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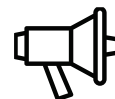


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FACTORS INFLUENCING THE DEVELOPMENT OF THE FOOD PROCESSING INDUSTRY: AN ECONOMIC ANALYSIS



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Abstract: This article explores the key economic factors influencing the development of the food processing industry in Uzbekistan during the period 2010–2023. Based on official statistical data, the study identifies production output, capital investment, and employment as the primary drivers of sectoral growth. Using descriptive methods, the research analyzes trends in these variables and introduces two relative efficiency indicators capital productivity (output per unit of investment) and labor productivity (output per employee with 2010 serving as the baseline year). The analysis reveals a strong and sustained increase in labor productivity, which rose more than ninefold by 2023, alongside a notable decline in capital productivity, indicating reduced investment efficiency despite rising capital inflows. Pearson correlation coefficients demonstrate strong associations between investment, output, and employment, although they are partially influenced by nominal trends. The results highlight structural shifts in the industry and suggest that targeted investment strategies, productivity-enhancing reforms, and efficient labor utilization are critical economic factors shaping the development of Uzbekistan's food processing sector.

Key words: food industry, capital productivity, labor productivity, investment efficiency, employment, industrial development, correlation analysis, descriptive statistics, structural transformation.

INTRODUCTION

In the current phase of Uzbekistan's economic development, the food processing industry is gaining strategic importance as one of the most actively evolving sectors within the national economy. Enterprises operating in this sphere face a wide range of influences from internal production capabilities and financial constraints to external market fluctuations, regulatory changes, and shifts in consumer demand. These multidimensional factors collectively shape the pace and direction of the industry's growth.

Given the pivotal role that the food industry plays in ensuring food security and supporting stable livelihoods, it becomes increasingly important to assess the forces that contribute to or hinder its development. In this regard, identifying the key economic, structural, and institutional factors is essential for building a more resilient and productive food sector. Therefore, this study aims to examine the various drivers that influence the food industry's progress in Uzbekistan and evaluate opportunities for improving its performance, productivity, and competitiveness.

Particular attention is paid to the national context, where the availability of affordable and high-quality food products is closely tied to both regional economic stability and overall public welfare. Ensuring an uninterrupted supply of essential food products is not only a matter of consumer satisfaction but also a critical component of the country's broader strategy for sustainable development and socio-economic security. As such, enhancing the efficiency and capacity of the food industry remains a clear priority for public policy and long-term economic planning.

LITERATURE REVIEW

The food processing industry is increasingly recognized as a strategic sector that contributes not only to economic growth but also to food security and technological modernization. Prosekov and Ivanova [1] argue that achieving sustainable food security requires addressing challenges in the structure and innovation capacity of the agro-industrial sector. Similarly, Fróna et al. [2] emphasize that feeding a growing global population will depend on integrated improvements in production efficiency and supply chain resilience.

Several studies have focused on resource optimization and productivity in food systems. Henderson et al. [3] explore how closing yield gaps and improving mixed crop–livestock systems can enhance productivity and reduce environmental impact, while Chai et al. [4] demonstrate the potential of intercropping and integrated farming to increase food output. Erokhin [5] examines sustainability issues in the food markets of developing economies, highlighting structural vulnerabilities and the importance of state support mechanisms.

From the business and innovation perspective, Nosratabadi et al. [6] stress the role of business model innovation in strengthening the food supply chain, especially under conditions of uncertainty. Vasa et al. [7] provide a comparative analysis of circular agriculture in selected countries, underscoring the need to adopt sustainability indicators in evaluating sectoral performance. In the Russian context, Kozhevnikova [8] identifies risk factors affecting bakery enterprises, while Kuzmina and Zhernokleeva [9] assess structural trends and challenges in food industry modernization.

These studies collectively underline the importance of investment in infrastructure, innovation, and human capital to ensure the long-term development of the food industry. They also support the idea that enhancing labor and capital productivity is key to achieving competitiveness. The findings serve as a conceptual basis for evaluating the dynamics of Uzbekistan's food processing sector in this study.

