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REGIONAL TRAJECTORIES OF YOUTH INTELLECTUAL MIGRATION IN KAZAKHSTAN

Abstract. This study examines the spatial redistribution of youth human capital in Kazakhstan by applying the conceptual framework of “intellectual hubs–gateways–peripheries” to regional data for 2020–2024. Using official statistics, the study analyzes internal and international migration among young people aged 14–34, with migration intensity standardized per 1,000 of the region’s average annual youth population, alongside the territorial concentration of higher education. The findings indicate that youth mobility is driven predominantly by internal migration. Astana, Almaty, and Shymkent emerge as the country’s main intellectual hubs, accounting for 60.3% of the national student population. Mangystau Region is the only region with positive net migration in both international and internal youth migration. Several northern and eastern regions constitute a pronounced intellectual periphery. The study demonstrates that assessing regional human capital loss solely through international migration is insufficient and proposes a comprehensive typology incorporating internal mobility, international migration, and the spatial concentration of higher education.

Keywords: *youth migration; intellectual migration; human capital; intellectual nodes, gateways, peripheries; internal migration; Kazakhstan; Central Asia.*

Жанар Арғынбаева ҚАЗАҚСТАНДАҒЫ ЖАСТАРДЫҢ ЗИЯТКЕРЛІК КӨШІ-ҚОНЫНЫҢ АЙМАҚТЫҚ ТРАЕКТОРИЯЛАРЫ

Андатпа. Зерттеу Қазақстандағы жастардың адами капиталының кеңістіктік қайта бөлінуіне және 2020–2024 жылдардағы өңірлік деректерге «зияткерлік түйіндер — қақпалар — перифериялар» тұжырымдамалық шеңберін қолдануға арналған. Ресми статистикалық деректер негізінде 14–34 жастағы жастардың ішкі және халықаралық көші-қоны талданды. Көші-қон қарқындылығы өңірдегі жастардың орташа жылдық санының әрбір 1 000 адамына шаққанда стандартталды, сондай-ақ жоғары білімнің аумақтық шоғырлануы қарастырылды. Нәтижелер жастардың кеңістіктік мобильділігі негізінен ішкі көші-қонмен айқындалатынын көрсетті. Астана, Алматы және Шымкент елдегі студенттер контингентінің 60,3%-ын шоғырландырып, негізгі зияткерлік түйіндер ретінде ерекшеленді. Маңғыстау облысы жастардың халықаралық және ішкі көші-қоны бойынша оң сальдо байқалатын жалғыз өңір болып табылады. Солтүстік және шығыс өңірлердің бірқатары айқын зияткерлік периферияны қалыптастырады. Зерттеу адами капиталдың өңірлік жылыстауын тек халықаралық көші-қон көрсеткіштері арқылы бағалаудың жеткіліксіз екенін көрсетіп, ішкі мобильділікті, халықаралық көші-қонды және жоғары білімнің шоғырлануын ескеретін кешенді типологияны ұсынады.

Түйін сөздер: жастар көші-қоны; зияткерлік көші-қон; адами капитал; зияткерлік түйіндер, қақпалар, перифериялар; ішкі көші-қон; Қазақстан; Орталық Азия.

Жанар Аргынбаева
РЕГИОНАЛЬНЫЕ ТРАЕКТОРИИ МОЛОДЕЖНОЙ ИНТЕЛЛЕКТУАЛЬНОЙ МИГРАЦИИ В КАЗАХСТАНЕ

Аннотация. Исследование посвящено пространственному перераспределению человеческого капитала молодежи в Казахстане с применением концептуальной рамки «интеллектуальные узлы — ворота — периферии» к региональным данным за 2020–2024 гг. На основе официальной статистики анализируются внутренняя и международная миграция молодежи 14–34 лет, интенсивность которой стандартизирована на 1 000 человек среднегодовой численности молодежи, а также территориальная концентрация высшего образования. Результаты показывают, что мобильность молодежи определяется преимущественно внутренней миграцией. Астана, Алматы и Шымкент выступают основными интеллектуальными узлами, концентрируя 60,3% студенческого контингента страны. Мангистауская область является единственным регионом с положительным сальдо международной и внутренней миграции молодежи. Ряд северных и восточных регионов формирует выраженную интеллектуальную периферию. Исследование показывает, что оценка региональной утечки человеческого капитала исключительно через международную миграцию недостаточна, и предлагает комплексную типологию, учитывающую внутреннюю мобильность, международную миграцию и концентрацию высшего образования.

