STRUCTURAL TRANSFORMATION, VALUE ADDITION, AND WATER PRODUCTIVITY IN UZBEKISTAN'S AGRICULTURAL ECONOMY: A DESCRIPTIVE AGRO-ECONOMIC ASSESSMENT

Maftuna Utkirova Murodovna

International Agriculture University (IAU), Tashkent, Uzbekistan

Management and Development Institute of Singapore (MDIST) Tashkent, Uzbekistan

mmmurodovna888@gmail.com

ORCID ID : 0009-0007-2687-2789

Abstract

The research analyzes the economic role of agriculture in Uzbekistan and its adaptability to achieve higher productivity as well as value through diversification, agro-industrial clustering, and improving irrigation efficiency. This study uses a descriptive evaluation of secondary indicators from the World Bank, ILO, FAOSTAT, Uzbekistan Statistics Agency's data, governmental reports, and previously published researches. The findings rely on the calculations of changes in the shares of agriculture in GDP, employment, year-on-year agricultural export growth rates, cluster yield premiums, and cotton water-productivity. The share of ***agriculture in GDP dropped from 37.09% in 1991 to 16.56% in 2026 thus a total*** decline amounting to 55.35%. The percentage of employment in agriculture decreased from 39.53% in 1994 to 25.20% today which indicates a change of ***36.25%. The proceeds from agricultural exports grew from $2.263 billion in 2026*** to $3.467 which means an increase of 53.19%. The average yield of cotton in cotton and textile branches is equal to 2.89 tons per hectare while it is 2.36 tons per hectare outside this sector thus implying the cotton yield premium amounting to 22.46%. Overall, Uzbekistan is undergoing a shift in the agricultural sector rather than a deletion of agriculture.

Keywords: *agricultural economics; Uzbekistan; Central Asia; structural transformation; cotton; irrigation; agro-industrial clusters; value addition; rural development*

1. Introduction

According to the World Bank's agri-food diagnostics, agriculture accounted for 28% of GDP and 27% of employment in 2019. The data indicated above, obtained from multiple World Bank reports, however, stipulate lower figures for 2025. [2,3]

Agriculture's diminishing share in the economy has economic significance. Such a decline does not necessarily indicate a decrease in agricultural output. Instead, it might occur due to the growing importance of the other sectors of the economy, productivity changes or labor reallocation. Therefore, the question rests not with the future of agriculture's role in Uzbekistan's economy, but whether the sector is changing from being raw material and employment-generating sector to a more productive and value-adding one.

Since 2017, agricultural policy has included trade liberalization, abolition of state quota systems for cotton and wheat, agricultural diversification, support for smallholders, expansion of water-efficient irrigation, and reforms to land-tenure security. [4] These reforms have also encouraged cotton-textile clusters that combine production, processing, and marketing. The reform direction is economically attractive, but institutional risks remain, especially regarding farmer autonomy, contract transparency, access to inputs, water allocation, and distribution of value along the chain.[5]

The objectives of this article are threefold: (1) to describe the long-run structural role of agriculture in Uzbekistan; (2) to assess recent export, clustering, and irrigation-productivity signals; and (3) to identify policy priorities for inclusive agro-economic development in Uzbekistan and comparable Central Asian settings.

2. Literature Review

The literature on agriculture in Central Asia asserts that the post-Soviet reform has not occurred in a uniform manner. Comparative analysis shows that the respective countries show varying combinations of land reform, farm restructuring, state control, and market liberalization in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. [6] In Uzbekistan, the research points out that it is the state of farm restructuring, land institutions, production incentives, and importance of family farms that determine agricultural efficiency. [7]

The recent studies center around the period after 2017. Djanibekov, Herzfeld, and Petriuk write that the government abolished state targets for cotton and wheat, made horticultural exports liberalized, and simplified agricultural modernization while pointing out that issues of land tenure security, farmers' autonomy, and position of small farms remain unresolved. [5] This means that the process of liberalization should be assessed not merely in terms of output level.

A second strand of research examines water scarcity and climate risk. In the Fergana Valley, demonstration fields using improved agronomic and irrigation practices reported cotton water-productivity values ranging from 0.35 to 0.89 kilograms per cubic meter, with an average application efficiency of 78%. [8] A study of Samarkand region found that irrigation and climate variables interact in their effects on wheat and cotton productivity, indicating that water availability alone is not sufficient: irrigation timing and efficiency also matter. [9]

Research on Uzbekistan argues that processing cotton, fruit, vegetables, leather, and other primary products can increase export value, rural employment, infrastructure investment, and household income. [10] The present article combines these three strands, structural transformation, institutional reform, and resource productivity, in one descriptive framework.

