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Assessing the Development of the Regional Economy on the Basis of Location Efficiency Indicators of Industrial Enterprises in Bukhara Region

Kudratov Muhammad Rustamovich*¹

1. Basic Doctoral Researcher, Bukhara State Technical University

* Correspondence: mkudratov51@gmail.com

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Abstract: This article assesses the development of the regional economy using location efficiency indicators of industrial enterprises in the Bukhara region. The study examines the territorial distribution, sectoral specialization, concentration level and economic efficiency of industrial production across districts and cities. Location quotient, localization coefficient, per capita industrial output, labour productivity and the share of industrial enterprises in regional value added are used as the main assessment indicators. The analysis identifies territories with high industrial specialization, emerging industrial growth centres and districts where production capacity remains underutilized. Particular attention is paid to the influence of infrastructure, raw-material resources, investment activity, labour potential and access to markets on the spatial efficiency of industrial enterprises. The results demonstrate that the rational location of industrial facilities contributes to employment growth, diversification of the regional economy, efficient use of local resources and reduction of territorial disparities. The article proposes strengthening industrial cooperation, developing specialized clusters, improving transport and engineering infrastructure, and directing investment towards districts with untapped industrial potential. The findings can be used to formulate regional industrial policy and improve the spatial organization of production in the Bukhara region.

Keywords: Regional Economy, Bukhara Region, Industrial Enterprises, Location Efficiency, Location Quotient, Industrial Specialization, Territorial Concentration, Labour Productivity, Regional Development, Industrial Clusters, Investment Activity, Spatial Disparities.

1. Introduction

In the current conditions of increasing interregional competition, the sustainable development of a regional economy largely depends on the rational location, specialization and efficient operation of industrial enterprises. Industrial production contributes to the formation of gross regional product, creation of new jobs, expansion of the regional revenue base, introduction of innovative technologies and more efficient use of local raw materials [1]. Therefore, assessing the territorial location efficiency of industrial enterprises is important for identifying regional growth centres, existing spatial disparities and areas with untapped production potential. The Bukhara region possesses considerable natural resources, labour potential, production experience and transport infrastructure [2]. The regional industrial structure includes fuel and energy production, oil and gas processing, textile and clothing manufacturing, construction materials, food

processing, chemical production and other sectors. However, industrial enterprises and production capacities are not distributed evenly across the districts and cities of the region [3]. While certain territories have become specialized industrial centres, others are characterized by limited production capacity, insufficient investment activity, weak industrial cooperation and the underutilization of local economic resources. These differences directly affect employment, household income, entrepreneurship, infrastructure development and the overall competitiveness of individual territories [4].

Traditional indicators such as industrial output, growth rates and the number of operating enterprises provide essential information about industrial development. Nevertheless, these indicators alone do not fully reveal the role of a particular district or sector in the regional economy [5]. For this reason, it is necessary to apply location efficiency indicators that allow industrial specialization, territorial concentration and comparative advantages to be quantitatively assessed. Indicators such as the location quotient, localization coefficient, per capita industrial output, labour productivity, capital productivity and the contribution of industrial sectors to gross regional value added provide a more comprehensive understanding of the spatial organization and economic efficiency of regional production [6].

Location efficiency analysis makes it possible to compare the share of a particular industrial activity in a district with its corresponding share at the regional level. A value greater than one generally indicates that a territory has a relatively high level of specialization in a particular industrial sector, whereas a value below one reflects a weaker concentration of that activity [7]. However, a high level of localization does not always imply high economic efficiency. Therefore, specialization indicators should be assessed together with production growth, labour productivity, investment intensity, capacity utilization, profitability and employment indicators. Such an integrated approach helps distinguish genuinely competitive industrial centres from territories whose high specialization is caused by dependence on a limited number of large enterprises [8].

The relevance of this study is also determined by the need to reduce disparities between districts and cities within the Bukhara region. Excessive concentration of industrial production in a few territories may increase infrastructure pressure, environmental risks and dependence on specific enterprises or sectors [9]. Conversely, the appropriate placement of new production facilities in districts with sufficient labour, raw materials and logistical potential can support balanced territorial development. The expansion of industrial cooperation, creation of value chains and establishment of specialized clusters can also strengthen economic links between regional territories [10].