Ключевые слова: *молодежная миграция; интеллектуальная миграция; человеческий капитал; интеллектуальные узлы, ворота, периферии; внутренняя миграция; Казахстан; Центральная Азия.*

Introduction

Youth migration begins to redistribute human capital well before the effects are reflected in regional labour-force statistics. The movements connected with university admission, graduation and starting work modify the age composition of the regions of origin and change the distribution of skills, consumption and future family formation across the country. In Kazakhstan, this phenomenon is increased by the distance between the regional centres and by the fact that universities, research organisations and high-productivity services are concentrated in only a few cities. Studies concerning Kazakhstan have already connected continuous youth out-migration with losses in human capital and with growing socio-territorial disparities [1,2].

The concept of “brain drain” only accounts for one aspect of this situation. If a graduate moves from a northern or eastern area to Almaty or Astana, the area of origin loses some of its young human talent, even though the individual is still in Kazakhstan. From the perspective of the region of origin, this appears to be brain drain, but from the viewpoint of the country, it is more accurate to describe it as internal circulation and concentration. It is important to make this distinction since the movement of young people between the different regions of Kazakhstan is much greater than international emigration.

Migration theory has shifted from explanations of mobility that rely on a single factor. Approaches based on social transformation see migration as part of broader economic and institutional changes [3]. Meanwhile, the aspirations-capabilities

framework connects the desire to move with the resources and the opportunity structures which enable mobility [4]. Young people are at a particularly mobile stage in the course of their lives since finishing their education, entering the labour market and setting up a household usually take place at the same time as moving [5]. Furthermore, since cultural and educational capital vary from one place to another, mobility becomes an element of the process by which qualifications are acquired, recognised and turned into employment [6].

The idea of intellectual migration is useful here, provided that it is applied with care. Intellectual migration analytics views students and skilled professionals as part of a broader spectrum of mobility and links internal and international migration together by means of the spatial notions of intellectual capital, nodes, gateways and peripheries [7]. Further research into student mobility demonstrates that educational institutions can function as migration infrastructure and that mobility is closely associated with the accumulation of intellectual capital [8,9]. The current article applies this framework in order to examine regional youth mobility. It does not label every person aged 14 to 34 as an intellectual migrant; instead, it investigates how youth movement is organised within a regional system in which access to higher education, research capacity and skilled employment is unevenly distributed. The analysis uses harmonised data for 2020–2024 and explicitly accounts for the 2022 administrative-territorial reform and for differences in the age coverage of official migration-by-speciality statistics.

The empirical analysis tests whether internal and external youth migration jointly produce a differentiated regional structure of metropolitan gateways, regional nodes and intellectual peripheries. According to the statistical data, Almaty, Astana, and Shymkent may be regarded as gateways; the Almaty Region, Turkistan, Mangystau, and Atyrau can be seen as potential regional nodes; and Karaganda, East Kazakhstan, Pavlodar, Kostanay, North Kazakhstan, and the Akmola region can be identified as intellectual peripheries. In the present study, these classifications are treated as hypotheses to be tested.

The first point is that metropolitan gateways should have both a continuous attraction across regions and a high concentration of higher-education students. The second point is that a regional node should have a generally positive youth migration balance even if it does not meet the criteria for being a metropolitan gateway. Thirdly, intellectual peripheries should see young people leave through both internal and external migration. Regions in which internal and external migration go in opposite directions are therefore regarded as transitional cases and are not forced to be classified as one of the three ideal types.

Literature review

Youth mobility, human capital and the life course

There are a number of transitions in young adulthood that are separately linked to migration; finishing school, going to university, graduating, and changes in employment all increase the likelihood of moving [5]. The status of students is not the same in all areas: in regions where there is a concentration of higher education and specialised employment, migration can act as a means by which the existing unequal structures of opportunity in different areas are reproduced.

