

Chapter 08

Rethinking homo economicus

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Methods of Determining the State of Vertical Growth and Labor Efficiency in the Regions

Métodos para determinar el estado del crecimiento vertical y la eficiencia laboral en las regiones

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ABSTRACT

The article analyzes the state of housing construction, which is considered one of the key indicators of urban development. In the analysis, housing construction is divided into individual and multi-storey categories, and the vertical development processes of the regions are evaluated based on the vertical growth index. The results show that in ten districts of the region, the vertical growth index is below the regional average, which indicates a high level of interregional inequality in the construction of multi-apartment housing. The study emphasizes the importance of referring to the concepts of “actual labor productivity,” “net labor productivity,” and “potential labor productivity” when assessing labor efficiency and identifying ways to improve it. It is noted that reducing the gap between actual and net labor productivity depends on several organizational, technological, and economic factors. Integrating artificial intelligence technologies into this analysis significantly enhances its effectiveness. In particular, AI-based forecasting models can: monitor vertical growth dynamics across regions in real time, predict changes in supply and demand in the construction sector, optimize the efficiency of labor resource utilization, identify the underlying factors that create gaps between actual and net labor productivity. Moreover, AI-driven analytical systems enable the formulation of more precise and evidence-based policy measures aimed at reducing interregional disparities.

Keywords: Urban Expansion; Labor Productivity; Population Density; Housing Stock; Construction; High-Rise Building; Vertical Growth; Factors that Reduce Labor Productivity; Opportunities to Increase Labor Productivity; Infrastructure Costs.

RESUMEN

El artículo analiza el estado de la construcción de viviendas, considerada uno de los indicadores clave del desarrollo urbano. En el análisis, la construcción de viviendas se divide en viviendas de una y varias plantas, y los procesos de desarrollo vertical de las regiones se evalúan con base en el índice de crecimiento vertical. Los resultados muestran que, en diez distritos de la región, el índice de crecimiento vertical se encuentra por debajo de la media regional, lo que indica una alta desigualdad interregional en la construcción de viviendas multifamiliares. El estudio enfatiza la importancia de considerar los conceptos de «productividad laboral real», «productividad laboral neta» y «productividad laboral potencial» al evaluar la eficiencia laboral e identificar maneras de mejorarla. Se observa que la reducción de la brecha entre la productividad laboral real y la neta depende de diversos factores organizativos, tecnológicos y económicos. La integración de tecnologías de inteligencia artificial en este análisis mejora significativamente su eficacia. En particular, los modelos de pronóstico basados en IA pueden: monitorear la dinámica del crecimiento vertical en las regiones en tiempo real, predecir cambios en la oferta y la demanda

en el sector de la construcción, optimizar la eficiencia en la utilización de los recursos laborales e identificar los factores subyacentes que crean brechas entre la productividad laboral real y la neta. Además, los sistemas analíticos basados en IA permiten la formulación de políticas más precisas y basadas en la evidencia, destinadas a reducir las disparidades interregionales.

Palabras clave: Expansión Urbana; Productividad Laboral; Densidad de Población; Parque de Viviendas; Construcción; Edificios de Gran Altura; Crecimiento Vertical; Factores que Reducen la Productividad Laboral; Oportunidades para Aumentar la Productividad Laboral; Costos de Infraestructura.

INTRODUCTION

Uzbekistan's plan for 2030 places a special emphasis on urbanization as a key strategy. The goal is to increase the urbanization rate from 51 percent to 60 percent. This involves creating master plans for all settlements, encouraging input from residents and entrepreneurs in developing district and city plans, and prioritizing the construction of taller buildings, particularly in densely populated areas. Economists initially determined the labor efficiency of an economic entity or sector, district or city based on the amount of products produced during a certain time unit. However, as research on the topic increased, so did the methodology for determining labor efficiency.^(1,2) Today, it is determined not only by the quantity of the product produced during a certain period of time, but also by its appearance, quality, costs incurred for the production of the product, and the amount of income from product sales.^(3,4)

The expansion of cities happens in three ways, each tied to population growth. The first scenario involves spreading out, reducing population density. The second expands the city's footprint without changing density. The third, unique scenario sees cities growing upward instead of outward, leading to increased population density with minimal infrastructure costs.^(5,6)

Choosing to build up instead of out comes with various perks. Firstly, it allows cities to use limited land more efficiently, especially in areas where land is scarce. Going vertical helps make the most of existing land without cramming it, preserving green spaces and farmland. It also prevents cities from encroaching on nearby rural areas.

