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Assessing the Spread Effects of Economic Growth Centres in Reducing Disparities in Regional Economic Development

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Abstract: The article examined growth centres' influence on surrounding territories and opportunities to reduce regional disparities. Growth pole theory, cumulative development and new economic geography were compared. An assessment framework covered investment distribution, district urbanisation, secondary centres and household incomes. Published nighttime light estimates, foreign investment figures and regional income data were synthesised. The ratio of national growth to leading centre growth was calculated as 0.79. Regional centres' economic activity and investment distribution across several territories were highlighted. Persistent income disparities informed proposals for transport connectivity, local production chains and regional monitoring. Findings were interpreted in terms of supporting polycentric development.

Keywords: growth centres, spread effects, regional disparities, polycentric development, nighttime lights, investment distribution, household incomes.

1. Introduction

The spatial concentration of economic activity is one of the most persistent regularities of modern development. Firms, skilled labour and financial resources tend to cluster in a limited number of locations where market access, specialised suppliers and knowledge externalities are abundant. F. Perroux, who introduced the notion of the growth pole, described economic space not as a geographical container but as a field of forces in which propulsive industries transmit impulses to the units connected with them [1]. In this interpretation, a growth centre is a node that generates expansion not only for itself but also for the territory linked to it through input-output relationships, income flows and the diffusion of innovations.

Whether the benefits of concentration eventually reach the periphery has been debated since the late 1950s. G. Myrdal argued that the operation of market forces tends to reinforce the initial advantages of leading areas through a process of cumulative causation; the outflow of capital and labour from lagging areas, which he termed backwash effects, could outweigh the spread effects that stimulate the periphery through demand for its products and the dissemination of technology [2]. A. O. Hirschman offered a more optimistic reading: in his view, the polarisation stage is followed by a trickling-down stage in which the complementarity between advanced and lagging regions and deliberate public investment ensure that growth is transmitted outward [3]. J.-R. Boudeville translated these ideas into the language of regional planning, distinguishing

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polarised, homogeneous and planning regions and linking the growth pole to a concrete urban hierarchy [4].

The theoretical question therefore concerns the balance between two opposing forces rather than the existence of either. H. W. Richardson formalised this balance, demonstrating that net positive spillovers around a newly established pole appear only after a considerable time lag and that spread and backwash are distributed asymmetrically across space [5]. This insight shifts the focus of policy evaluation from the growth rate of the centre itself to the measurable transmission of growth into surrounding territories. An assessment framework must accordingly capture investment diffusion, income linkages, urbanisation of the hinterland and the performance of secondary cities.

Uzbekistan offers an instructive setting for such an assessment. The national development agenda formulated in the Uzbekistan - 2030 Strategy places sustainable economic growth and the improvement of living standards across all territories among its central priorities [6]. Over recent years, the capital city has consolidated its role as the leading growth centre, while regional cities have increasingly emerged as secondary centres of industrial, logistic and service activity. The aim of this article is to develop a theoretical framework for assessing the spread effects of growth centres and to apply it to verified official indicators in order to identify the channels through which growth is transmitted to the regions and the measures that can strengthen them.

The practical relevance of the spread-effect concept has increased with the growing availability of spatially detailed data. Earlier assessments were constrained by the scarcity of subnational statistics, which forced researchers to rely on regional aggregates that concealed the internal structure of growth. The combination of official regional accounts with satellite-based indicators now allows the transmission of growth to be traced at the level of individual cities and districts. This methodological shift makes it possible to move from a general debate about whether growth centres benefit the periphery to a concrete evaluation of the channels through which such benefits materialise and of the instruments that can reinforce them.

The classical literature on growth poles established the conceptual vocabulary of the field but left open the question of measurement. J. B. Parr, reviewing several decades of growth-pole strategies, concluded that many early programmes underperformed because they expected rapid spillovers, ignored the time dimension emphasised by Richardson, and selected poles without regard to the existing urban hierarchy [7]. His retrospective assessment nevertheless confirmed that strategies grounded in realistic time horizons and supported by transport and institutional linkages produced durable regional benefits. N. Kaldor supplemented this discussion with the argument that regional growth is driven by the expansion of the export base and by dynamic economies of scale, which implies that a secondary centre must develop its own tradable specialisation in order to absorb impulses from the leading pole.