RESEARCH METHODOLOGY

The methodological basis of this study draws upon the theoretical approaches of both domestic and international researchers in the fields of industrial development and innovation economics. In particular, the study builds on the idea that structural transformation and resource productivity are critical indicators of sectoral competitiveness. These concepts guide the evaluation of trends in Uzbekistan's food processing industry over time.

The core method applied in the research is the aggregation and analytical interpretation of statistical data. Time series data from 2010–2023, including food industry output, investment volumes, and employment levels, were collected from official publications of the State Committee of the Republic of Uzbekistan on Statistics. Using this dataset, the study conducted comparative analysis, productivity assessments, and correlation evaluations. Specifically, capital productivity (output per unit of investment) and labor productivity (output per employee) were calculated relative to a 2010 baseline. The relationships between variables were examined using Pearson correlation coefficients, and the findings were illustrated through line charts to support visual interpretation of development patterns.

ANALYSIS AND RESULTS

In recent years, the development of the food processing industry has been shaped by a complex interplay of structural and economic factors. These include the general growth of industrial output, changes in the investment climate, state policy priorities, and fluctuations in consumer demand. Unlike in countries with large-scale, vertically integrated agribusinesses where international competition and export orientation are strong drivers the food industry in Uzbekistan remains primarily focused on domestic consumption and internal market stability.

Despite this, the industry demonstrates steady growth and increasing structural significance. According to official data, the total volume of industrial output in Uzbekistan has shown consistent growth over the period from 2010–2023. Within this structure, the manufacturing sector plays a dominant role, and the food processing segment, while smaller in scale, contributes a significant and growing share.

Table 1. Industrial and food industry output in Uzbekistan in bln soums¹.

Year	Total industrial output (bln UZS)	Food industry output (bln UZS)
2010	38119.0	5521.5
2011	47587.1	7305.8
2012	57552.5	8610.6
2013	70634.8	11373.7
2014	84016.7	14387.2
2015	97598.2	18511.6
2016	111869.4	22400.5
2017	148816.0	23217.7
2018	235304.7	25256.0
2019	322535.8	35337.3
2020	368740.2	42314.9
2021	456056.1	48643.3
2022	553265.0	57547.3
2023	655821.9	65174.7

As shown in Table 1, over the period from 2010–2023, Uzbekistan's food processing industry demonstrated strong and accelerating growth. In 2010, the total output of the food industry was 5,521.5 billion UZS, and by 2023, it had reached 65,174.7 billion UZS, reflecting an absolute increase of 59,653.2 billion UZS. This is equivalent to a growth rate of approximately 1,080%, or an 11.8-fold increase compared to the base year.

In comparison, the total industrial output of Uzbekistan grew from 38,119.0 billion UZS in 2010 to 655,821.9 billion UZS in 2023 an increase of 617,702.9 billion UZS, or 1,621%, which corresponds to a 17.2-fold increase.

Although the overall industrial output grew faster in relative terms, the food industry exhibited stable upward dynamics, with more than a tenfold increase in volume. The food industry remains a resilient and essential segment of Uzbekistan's manufacturing structure, growing alongside national industrialization trends.

Table 2. Food industry production, investment, and employment (2010–2023)².

Year	Food Industry Output (bln UZS)	Investment in Food Industry (bln UZS)	Employment in Food Industry (thousand people)
2010.0	5521.5	225.3	84.8
2011.0	7305.8	330.9	84.9
2012.0	8610.6	372.9	85.4
2013.0	11373.7	408.2	85.4
2014.0	14387.2	573.6	81.8
2015.0	18511.6	822.8	84.4
2016.0	22400.5	651.8	89.1
2017.0	23217.7	1123.2	91.4
2018.0	25256.0	1826.3	95.6
2019.0	35337.3	3729.0	106.8
2020.0	42314.9	4472.8	113.9
2021.0	48643.3	5563.6	111.2
2022.0	57547.3	6293.1	110.5
2023.0	65174.7	6522.9	111.6

When it comes to Table 2, over the period from 2010–2023, Uzbekistan's food processing industry demonstrated steady and multidimensional growth, supported by three interrelated factors: the expansion of production volumes, the intensification of investment activity, and a moderate increase in employment.