In Kazakhstan, studies on internal migration have connected people's mobility with the employment, education and housing opportunities available in the major cities [10]. Research into migration from rural to urban areas in northern Kazakhstan also indicates that people's intentions to migrate depend on the institutional and

material conditions present in both the areas of origin and in the destinations [11]. This information supports the evidence that the out-migration of young people results in measurable economic costs for regions and for the national economy as a whole [1]. The relevant spatial relationship is therefore not merely that between Kazakhstan and other countries; it also exists between the regional labour markets and the metropolitan areas which provide access to education and careers.

Research among students from Central Asia indicates that overseas qualifications can act as a form of cultural capital, while a person's class, gender, and family background influence the decisions regarding where and how to study [12]. The same kind of process occurs in Kazakhstan, since prestigious universities and specialised labour markets are located in only a few cities. Young people might move there initially for the purpose of receiving an education and then remain for work, in this way connecting the geographical distribution of higher education with long-term changes in the regional population.

From brain drain to circulation

The term brain drain is generally taken to mean the loss of well-trained individuals from the places where they were educated or where their skills were needed. It remains a useful concept for areas that lose graduates, researchers, engineers, or medical professionals. At the same time, though, it can simplify a more complicated situation by failing to take into account return migration, further movement, and the networks that people who are moving maintain among different locations. In order to account for this broader pattern—which involves skills and connections not simply moving once from one country to another but instead circulating among a number of places over time—the idea of brain circulation was developed [13,14].

That is the reason why a multi-scalar perspective is necessary. The meaning of a given move can vary according to the territorial scale from which it is observed. For example, when a young person moves from Kostanay to Astana, the region of origin suffers a loss of some of its young human capital. Nevertheless, Kazakhstan as a whole does not lose that individual to the rest of the international community. At the national level, the result is therefore one of concentration rather than exit. Likewise, positive international immigration into a region does not necessarily mean that the region is holding on to its young residents, particularly if a large number of them subsequently move to other areas within the country.

It also serves to prevent a typical mobility bias. Since migration research usually concentrates on people who move and gives less attention to the institutional conditions which enable others to remain [15], regional policy should not regard retention as simply the opposite of attraction. A region might attract students or foreign migrants and yet be unable to retain its own graduates.

Intellectual nodes, gateways and peripheries

The term 'intellectual migration analytics' offers a way of describing these multi-scalar relationships. Li, Lo and Lu present intellectual migration as a spectrum that connects student and professional mobility and introduce the ideas of intellectual capital, nodes, gateways and peripheries [7]. Nodes are areas where educational, research and professional resources are concentrated. Gateways are highly connected locations by means of which intellectual mobility is channelled and redistributed. Peripheries refer to regions in which human capital has been weakened either because of continuous out-migration or due to limited access to the institutions that create and retain intellectual capital.

In the present study, these categories are operationalised through observable migration and higher-education indicators rather than treated as directly observed

institutional attributes. The difference between a node and a gateway is particularly useful in the case of Kazakhstan; it is possible for a regional centre to have a university system and a specialised economy without at the same time acting as a national migration gateway. On the other hand, Almaty or Astana can continue to have gateway functions even in a year when emigration outside the country is greater than immigration, since there is still a significant domestic inflow and a high density of higher-education institutions. Thus, gateway status refers to connectivity and concentration rather than serving as a synonym for positive international net migration.

The migration patterns of Kazakhstan are also influenced by its economic specialisation. A study of the Bolashak programme shows how the combination of skills, public investment and labour-market opportunities affects the movement of highly qualified graduates [16]. Research into Kazakhstan's international migration indicates that regional economic corridors and differences in the labour market remain important [17]. The issue to be examined empirically is whether these processes result in a stable hierarchy of metropolitan gateways, regional nodes and peripheral donors when the internal and external flows of young people are looked at separately.

Research methods

Data and population coverage

The analysis is based on official data provided by the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. The primary source is the statistical collection Youth of Kazakhstan 2020–2024, which was published in 2025 [18]. This collection includes figures relating to the regional youth population, total migration, external migration, internal migration and indicators concerning higher education. The analytical panel includes the 20 regions and cities of republican significance for each year from 2020 to 2024.

The legal definition of youth varied during the period under review. Previously, before the amendment of 2022, the upper age limit set by law was under 29. The law known as No. 168-VII, passed on 26 December 2022, raised the upper age limit to under 35; the provisions relating to youth policy came into effect after the required 60-day period [19,20]. If the definition in force at the time were applied year by year, the time series would be broken. In order to avoid this, the BNS 2020–2024 dataset retrospectively applies a harmonised age group of 14 to 34 for each year, and the analysis makes use of this statistical definition throughout [18]. This should be understood as a harmonisation convention and not as evidence that the legal definition was the same in 2020 and in 2024.

