knowledge exchange, brain drain diminishes educational investment return for developing countries. Measuring the scale and impact of this migration remains challenging because of the absence of standardized statistical systems for tracking the characteristics of international migrants. To mitigate brain drain, developing countries should prioritize the implementation of incentive-based policies (Carrington and Detragiache, 1999). Brain drain, defined as the emigration of highly educated and skilled individuals, poses a significant challenge in developing countries. Between 1961 and 1983, at least 700,000 scientists, engineers, doctors, and other skilled professionals emigrated from developing nations to destinations such as the United States, Canada, and the United Kingdom, leading to significant losses of intellectual capital in some countries (Stalker, 1994: 118). Turkey has also experienced a substantial outflow of highly educated individuals, particularly from Western countries, with the United States as its primary destination. However, precise statistical data on brain drain in Turkey remain unavailable, making it challenging to quantify the number of educated and skilled individuals who have emigrated over the years (Toksöz, 2006: 231). Nevertheless, studies on the subject provide valuable insights into the scale and impact of brain drain.

Figure 1 shows the number of foreign and Turkish citizens who emigrated from Turkey between 2016 and 2023. The total number of emigrants has increased from 2016 to 2023. There is a significant increase, especially in 2020 and 2023. The total emigration of 177,960 in 2016 reached 714,579 in 2023. The emigration of Turkish citizens is expected to increase from 2016 to 2023. However, a decrease was observed in 2019 and 2020. In 2023, it reached 291,377, representing a significant increase. The migration of foreign nationals showed a continuous increase from 2016 to 2020, decreased in 2021, and started to increase again. In 2023, 423,202 foreign nationals migrated (Turkstat, 2024a). Between 2021 and 2022, total emigration increased by 62.3%. The migration of Turkish citizens increased by 34.7%, whereas the migration of foreign nationals increased by 77.8%. Between 2022 and 2023, total emigration increased by 53%.

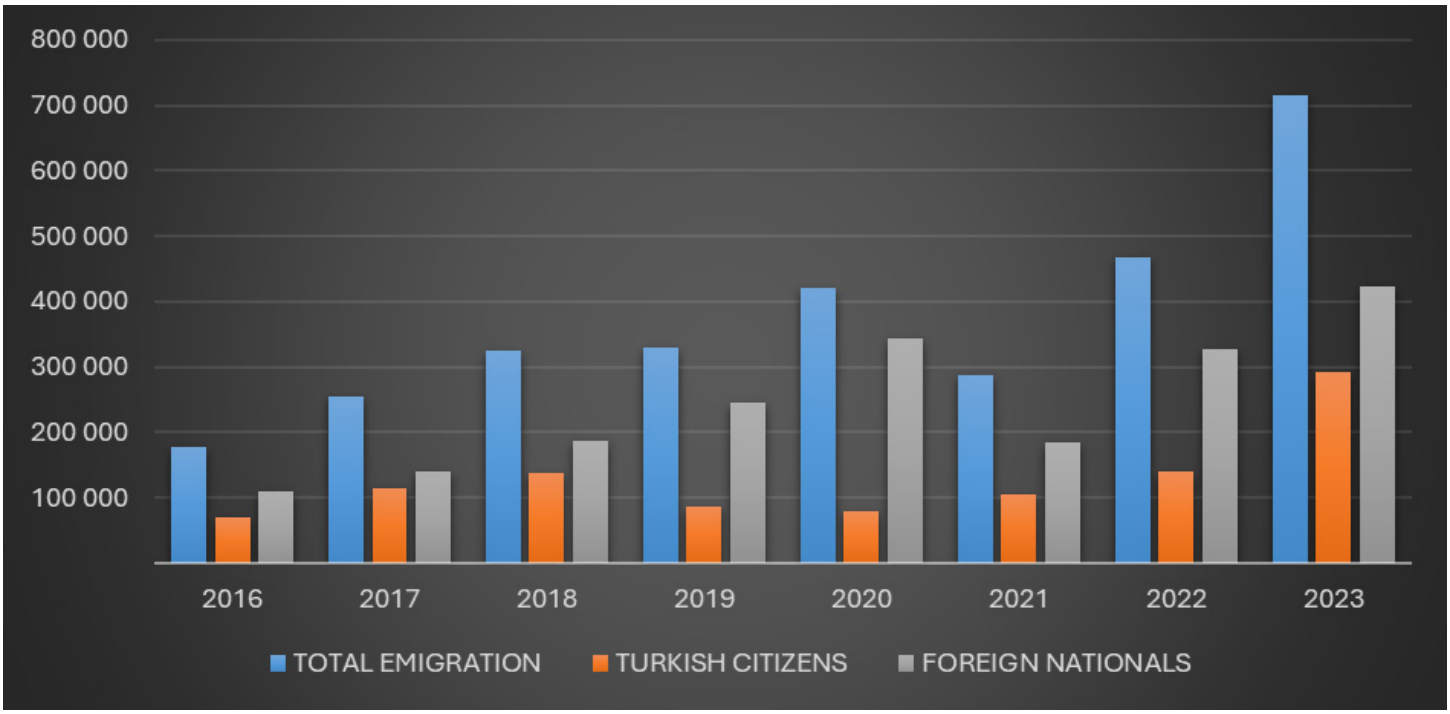

Figure 1. International Migration Statistics (2016-2023) (Source: Turkstat, 2024a).

During this period, migration by Turkish citizens increased by 108.8%, whereas migration by foreign nationals increased by 29.3%. Based on these data, it can be observed that international migration has increased significantly for both Turkish citizens and foreign nationals over the years, with significant changes in some years (Turkstat, 2024b).

This study examines the historical evolution and current trends of brain drain from Turkey to the United States and Europe, focusing on the socio-economic and political dynamics that have shaped this migration over the decades. By examining the factors driving the movement of skilled labor to these regions, this study highlights how opportunities in technology, academia, and specialized professions have influenced migration patterns. Additionally, it evaluates the policies and frameworks adopted by the United States and European countries, offering a critical perspective on their role in attracting Turkey's human capital. In conclusion, this study contributes to the literature by addressing the multifaceted implications of brain drain and proposing strategies to mitigate its adverse effects while fostering international collaboration and sustainable development for Turkey.

2. BRAIN DRAIN TO THE USA

After the establishment of the Republic of Turkey, the country was not initially a significant source of international migration. External migration from Turkey emerged relatively recently, beginning with the emigration of Turkish workers to Western European countries in the 1960s. Migration to Middle Eastern countries increased in the 1970s. Although Turkish migration to the United States also began during this period, it remained modest in scale compared to the larger waves of immigration from other ethnic groups to the United States. Given the history of large-scale immigration to the United States, representation of the Turkish ethnic group has been limited. However, following World War II, the nature of Turkish migration to the United States began to shift with the emergence of "brain drain" as a significant driver. Several factors contribute to the lack of precise data on the scale and characteristics of Turkish migration to the United States, complicating a comprehensive understanding of the phenomenon. The demographic composition of the United States predominantly consists of White Anglo-Saxon Protestants (WASPs)[1], reflecting a significant Christian majority in the country's belief structure. Within this context, Islam has emerged as a critical cultural and religious identifier for the Turkish ethnic group in the United States. Another distinguishing factor is the use of the Turkish language and the geographic concentration of Turkish communities in certain regions. Despite these distinctive characteristics, accurately determining the number of Turks in the U.S. remains a significant challenge (Kurtuluş, 1999: 47–50). Understanding the term "Turk" within its historical and sociocultural contexts is crucial. Before 1923, it denoted an individual born in the Ottoman Empire, while after 1923, it referred to someone born in the Republic of Turkey. This term traditionally encompassed those who were Muslim, had Muslim ancestry, were raised in a Turkish-speaking household, and self-identified as Turks[2]. The concept also extends to second- and third-generation Turkish Americans, many of whom may lack proficiency in the Turkish language or adhere to Islam but continue to maintain an affiliation with their Turkish heritage (Halman, 1980: 992). However, the term explicitly excludes members of other ethnic groups originating from Turkey or the Ottoman Empire who identify as Greek, Armenian, Jewish, or with a non-Turkish ethnicity. In essence, being from Turkey alone is insufficient to be classified as "Turk"; ethnic and cultural self-identification plays a crucial role, thereby excluding groups such as Greeks, Armenians, and Jews from this category.[3]