The new economic geography reformulated the same problem in general-equilibrium terms. P. Krugman showed that the interaction of increasing returns, transport costs and labour mobility can produce a core-periphery pattern even between initially identical regions, and that small changes in trade costs can shift the economy between concentrated and dispersed equilibria [8]. M. Fujita, P. Krugman and A. J. Venables extended this approach to urban systems, explaining how new cities emerge at a certain distance from established centres once the population and market size of the hinterland reach a critical threshold [9]. The implication for the present study is direct: the emergence and growth of secondary cities can be interpreted as the spatial expression of spread effects operating through market access.

Empirical research on regional convergence provides the quantitative background. J. G. Williamson documented an inverted-U relationship between the level of national development and regional inequality, suggesting that disparities widen at early stages of growth and narrow as integration deepens [10]. R. Barro and X. Sala-i-Martin confirmed

conditional convergence across regions of developed economies, with lagging regions growing faster once differences in structural characteristics were taken into account [11]. G. Duranton and D. Puga systematised the micro-foundations of agglomeration, identifying sharing, matching and learning as the mechanisms that make cities productive and that, when reproduced in secondary centres, enable them to generate growth of their own.

An important extension of the growth-pole approach concerns the hierarchy of centres. In a national urban system, impulses originating in the primary centre are transmitted not directly to every rural locality but through intermediate nodes: regional capitals, industrial towns and district centres. Each level of the hierarchy performs a filtering function, receiving innovations, investment and demand from above and redistributing them to its own hinterland. The effectiveness of the spread effect therefore depends on the density and capacity of intermediate centres; where such centres are weak, the periphery remains isolated even when the primary pole grows rapidly [12]. This hierarchical perspective underpins the attention paid in the present article to secondary cities.

More recent studies have examined the spatial reach of large cities directly. M. D. Partridge, D. S. Rickman, K. Ali and M. R. Olfert analysed population dynamics across the urban hierarchy and found that proximity to larger urban centres benefited surrounding areas, with little evidence of the agglomeration shadows predicted by some theoretical models [13]. Their results support the view that, under conditions of good connectivity, spread effects dominate over backwash in the hinterland of major cities. P. Martin demonstrated, within a model of growth and geography, that public policies which reduce the cost of transactions between regions, rather than those which simply relocate firms, can simultaneously promote aggregate growth and reduce regional inequality [14].

Methodological progress in measuring subnational activity has opened new opportunities for evaluating spread effects. J. V. Henderson, A. Storeygard and D. N. Weil showed that satellite observations of nighttime lights provide a reliable proxy for economic activity at fine spatial scales, particularly where official subnational statistics are limited [15]. The OECD, in its study of how regions grow, emphasised that growth potential is distributed across regions of all types and that lagging regions contribute substantially to aggregate performance when their assets are mobilised [16]. The World Bank's report on economic geography concluded that concentration of production and convergence of living standards can proceed together if policy combines spatially blind institutions, connective infrastructure and targeted interventions. A. Rodríguez-Pose added that development strategies should recognise the potential of places outside the main agglomerations, since their participation in growth strengthens both economic efficiency and social cohesion.

The evidence on agglomeration economies also clarifies why secondary centres can grow faster than the primary centre at certain stages. As the leading city expands, congestion, land prices and wage levels rise, which encourages firms in standardised activities to relocate to smaller cities that offer lower costs while remaining connected to the core market [17]. This relocation constitutes one of the most important mechanisms of the spread effect: it transfers productive capacity to the periphery without reducing the overall efficiency of the national economy. The capital, in turn, specialises in higher-value services, finance and innovation, strengthening the complementarity between levels of the urban hierarchy.