¹ The analysis presented in this section is based on official data from the State Committee of the Republic of Uzbekistan on Statistics.

² The analysis presented in this section is based on official data from the State Committee of the Republic of Uzbekistan on Statistics.

This dynamic reflects the ongoing transformation of the sector into a more capital-intensive and structured component of the national economy.

The volume of output in the food industry increased from 5,521.5 billion UZS in 2010 to 65,174.7 billion UZS in 2023, which corresponds to a cumulative growth of approximately 1,080%, or an 11.8-fold increase. This growth pattern demonstrates the strengthening role of the food sector in meeting domestic demand and supporting economic diversification. However, the rate of output expansion varied over time, with especially high increases observed in 2013, 2014, 2018, and 2019. These years likely coincide with targeted policy interventions and increased resource mobilization.

The dynamics of investment in the food sector reveal an even more pronounced trajectory. From 225.3 billion UZS in 2010, investment levels rose to 6,522.9 billion UZS by 2023 – a 2,795% increase, or a near 29-fold growth. The post-2017 period, in particular, was marked by intensified capital inflows, likely stimulated by reforms aimed at industrial modernization, private sector engagement, and favorable fiscal measures. This sharp acceleration in investment has clearly outpaced the growth of output, highlighting a shift toward capital-intensive development and long-term capacity building in the industry.

In contrast, changes in employment within the sector were more moderate. The number of employees in food processing increased from 84.8 thousand in 2010 to 111.6 thousand in 2023, reflecting an overall rise of 31.6%. This discrepancy between output and labor growth suggests significant improvements in labor productivity, driven by technological upgrades, improved management practices, and possibly automation in certain production lines. The industry, therefore, appears to be moving toward more efficient resource utilization.

To evaluate the statistical relationships between these variables, a Pearson correlation analysis was conducted using nominal values. The results revealed a very strong positive correlation between investment and output ($r = 0.976$), indicating that the expansion of production was closely associated with capital accumulation. A similarly strong correlation was found between investment and employment ($r = 0.955$), implying that capital growth also contributed to job creation, albeit less intensively. The correlation between employment and output ($r = 0.925$) further reinforces the importance of labor input, although its impact appears secondary to that of investment.

While these high correlation coefficients are informative, it should be noted that they are based on non-adjusted nominal values, and thus may partially reflect common upward trends over time. Nonetheless, the patterns are consistent with the structural features of Uzbekistan's food industry, where investment acts as the primary engine of growth, supported by gradual improvements in labor force involvement.

This conclusion is further supported by an analysis of relative productivity indicators. Figure 2 illustrates the dynamics of both capital productivity (defined as the ratio of output to investment) and labor productivity (output per worker), measured relative to their 2010 levels. Over the analyzed period, capital productivity demonstrates a gradual and persistent decline, while labor productivity shows a steady and accelerating upward trend.