Between 1820 and 1920, 326,347 individuals migrated from Turkey to the United States (Table 1). However, these statistics

Table 1. Turks Who Emigrated from Turkey (Then the Ottoman Empire) to the United States

Periods	Number of Turks
1820	1
1821-1830	20
1831-1840	7
1841-1850	59
1851-1860	83
1861-1870	131
1871-1880	404
1881-1890	3.782
1891-1900	30.425
1901-1910	157.369
1911-1920	134.066
TOTAL	**326.347**

Source: (U.S. Department of Justice, 1986: 3-4).

1 Ethnic groups in the United States have different characteristics. Each group also has some common points. Some basic criteria will make it easier for us to identify and reach ethnic structures. These include common geographical origins, migration status, race, language and dialect, religious beliefs, ties (such as friendship, and community ties), traditions, music, literature, folklore, food preferences, and especially institutions that serve and protect a group. The more these basic determinants appeal to a group, the easier it will be to reach the ethnic structure and number of that group (Themstrom et al., 1980).

2 Talat Salman Halman (1980: 992) stated that the term "Turk" has a different meaning before 1923 and after 1923.

3 In this regard, see the definition and numbers of ethnic groups in the United States, which contains all racial information. See "Themstrom, S., Orlov, A., & Handlin, O. (1980). Harvard Encyclopedia of American Ethnic Groups. Cambridge: Harvard UP."

indicate that not all immigrants recorded as "Turkish" were of Turkish origin; Greeks or other ethnic groups may have been included in these numbers. Since migration records were based on the last country in which a person was permanently resident, it is evident that many of those who emigrated during this period were not ethnically Turkish (Kurtuluş, 1999: 53). According to official U.S. statistics, emigration from the Ottoman Empire to the United States between 1820 and 1860 was minimal, with an annual maximum of just 15 recorded migrants. Over a broad period from 1820 to 1950, approximately 360,000 individuals emigrated from Ottoman Turkey. The proportion of ethnic Turks is estimated to be less than 10%[4] (Halman, 1980: 993).

Researchers analyzed the statistics of emigrants from Turkey to the United States who face the challenge of ethnic and racial classifications because the definition of "Turk" varies significantly. This issue is particularly pronounced in migration from Ottoman lands to the U.S. (Bali, 2018: 49). During the late 19th and early 20th centuries, most of the Ottoman Empire emigrated to North and South America. However, significant Ottoman migrations to the United States have been overlooked for various reasons. The primary point to consider is that many individuals who emigrated from Ottoman territories identified themselves not as "Ottoman" but according to their ethnic or religious affiliation. This further complicated efforts to trace the source regions behind these migration movements. Official U.S. censuses often referred to these migrants as "Turks" or "from Turkey," yet their categorisations reflected regional and ethnic distinctions. For instance, Turkish immigrants were classified as originating from "Turkey in Europe," "Turkey in Asia," "European Turkey," or "Asian Turkey." Ethnicity typically defined Armenian migrants, who were often labeled as "Armenians." In contrast, others were grouped as originating from the Ottoman state ("Turkey in Asia") or specific regions, such as Arabia and Egypt. Consequently, existing immigration statistics fail to provide concrete figures on the exact numbers of ethnic Turks who migrated from Anatolia and the Balkans to the United States before World War I. In the United States, authorities often categorize immigrants based on religion, creating additional challenges in accurately identifying ethnic Turks. Many immigrants feared that Islam would hinder their acceptance in a predominantly Christian country, leading some to conceal their religious identity. Consequently, the number of Muslims and Turks migrating to the U.S. from Ottoman territories remained small. The prevailing opinion is that most of these immigrants were Christians and Jews (Karpat, 2004: 613–614). Karpat (2017) further attributed the lack of reliable immigration data for this period to Muslim migrants' reticence, who often avoided revealing their religious affiliation. Additionally, there is evidence that some Christian missionaries in Ottoman lands facilitated the emigration of individuals who converted to Christianity, helping them avoid attention. To evade scrutiny from Ottoman authorities, many of these individuals registered themselves as "Syrian" or "Christian." In the U.S., some Muslim immigrants have adopted a Christian identity in public life to avoid cultural backlash (Karpat, 2017: 369).

Table 2. Distribution of ethnic groups.

Religious/Ethnic Identity	The ratio of Ethnic Groups to Total Migrants (%)
Rum	27
Armenian	18
Jewish	6
Serbia, Montenegrin, Bulgaria	12
Syria	26
Turkish	5
Other	6

Source: (Bali, 2018: 53).

Kurtuluş (1999: 52–53), citing official U.S. statistics, reported that the number of emigrants from the Ottoman Empire to the United States between 1820 and 1920 was approximately 326,000. Karpat (2004: 628) provides a slightly higher estimate, stating that the total number of Ottoman and Turkish immigrants between 1820 and 1931 was 416,793. In contrast, Gordon (1932) recorded the figure as 323,392, but after accounting for returning immigrants, this number decreased to 186,463. Bali (2018: 53) acknowledged these variations and estimated that the number of Ottoman and Turkish immigrants settling in the United States likely fell between 200,000 and 300,000. Table 2 illustrates the ethnic and religious distribution of these immigrants, providing insights into the relative proportions of various groups. Among the ethnic groups, Greeks represent the largest share of migrants, accounting for 27% of the total. Syrian nationals follow them at 26%, Armenians at 18%, and Serbs, Montenegrins, and

Table 3: Emigration from Turkey to the USA (1921-1987)

Periods	Number of Turks
1921-1930	33.824
1931-1940	1.065
1941-1950	798
1951-1960	3.519
1961-1970	10.142
1971-1980	13.399
1981-1990	23.233
1991-1998	33.027
TOTAL	119.007

Source: (U.S. Department of Justice, 1988: 4 and Saatçi, 2009:96).

4 Historian Oscar Handlin says of the Turks that "wherever a few people gathered, they formed only small groups (cliques)".

Bulgarians collectively account for 12%. Jewish migrants constitute 6%, while Turks represent the smallest share, comprising only 5% of the total ethnic group immigrating to the United States.