The location of industrial enterprises is influenced by a combination of economic, natural, infrastructural and institutional factors. These include proximity to raw materials and consumer markets, transport costs, availability of energy and water resources, labour qualifications, investment conditions, access to finance, digital infrastructure and the quality of public administration [11]. The interaction of these factors determines not only where enterprises are established but also their productivity, competitiveness and ability to generate long-term multiplier effects in the regional economy. Consequently, an assessment based on location efficiency indicators should consider both statistical results and the underlying factors that shape them [12].

The spatial location of industrial enterprises and its influence on regional economic development have long occupied an important place in economic research. The theoretical foundations of industrial location were developed by Weber (1929), who explained the selection of an enterprise's location through the minimization of transportation, labour and agglomeration costs [13]. According to this approach, industrial enterprises tend to locate near raw-material sources, labour markets or final consumers, depending on which factor has the greatest impact on total production costs. Although Weber's model was developed under relatively simple assumptions, it remains important for explaining the territorial

distribution of resource-intensive industries, including fuel and energy, chemical, construction-material and food-processing enterprises [14].

Porter examined industrial concentration from the perspective of competitive advantage and cluster development. According to Porter, the geographical concentration of interconnected enterprises, suppliers, service providers, educational institutions and government organizations encourages innovation and productivity growth. This approach differs from the traditional interpretation of industrial location because it focuses not only on production costs but also on cooperation, competition, technological development and knowledge exchange [15]. OECD studies also show that cluster-based policies can strengthen regional specialization when they are supported by local capabilities, appropriate institutions and effective cooperation among economic actors. Later research demonstrated that the location quotient should not be interpreted in isolation. A high value may result from the operation of only one large enterprise, while the remaining local economy remains weakly diversified. Therefore, location indicators need to be considered together with industrial output growth, employment, labour productivity, investment intensity, enterprise density and value added. OECD regional development studies similarly use localization and specialization indicators to identify competitive industrial activities and potential regional clusters. In particular, evidence from regional development programmes shows that industries with a location quotient above one can be regarded as potential areas of competitive specialization, although their long-term growth prospects must also be assessed.

Glaeser investigated the relationship between industrial concentration, knowledge spillovers and urban growth. Their findings suggest that regional development may be supported by both specialization and economic diversity. Specialized territories benefit from professional skills and industry-specific infrastructure, whereas diversified regions are more resistant to sectoral shocks and may create better conditions for innovation across industries. Henderson also emphasized that agglomeration economies can increase productivity, but their effect depends on city size, industry type, infrastructure and the stage of technological development. These conclusions indicate that the effectiveness of industrial location should be evaluated not only according to the degree of concentration but also according to its contribution to productivity and regional resilience.

Modern studies pay particular attention to the quality of regional institutions, connectivity and innovation capacity. The OECD argues that regions in industrial transition need place-based policies that combine industrial modernization, human-capital development, innovation, entrepreneurship and institutional coordination. Uniform policy measures may produce different results because territories differ in their industrial structure, infrastructure and development potential (OECD, 2023). Therefore, regional industrial policy should be developed on the basis of territorial diagnostics rather than relying exclusively on national averages.

Transport and logistics accessibility are also widely recognized as decisive factors in industrial location. Lower transportation costs expand enterprise market access, facilitate industrial cooperation and improve the movement of raw materials and finished products. The World Bank's research on Uzbekistan emphasizes the importance of integrated transport infrastructure, logistics services and free economic zones for increasing the spatial efficiency of production. At the same time, infrastructure facilities should be connected with broader regional value chains so that their economic benefits extend beyond the enterprises located within special zones. The issue is especially important for Uzbekistan, where regional industrial development is affected by differences in natural resources, population distribution, transport connectivity, energy supply and investment attractiveness. The World Bank's 2025 economic assessment of Uzbekistan highlights the need to improve regional connectivity, modernize railway infrastructure and strengthen links between Bukhara, Navoi, Khorezm, Karakalpakstan and other economically

significant territories. Improved connectivity can reduce spatial transaction costs and support the integration of regional enterprises into domestic and international value chains.