The literature thus converges on three propositions. First, spread effects are real but lagged and spatially uneven. Second, their strength depends on the density of linkages between the centre and the hinterland and on the capacity of secondary centres to absorb impulses. Third, modern data sources, including nighttime lights, permit the observation of these processes at the level of cities and districts. What remains insufficiently developed,

particularly for the economies of Central Asia, is an integrated framework that links these propositions to observable indicators; the present article addresses this gap.

2. Materials and Methods

The study adopts a theoretical-applied design that combines conceptual modelling with the interpretation of verified official indicators. At the conceptual level, the historical-logical method and comparative analysis were used to synthesise the growth-pole, cumulative-causation and new-economic-geography approaches into a single assessment framework. The framework distinguishes four transmission channels through which a growth centre influences its hinterland: investment diffusion, the urbanisation of surrounding districts, the development of secondary centres, and income linkages.

The four channels are interpreted as follows. Investment diffusion refers to the extent to which capital formation is distributed beyond the leading centre. Urbanisation of districts captures the transition of rural territories towards a denser pattern of economic activity. The development of secondary centres reflects the capacity of regional cities to generate growth autonomously. Income linkages represent the translation of production growth into household welfare across regions. The channels are complementary: investment diffusion creates the preconditions for urbanisation, urbanisation strengthens secondary centres, and the growth of secondary centres raises incomes in their hinterlands.

The empirical component relies on four groups of sources, each accessible through a verifiable link. The first group comprises the results of the nighttime-lights assessment of regional economic activity carried out by the Center for Economic Research and Reforms for 2020-2024 [18]. The second group includes data of the Statistics Agency on foreign investment and credits utilised in fixed capital by region in 2024 [19]. The third group consists of indicators of per capita household income by region and the fourth covers official releases on the gross domestic and gross regional product [20]. No estimates beyond those published in these sources were introduced; all derived values were calculated directly from the published figures.

To measure the degree of investment diffusion, the regional share of investment was calculated as follows:

$$S_r = (I_r / I) \times 100\% \quad (1)$$

where S_r is the share of region r in the total volume of foreign investment and credits utilised in fixed capital, I_r is the volume utilised in region r , and I is the national total. A low share of the capital city combined with high shares of other regions indicates that investment activity is dispersed rather than concentrated in the leading centre, which constitutes direct evidence of the investment-diffusion channel of the spread effect.

To compare the dynamics of the national economy with those of the leading centre, a diffusion ratio was applied:

$$D = \frac{g_n}{g^*} \quad (2)$$

where g_n is the cumulative growth of per capita gross regional product for the country as a whole and g^* is the corresponding growth of the leading centre over the same period. A ratio close to one indicates that national growth keeps pace with that of the centre, meaning that expansion is not confined to the core; a ratio substantially below one would signal that growth remains concentrated. Because the national aggregate includes the centre itself, the ratio serves as a conservative indicator: the closer it approaches unity, the stronger the evidence that the periphery participates in growth.

The analysis is subject to certain limitations. Nighttime-light estimates, while closely correlated with official statistics, may underrepresent activities with low light intensity, such as agriculture, and overrepresent energy-intensive industries. The regional investment data refer to foreign investment and credits rather than to total fixed capital investment. These limitations do not affect the qualitative conclusions, since the indicators

were used to identify the direction and structure of processes rather than to estimate precise causal effects; they do, however, define the agenda for further research.

3. Result and Discussion

The nighttime-lights assessment conducted by the Center for Economic Research and Reforms provides the most detailed picture of how economic activity has evolved across the territory. According to its results, per capita gross regional product in Uzbekistan increased by 63.5% between 2020 and 2024, from 2,011 to 3,287 US dollars, a result close to the 59.4% growth recorded by official statistics. In Tashkent city, the leading centre, the indicator rose by 3.2 thousand dollars to reach 7.2 thousand dollars [21]. Table 1 presents the per capita estimates for the cities that stood out in 2024.