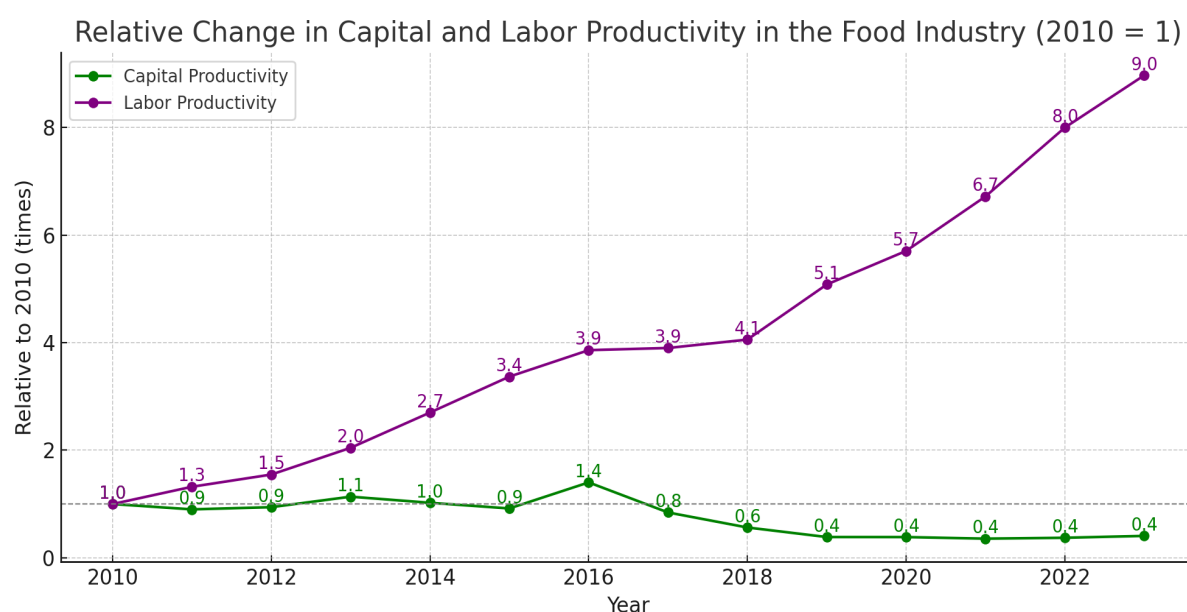


Figure 1. Food industry production, investment, and employment (2010–2023)³.

³ The analysis presented in this section is based on official data from the State Committee of the Republic of Uzbekistan on Statistics.

In 2010, both metrics were set as baseline values (1.0). Capital productivity slightly fluctuated in the first half of the decade, peaking at 1.4 in 2016, but subsequently declined to 0.4 by 2023, indicating that each unit of investment generated significantly less output than in the base year. This trend may be attributed to a rapid increase in investment volumes that outpaced output growth, possibly due to time lags in the realization of capital-intensive projects, rising input costs, or structural inefficiencies in investment allocation.

In contrast, labor productivity increased almost continuously throughout the period, rising from 1.0 in 2010 to 9.0 in 2023, which reflects a ninefold improvement in output per employee. This dramatic increase signals substantial gains in efficiency, likely resulting from mechanization, process automation, and better organizational management.

The divergence between the two productivity measures emphasizes a critical shift in the sector: while the effectiveness of capital use has declined, the efficiency of human labor has sharply improved.

These opposing trajectories underscore the necessity of optimizing investment effectiveness in the future. Simply increasing capital expenditure may no longer yield proportional benefits unless accompanied by rigorous project evaluation, technological upgrading, and institutional support for innovation. Meanwhile, the sustained growth in labor productivity highlights the sector's capacity to benefit from knowledge transfer, workforce training, and operational modernization. Together, these insights offer a nuanced view of structural transformation within Uzbekistan's food industry and inform policy directions for maintaining sustainable growth.

CONCLUSION

Over the past decade, Uzbekistan's food processing industry has steadily increased its contribution to the national economy. The sector has demonstrated consistent output growth, driven mainly by a sharp rise in capital investment and a more gradual increase in labor involvement. While output expanded more than elevenfold, investment grew nearly thirtyfold, indicating that capital accumulation was the dominant quantitative driver. However, this was not accompanied by proportional efficiency: capital productivity has steadily declined since 2016, suggesting that additional investment does not automatically translate into greater returns. In contrast, labor productivity showed continuous growth—rising ninefold—indicating that the sector has benefited significantly from better labor organization, process improvements, and potentially, gradual technological adaptation.

This divergence between capital and labor productivity reveals an important structural transformation. The food industry is gradually shifting from labor-intensive production to a model in which physical and technological assets play a greater role. Yet the data suggest that without a parallel improvement in investment quality, the long-term effectiveness of this shift may be compromised. Strong correlations between output, investment, and employment confirm the mutual reinforcement of these variables, but also underscore the importance of managing them strategically—especially in light of the observed drop in capital efficiency.