In the case of the Bukhara region, industrial specialization is shaped by the availability of fuel and energy resources, agricultural raw materials, mineral resources, labour potential and historically established production facilities. Oil and gas processing, textile production, food manufacturing, construction materials and other industrial activities have different location requirements. Resource-oriented industries tend to be located close to extraction or raw-material bases, while labour-intensive and consumer-oriented industries benefit from proximity to population centres, transport networks and local markets. Consequently, the efficiency of industrial location across the region cannot be assessed using a single production indicator.

2. Materials and Methods

The study employs statistical, comparative, spatial and economic analysis methods to assess the development of the Bukhara regional economy based on the location efficiency of industrial enterprises. Official statistical data on industrial output, employment, investment, the number of enterprises, and population across the districts and cities of the Bukhara region constitute the empirical basis of the research.

The **location quotient (LQ)** is calculated to determine the industrial specialization of each territory:

$$LQ_{ij} = \frac{E_{ij}/E_j}{E_i/E}$$

where E_{ij} represents industrial employment or output in industry i and territory j ; E_j is total employment or output in territory j ; E_i is the regional value of industry i ; and E denotes total regional employment or output. An $LQ > 1$ indicates relative industrial specialization, while an $LQ < 1$ shows that the activity is underrepresented.

The analysis also uses per capita industrial output, labour productivity, enterprise density, investment intensity and industrial growth rates. Districts and cities are compared and grouped according to their specialization and efficiency levels. The results are interpreted using descriptive statistics, tables and diagrams to identify industrial growth centres, territorial disparities and areas with underutilized production potential.

3. Results and Discussion

In assessing the efficiency of industrial production, the economic literature has traditionally given priority to the sectoral dimension. However, although indicators of labour productivity, return on capital or energy intensity calculated by sector show how a product is produced, they provide no information about where it is produced and how well grounded the choice of location itself is. It is precisely at this point that the location efficiency of industrial enterprises emerges as an independent analytical category.

This distinction may be explained methodologically as follows. Sectoral efficiency is determined by the internal production function of the enterprise and may theoretically take the same value irrespective of the territory in which the enterprise is situated. Location efficiency, by contrast, measures the mutual correspondence between the enterprise and the territory that hosts it: the degree of use of the local raw material base, the provision of labour resources, the possibility of connecting to infrastructure, and the share of the created value that remains within the territory. For this reason, two enterprises with an identical technological level exert entirely different effects on the regional economy when they are located in different districts. Consequently, sectoral indicators are insufficient for

assessing the territorial dimension of industrial policy and must be complemented by dedicated indicators characterising location.

In the present study, a four-element system of indicators was developed to measure the location efficiency of industrial enterprises in Bukhara region. These indicators consecutively cover the viability of industrial activity in a territory, the capacity to implement projects, the productivity of capital, and the employment-generating capacity:

K1 – coefficient of enterprise activity in the territory. It is calculated as the ratio of the number of operating enterprises to the total number of registered enterprises. This coefficient expresses the ability of a territory not merely to attract an industrial enterprise but also to retain it, and it measures the institutional and infrastructural aspect of location quality.

K2 – project commissioning coefficient. It is determined through the ratio of the number of projects launched in industrial zones to the number of projects sited in them. It shows the degree to which a territory is able to convert a project idea into actual production, that is, the practical implementation capacity of the location decision.

K3 – return on capital of location. It is calculated as the ratio of the volume of output produced in industrial zones to the value of the investment directed into the commissioned projects, and expresses the speed at which each sum of capital invested in the territory is converted into output.

K4 – employment-generating capacity of location. It is measured through the ratio of the number of jobs created to 1 billion soums of investment and characterises the social effectiveness of the location decision.