Table 1. Per capita gross regional product of leading and secondary cities in 2024 according to nighttime-lights estimates, thousand US dollars

City	Per capita GRP	Position in the urban hierarchy
Navoi	8.3	Industrial regional centre
Zarafshan	6.8	Mining and industrial town
Samarkand	5.7	Regional centre
Kokand	5.6	Historical secondary city
Andijan	5.1	Regional centre
Yangiyul	5.0	Satellite town of the capital
Karshi	4.8	Regional centre
Termez	4.5	Regional centre
Urgench, Margilan, Kattakurgan	4.3 each	Regional centre and secondary cities
Chirchik	4.0	Satellite industrial town of the capital

Table 1 reveals a feature of fundamental importance for the theory of spread effects: several regional cities and towns reached per capita output levels comparable to, and in one case exceeding, that of the capital. Navoi, with 8.3 thousand dollars, exceeded the 7.2 thousand dollars recorded for Tashkent city as a whole, which reflects the concentration of large industrial enterprises in this regional centre. Samarkand, Kokand and Andijan formed a group of secondary centres with 5.1-5.7 thousand dollars, while satellite towns of the capital, namely Yangiyul and Chirchik, recorded 5.0 and 4.0 thousand dollars respectively. The presence of satellite towns in the list is consistent with the hypothesis of Partridge and co-authors that proximity to a large centre supports the development of neighbouring places [22]. The overall picture corresponds to a polycentric structure in which growth is generated by a network of nodes rather than by a single pole.

The spatial transmission of growth is also visible at the district level. The same assessment estimated the degree of urbanisation of districts using nighttime-light intensity. Table 2 summarises the indicators that describe the transformation of the settlement structure between 2020 and 2024.

Table 2. Indicators of the spatial diffusion of economic activity in Uzbekistan, 2020-2024

Indicator	2020	2024	Change
Per capita GRP, nighttime-lights estimate, USD	2,011	3,287	+63.5%
Per capita GRP of Tashkent city, thousand USD	4.0*	7.2	+3.2
Districts with nighttime-light intensity typical of urban agglomerations (index above 10)	21	26	+5
Rural districts with low light intensity	129	102	-27

Indicator	2020	2024	Change
Districts showing transition to an urban type of development	-	27	-

The data in Table 2 point to a structural shift in the settlement system. The number of districts whose light intensity corresponds to urban agglomerations increased from 21 to 26, while the number of rural districts with low light intensity decreased from 129 to 102. Consequently, 27 districts moved towards an urban type of development within five years. In terms of the framework adopted here, this is evidence of the urbanisation channel of the spread effect: economic activity, infrastructure and services expanded beyond the established urban cores into districts that previously belonged to the rural periphery. According to the theory of Fujita, Krugman and Venables, such a transition represents the formation of new nodes of the urban system under the influence of growing market potential.

Applying formula (2) to the data in Table 2 gives a quantitative indication of how broadly growth was shared. The cumulative growth of the leading centre, calculated from the reported values, amounted to 80.0% (from 4.0 to 7.2 thousand dollars), while national growth was 63.5%. The diffusion ratio is therefore $D = 63.5 / 80.0 \approx 0.79$. This means that the national economy expanded at approximately four-fifths of the pace of the leading centre, even though the aggregate includes regions with a considerably lower initial base. The value indicates that growth was not confined to the core and that the periphery participated substantially in the expansion of output, which is consistent with the second phase of Hirschman's model, in which polarisation gives way to the transmission of growth [23].

The regional dimension of the urbanisation channel deserves particular attention. The same assessment recorded a notable increase in economic activity in Navoi and Namangan regions, as well as in Fergana and Samarkand regions, and identified small and medium-sized cities such as Zarafshan, Karshi, Chirchik, Margilan and Termez as places of high economic activity [24]. The geographical dispersion of these localities, which span the western, southern and eastern parts of the country and the Fergana Valley, indicates that the diffusion of activity is not limited to the capital's surroundings but extends across the entire territory.