Table 3 provides data on the number of immigrants to the United States following the establishment of the Republic of Turkey. As shown in Table 3, the migration of Turks to the United States increased significantly after the 1950s. This trend aligns with a global rise in brain drain during the same period, implying that these migrations included a significant proportion of skilled individuals. From the annual immigration statistics reports[5] of the United States, detailed tables on birthplaces, occupational groups, and visa types of immigrants can be found. For example, Table 4 lists Turkish-born immigrants arriving in the United States. When analyzed by country of last residence, the number of Turkish immigrants rose to 69,659[6]; however, when the number of Turkish (Turkish-born) citizens is considered, this number is 62,502[7]. The difference of 7,157 is due to the presence of other persons in Turkey.

Table 4. Number of Turkish immigrant children by place of birth

Years	Total Number of Migrants
1970-1974	9.567
1975-1979	8.368
1980-1984	11.919
1985-1989	8.689
1990-1994	11.528
1995-1998	12.431
TOTAL	62.502

Source: (Saatci, 2009: 99).

Emigration from Turkey to the United States increased significantly following World War II, marking a shift from earlier periods. In the initial waves of migration, more than half of the emigrants were illiterate, non-English speaking, or unskilled. However, starting in the 1950s and 1960s, the profile of migrants evolved. This period saw an increasing number of highly educated individuals, including those with undergraduate and postgraduate degrees and individuals with high-income levels, which marked an improvement in the overall quality of migration.

The initial wave of skilled Turkish migrants to the United States predominantly consisted of professionals such as engineers, doctors, and social scientists. An analysis of Table 5 shows that within five years, 500 skilled individuals, including engineers, doctors, and scientists, emigrated to the United States (Kurtuluş, 1999: 57). Additionally, Oğuzkan (1976) found in his research that between 1956 and 1970, a total of 1,500 Turks, comprising 907 engineers and 594 medical doctors, migrated to the U. S[8]. Since the late 1940s, brain drain has predominantly defined Turkish emigration to the United States. At least 2,000 engineers and 1,500 doctors migrated to the U.S. during this period. However, this number would likely have been significantly higher had it not been for the immigration quotas imposed by the U.S. in the 1920s, which remained in effect until 1965 (Halman, 1980: 993–994). Each new study offers additional insights into the magnitude of brain drain during specific periods, but no definitive figure exists for any given timeframe. Instead, a combination of documents, field studies, reports, and scholarly articles continues to contribute to our understanding of this phenomenon. Since the 1990s, the most reliable indicator of brain drain from Turkey to the U.S. has been statistical data on emigration. Key sources of this information include the types of skilled visas issued and the number of Green Card recipients. These metrics provide valuable insights into the scale and characteristics of skilled migration from Turkey to the United States.

Table 5. Immigration of Turkish Scientists to the USA (1962-1966)

Years	Engineers	Fundamental Sciences	Doctor and Operator	Social Sciences	Total
1956	19	2	4	-	25
1962	36	5	31	1	73
1963	116	7	55	4	182
1964	31	-	29	4	64
1965	28	7	36	4	75
1966	45	23	57	1	106
Total	**256**	**22**	**208**	**14**	**500**

Source: (Kurtuluş, 1999: 56).

5 Statistical Yearbook of the Immigration and Naturalization Service (1988), https://cis.org/sites/default/files/2019-03/INS_Yearbook_1988_0.pdf (25.03.2024).
6 According to Table 3; total immigrants approximately 1971-1998.
7 According to Table 4; it shows immigrants between 1970 and 1998.
8 Oğuzkan, T. (1976). The scope and nature of the Turkish brain drain. In *Turkish Workers in Europe, 1960-1975* (pp. 74-103). Brill.

Table 6. H-1B visa statistics for the top five countries and Turkey (2019-2023)

Countries/Years	2019	2020	2021	2022	2023
Total Number	**388.403**	**426.710**	**407.071**	**441.502**	**386.318**
India	278.491	319.494	301.616	320.791	279.386
China	50.609	51.597	50.328	55.038	45.344
Philippines	2.707	2.711	2.786	3.501	4.619
Canada	4.615	3.987	3.836	4.235	3.852
South Korean	3.476	3.665	3.481	4.097	3.603
Turkey	1.279	1.204	1.154	1.436	1.280

Source: (USCIS, 2024).

Table 6 presents the number of H-1B visas issued by the United States to the top five recipient countries and Turkey between 2019 and 2023. As shown in Table 2.17, the total number of H-1B visas issued by the U.S. was 388,403 in 2019, increasing to 426,710 in 2020, and declining to 407,071 in 2021. The number rose again to 441,502 in 2022, but decreased to 386,318 in 2023. The general trend indicates significant increases in 2020 and 2022, with a decline observed in the most recent year. India consistently ranked as the leading recipient of H-1B visas, starting with 278,491 in 2019, rising to 319,494 in 2020, decreasing to 301,616 in 2021, increasing again to 320,791 in 2022, and finally declining to 279,386 in 2023. China ranked second, with 50,609 visas issued in 2019, increasing slightly to 51,597 in 2020, then dropping to 50,328 in 2021, followed by an increase to 55,038 in 2022 and a decline to 45,344 in 2023. Although China's figures are significantly lower than India's, they exhibit a similar fluctuating pattern. The Philippines demonstrated a steady upward trend, starting with 2,707 visas in 2019 and experiencing small increases to 2,711 in 2020 and 2,786 in 2021, followed by a more pronounced rise to 3,501 in 2022 and 4,619 in 2023. Canada began with 4,615 visas in 2019 and displayed a fluctuating trend, with 3,987 visas in 2020, 3,836 in 2021, 4,235 in 2022, and 3,852 in 2023. Similarly, South Korea exhibited variability, starting with 3,476 visas in 2019, increasing to 3,665 in 2020, decreasing to 3,481 in 2021, rising again to 4,097 in 2022, and declining to 3,603 in 2023. Although receiving fewer H-1B visas than the top five countries, Turkey has shown relatively stable figures over the years. The number of H-1B visas issued to Turkish nationals was 1,279 in 2019, decreasing slightly to 1,204 in 2020, further to 1,154 in 2021, then increasing to 1,436 in 2022, and slightly decreasing again to 1,280 in 2023. These figures highlight Turkey's limited but consistent contribution to the skilled migration pool represented by H-1B visa holders.

Figure 2 illustrates the brain drain from Turkey to the United States over the last 23 years and shows the number of Turkish citizens who obtained the H-1B visa, which is the most common type of visa for skilled workers. Considering that the H-1B visa is only granted to highly skilled individuals, the data reflects the most recent picture of brain drain from Turkey to the United