As the denominator, the average annual youth population is employed. For a given year t , it is determined by averaging the population aged 14 to 34 on 1 January of year t and on 1 January of the following year, that is, year $t+1$. The values for 1 January 2020 needed to calculate the 2020 denominator were obtained from the previous official collection, Youth of Kazakhstan 2019–2023 [21].

Table 1. Primary statistical sources and analytical use

Indicator/Data set	Source	Age coverage	Spatial and temporal coverage	Use in analysis
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Youth population	BNS, Youth of Kazakhstan 2020-2024, 2019-2023 for 1 Jan 2020	14-34	20 regions, 2020-2025 start-of-year values	Average annual denominator
Total youth migration	BNS Table 5.1	14-34	20 regions; 2020-2024	Consistency check and total balance
External youth migration	BNS Table 5.2	14-34; age bands 14-18, 19-23, 24-29, 30-34	20 regions; 2020-2024	Direct external inflow, outflow and net migration
Internal youth migration	BNS Table 5.3	14-34; same age bands	20 regions; 2020-2024	Direct internal inflow/outflow; reconciled with Table 5.1 minus Table 5.2
Higher-education students	BNS Table 9.3	Student age structure reported through 34	20 regions; 2024/2025	Contextual indicator of intellectual infrastructure
Migration by specialty	BNS Taldau: external migration of population aged over 15 by specialities	15+	Regional dynamic series	Not used as a youth variable; retained only as contextual evidence

Note - compiled based on sources [18,21,22]

The speciality series is not included in the youth figures since age and speciality are not listed together. All regional balances and rates were calculated from the same harmonised regional panel using the formulas reported below.

Migration measures and validation

The figures for external arrivals, departures and net migration are directly taken from BNS Table 5.2, while those for internal arrivals and departures come from Table 5.3. As an independent means of checking the accounts, we compared the internal figures with the difference between the total youth migration in Table 5.1 and the external youth migration in Table 5.2. Furthermore, the regional totals were checked against the published national totals; for each year from 2020 to 2024, the national discrepancies for arrivals and departures were zero.

Two annual migration rates are employed. External net migration, per 1,000 young residents, is calculated by dividing the number of external arrivals minus the number of external departures by the average annual youth population and then multiplying by 1,000. Internal net migration per 1,000 young residents is calculated in a similar way. When five-year comparisons are made, both the cumulative number of people and the arithmetic mean of the five annual rates are given. This method prevents the total migration over five years from being divided by the population of a single year.

The rates shown have been rounded to two decimal places, the number of people is given as an integer, and missing values or those which are methodologically unavailable are listed as NA rather than being entered as zero.

$$\text{ENMRrt} = (\text{ExternalInrt} - \text{ExternalOutrt}) / \text{YouthPopulationrt} \times 1,000$$

$$\text{INMRrt} = (\text{InternalInrt} - \text{InternalOutrt}) / \text{YouthPopulationrt} \times 1,000$$

Administrative-territorial harmonisation

The administrative changes impact the regional panel for the period 2020 to 2024; since the South Kazakhstan Region was renamed the Turkistan Region in 2018 and Shymkent was at that time made a city of republican significance [23], South Kazakhstan is not regarded as an additional region during the study period.

The 2022 reform established the Abai, Zhetysu, and Ulytau regions respectively by taking territories from East Kazakhstan, the Almaty Region, and the Karaganda Region [24]. The retrospective data from the BNS youth collections enable the use of a consistent geographical framework based on the 20-region structure. Rather than joining together the boundaries that existed before and after the reform, the harmonised values are employed. The analytical file continues to include the official top-level administrative codes [25].

Operationalisation of intellectual migration and regional types

Another issue is that of the occupational makeup of migration. The BNS dynamic tables on migration by speciality cover the population aged 15 and above [22]. The tables list the specialities of technical, agricultural, architectural and construction, medical, pedagogical, economic and legal work, but do not include a cross-tabulation by age and speciality, which would isolate the young. The figures for young people are therefore left out of the estimates of youth intellectual migration; the entries relating to young people by speciality in the analytical dataset are given the value NA.