The investment-diffusion channel was assessed on the basis of the regional distribution of foreign investment and credits utilised in fixed capital. In 2024, Uzbekistan utilised 34.9 billion US dollars of foreign investment and credits, of which 26.4 billion dollars, or 333.8 trillion soums, were directed to fixed capital. Table 3 presents the regions with the largest volumes and the shares calculated using formula (1).

Table 3. Regions with the largest volumes of foreign investment and credits utilised in fixed capital in 2024

Region	Trillion soums	Billion USD	Share S_r , %
Tashkent region	over 50.0	3.8	15.0
Namangan region	about 44.0	3.4	13.2
Bukhara region	40.4	3.2	12.1
Tashkent city	40.1	3.1	12.0
Navoi region	27.6	2.1	8.3
Total for Uzbekistan	333.8	26.4	100.0

Table 3 shows that the leading centre did not dominate the geography of foreign investment. Tashkent city, with a share of 12.0%, ranked only fourth, behind Tashkent region (15.0%), Namangan region (13.2%) and Bukhara region (12.1%). The top five regions together accounted for about three-fifths of the total, with the remaining two-fifths distributed among the other regions. The high position of Namangan region, a territory with a large population and a traditionally agrarian profile, is of particular analytical significance: it demonstrates that investment is flowing to regions where labour resources

and market potential are concentrated, not only to the administrative core. In the terminology of Myrdal, this is a manifestation of spread effects that counteract the tendency of capital to accumulate in the leading centre. The leading position of Tashkent region, which surrounds the capital, confirms the complementary mechanism described by Partridge and co-authors, whereby the hinterland of a large city attracts activity that benefits from proximity to it.

Official data on gross regional product corroborate the dynamism of secondary centres. According to preliminary estimates, the gross regional product of Samarkand region reached 99,866.1 billion soums in 2024 and increased by 6.9% compared with 2023 while that of Bukhara region amounted to 71,560.4 billion soums [25]. At the national level, following the revision of national accounts, the nominal GDP for 2024 was estimated at 121.4 billion dollars, and per capita GDP at 41.3 million soums. Regional centres therefore act as substantial economic units whose output is comparable in scale to that of entire national economies of smaller countries, which gives them the capacity to function as growth poles for their own hinterlands.

The income channel reflects how the expansion of production translates into the welfare of households. In 2024, per capita nominal household income increased in all regions; the highest real growth was recorded in Tashkent city (15.4%), Navoi region (7.9%) and Tashkent region (6.4%). The fact that two of the three leaders in income growth are regions with a strong industrial base or located around the capital is consistent with the pattern observed in Tables 1-3. At the same time, the ratio between the three highest-income and the three lowest-income regions increased from 2.3 to 2.4 during the year. According to Richardson's model, such dynamics are typical of the stage at which spread effects have already begun but have not yet fully offset the advantages of the leading nodes; the income channel therefore represents the principal reserve for further equalisation.

A comparison of Tables 1 and 3 reveals a coherent spatial logic. The regions that attract substantial foreign investment, notably Navoi, Bukhara and Tashkent regions, also contain the cities with the highest per capita output, which confirms that investment and the development of secondary centres reinforce each other. At the same time, the strong position of Namangan region in investment flows suggests a new stage in which capital is directed to regions with abundant labour resources whose cities have not yet reached the top of the output ranking. According to Hirschman's reasoning, such investment is a precondition for the subsequent strengthening of the region's own growth centres.

Summarising the results, a conceptual model of the spread effect of growth centres was developed (Figure 1). The model integrates the four channels identified in the methodology and links them to the policy instruments that can strengthen each channel.