Since these four indicators are expressed in different units of measurement, the min-max normalisation method was applied in order to aggregate them, and an equally weighted location efficiency index (LEI; in the Uzbek original – JSI) was constructed:

$$LEI_i = (1/4) \cdot \sum (K_{ji} - K_j \min) / (K_j \max - K_j \min),$$

where *i* denotes the territory and *j* the ordinal number of the indicator. The index takes values between 0 and 1, and its approach to 1 indicates a comparatively high location efficiency of industrial enterprises in the given territory.

Before proceeding to the location analysis, it is necessary to record the general situation at the regional level. In 2016–2024 the gross regional product of Bukhara region increased from 10,441.7 billion soums to 71,560.4 billion soums, that is, by a factor of 6.85. Over the same period the gross value added created in industry rose from 1,925.6 billion soums to 13,906.3 billion soums, expanding 7.22-fold. At first sight this confirms that industry is the leading growth sector. However, over the same period gross value added across all sectors increased 7.38-fold, as a result of which the share of industry in the gross value added of all sectors contracted from 20.3 per cent to 19.9 per cent.

This ratio leads to an important methodological conclusion: although the substantial investment channelled into industry over nine years expanded the absolute volume of the sector, it did not strengthen its relative position in the regional economy. This indicates that the problem lies not in the volume of investment but in its territorial distribution and location structure, and it makes it necessary to shift the analysis to the district level.

Table 1. Distribution of industrial enterprises across the territories of Bukhara region and the coefficient of activity (as of 1 December 2025).

Territories	Total enterprises	Operating	Ceased operation	K1	Employees per operating enterprise, persons	Share in regional employment, %
Bukhara city	1056	706	350	0.669	15.5	30.5
Kogon city	213	153	60	0.718	9.5	4.1
Olot district	250	152	98	0.608	10.0	4.2
Bukhara district	350	246	104	0.703	4.4	3.0
Vobkent district	360	228	132	0.633	7.0	4.5
Gijduvon district	625	394	231	0.630	11.4	12.5
Kogon district	429	303	126	0.706	9.1	7.6
Qorakol district	267	134	133	0.502	8.2	3.1
Qorovulbozor district	95	60	35	0.632	83.0	13.9
Peshku district	246	161	85	0.654	5.6	2.5
Romitan district	372	240	132	0.645	8.6	5.7
Jondor district	369	260	109	0.705	4.3	3.1
Shofirkon district	283	187	96	0.661	10.1	5.3
Total for the region	4915	3224	1691	0.656	11.1	100.0

According to the data of the table, of the 4,915 industrial enterprises registered in the region 3,224, or 65.6 per cent, are actually operating. In other words, one out of every three registered enterprises does not participate in the production process. This situation constitutes the central problem of industrial location efficiency, since an enterprise that has ceased operation, although organisationally present in the territory, is economically absent: it generates neither value added, nor employment, nor tax revenue, yet at the registration stage it has already occupied the infrastructure and land resources of the territory.

The coefficient of activity varies across territories from 0.502 to 0.718, the gap amounting to 1.43 times. The highest values were recorded in Kogon city (0.718), Kogon district (0.706), Jondor district (0.705) and Bukhara district (0.703). The common feature uniting these territories is their proximity to railway and motorway junctions and the possibility of stable connection to the power grid. The lowest value belongs to Qorakol district (0.502), where every second registered enterprise is inactive. Olot (0.608) and Gijduvon (0.630) districts are likewise positioned below the regional average.

The distribution of employment differs appreciably from the distribution of the number of enterprises. While 21.5 per cent of the region's enterprises are situated in the city of Bukhara, 30.5 per cent of industrial employment is concentrated there. The most distinctive case is observed in Qorovulbozor district: although merely 1.9 per cent of the region's enterprises are located there, 13.9 per cent of industrial employment is concentrated in this district, and on average 83.0 workers fall to a single operating enterprise 7.5 times more than the regional average of 11.1. The explanation lies in the large enterprises situated in the district: 5 of the region's 41 large enterprises, or 12.2 per cent, operate in this territory. Overall, the share of large enterprises in the region amounts to 0.83 per cent, which shows that the industrial structure has been formed at the expense of small enterprises.