Based on these findings, the development of the food processing sector requires a shift from quantity-based growth to quality-oriented management. This includes improving the planning and evaluation of investment projects to avoid inefficient allocation of funds and to ensure better returns. In parallel, more attention should be given to strengthening the human capital base through skill development and vocational training. Continued growth in labor productivity confirms the potential for workforce-based gains and justifies further public and private efforts in this direction. Investment in technologies—particularly those that improve process efficiency—should also be prioritized to close the widening gap in capital efficiency.

Finally, a more integrated approach to sectoral development may yield additional long-term benefits. Aligning food processing with agricultural supply chains, improving regional infrastructure, and expanding local sourcing can help reduce costs and increase resilience. The experience of the last decade clearly shows that growth without efficiency has its limits. For Uzbekistan's food industry to remain competitive and sustainable, deeper institutional support, smarter investment strategies, and long-term productivity-oriented policies must take center stage.

References:

1. Prosekov, A. Y., & Ivanova, S. A. (2018). Food security: The challenge of the present. *Geoforum*, 91, 73–77.
2. Fróna, D., Szendrő, Á., & Harangi-Rákos, M. (2019). The challenge of feeding the world. *Sustainability*, 11(20).
3. Henderson, B., Godde, C., Medina-Hagen, K., et al. (2016). Closing system-wide yield gaps to increase food production and mitigate GHGs among mixed crop-livestock smallholders in Sub-Saharan Africa. *Agricultural Systems*, 143, 106–113.
4. Chai, Q., Gan, Y., Zhao, C., et al. (2021). Integrated farming with intercropping increases food production while reducing environmental footprint. *PNAS*, 118(38).
5. Erokhin, V. (2017). Factors influencing food markets in developing countries: An approach to assess sustainability of the food supply in Russia. *Sustainability*, 9(8).

6. Nosratabadi, S., Mosavi, A., & Lakner, Z. (2020). Food supply chain and business model innovation. *Foods*, 9(2).
7. Vasa, L., Angeloska, A., & Trendov, N. M. (2017). Comparative analysis of circular agriculture development in selected Western Balkan countries based on sustainable performance indicators. *Economic Annals-XXI*, 168(11–12), 44–47.
8. Kozhevnikova, G. G. (2015). Issledovanie riskoobrazuyushchikh faktorov v deyatel'nosti khlebopekarnykh predpriyatii [Research of risk-generating factors in bakery enterprises]. *Sovremennaya ekonomika: problemy i resheniya*, 11(35), 27–38.
9. Kuzmina, A. O., & Zhernokleeva, A. S. (2019). Sovremennoe sostoyanie i tendentsii razvitiya pishchevoy promyshlennosti Rossii [Current state and development trends of the food industry in Russia]. *Molodoy uchenyy*, 17(255), 149–152.
10. Huang, J., Wei, W., Cui, Q., & Xie, W. (2017). The prospects for China's food security and imports: Will China starve the world via imports? *Journal of Integrative Agriculture*, 16(12), 2933–2944.
11. Jat, M. L., Dagar, J. C., Singh, A. K., et al. (2016). Climate change and agriculture: Adaptation strategies and mitigation opportunities for food security in South Asia and Latin America. *Advances in Agronomy*, 137, 127–235. Academic Press Inc.
12. Rosegrant, M. W., Tokgoz, S., & Bhandary, P. (2013). The new normal? A tighter global agricultural supply and demand relation and its implications for food security. *American Journal of Agricultural Economics*, 95(2), 303–309.
13. Garai-Fodor, M. (2021). Food consumption patterns in a values-based approach for Generation Z. *Acta Polytechnica Hungarica*.
14. Liu, Y., Wang, S., & Chen, B. (2019). Optimization of national food production layout based on comparative advantage index. *Energy Procedia*, 158, 3846–3852.
15. Shevchenko, Y. S. (2017). Finansovye rezul'taty i ikh vliyanie na effektivnost' organizatsii [Financial results and their impact on enterprise performance]. *Ekonomika i predprinimatel'stvo*, 1(78), 86–89.

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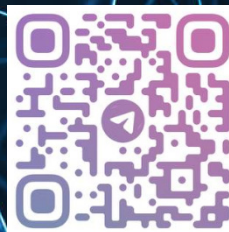
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