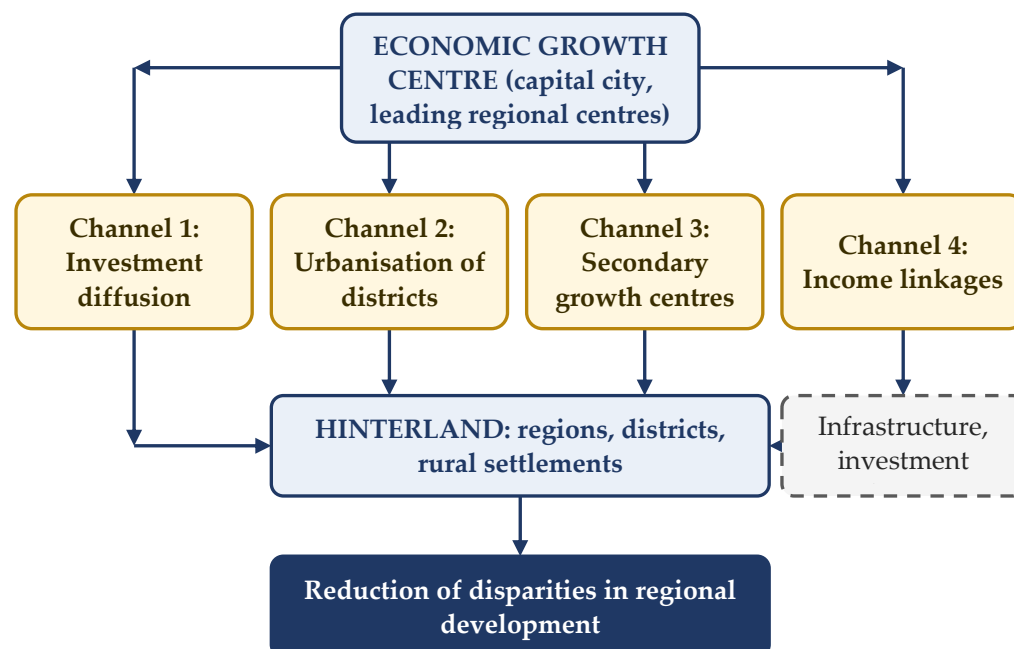


Figure 1. Conceptual model of the spread effect of an economic growth centre

Figure 1 represents the growth centre as the source of impulses transmitted through four channels. The investment-diffusion channel is reflected in the dispersed regional structure of foreign investment (Table 3); the urbanisation channel manifests itself in the transition of 27 districts to an urban type of development (Table 2); the secondary-centre channel is visible in the high output of regional cities (Table 1); and the income channel is expressed in household income growth across all regions. The four channels converge on the hinterland, whose development leads to a reduction of regional disparities. Connective infrastructure, the investment climate and local institutional capacity are shown as enabling conditions that amplify spread and weaken backwash. The model thus operationalises the theoretical debate between Myrdal and Hirschman: the balance of spread and backwash is not predetermined but depends on the strength of the transmission channels, which can be deliberately reinforced.

The results are consistent with international evidence. The OECD found that regions outside the main metropolitan areas account for a substantial part of aggregate growth when their assets are mobilised and Martin showed that policies reducing interregional transaction costs promote both growth and cohesion. The Uzbek case demonstrates that these conditions are being formed: the capital retains its role as the leading centre, while regional centres, satellite towns and urbanising districts increasingly generate growth of their own. The trajectory corresponds to the downward segment of Williamson's inverted-U curve, which the literature associates with a maturing national economy.

The policy implications of the model can be formulated in terms of the balance between spread and backwash. Backwash effects are strongest when the periphery loses skilled labour and capital to the centre without receiving compensating flows of demand, technology and investment. The observed data indicate that compensating flows are substantial: foreign investment is dispersed, secondary cities are expanding, and a significant number of districts are urbanising. The task of regional policy is therefore not to restrain the growth of the leading centre but to intensify the channels through which its growth is transmitted. Krugman's analysis suggests that reducing transport and transaction costs between centres and their hinterlands is a decisive lever in this respect, since it shifts the economy towards a more dispersed equilibrium.