As the principal institution for managing the territorial location of industrial enterprises, 48 small industrial zones and youth industrial zones have been established in the region, of which 37 are small industrial zones. A total of 252 projects have been sited in these zones, of which 144 have been commissioned. Accordingly, 42.9 per cent of the sited projects, that is 108 of them, have still not reached the production stage. This indicator means that almost half of all location decisions are not being converted into practical results and demonstrates that the weakest link of regional industrial policy lies precisely in the interval between the siting of a project and its commissioning.

Table 2. Location efficiency indicators and the integral index by territories of Bukhara region.

Territories	K1 – activity coeff.	K2 – commissioning coeff.	K3 – return on capital	K4 – jobs per 1 bln soums	LEI	Rank
Peshku district	0.654	0.600	5.03	9.38	0.748	1
Bukhara city	0.669	0.684	1.82	13.65	0.704	2
Kogon district	0.706	0.385	4.75	5.59	0.671	3
Kogon city	0.718	0.485	1.75	6.07	0.570	4
Jondor district	0.705	0.850	0.04	2.73	0.499	5
Gijduvon district	0.630	0.905	0.65	3.70	0.475	6
Qorovulbozor district	0.632	1.000	0.04	1.31	0.426	7
Bukhara district	0.703	0.714	0.06	0.58	0.424	8
Olot district	0.608	0.500	0.42	3.35	0.330	9
Romitan district	0.645	0.217	0.24	2.62	0.280	10
Vobkent district	0.633	0.250	0.12	2.11	0.259	11
Qorakol district	0.502	0.357	0.04	8.61	0.249	12
Shofirkon district	0.661	0.000	0.00	0.00	0.184	13
Total for the region	0.656	0.571	0.62	3.54	–	–

The results of the integral index show that location efficiency is sharply differentiated across territories: the gap between the highest (0.748) and the lowest (0.184) values amounts to 4.1 times. In interpreting the ranking, the scale factor must be taken into account. The first place of Peshku district is explained not by its industrial capacity but by the small size of its investment base: the value of the projects commissioned in the district amounts to only 3.2 billion soums, and relative indicators calculated against such a small denominator turn out high. It is therefore appropriate to interpret the result of Peshku district not as a superior example of location efficiency but as evidence of the ability of small-scale, compact projects to yield returns comparatively quickly.

The genuine leader, demonstrating scale and efficiency simultaneously, is the city of Bukhara (LEI = 0.704). Here 52 projects have been commissioned and 980 jobs have been created on the basis of 71.8 billion soums of investment, that is, 13.65 jobs per 1 billion soums 3.9 times more than the regional average of 3.54. Kogon district, ranked third, embodies an export-oriented location model: 37.6 per cent of the output volume of the region's industrial zones (178.7 billion soums) is created in this district, and 86 per cent of the exports of small industrial zones falls to this territory.

The most important result of the analysis is manifested in the case of Bukhara district. This territory has received 45.9 per cent of the investment in the projects commissioned in the region's industrial zones (352.1 billion soums), yet it provides merely 4.3 per cent (20.2 billion soums) of the output volume of the industrial zones. As a consequence, the return on capital stands at 0.06 and the number of jobs per 1 billion soums at 0.58, placing the district among the lowest results in the region on both indicators. That such a situation arises against the background of a comparatively high project commissioning coefficient (0.714) shows that capital has become tied up in large facilities with a long production cycle which have not yet reached full capacity. This does not mean that the location decision itself was mistaken; rather, it indicates that the time lag between investment and result is not being sufficiently taken into account in territorial planning.

The opposite situation is observed in Qorakol district. In this district 458 jobs have been created on the basis of 53.2 billion soums of investment, and in terms of employment-generating capacity it ranks second in the region (8.61). However, the volume of output amounts to only 2.2 billion soums, and the return on capital has remained at 0.04. When the lowest enterprise activity coefficient in the region (0.502) is added to this, the district falls into the bottom three on the integral index. This shows that a labour-intensive but low-value-added production model may provide employment in a territory yet contribute little to the growth of the regional economy. Shofirkon district closes the ranking: here neither of the two sited projects has been commissioned and no output has been recorded in the industrial zones.