As a result, the term 'intellectual' is applied to the regional system rather than to any specific occupational characteristic of each migrant. When assessing youth mobility, regional higher-education concentration is used as a contextual indicator of intellectual infrastructure, although the article does not state that all migrants between the ages of 14 and 34 are students or highly qualified workers. In order to directly identify youth intellectual migrants, it would be necessary to have linked data on age, education or occupation, as well as on origin and destination.

The typology at the regional level is based on specific rules: in order to be classified as a metropolitan gateway, a region must show positive internal net migration in each of the five years and also have a student-to-youth ratio for 2024/2025 that exceeds the median ratio among the 20 regions (which is 67.97 students per 1,000 young residents).

The regional-node criterion captures a favourable non-metropolitan position in the youth mobility system rather than metropolitan educational centrality; for this reason, node status is based on sustained net attraction across the combined internal-external balance. A region classified as a regional node must have a positive cumulative external balance and a positive cumulative combined balance, but at the same time, it must fail to meet the gateway rule.

A periphery is defined as a region with negative cumulative balances in both internal and external migration. The other cases involving mixed signs of balance are described as transitional or externally connected domestic donors. These rules serve as criteria for classifying the regions descriptively and do not aim to estimate any causal effects.

RESULT

National dynamics of youth mobility

In each year of the period covered by the series, the number of young people moving between regions was greater than the number of external migrations. The total number of young people arriving within the regions was 381,272 in 2020,

414,006 in 2021, 439,785 in 2022, 411,410 in 2023 and 524,311 in 2024. The number of external arrivals varied from 4,825 in 2020 to 13,906 in 2024. Over the five-year period, the regional system registered 2,170,784 interregional youth arrivals, as compared with 43,546 external arrivals and 35,088 external departures.

External net migration also changed its direction over that period. In 2020 and 2021, Kazakhstan had external deficits of -5,192 and -5,412 among its youth, respectively; the balance became positive in 2022 at +1,134, increased to +7,294 in 2023 and amounted to +10,634 in 2024. It would therefore be inaccurate to describe the period from 2020 to 2024 as one with uniformly negative international youth migration.

Table 2. National youth migration, 2020-2024, persons

Year	Internal arrivals	External arrivals	External departures	External net migration
2020	381 272	4 825	10 017	-5 192
2021	414 006	4 983	10 395	-5 412
2022	439 785	8 356	7 222	1 134
2023	411 410	11 476	4 182	7 294
2024	524 311	13 906	3 272	10 634

Note - compiled based on sources [18,21,22]

The figures are based on the author's calculations using BNS Tables 5.2 and 5.3[18,21]. At the national level, the number of internal arrivals equals the number of internal departures because each interregional move is recorded once in the region of origin and once in the region of destination.

Regional trajectories: concentration and loss

In each year, only three regions showed positive internal youth migration: Astana, Almaty city and Shymkent. The total internal migrations for these regions were +105,590, +104,701 and +17,271 people, respectively. The corresponding average annual internal migration rates were 48.94, 30.75 and 9.29 per 1,000 young residents. None of the other regions had a positive five-year internal balance; Mangystau was the closest with a figure of -633.

The highest total domestic losses occurred in Turkistan (-66,095), followed by Zhambyl (-29,791), Zhetysu (-21,508), Kyzylorda (-17,525), and Abai (-16,758). These losses cannot be regarded as simply northern or industrial in character. There is a metropolitan core alongside a wide donor area covering a variety of different economic profiles.

External migration follows a different pattern when it comes to geographical distribution. Mangystau had the largest cumulative external surplus among the regions outside the major cities (+7,826), then came the Almaty Region (+3,755), followed by Turkistan (+1,293), Atyrau (+1,018) and Zhetysu (+103). In several of these regions, more young people were lost to other parts of Kazakhstan than were gained through international migration.