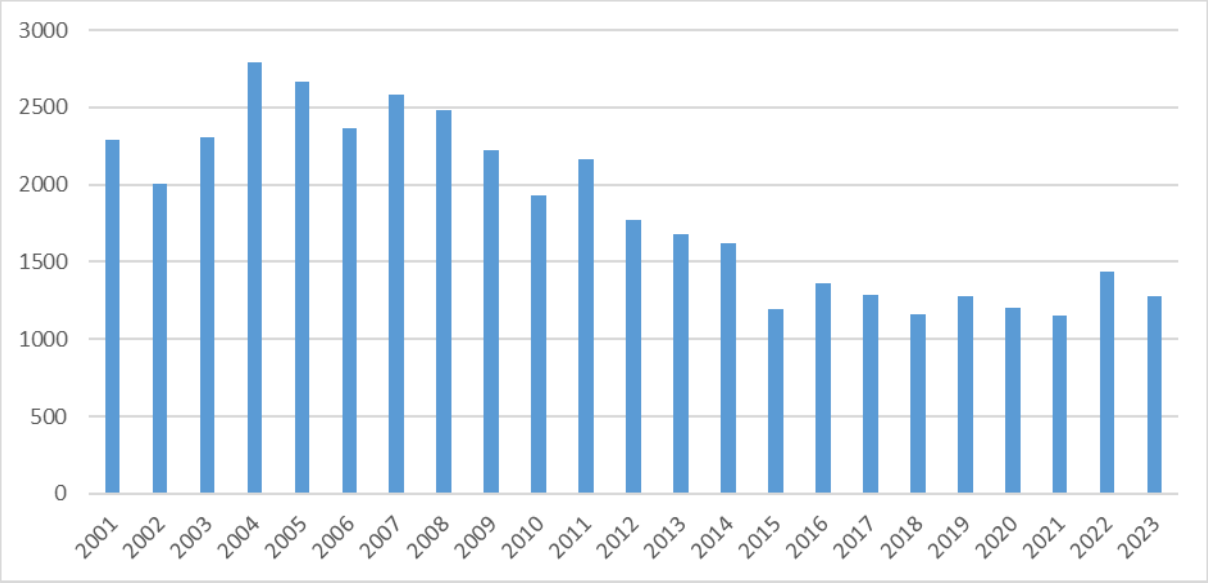

Figure 2. Turkish Citizens Receiving H-1B Visas (2001-2023)
Source: USCIS, 2024

States. While 2001 witnessed the migration of over 2.200 highly educated individuals from Turkey to the United States, this number peaked in 2004 at about 2.800. Although the pace of brain drain seems to have declined in the following years, the total number of highly skilled migrants to the United States between 2001 and 2023 represents a significant loss of human capital from Turkey (Akyıldız, 2023: 25; USCIS, 2024). The number of Turkish brain drains was 42.257 between 2001 and 2023.

It is also possible to see the brain drain from Turkey to the USA (although it is not as complete as the H-1B visa) in terms of the number of Green Card applicants and recipients[9]. While the H-1B visa is granted to persons with specific education, especially higher education (bachelor's degree and above), the Green Card is granted to those with a high school diploma or who have worked in a specialized field (at least 2 years). In this respect, the total number of applicants from Turkey will provide a clearer picture of the migration tendency of those who potentially want to leave the country, and the number of cardholders will provide a clearer picture of those who have left. Table 7 shows the number of Green Card applications and recipients in the last 15 years. In 2007, approximately 70.000 people applied, and 1.803 people were entitled to receive a Green Card. The number of visa recipients was 826. Since 2007, there has been a rapid increase in the number of applications, which has exceeded 200,000 in some years, such as 2018 and 2020. The total number of applicants was 221,271 in 2020. The number of accepted applicants was 2,709, but only 708 people were able to obtain visas. The fact that the total number of applicants between 2007 and 2021 was more than 2 million proves that Turkey has a serious brain drain issue. The number of people entitled to receive a Green Card in 15 years is approximately 40,000, and the number of people who have successfully obtained a visa is 15,506. Based on these data, 15,506 people migrated to the United States from Turkey between 2007 and 2021.

Table 7. Green Card Application, Acceptance, and Visa Statistics from Turkey to the USA (2007-2021)

Years	Number of Applicants	Number of selected people	Number of visas issued	Visa Obtaining Rates
2007	68.763	1.803	826	% 45.8
2008	77.538	1.357	972	% 71.6
2009	77.156	1.418	1.041	% 73.4
2010	90.643	2.188	1.058	% 48.4
2011	115.474	2.266	993	% 43.8
2012	108.015	3.077	889	% 29.2
2013	138.832	1.807	712	% 39.4
2014	152.074	3.972	1.084	% 27.3
2015	157.780	3.688	1.245	% 33.8
2016	137.146	1.795	796	% 44.3
2017	170.370	2.186	1.386	% 63.4
2018	204.729	4.390	1.821	% 41.5
2019	188.579	2.411	1.387	% 57.5
2020	221.271	2.709	708	% 26.1
2021	128.743	2.874	588	% 20.5
Total	**2.037.113**	**37.941**	**15.506**	**% 40,87**

Source: (Amerika Danışmanı, 2023).

2.1. THE RISE OF THE UNITED STATES AS A HUB FOR BRAIN DRAIN

The United States has established a comprehensive system shaped by historical, economic, technological, institutional, and legal factors, making it a central hub for skilled migration. In particular, the Immigration and Nationality Act of 1965, which abolished national origin quotas and prioritized family reunification alongside skilled labor migration, accelerated the influx of experts such as engineers, scientists, and healthcare professionals into the U.S. (Hirschman, 2014). These legal reforms not only enabled immigrants to settle in the country but also facilitated a transformation centered on knowledge, technology and innovation, solidifying the U.S. as a global talent center.

The U.S.'s innovative institutional structure plays a pivotal role in the career development of skilled individuals. American universities have become global attractions for immigrant students, offering high-quality education in engineering and science disciplines. Many of these students choose to work in U.S.-based research centers, laboratories, and high-tech companies upon graduation, significantly contributing to the country's scientific and economic growth. The fact that one-third of U.S. Nobel laureates who are foreign-born vividly underscore the scientific success of immigrants. Additionally, high-tech and innovation-focused regions in the U.S. influence skilled immigrants' preferences. Due to their robust innovation ecosystems, areas like Silicon Valley, Boston's Route 128, and the North Carolina Research Triangle Park have become magnets for engineers, scientists, and programmers. The technological booms and demand for highly skilled labor in these centers have

9 Implemented since 1990 and in force since then, the Green Card Program essentially attracts skilled immigrants. The Green Card can also be taken into consideration as an indicator of brain drain because it has set an example for the Blue Card system established by the EU to attract skilled labor, and it cares about the education, experience and professional knowledge of the applicant (Sönmez, 2022: 73). Green Cards are issued in different categories, and the fact that the prioritized groups are those from the fields of art, education, sports and academia indicates that they will be taken into consideration as brain drain data.

propelled the U.S. to a leadership position in technology and entrepreneurship. For example, between 1995 and 2005, immigrant entrepreneurs founded one-quarter of the technology companies established in the U.S., clearly demonstrating this effect. Legal frameworks, such as the H-1B visa program, have further accelerated this process. Initiated in 1990, the H-1B program provides temporary employment opportunities for highly skilled professionals while also allowing for a transition to permanent residency. This program, particularly beneficial in fields such as engineering, information technology, and science, has directly contributed to the U.S.'s economic growth and innovative capacity. The expansion of annual visa quotas has enabled hundreds of thousands of professionals to migrate to the U.S. (Hirschman, 2014; Portes, 2006).

The U.S. economic structure, combined with immigrants' motivation and active roles in the workforce, has driven not only economic growth but also scientific advancements. The country's open-door policies, entrepreneurial culture, and institutional infrastructure that foster innovation have made it a global hub for skilled immigrants. The synergy of these factors has positioned the U.S. not just as a migration destination but as an innovation hub that facilitates knowledge and resource sharing and a global leader in these domains. Based on long-term growth data, Krugman and Wells (2009) highlighted that living standards and economic development in the U.S. improved significantly after the 1960s. Considering the rise in skilled immigration during this period, it can be argued that immigrants played a crucial role in the nation's economic advancement.