Secondly, going vertical can improve transportation and infrastructure. Vertical cities can develop public transportation networks, reducing congestion. They also offer easy access to popular amenities, making them attractive places to live and work.⁽⁷⁾

Thirdly, vertical cities are more energy-efficient. Tall buildings help keep heat in lower floors, reducing heat loss in colder climates. Natural ventilation systems contribute to significant energy savings, making a positive impact on the environment.⁽⁸⁾

In summary, Uzbekistan's urbanization strategy, with a focus on building upwards, isn't just about tackling present challenges. It's about setting cities on a path of sustainable growth, resource efficiency, and an improved quality of life for residents.⁽⁹⁾

LITERATURE REVIEW

Many researchers argue that urbanization occurs as a result of structural changes. In particular, while analyzing the relationship between development, structural changes and

urbanization, X. Yang explains the evolution of the distribution by the increase of transaction efficiency as a result of changes in the level of urbanization, policy or institutional structures, thereby explaining the structural changes. G. Michaels, F. Rauch, S. Redding analyze the population evolution in rural and urban areas of the United States of America from 1880 to 2000. They find a positive correlation between initial density and subsequent growth for population density during this period. Using theory and empirical evidence, they conclude that the main cause of urban population growth is the result of differences in the initial share of agricultural employment in terms of population density and structural changes that shift employment away from agriculture. Rofo A.I. Labor Economics. Today, it is determined not only by the quantity of the product produced during a certain period of time, but also by its appearance, quality, costs incurred for the production of the product, and the amount of income from product sales.⁽¹⁰⁾

Assessing vertical growth and labor efficiency in regions involves analyzing both structural economic development and workforce productivity. Vertical growth refers to the deepening of economic activities, modernization of industries, and the improvement of value-added processes within a region. To evaluate this, researchers usually examine indicators such as structural shifts in the economy, technological advancement, investment levels, and the expansion of high-value sectors.⁽¹¹⁾ Labor efficiency is measured through indicators that reflect how effectively human resources are used in the regional economy. Common methods include analyzing labor productivity (output per worker or per hour), employment rates, skill levels, and the efficiency of labor allocation across sectors. Additional tools—such as comparative regional analysis, statistical modeling, and performance benchmarking—help determine disparities and identify areas for improvement.⁽¹²⁾

Labor efficiency is assessed to determine how effectively the workforce contributes to regional economic output. Common methods include:

- Labor productivity measurement (GDP per worker, output per hour, sectoral productivity).
- Efficiency ratios, comparing input resources (labor, skills, working hours) with economic output.
- Human capital indicators, such as education level, professional skills, and workforce training.
- Comparative regional benchmarking to identify strengths, weaknesses, and productivity gaps among regions.

Together, these methods allow policymakers and researchers to understand a region's developmental trajectory, identify bottlenecks, and design strategies aimed at improving economic quality and enhancing labor performance.