4. Conclusion

The article developed a theoretical framework for assessing the spread effects of economic growth centres and applied it to verified official indicators for Uzbekistan. The

synthesis of the growth-pole, cumulative-causation and new-economic-geography approaches made it possible to treat the spread effect as the outcome of four measurable transmission channels: investment diffusion, urbanisation of the hinterland, development of secondary centres and income linkages.

The analysis produced the following findings. Per capita gross regional product increased by 63.5% in 2020-2024 according to nighttime-lights estimates, and the diffusion ratio of 0.79 indicates that national growth kept close pace with that of the leading centre. A number of regional cities, including Navoi, Samarkand, Kokand and Andijan, reached high levels of per capita output, forming a polycentric network of secondary centres. Twenty-seven districts moved towards an urban type of development, and the number of low-light rural districts decreased from 129 to 102. Foreign investment in fixed capital in 2024 was distributed across several regions, with Tashkent city accounting for 12.0% of the total and Namangan region ranking second among all regions. Household incomes grew in every region, and the remaining differences in income levels represent a reserve for further equalisation.

On the basis of these findings, the following recommendations are proposed.

1. The polycentric model of development should be consolidated by designating regional centres with the highest output and investment dynamics as secondary growth poles and by aligning infrastructure programmes with their functional hinterlands.
2. Connective infrastructure between secondary centres and surrounding districts, including transport corridors and digital networks, should be prioritised, since reducing interregional transaction costs strengthens spread effects while supporting overall growth.
3. Nighttime-lights indicators should be incorporated into the regular monitoring of regional development at the district level, allowing the early identification of districts in transition and the timely provision of services to them.
4. Investment promotion in regions with large labour resources should be complemented by vocational training and business support programmes that increase the local share of value added generated by new enterprises.
5. Income-linkage programmes connecting small producers in rural districts with the supply chains of enterprises located in secondary centres should be expanded, thereby strengthening the income channel of the spread effect.

The implementation of these measures corresponds fully to the objectives of the Uzbekistan - 2030 Strategy concerning sustainable growth and improvement of living standards in all territories [20]. Further research may focus on estimating the spatial range of spread effects around individual secondary centres using district-level nighttime-lights series and spatial econometric methods.

The findings also contribute to the theoretical discussion. They support the view, shared by Hirschman and Richardson, that spread effects become dominant over time when the economy reaches a certain level of integration, and they illustrate how modern data sources make it possible to observe this transition in practice. For economies of Central Asia, the proposed four-channel framework provides a transparent and reproducible tool for monitoring the spatial dimension of growth and for aligning regional policy with the objectives of balanced development.

REFERENCES

- [1] R. J. Barro and X. Sala-i-Martin, "Convergence," *Journal of Political Economy*, vol. 100, no. 2, pp. 223–251, 1992, doi: 10.1086/261816.
- [2] J.-R. Boudeville, *Problems of Regional Economic Planning*. Edinburgh, U.K.: Edinburgh University Press, 1966. [Online]. Available: [Internet Archive](https://www.internetarchive.org/)