Table 3 – Regional youth migration trajectories, 2020–2024

Region	Cumulative external net migration, persons	Cumulative internal net migration, persons	Combined net migration, persons	Average annual external net migration rate, per 1,000 youth	Average annual internal net migration rate, per 1,000 youth
Abai	-1 081	-16 758	-17 839	-1.29	-20.82
Akmola	-1 460	-8 678	-10 138	-1.38	-8.23
Aktobe	-350	-4 480	-4 830	-0.25	-3.34
Almaty region	+3 755	-10 895	-7 140	+1.74	-5.30
Atyrau	+1 018	-5 181	-4 163	+0.99	-5.03
West Kazakhstan	-97	-5 514	-5 611	-0.09	-5.84
Zhambyl	-851	-29 791	-30 642	-0.50	-17.05
Zhetysu	+103	-21 508	-21 405	+0.11	-22.95
Karaganda	-3 003	-7 870	-10 873	-1.85	-5.00
Kostanay	-1 504	-8 735	-10 239	-1.18	-7.70
Kyzylorda	-8	-17 525	-17 533	-0.01	-14.24
Mangystau	+7 826	-633	+7 193	+6.81	-0.48
Pavlodar	-1 981	-6 809	-8 790	-1.93	-6.95
North Kazakhstan	-2 208	-8 194	-10 402	-3.18	-12.08
Turkistan	+1 293	-66 095	-64 802	+0.40	-20.34
Ulytau	-259	-4 886	-5 145	-0.80	-15.67
East Kazakhstan	-2 754	-4 010	-6 764	-2.96	-4.50
Astana	+2 596	+105 590	+108 186	+1.11	+48.94
Almaty city	+5 978	+104 701	+110 679	+1.72	+30.75
Shymkent	+1 445	+17 271	+18 716	+0.77	+9.29

Note - compiled based on sources [18,21,22]

The rates refer to annual net migration per 1,000 average annual residents between the ages of 14 and 34; the table gives the average of the five annual rates.

Metropolitan gateways and higher-education concentration

The cities of Almaty, Astana and Shymkent meet the gateway criterion. In each of the five years in question, they had a positive internal youth balance, and all three of them were in the top group when it came to higher-education concentration. In the 2024/2025 period, Almaty had 197,400 students, Astana 84,406 and Shymkent 80,762. Taken together, they amounted to 362,568 out of the 600,915 students included in the regional table, which is 60.3%.

Compared with the average number of young people in 2024, Almaty had 280.40 higher-education students per 1,000 young residents, Shymkent 205.81 and Astana 180.10; the median figure for the 20 regions was 67.97. Since both conditions of

the operational gateway rule are met, all three cities satisfy it—that is, they have sustained positive internal migration and a level of educational concentration above the median.

The annual external balance shows that gateway status cannot be determined solely on the basis of international migration. Astana had an external deficit in both 2020 and 2021, and Almaty had small deficits in those same years. Yet in each case, a large number of people still moved in through internal migration. In 2024, Astana's internal net gain was +31,139, and Almaty's was +21,360; their external balances were +1,607 and +2,640, respectively. It is domestic connectivity that determines the classification.

Regional nodes, transitional positions and peripheries

Mangystau is the only non-metropolitan region which has both a positive cumulative external balance (+7,826) and a positive combined balance (+7,193); its five-year internal balance was nearly in equilibrium at –633, and therefore it falls into the regional-node category.

The area comprising Atyrau, the Almaty Region, Turkistan and Zhetysu has a different arrangement. Although each of these areas has a positive cumulative external balance, they each have an internal balance which is negative enough to result in an overall deficit. It is more appropriate to term them as domestic donors that are externally connected. Turkistan is the most evident example: it has a positive international balance of +1,293 and a negative internal balance of –66,095. Thus, a positive international balance can still go along with considerable regional loss of human capital.

The following twelve regions are included in the dual-loss periphery: Abai, Akmola, Aktobe, West Kazakhstan, Zhambyl, Karaganda, Kostanay, Kyzylorda, Pavlodar, North Kazakhstan, Ulytau and East Kazakhstan. The idea that Karaganda, East Kazakhstan, Pavlodar, Kostanay, North Kazakhstan and Akmola are part of the peripheral group is still valid.

It is especially important that internal losses persist. In all five years, Karaganda, East Kazakhstan, Pavlodar, Kostanay, North Kazakhstan and Akmola regions all had negative internal balances, and their cumulative external balances were as well, varying from –1,460 in the case of Akmola to –3,003 in Karaganda. This double deficit provides stronger evidence of peripheral status than external migration indicators alone.