3. BRAIN DRAIN TOWARD THE EUROPE REGION

Turkey has been a relatively late participant in the history of European outward migration, primarily because of legal barriers. Adopting the 1961 Constitution, which granted freedom of movement, further delayed large-scale migration from the country. Migration statistics highlight the rapid acceleration of Turkish emigration during this period. For instance, the number of Turkish immigrants in the Federal Republic of Germany grew from 6,700 in 1961 to more than 1,500,000 by 1987. Since the late 1950s, external migration to Europe has occurred in distinct stages. Following the legal reforms of 1961, private companies began to facilitate emigration. The first significant migration resulted from an intergovernmental agreement occurred with Germany in 1961. Subsequently, bilateral labor exchange agreements were signed with other European countries, including Austria, Belgium, and the Netherlands in 1964, France in 1965, and Sweden in 1967. Table 8 summarizes these agreements between Turkey and the European states (Abadan-Unat, 2002: 37, 42-43).

Table 8. Turkey's Labor Agreements with European Countries

COUNTRIES	LABOR AGREEMENT
West Germany	30 September 1961
Austria	15 May 1964
Belgium	15 July 1964
Netherlands	19 August 1964
France	8 April 1965
Sweden	10 March 1967

Source: (Abadan-Unat, 2002:42).

Abadan-Unat (2002: 38) stated that after the 1950s, external migration from Turkey to Europe went through certain stages and that this process was divided into 5 stages. These 5 stages are described below.

The a) 1950s: Individual Enterprises and Private Intermediaries,

b) 1960s: "Increased Labor Export" Regulated by the State based on Bilateral Agreements,

c) 1970s: Economic Crisis, Suspension of Foreign Labor Recruitment, Legal Status for "Tourist" (illegal) immigrants, family reunification, child benefits

d) 1980s: Education Problems of Children, Ghetto Life, Association Movements, Increase in Asylum Requests, Visa Requirements, Laws Encouraging Return

e) 1990s: Foreigners' Law, Foreigners' Acquisition of Identity, Increasing Xenophobia, Expansion of Ethnic Businesses, Expansion of Ethnic and Religious Associations, Demand for Political Rights.

Migration from Turkey to Europe has evolved into a widely accepted employment alternative, encompassing diverse forms such as brain drain, labor export, entrepreneurial ventures, and long-term settlements abroad. Despite its significant impact, this migration has had a relatively short history. The liberalization of Turkish citizens' right to emigrate has facilitated this process. Between the 1960s and 1984, more than 2 million Turkish citizens were permanently residing across five continents. The rapid and unprecedented nature of these migration flows underscored their transformative impact. Although the initial migration to Europe was predominantly driven by industrial labor demand and formal agreements, migration dynamics

Table 9. Number of Turkish Workers Sent Abroad through Official Institutions (1961-1975)

Years	Germany	Australia	Austria	Belgium	France	Holland	Switzerland	Total
1961	1.476	0	0	0	0	0	0	1.476
1962	11.025	0	160	0	0	0	0	11.1185
1963	23.436	0	937	5.605	63	251	36	30.328
1964	54.902	0	1.434	6.651	25	2.958	193	66.163
1965	45.572	0	1.973	1.661	0	2.181	122	51.509
1966	32.580	0	469	0	0	1.208	153	34.410
1967	7.199	0	1.043	0	0	48	215	8.505
1968	41.409	107	673	0	0	875	97	43.161
1969	98.142	970	973	0	191	3.404	183	103.863
1970	96.936	1.186	10.622	431	9.036	4.843	1.598	124.652
1971	65.684	879	4.620	583	7.897	4.853	1.342	85.858
1972	65.875	640	4.472	113	10.610	744	1.312	83.766
1973	103.793	886	7.083	265	17.544	1.994	1.109	132.674
1974	1.228	1.138	2.501	555	10.577	1.503	770	18.272
1975	640	401	226	59	25	32	229	1.612
Total	**649.897**	**6.207**	**37.186**	**15.923**	**55.968**	**24.894**	**7.359**	**797.434**

Source: (İşkur, 2011: 43).

gradually shifted, elevating its importance in social and economic contexts (Abadan-Unat, 1993: 307). Turkish migration to Europe has taken multiple forms over time, necessitating a nuanced understanding of its foundational characteristics and developmental trajectory. It is crucial to recognize that migration movements toward Europe are not entirely based on the free choice of migrants. Böhning (1981: 31) observed that individual migrants' choices are often constrained by regulations imposed by industrialized countries. These regulations define strict parameters that migrants must navigate in their home countries. Furthermore, the broader international context in which migration occurs alongside the policies of sending countries plays a significant role in shaping the scale and nature of migration flows.

The migration of Turkish labor to Western Europe lacks colonial roots, distinguishing it from many other labor migration flows. Turks initially migrated as laborers in the late 1950s, with some serving as quartermasters for the increasing flow of migrant workers to West Germany. Early recruitment efforts involved relatively small numbers, primarily men aged 20 to 35, about one-third of whom were skilled workers. These individuals typically migrated without a family. By January 1963, there were only 22,000 Turkish workers in West Germany. The first significant period of Turkish labor migration occurred between 1963 and 1966. Facilitated by the Turkish Employment Agency, approximately 180,000 workers were sent to countries including West Germany, Belgium, the Netherlands, and Austria. However, the number of Turkish migrant workers was considerably higher, as many migrants traveled through unofficial channels and later obtained legal status in Europe. By September 1966, the number of Turkish workers employed in West Germany had risen to 161,000, and 14,500 Turkish workers had resided in the Netherlands by the end of the same year. Despite the economic crises of 1966–1967, which disrupted labor migration from Mediterranean countries to Western Europe, a significant proportion of Turkish migrants did not return to Turkey. Although some were forcibly returned because of restrictive policies, most remained abroad. Between 1961 and 1973, labor migration from Turkey to Europe surged, with approximately 525,000 Turkish workers officially sent to Western Europe, 80% of whom migrated to West Germany. During this period, the demographic profile of Turkish labor migrants evolved. The proportion of female workers increased, with nearly a quarter of legally employed Turkish workers in West Germany being women. In contrast, labor recruitment in other Western European countries predominantly targets male workers. Additionally, the skill composition of Turkish labor fluctuated: the proportion of skilled workers dropped to just over a quarter of the total labor force between 1968 and 1970 but rose to over a third by 1971. West Germany showed a particular interest in skilled Turkish workers, whereas the Netherlands recruited predominantly unskilled laborers. By mid-1974, the number of Turkish workers in Western Europe had grown substantially, with over 600,000 employed in West Germany and around 30,000 in the Netherlands. Thousands more were employed in Austria, Switzerland, Belgium, and France. By 1974, the total number of legally employed Turkish workers across Europe exceeded 700,000, reflecting the intense labor migration experienced by Western Europe during this period (Penninx, 1982: 785-787).

The number of Turkish laborers sent to European countries through official institutions is detailed in Table 9. In 1961, 1,476 workers were sent abroad for the first time. Over time, the

number of labor migrants fluctuated, increasing during certain periods and decreasing in others. By 1973, the number of emigrants had reached 132,674. However, the 1973 oil crisis significantly reduced labor demand in European countries, resulting in a sharp decline in the number of workers sent abroad to 18,272 in 1974. From 1961 to 1975, Germany emerged as the primary destination for Turkish labor migrants, receiving approximately 81% of all workers sent through official channels. This highlights Germany's pivotal role in shaping Turkish labor migration during this era.