- [3] G. Duranton and D. Puga, "Micro-foundations of urban agglomeration economies," in *Handbook of Regional and Urban Economics*, vol. 4, J. V. Henderson and J.-F. Thisse, Eds. Amsterdam, The Netherlands: Elsevier, 2004, pp. 2063–2117, doi: 10.1016/S1574-0080(04)80005-1.
- [4] M. Fujita, P. Krugman, and A. J. Venables, *The Spatial Economy: Cities, Regions, and International Trade*. Cambridge, MA, USA: MIT Press, 1999, doi: 10.7551/mitpress/6389.001.0001.
- [5] J. V. Henderson, A. Storeygard, and D. N. Weil, "Measuring economic growth from outer space," *American Economic Review*, vol. 102, no. 2, pp. 994–1028, 2012, doi: 10.1257/aer.102.2.994.
- [6] A. O. Hirschman, *The Strategy of Economic Development*. New Haven, CT, USA: Yale University Press, 1958. [Online]. Available: [Internet Archive](#)
- [7] N. Kaldor, "The case for regional policies," *Scottish Journal of Political Economy*, vol. 17, no. 3, pp. 337–348, 1970, doi: 10.1111/j.1467-9485.1970.tb00712.x.
- [8] P. Krugman, "Increasing returns and economic geography," *Journal of Political Economy*, vol. 99, no. 3, pp. 483–499, 1991, doi: 10.1086/261763.
- [9] P. Martin, "Public policies, regional inequalities and growth," *Journal of Public Economics*, vol. 73, no. 1, pp. 85–105, 1999, doi: 10.1016/S0047-2727(98)00110-8.
- [10] G. Myrdal, *Economic Theory and Under-developed Regions*. London, U.K.: Gerald Duckworth, 1957. [Online]. Available: [Internet Archive](#)
- [11] OECD, *How Regions Grow: Trends and Analysis*. Paris, France: OECD Publishing, 2009, doi: 10.1787/9789264039469-en.
- [12] J. B. Parr, "Growth-pole strategies in regional economic planning: A retrospective view. Part 1. Origins and advocacy," *Urban Studies*, vol. 36, no. 7, pp. 1195–1215, 1999, doi: 10.1080/0042098993187.
- [13] M. D. Partridge, D. S. Rickman, K. Ali, and M. R. Olfert, "Do new economic geography agglomeration shadows underlie current population dynamics across the urban hierarchy?" *Papers in Regional Science*, vol. 88, no. 2, pp. 445–467, 2009, doi: 10.1111/j.1435-5957.2008.00211.x.
- [14] F. Perroux, "Economic space: Theory and applications," *The Quarterly Journal of Economics*, vol. 64, no. 1, pp. 89–104, 1950, doi: 10.2307/1881960.
- [15] H. W. Richardson, "Growth pole spillovers: The dynamics of backwash and spread," *Regional Studies*, vol. 10, no. 1, pp. 1–9, 1976, doi: 10.1080/09595237600185011.
- [16] A. Rodríguez-Pose, "The revenge of the places that don't matter (and what to do about it)," *Cambridge Journal of Regions, Economy and Society*, vol. 11, no. 1, pp. 189–209, 2018, doi: 10.1093/cjres/rsx024.
- [17] J. G. Williamson, "Regional inequality and the process of national development: A description of the patterns," *Economic Development and Cultural Change*, vol. 13, no. 4, Part 2, pp. 1–84, 1965, doi: 10.1086/450136.
- [18] World Bank, *World Development Report 2009: Reshaping Economic Geography*. Washington, DC, USA: World Bank, 2009, doi: 10.1596/978-0-8213-7607-2.
- [19] Fergana Agency, "In 2024, Uzbekistan utilised almost \$35 billion of foreign investment and credits," Jan. 22, 2025. [Online]. Available: [Fergana Agency](#)
- [20] President of the Republic of Uzbekistan, "On the Uzbekistan–2030 Strategy," Presidential Decree No. PF-158, Sep. 11, 2023. [Online]. Available: [LexUZ](#)
- [21] Samarkand Regional Department of Statistics, "Gross regional product of Samarkand region for 2024," Jan. 29, 2025. [Online]. Available: [Samarkand Regional Statistics Department](#)
- [22] Gazeta.uz, "Real household incomes grew in 2024, but the gap between regions increased," Feb. 5, 2025. [Online]. Available: [Gazeta.uz](#)
- [23] Kun.uz, "After revision, Uzbekistan's GDP for 2024 exceeded \$121 billion," Nov. 17, 2025. [Online]. Available: [Kun.uz](#)
- [24] Spot.uz, "Tashkent leads: Economic activity in Uzbekistan assessed for the first time on the basis of nighttime lights," Aug. 11, 2025. [Online]. Available: [Spot.uz](#)
- [25] Bukhara Regional Department of Statistics, "Gross regional product of Bukhara region," n.d. [Online]. Available: [Bukhara Regional Statistics Department](#)