Table 4 – Regional classification based on operational criteria

Regional type	Operational criterion	Regions
Metropolitan gateway	Positive internal net in all 5 years + 2024/25 student-to-youth ratio above regional median	Almaty city; Astana; Shymkent
Regional node	Positive cumulative external net + positive cumulative combined net does not meet the gateway rule.	Mangystau
Transitional / externally connected domestic donor	Positive cumulative external net + negative cumulative internal and combined net	Almaty Region; Atyrau; Turkistan; Zhetysu

Intellectual periphery	Negative cumulative internal net + negative cumulative external net	Abai; Akmola; Aktobe; West Kazakhstan; Zhambyl; Karaganda; Kostanay; Kyzylorda; Pavlodar; North Kazakhstan; Ulytau; East Kazakhstan
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Note - compiled based on sources [18,22]

The 2024/2025 median figure for the number of students per 1,000 young residents is 67.97. The regional median is used as a distribution-based threshold because no theoretically established absolute cut-off exists for higher-education concentration.

Discussion

The regional series reveals substantial spatial asymmetry, but the dominant mechanism is redistribution between regions rather than a uniform international outflow. Migration within the country is one order of magnitude greater than external migration, and the net gains within the country are almost entirely concentrated in Almaty, Astana and Shymkent.

This pattern is in agreement with previous studies concerning the attraction of Kazakhstan's largest cities [10], although it provides a more exact description of the regional aspect of that attraction. Almaty, Astana and Shymkent combine sustained positive internal net migration with the highest concentration of higher-education students; it is therefore more accurate to describe their position in terms of the intellectual-gateway concept than merely on the basis of external balance, since these three cities transmit large volumes of youth mobility and concentrate the institutions through which educational and occupational mobility is organised [8,9,26].

The internal–external divergence also changes how we interpret brain drain. For a region such as Turkistan, the main demographic loss during 2020–2024 did not occur through international migration. Its cumulative external youth balance was positive, while its domestic balance was strongly negative. From the regional perspective, the movement resembles brain drain; from the national perspective, it is internal circulation toward other centres. The Mangystau region displays a different pattern: it has a large external surplus and experiences nearly balanced internal migration, setting it apart from the other non-metropolitan areas. This is in line with the kind of attraction usually found in a labour market that is intensive in resources, even though the region has a much lower concentration of higher education than the metropolitan gateways. Here, having node status means occupying a favourable position with regard to mobility, without implying the educational or network centrality that is seen in the three largest cities.

The industrial areas of the north and east are still at risk: in the five-year period, these regions recorded cumulative youth losses through both internal and international migration. This outcome is in line with research which has linked regional migration to unequal economic opportunities and to socio-territorial risks [1,2,11], and it indicates that the mere presence of a university is not enough to ensure youth retention. Although Karaganda had one of the highest student-to-youth ratios outside the three major cities, its internal youth balance was still negative during the whole period.

The regional education systems are able to generate human capital, which is then taken up elsewhere. The fact that there is a large university sector together with

continued out-migration suggests the presence of an education-to-retention gap. Higher education might draw in students on a temporary basis without leading to local career paths after they graduate. In order to test this hypothesis, it would be necessary to have linked data on admissions, graduation, first employment and later residence. The published BNS tables do not include such linked data; student concentration is therefore employed merely as background evidence of the area's intellectual infrastructure and is not regarded as a feature of individual migrants. The administrative reform is just as important when it comes to interpretation. If South Kazakhstan and Turkistan were treated as separate regions between 2020 and 2024, then an area which had been renamed in 2018 would be duplicated [23]. Moreover, making a comparison between the areas of East Kazakhstan, the Almaty Region, or Karaganda before 2022 and their boundaries after the reform would also result in discontinuities since Abai, Zhetysu, and Ulytau had been established [23].

By using the retrospective BNS series, all the observations are placed on the same geographical basis, eliminating a kind of apparent change that is due to administrative adjustments rather than to demographic factors. A separate qualification is needed for specialist statistics. The BNS series on external migration by speciality is useful for illustrating the overall skill structure of migration, but it includes only people aged 15 and above. It cannot be stated that the technical, medical or pedagogical balances apply specifically to young people; these figures are excluded from the calculations for young people. The empirical analysis is therefore restricted to the directly observed mobility of young people by age and region, while intellectual migration is therefore used as an analytical framework for interpreting the regional mobility system. The policy priorities vary depending on regional position; thus, in the three gateways, they should involve absorption capacity, graduate retention, housing, and the transition from study to employment. In Mangystau and in the transitional external-attraction regions, the main issue is whether international gains result in sustainable domestic retention. In the dual-loss peripheries, monitoring should focus on graduate retention, youth employment, regional wage differentials and access to specialised career paths.