The predominance of Turkish migrants in Germany is of particular significance to the history of Turkish migration. Because of labor agreements, Turkish workers were sent to various European countries to address labor shortages. However, Germany has emerged as the primary destination for the largest number of Turkish migrants. This migration flow fostered the development of unique economic and sociological ties between the two countries (Akyıldız, 2019: 81). Figure 3 illustrates the growth of the Turkish and overall foreign population in Germany over time. In 1960, only 2,700 Turks lived in Germany. However, this number surged to over 2,000,000 by 1997, demonstrating the profound impact of Turkish migration on German society and bilateral relations (Abadan-Unat, 2002: 39). The figure provides a comprehensive depiction of the growth and evolution of the Turkish population in Germany from 1966 to 2018, segmented by gender (male, female) and total population. In 1960, the Turkish population in Germany comprised approximately 2,700 individuals. Over subsequent decades, this figure experienced a substantial increase, exceeding 2,000,000 in 1998, marking a significant milestone in migration patterns. However, after reaching its zenith, the Turkish population began to decline steadily, eventually stabilizing at approximately 1,500,000 by 2018. The data underscore a pivotal transition in the migration trajectory, highlighting the long-term dynamics of migration to Germany.

Turkish migration to Western Europe, which spans approximately 30 years, can be categorized into two distinct phases. The first phase, from the early 1960s to the mid-1970s, primarily consisted of labor migration driven by bilateral agreements to address labor shortages in European countries. The second phase, which began in the 1980s, demonstrated diverse migration patterns. This included family reunification, often facilitated through marriage migration and migration influenced by Turkey's domestic political and economic conditions. Additionally, this phase saw an increase in undocumented and illegal workers, along with the migration of skilled specialists seeking better opportunities abroad (Akgündüz, 1993: 153).

The first notable characteristic of Turkish migration to Europe was the predominance of migrants originating from the wealthier and more developed regions of Turkey, particularly Thrace, Marmara, and Northern Central Anatolia. Although this trend has diminished over time, these regions continue to contribute disproportionately to emigration relative to their population share. By the end of 1974, the seven leading provinces sending migrants abroad were Istanbul, Ankara, Izmir, Adana, Bursa, Zonguldak, and Samsun. Collectively, these provinces accounted for 42.5% of total emigration, with Istanbul alone contributing 20.7%. In contrast, the least developed provinces in southeast Anatolia, such as Hakkari, Siirt, Bitlis, and Van, represented only 0.16% of total migrants between 1960 and 1974. Table 10 highlights that most migrants were of urban origin. This is noteworthy given that only 33% of Turkey's

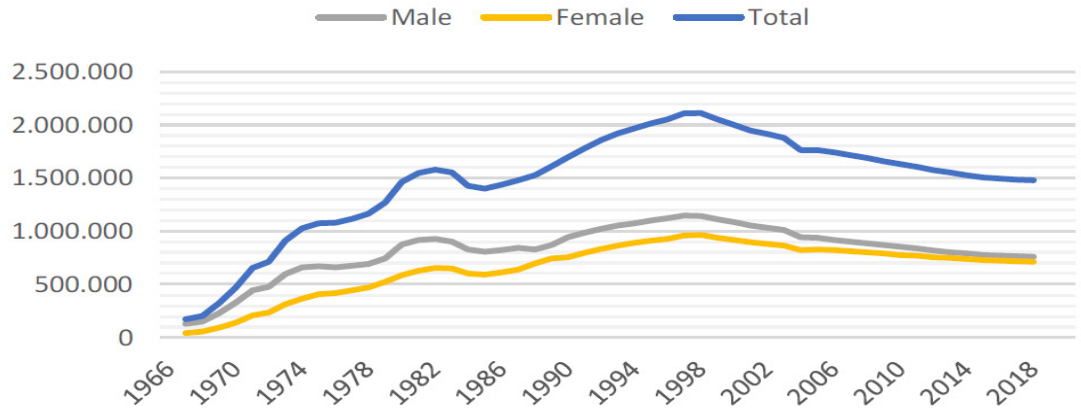

Figure 3. Population Development of Turkish Citizens in Germany (**Source:** Federal Office of Migration and Refugees, 2024).

population resided in cities in 1965, which rose to 39% by the 1970s. However, Wilpert (1992, p. 179) challenged this observation, arguing that labor migration records from Turkey to Germany were statistically flawed. Both Turkey and Germany relied on migrants' residence information rather than their place of birth, leading to inaccurate assessments of the urban-rural divide. Wilpert emphasized that many Turkish workers originated from small towns and villages, a fact that was obscured by the reliance on residency data in migration surveys[10]. Another notable characteristic of Turkish migration to Europe was the relatively high level of education and professional skills among Turkish immigrants, especially when compared to the general educational levels in Turkey at the time. Between 1961 and 1974, skilled workers comprised an average of 33.6% of all Turkish migrants. For instance, in 1965, skilled migrants accounted for 5%–10% of Turkish plumbers and electricians and 30%–40% of Turkish carpenters, bricklayers, and miners. It is also significant to note that the average annual demand for skilled labor in receiving countries during 1965–1974 was 39.2%. This indicates that Turkish migration patterns are closely aligned with host countries' labor market needs, reflecting the importance of professional skills in facilitating migration opportunities during this era[11] (Akgündüz, 1993: 174-177).

The migration movement from Turkey to European countries started in the 1960s with the recruitment of laborers and evolved into flows of semi-skilled and skilled migrants. Following the 1960s and 1970s, countries such as the United States and Canada shifted their immigration policies toward "selective skilled migration policies," developing systems that granted permanent residence and work rights to skilled individuals. However, European countries adopted similar policies only after the 1990s and 2000s, establishing structured programs for skilled migrant workers. In addition to individual visa programs implemented by each European country for non-EU citizens, a unified system aimed at attracting highly skilled workers from non-EU countries was introduced. This program, known as the EU Blue Card, facilitates the recruitment of skilled professionals from all

Table 10. Some Characteristics of Turkish Immigrants

Years	Group of city origin	Male	Skilled
1961	54.2	96.9	44.8
1962	67.0	96.1	31.9
1963	77.6	91.5	24.5
1964	52.3	93.6	36.9
1965	54.9	78.3	39.0
1966	50.3	71.6	25.7
1967	54.3	60.5	30.5
1968	53.6	73.7	28.8
1969	56.6	80.0	24.5
1970	57.5	83.9	27.0
1971	52.4	83.9	35.5
1972	50.6	78.1	33.7
1973	48.9	80.1	42.0
1974	54.4	93.4	39.2

Source: (Akgündüz, 1993).