Some studies suggest that urbanization can occur without structural changes. In particular, according to R. Jedwab, the rapid increase in urbanization in Africa cannot be explained by standard theories of structural change. Because this situation is related to the export of natural resources, not the green revolution or the industrial revolution. He explains through the Engel curve that resource windfalls are disproportionately spent on urban goods and services, leading to the emergence of “consumer cities.” Jedwab illustrates this theory using new data spanning a century and two identification strategies (instrumental variables strategy and fixed effects approach) using both cross-country and within-country data for Ivory Coast and Ghana. The study finds that cocoa production, a natural resource in rural areas, has a strong impact on urban growth and analyzes the consequences of urbanization without structural changes for long-term growth.⁽⁵⁾

Building upon Jedwab’s research, another study reinforces the notion that the majority of developing countries adhere to a standardized pattern where urbanization is intricately linked to a departure from agricultural productivity growth or a gravitation towards industrial productivity growth.⁽³⁾ The authors of this study emphasize that in these nations, the process of urbanization is intricately tied to profound structural changes, transforming cities into hubs known as “production cities.” In this context, urban areas undergo a significant metamorphosis, evolving into vibrant centers that play a pivotal role in production and industrial activities. This perspective underscores the dynamic relationship between urbanization and economic shifts in developing countries, portraying cities not merely as residential hubs but as key players in driving productivity and economic advancement.

METHOD

Using a vertical growth index, the study compares the intensity of urban expansion over time and identifies trends over time in the dominant growth component. It is determined based on the following formula:

$$VHG = \frac{(B^{k+})_{t+1}}{(B^{k-1-})_{t+1}} - \frac{(B^{k+})_t}{(B^{k-1-})_t} \quad (1)$$

Where B^{k+} and B^{k-1-} represent the number of houses with more and less than k floors built in the x-time interval.

$$(B^{k+})_x(B^{k-1-})_x$$

Analysis and results

In recent years, great attention has been paid to providing housing to the population in the Republic of Uzbekistan. In particular, in 2018-2022, the total area of the housing fund by region increased by 29,7 percent. It should be noted that this value of growth was 2,2 times more than in the previous five years (2013-2017).

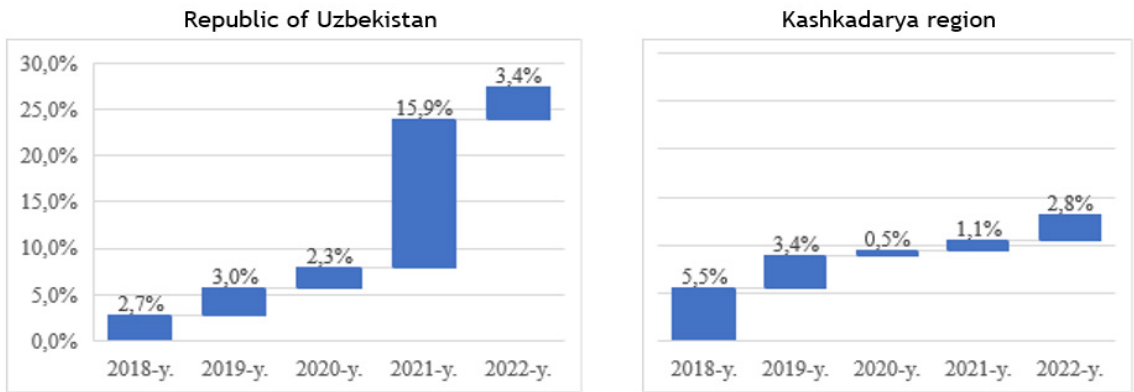


Figure 1. The dynamics of changes in the area of housing stock

The total area of the housing fund in Kashkadarya region in 2022 will be 57 336,1 thousand square meters, which has increased by 13,8 % compared to the figure in 2017. High growth rates were observed in Nishon (27,3 percent), Yakkabog (21,5 percent), Guzor (19,5 percent) and Kitab (16,9 percent) districts.

The main share of the housing fund area is in Karshi (9,4 percent), Kitab (8,2 percent), Yakkabog (8,1 percent), Guzor districts (7,9 percent) and the city of Karshi (8,3 percent) correspondingly, these areas own 41,9 % of the housing fund in the region. Mubarak (2,7 percent) and Mirishkor (2,9 percent) districts take the last places in this ranking.