The nodes–gateways–peripheries model is supported by the 2020–2024 regional panel for Kazakhstan. The most prominent finding is the gateway status held by Almaty, Astana and Shymkent, which were the only areas to show positive internal youth migration over the five-year period and together made up 60.3 per cent of the higher-education students according to the 2024/2025 regional data. For the metropolitan gateways, policy monitoring should focus on graduate retention, housing affordability, youth employment and the transition from study to employment. The regional-node hypothesis is only partially supported.

The regional-node hypothesis is only partially supported. Mangystau is the only non-metropolitan region to have achieved a positive cumulative external and combined youth migration. Atyrau, the Almaty Region, Turkistan and Zhetysu all have positive external balances but still act as domestic donors, which places them in a position between a node and a periphery rather than firmly within either of the two ideal types. For these regions the relevant indicators are the internal retention rate, duration of residence, youth employment and the conversion of international inflows into sustained regional population gains.

The data also support the peripheral pattern in the case of the industrial region, since the northern areas of Karaganda, East Kazakhstan, Pavlodar, Kostanay, North Kazakhstan and Akmola experienced cumulative losses in both internal and external migration. Moreover, the data show that the peripheral pattern can be applied to other

regions as well, indicating that youth loss is not limited to just one economic macro-region. The relevant indicators would be graduate retention, youth employment, wage differentials and access to specialised occupations. Twelve regions recorded cumulative losses in both internal and external youth migration, indicating that youth depletion spans several economic and territorial profiles.

The main implication is that regional brain drain in Kazakhstan is driven primarily by internal spatial redistribution. Although international youth migration is important, it is too small in scale and too unevenly distributed to account for the regional hierarchy by itself; a region may gain people through immigration even though it loses a greater number of young residents domestically, and a metropolitan area may have a temporary deficit of international migrants while still retaining the country's leading attractor of young people.

The term 'youth intellectual migration' should therefore be employed with clearly defined measurement limits. The current data show regional mobility of young people within an intellectual-capital system; they do not directly specify the occupation or field of study of each young migrant. A definite test would need an official cross-tabulation or microdata that links age, education or speciality, place of origin, destination and type of migration. Nevertheless, the data and framework available provide a reproducible basis for examining how youth mobility contributes to the concentration and depletion of human capital in the various regions of Kazakhstan.

Conclusion

This study shows that the regional redistribution of youth human capital in Kazakhstan is driven primarily by internal rather than international migration. During 2020–2024, Astana, Almaty and Shymkent were the only territories to maintain positive internal youth migration balances in every year, while together accounting for 60.3% of higher-education students in the regional dataset in 2024/2025. Their position is therefore best understood as that of metropolitan gateways combining sustained domestic attraction with a high concentration of educational infrastructure.

The regional-node hypothesis is only partially supported. Mangystau is the only non-metropolitan region with both a positive cumulative external migration balance and a positive combined youth migration balance. Atyrau, Almaty Region, Turkistan and Zhetysu recorded positive external balances but remained net donors within Kazakhstan and are therefore better described as externally connected domestic donors. At the same time, twelve regions experienced cumulative losses through both internal and external migration, with Karaganda, East Kazakhstan, Pavlodar, Kostanay, North Kazakhstan and Akmola forming the clearest group of intellectual peripheries. These findings demonstrate that a positive international migration balance does not necessarily imply regional retention of young human capital.

The main contribution of the study is to show that the nodes–gateways–peripheries framework becomes more informative when internal and international migration are analysed separately and combined with indicators of higher-education concentration. Different regional policies are needed: metropolitan gateways should focus on retaining graduates, housing, and transition to work; donor regions must monitor if international inflows lead to local retention; and peripheries should address youth employment, wages, graduate retention, and career access. Current official data only record regional youth mobility without details on migrants' education or occupation. To better measure young people's intellectual migration, linked data on age, education, origin, destination, and migration type are needed.

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