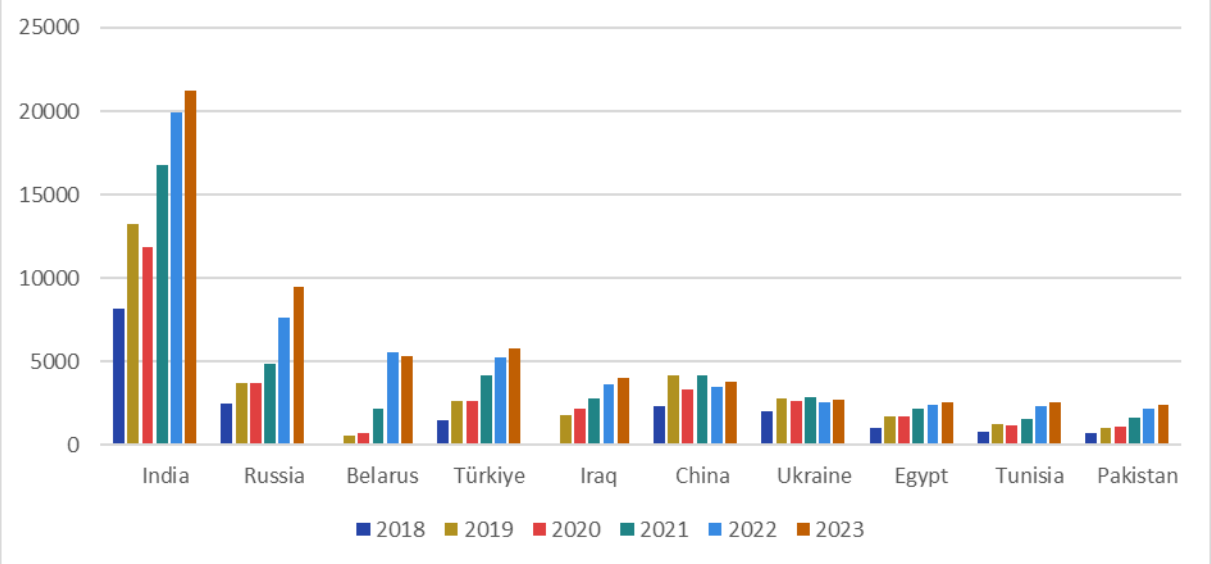

Figure 4. Top 10 countries whose citizens were granted EU Blue Cards, 2018–2023 (**Source:** Eurostat, 2024).

10 Looking at the proportions of the total population living in cities and villages at that time (Akyıldız, 2022: 9-10), it is seen that this proportion in cities was 31.9 % in 1960, 34.4 % in 1965, and 38.5 % in 1970. Here, it can be said that the Turkish immigrants who went to Europe did not come from cities, as some authors have mentioned, but mainly from villages and towns.

11 Akagündüz (1993: 177) was cited in various sources (Martin 1991, Gökdere 1978).

European countries. This section provides an overview of the number of skilled Turkish workers who have migrated from Turkey to European countries in recent years.

In 2007, a Proposal for a Council Directive on the conditions of entry and residence of third-country nationals for the purpose of high-skilled employment was introduced, and in 2009, the European Union formally adopted the Blue Card Directive (European Commission, 2023). However, the implementation of the Directive was subdue to the 2008 economic crisis and rising unemployment levels across the Eurozone. In 2009, the European Commission launched the "Blue Card" scheme to facilitate access to the labor market for highly skilled third-country nationals. The scheme provides socio-economic rights, favorable conditions for family reunification, and the ability to move within the EU. The adoption of the Blue Card scheme has gradually included Turkish citizens. For instance, 112 of the 3,364 Blue Cards issued in 2012 were granted to Turkish nationals. This figure increased to 409 of 12,954 in 2013, 447 of 13,860 in 2014, 559 of 17,072 in 2015, and 715 of 20,947 in 2016. Germany issued most of these Blue Cards, reflecting its prominent role in attracting skilled labor from Turkey. The Blue Card is not the only way to target highly skilled migrants from Turkey. The 2011 "Single Permit Directive" offers an additional pathway for highly skilled Turkish migrants to enter the EU. This directive supports the permanence of migrants by enabling those already residing in an EU Member State to obtain a permit, regardless of their initial reason for admission (Sanchez-Montijano et al., 2018: 7-8).

Figure 4 illustrates the top 10 countries with the highest number of Blue Cards issued by the EU. As depicted in the data, 21,228 out of the 91,903 Blue Cards issued in 2023 were granted to Indian citizens, accounting for approximately 23.1% of the total. Russia follows with 9,488 Blue Cards, representing 10.3%, while Belarus ranks third with 5,294 cards (5.8%), and Turkey occupies the fourth position with 5,803 cards, corresponding to 6.3%. Between 2018 and 2023, brain drain from Turkey to Europe reached critical levels, with more than 22,000 skilled individuals emigrating. Specifically, the number of Turkish nationals granted Blue Cards rose from 1,518 in 2018 to 5,803 in 2023. Cumulatively, 2,242 Turkish citizens were issued Blue Cards between 2012 and 2016, while this figure increased sharply to 22,028 between 2018 and 2023, resulting in a total of nearly 24,000 over the past 11 years. This trend underscores Turkey's increasing vulnerability to a substantial loss of human capital. The consistent rise in skilled migration reflects the country's critical position among nations experiencing significant brain drain, with potential long-term implications for its socio-economic and innovation capacities.

Figure 5 illustrates the remarkable increase in the number of Turkish nationals granted Blue Cards, a visa category for highly skilled migrants, between 2012 and 2023. Starting with only 112 recipients in 2012, the figure surged to 5,803 by 2023, representing an approximately 52-fold increase over the 11-year period. Notably, a sharp rise is evident from 2018 onward, with the number reaching 4,157 in 2021, 5,234 in 2022, and peaking at 5,803 in 2023. In total, 25,049 highly skilled Turkish nationals emigrated to Europe during the 2012–2023 period under the Blue Card scheme. This trend highlights the increasing outflow of Turkey's skilled workforce to European countries, underlining the growing demand for highly skilled professionals within the European labor market. Simultaneously, it reflects a significant

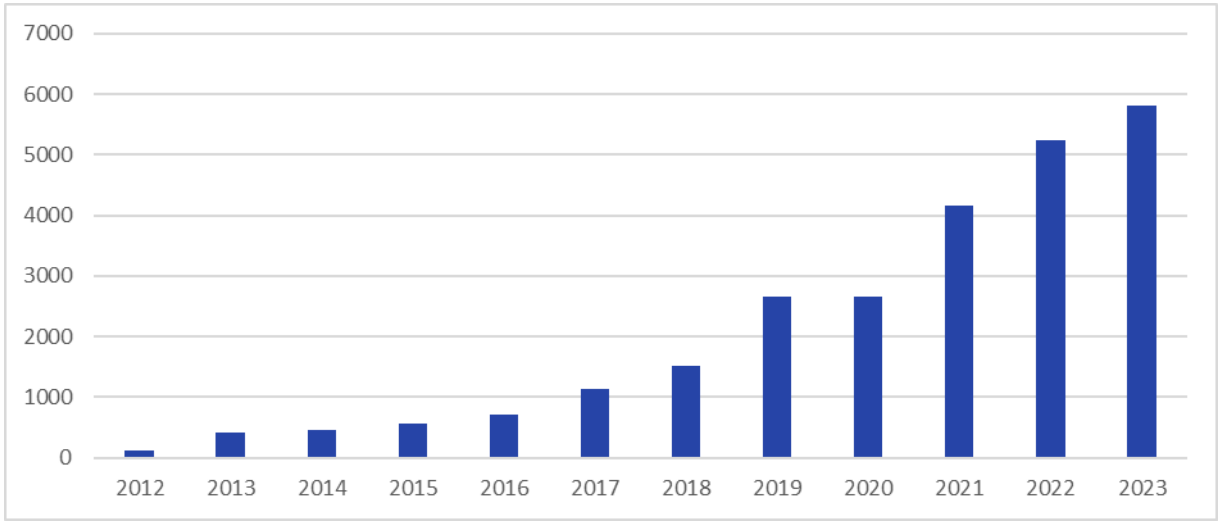

Figure 5. The Rising Trend of Blue Card Holders from Turkey (Source: Eurostat, 2024).

brain drain from Turkey, emphasizing Turkey's substantial loss of human capital and the critical role in fulfilling Europe's skilled labor needs.