Areas	2018	2019 year	2020 year	2021 year	2022 year
Kashkadarya region	5,5 %	3,4 %	0,5 %	1,1 %	2,8 %
Karshi city	3,7 %	6,5 %	0,8 %	1,7 %	0,6 %
Shakhrisabz city	-	1,6 %	7,1 %	0,8 %	2,2 %
Guzor	12,0 %	3,9 %	0,2 %	1,0 %	1,5 %
Dekhqonobod	0,0 %	0,3 %	1,4 %	2,0 %	2,2 %
Qamashi	3,6 %	0,8 %	-1,0 %	0,6 %	1,3 %
Karshi dist	3,6 %	0,7 %	-1,4 %	0,1 %	3,7 %
Koson	10,5 %	0,4 %	0,3 %	0,5 %	0,8 %
Kitab	9,4 %	0,6 %	3,6 %	1,4 %	1,1 %
Mirishkor	3,2 %	0,0 %	-1,4 %	2,9 %	0,3 %
Muborak	6,8 %	0,5 %	-5,8 %	1,8 %	0,4 %
Nishan	2,0 %	24,9 %	-0,5 %	0,2 %	0,2 %
Kasbi	1,5 %	0,3 %	1,5 %	1,9 %	0,3 %
Kokdala	-	-	-	-	-
Chirokchi	2,2 %	4,1 %	0,4 %	1,0 %	-41,3 %
Shakhrisabz dist	-35,8 %	1,1 %	0,3 %	1,2 %	1,0 %
Yakkabog	13,1 %	6,7 %	-0,4 %	0,5 %	0,6 %

The analysis shows that the construction and commissioning of residences in the regions of the region took place at a rapid pace in 2018-2019. The area of the housing fund in the region increased by 5,5 % in 2018 and by 3,4 % in 2019 compared to the previous year. In particular, in 2018, this indicator increased by 13,1 % in Yakkabog district, 12,0 % in Guzor district, 10,5 % in Koson district, 9,4 % in Kitab district, and in 2019, it increased by 24 % in Nishan district. 0,9 percent, increased by 6,7 percent in Yakkabog district and 6,5 percent in Karshi city. During the last five years, special attention has been paid to the issues of expanding the non-state sector in the economy, reducing the direct interference of the state in the activities of enterprises and organizations. As a result, the rate of economic freedom of subjects has increased significantly. Economic freedom, on the one hand, has led to a sharp increase in the number of entrepreneurship and small business entities. In particular, in 2016, 207 thousand 104 business entities were operating in the country, and by 2022 their number will reach 517 thousand 501. On the other hand, thanks to economic freedom, labor efficiency in enterprises and organizations began to increase. Due to the increase in labor productivity, for example, in 2005, the share of business entities in the gross domestic product of our country was 38,2 percent, and by 2022, this indicator was 51,8 percent.

CONCLUSIONS

In conclusion, the vertical growth of regions, especially cities, has several advantages and can be an important tool to help create favorable conditions for residents and optimize land

use. However, there are specific aspects and negative consequences of vertical growth, such as the reduction of urban green areas due to the increase in housing construction, and the increase in the load on the existing infrastructure. Taking this into account, the following proposals and recommendations were developed for the regions of Kashkadarya region:

1. Updating the master plans of Karshi, Nishon, Chirokchi and Kitab districts of the province based on the principle of «growth».
2. Assessing the effectiveness of the task of building multi-storey housing based on the principle of «growth» defined in the Uzbekistan-2030 strategy and in order to regularly study the opinion of the population, to launch social polls conducted every six months. Selection of Dehkanabad district and Karshi city as pilot areas for conducting surveys.
3. Establishing public control over the strict adherence to the minimum norms of «green area» area per inhabitant in housing construction and the area around the residence and the city as a whole.
4. There are still a number of problems that hinder the improvement of labor efficiency in the society. For example, development of the material and technical base of enterprises and organizations, diversification of production, implementation of innovations in production, organization of the production process on a scientific basis, reduction of losses during working hours, increase of education and qualification of employees, system of fair remuneration for labor implementation issues are pending resolution.
5. The successful solution of these issues would have increased the efficiency of labor in enterprises and organizations.

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