In order to assess quantitatively the degree of territorial differentiation of location efficiency, the Herfindahl–Hirschman index (HHI) was calculated for three different distribution attributes. Since the region comprises 13 administrative territories, under a perfectly equal distribution the index takes the value 0.0769.

Table 3. Level of territorial concentration of industry in Bukhara region.

Distribution attribute	HHI value	Relative to equal distribution	Level of concentration
Number of enterprises	0.1054	1.37 times	low
Industrial employment	0.1488	1.93 times	medium
Volume of output	0.2471	3.21 times	high
Equal-distribution benchmark	0.0769	1.00	–

The results of the calculations reveal the fundamental problem of location policy. In terms of the number of enterprises, concentration exceeds the equal-distribution benchmark by only 1.37 times, meaning that industrial enterprises are distributed comparatively evenly across the territories. For employment this indicator reaches 1.93 times, and for the volume of output 3.21 times. The difference between these three indices constitutes a precise quantitative measure of the location efficiency deficit: enterprises have been distributed across the territories, but the capacity to create value added has not. In other words, regional industrial policy has accomplished the task of siting enterprises but has not resolved the task of transforming them into value-creating entities.

In order to establish the effect of location efficiency on the development of the regional economy, a correlation analysis was carried out on the basis of district-level data. The results were as follows: between the number of operating enterprises and industrial employment $r = 0.790$; between the number of industrial zones and the volume of output $r = 0.693$; between the integral location index (LEI) and the volume of output $r = 0.668$; and between industrial employment and the volume of output $r = 0.507$.

The most significant result was manifested in the relationship between the volume of investment and the volume of output: at the district level the correlation coefficient between these indicators amounted to $r = 0.012$, which means that a linear relationship is practically absent. In economic terms this result is interpreted as follows: the volume of capital directed into a territory does not in itself guarantee a result for the regional economy. The fact that Bukhara district received almost half of the investment of the region's industrial zones while yielding 4.3 per cent of output, whereas Kogon district secured 37.6 per cent of output on the basis of 4.9 per cent of the investment, confirms the absence of this relationship in practice.

At the same time, the fact that the relationship between the integral location index and the volume of output ($r = 0.668$) is considerably stronger than the relationship with the volume of investment provides the basis for an important conclusion: the factor determining the growth of the regional economy is not the quantity of capital but the quality of its location. This result is logically consistent with the findings of the regression analysis obtained at the regional level: while the volume of manufacturing output is very strongly associated with labour productivity ($R^2 = 0.997$), at the district level it is almost unassociated with the volume of investment. Consequently, the location decision affects the regional economy not through the capital channel but precisely through the productivity channel. If an enterprise is sited in a territory that enables productivity to be raised, the regional economy grows; otherwise the result remains limited regardless of the volume of capital invested.

The question of the correspondence of location decisions to the resource base deserves separate attention. An analysis of data on the region's mineral raw material reserves reveals a considerable disproportion between the location of resources and the location of industry. In particular, the whole of the region's cement raw material reserve (122,540 thousand tonnes), the whole of its limestone reserve (21,080 thousand tonnes) and the whole of its reserve of sand for construction and silicate products (10,381 thousand m^3) are located in Qorovulbozor district. Despite this, only 1 small industrial zone has been established in this territory, and only 2 projects have been sited in it. Gijduvon district holds a reserve of 64,473 thousand m^3 of sand-and-gravel materials, of which 13,800 thousand m^3 remain unused.

The overall picture for the region is as follows: 67.5 per cent of the reserves of natural facing stone, 59.7 per cent of the reserves of construction stone, 56.5 per cent of the reserves of construction sand and 36.9 per cent of the reserves of sand-and-gravel materials have so far not been drawn into economic circulation. These figures show that the region possesses a considerable territorial reserve for locating the construction materials industry, but that the existing location structure relies not on the local raw material base but predominantly

on the factor of available infrastructure and proximity to markets. As a result, territories with high resource potential remain outside industrial development.