3.1. THE HISTORICAL DEVELOPMENT AND POLICIES OF BRAIN DRAIN IN EUROPE

Following World War II, Europe concentrated on rebuilding efforts to recover from the devastating impact of the war and achieve rapid economic recovery. Industrialization, infrastructure projects and the expansion of the service sector necessitated the recruitment of migrant labor when local workforces were insufficient. Countries like Germany, France, Belgium, and the Netherlands developed various policies to attract both unskilled and skilled labor during this period. For instance, Germany's "Gastarbeiter" (guest worker) program drew a significant labor force from countries such as Turkey, Greece, and Italy. Meanwhile, Switzerland and the Benelux countries have initiated temporary worker programs targeting skilled professionals like engineers and technicians. The Marshall Plan's financial aid accelerated industrial production, thus increasing the demand for labor. However, after the 1973 oil crisis, policies shifted from unskilled labor migration to more selective, skill-oriented approaches (Hansen, 2003; Zimmermann, 2005).

From the 1990s onward, Europe faced demographic challenges such as an aging population and declining birth rates, prompting the reinforcement of skilled migration policies. Addressing workforce shortages in technology, engineering, and healthcare sectors has become crucial for maintaining competitiveness in the global talent race. In this context, the EU introduced the Blue Card scheme in 2009, aiming to attract skilled labor to its member states. The Blue Card system was designed with criteria such as minimum salary threshold, professional qualifications, and employment contracts. However, implementation inconsistencies among countries and bureaucratic hurdles have limited its success. For example, the inability of Blue Card holders to move freely between EU countries hindered the system's effectiveness (Facchini and Lodigiani, 2014). Additionally, European education policies were restructured to support skilled migration. The Bologna Process facilitated the harmonization of education systems and mutual recognition of university degrees, thus easing the mobility of skilled individuals throughout Europe. The 2004 and 2005 European Council Directives simplified the admission of researchers and students from third countries and allow them to work in multiple EU countries. Germany introduced a Green Card program for IT specialists and later integrated it into the Blue Card system. France offered a "Skills and Talents Visa" for individuals with scientific or economic potential, while the Netherlands launched the "Highly Skilled Migrant Program" to attract individuals meeting specific salary thresholds (Boucher, 2020). Nevertheless, Europe's skilled migration policies have encountered challenges. Language proficiency requirements, high salary thresholds, and other selective criterion deter candidates, particularly those from low-income countries. Moreover, significant barriers exist regarding gender equality and ethnic diversity. High salary thresholds and complex bureaucratic processes limit opportunities for women and migrants from underdeveloped countries. For instance, although Germany's Green Card program initially addressed a significant labor shortage, its stringent qualification requirements diminished its anticipated impact.

In conclusion, demographic and economic challenges have driven Europe to shape its skilled migration policies. To maintain competitiveness in the global talent race, these policies facilitate the integration of skilled individuals and provide flexible entry into labor markets. However, the long-term success of these policies relies on enhanced inter-country coordination and the development of mechanisms to support integration processes. Furthermore, the alignment of education and labor market policies remains a critical priority for advancing Europe's economic growth and technological innovation capacity.

4. CONCLUSION AND EVALUATION

Different regional dynamics and policies have shaped Turkey's brain drain, which has increased since the 1960s.The brain drain to the United States has been particularly driven by the motivation of highly skilled individuals to integrate into fields such as technology, science, and academia. Between 2001 and 2023, 42,257 Turkish citizens migrated to the United States solely through H-1B visas, clearly demonstrating the significant loss of Turkey's skilled human capital. Additionally, from 2007 to 2021, more than 2 million applications were made for the Green Card program, of which 15,506 applicants successfully obtained visas and settled in the United States. This situation reflects not only a substantial loss of highly skilled individuals but also a broad drain of human resources from Turkey. The brain drain to Europe, on the other hand, initially began as labor migration and eventually shifted toward a focus on skilled labor. Between 2012 and 2023, 25,049 Turkish citizens migrated to European countries through the Blue Card program, clearly reflecting Turkey's loss of knowledge and expertise. In particular, between 2018 and 2023, 22,028 individuals were granted Blue

Cards and settled in Europe. During this period, Germany became the most preferred destination for Turkish migrants, followed by the Netherlands, France, and Belgium. The Blue Card program in Europe which offers advantages targeted at skilled labor, has accelerated Turkey's human capital losses. These developments have negatively impacted Turkey's economic, technological, and scientific development, posing significant challenges to its long-term national goals.

To address Turkey's brain drain problem and safeguard its skilled human capital to contribute to national development, specialized policies must be devised with distinct focuses on the United States and Europe. For the United States, the primary emphasis should be on enhancing academic and technological collaboration. Regular engagement with Turkish scientists, engineers, and entrepreneurs in the U.S. should be established to develop joint projects and encourage their contribution to research and development initiatives in Turkey. For instance, mechanisms such as joint funding programs and academic exchange schemes can facilitate the utilization of expertise from the diaspora. Additionally, attractive incentive packages should be designed to support the return of skilled professionals who have migrated to the U.S. These packages could include competitive job opportunities in technology development zones, research grants, and programs promoting high-quality living standards. Furthermore, strengthening partnerships with the Turkish diaspora through digital platforms and networks that facilitate international knowledge transfer is essential. Such networks would not only foster investments by Turkish entrepreneurs and academics in the U.S. but also generate significant economic and scientific gains for Turkey. For Europe, sustainable collaboration models should be developed to maintain the connections of skilled labor with Turkey. Initiatives involving Turkish academics, engineers, and entrepreneurs residing in Europe should establish investment and knowledge-sharing mechanisms for Turkey's strategic sectors. In particular, bilateral agreements can be pursued with European countries to encourage the return of Blue Card holders to Turkey. Additionally, government-supported financing programs could be offered to incentivize members of the Turkish diaspora to economic investments and entrepreneurial activities. Organizing Turkey-based diaspora events could further strengthen Turkish professionals' social and cultural ties abroad, serving as a platform to motivate their contribution to Turkey's development goals.

In general, Turkey should establish a *Global Talent Pool* to monitor and engage its skilled human capital on an international scale. This pool would provide information on the expertise, professional fields, and international achievements of skilled individuals who have emigrated from Turkey, enabling their integration into Turkey's developmental strategies. Furthermore, to encourage reverse brain drain, it is essential to implement financial and social incentives alongside the simplification of bureaucratic procedures. For instance, returning individuals can be offered tax exemptions, high-skilled job opportunities, and academic positions. In addition, comprehensive reforms are necessary to strengthen Turkey's education system and labor market to retain skilled workforce at a global level. To achieve its sustainable development goals, Turkey must adopt a holistic policy framework that addresses both domestic and international dimensions. These policies should be periodically reviewed in the context of international collaboration to ensure effectiveness. In this way, Turkey can simultaneously safeguard its human capital and enhance the flow of international knowledge, paving the way for achieving its long-term economic and technological objectives.

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