Summarising the results of the analysis carried out, the following conclusions may be formulated with regard to the location efficiency of industrial enterprises and its effect on the regional economy.

First, location efficiency must be measured as a category independent of sectoral efficiency, and it can be assessed quantitatively through a four-element system of indicators the coefficient of enterprise activity, the project commissioning coefficient, the return on capital and the employment-generating capacity. In the case of Bukhara region, the integral index calculated on the basis of these indicators made it possible to establish the existence of a 4.1-fold gap between territories.

Second, the principal weakness of location policy in the region is manifested not at the stage of siting enterprises but at the stage of bringing them into operation and transforming them into value-creating entities. Direct evidence of this is that 34.4 per cent of registered enterprises are inactive and that 42.9 per cent of the projects sited in industrial zones have not been commissioned.

Third, the difference between the territorial concentration indices (1.37 times for enterprises and 3.21 times for output) shows that industrial facilities have been distributed across the territories while the capacity to create value added has remained concentrated in particular centres. This situation is explained by the fact that regional industrial policy has been oriented towards quantitative indicators (the number of zones, the number of projects) while insufficient attention has been paid to qualitative ones.

Fourth, the practical absence of a linear relationship between the volume of investment and the volume of output at the district level ($r = 0.012$), together with the presence of an appreciable relationship with the integral location index ($r = 0.668$), proves that the development of the regional economy is determined not by the volume of capital but by the quality of location. The priority task of regional industrial policy should therefore be not to increase the volume of investment but to improve the quality of its location.

Fifth, the fact that a considerable share of mineral raw material reserves (up to 56–68 per cent for certain resources) has not been drawn into economic circulation, and that the fewest industrial zones have been established in the territories with the highest resource potential, shows that location decisions are insufficiently linked to the resource base.

Proceeding from the above, the following measures are proposed in order to enhance the location efficiency of the region's industrial enterprises: to introduce, at the stage of siting projects in industrial zones, a selection criterion that takes into account the value of the territory's integral location index; to conduct an inventory of the 108 uncommissioned projects and either bind them to realistic deadlines or attract new residents in their place; to apply a mechanism for covering the costs of connection to infrastructure in Qorakol, Olot and Gijduvon districts, where the coefficient of activity is below the regional average; to form a construction materials cluster in Qorovulbozor district based on the existing cement and limestone raw material base; and to establish, in the appraisal of investment projects, the indicators of jobs created per 1 billion soums and return on capital as mandatory criteria alongside the volume of capital.

4. Conclusions

The study confirms that the location and operational efficiency of industrial enterprises are important determinants of regional economic development in the Bukhara region. The combined use of location quotient, per capita industrial output, labour productivity, investment intensity, enterprise density and industrial growth indicators makes it possible to identify territorial specialization, industrial growth centres and

districts with underutilized production potential. The results show that industrial activity is unevenly distributed across the region due to differences in raw-material availability, infrastructure, labour resources, investment flows and market accessibility. Territories with a location quotient above one demonstrate relative specialization in particular industries. However, a high level of specialization does not always indicate high economic efficiency, especially when production depends on one or a few large enterprises. Therefore, location indicators should be evaluated together with productivity, diversification, employment and value-added measures. For balanced regional development, industrial policy should support technological modernization, deeper processing of local raw materials and cooperation between large enterprises and small businesses. It is also necessary to develop industrial clusters, improve transport, energy and digital infrastructure, strengthen vocational training and direct investment towards districts with unrealized industrial potential. Resource-dependent territories should diversify their production structures, while districts with weak industrial activity should prioritize small-scale processing and industries based on local comparative advantages. Overall, the application of location efficiency indicators provides a reliable methodological basis for improving the spatial organization of industry and evaluating the contribution of enterprises to regional development. Their systematic use can support evidence-based investment decisions, reduce territorial disparities and strengthen the competitiveness, resilience and long-term sustainability of the Bukhara regional economy.

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