3. Data and Methods

The study uses secondary data and published evidence. The principal indicators are: agriculture, forestry, and fishing value added as a share of GDP;

agricultural employment as a share of total employment; the value of crop and livestock exports; reported cotton yield inside and outside cotton-textile clusters; and cotton water-productivity ranges from field studies. The data are drawn from public World Bank-based series, Uzbekistan's Statistics Agency, FAOSTAT-based reporting, policy documents, and peer-reviewed or scholarly publications. [1-4, 8-10]

Data comparability limitation. The indicators have different reference years, definitions, and source systems. The article therefore avoids presenting them as one Synchronized annual dataset. The results should be read as a triangulated national and sectoral assessment, not as a causal time-series model.

4. Results

4.1 Structural transformation

Indicator	Initial observation	Latest observation	Calculated change	Interpretation
Agriculture share of GDP	37.09% (1991)	16.56% (2025)	-55.35%	Agriculture became a smaller share of a diversifying economy
Agricultural employment	39.53% (1994)	25.20% (2025)	-36.25%	Labor is gradually reallocating beyond agriculture
Agricultural exports	$2.263 bn (2023)	$3.467 bn (2024)	+53.19%	Export value rose sharply in the latest comparison
Cotton yield in clusters	2.12 t/ha national average (2018)	2.89 t/ha cluster average	+36.32% vs. 2018 baseline	Cluster areas report higher yields, but causality is not established

Cotton yield outside clusters	2.12 t/ha national average (2018)	2.36 t/ha outside clusters	+11.32% vs. 2018 baseline	Non-cluster yield also improved relative to the baseline

The first result is a structural transformation of the economy. Agriculture's GDP share fell by approximately 55.35% relative to its 1991 level, while its employment share fell by approximately 36.25% relative to 1994. [2, 3] These changes are consistent with movement toward industry and services, but they do not establish that agricultural households are benefiting equally. A lower employment share can coexist with rural underemployment, informality, or migration, while a lower GDP share can coexist with rising output in high-value subsectors.

The FAOSTAT-based series reports crop and livestock exports of approximately $2.263 billion in 2023 and $3.467 billion in 2024, an increase of 53.19% calculated from those values. [11] The result should be treated cautiously because export values can be affected by prices, exchange rates, product composition, and reporting coverage. Nevertheless, it supports the argument that agricultural Modernization should be evaluated through value addition and market access, not only through cultivated area or raw output.

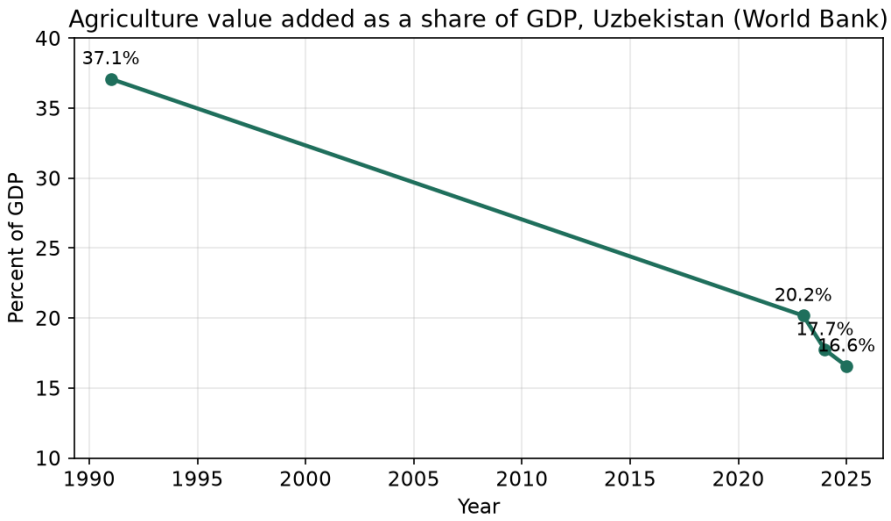


Figure 1. Agriculture value added as a share of GDP, selected observations.

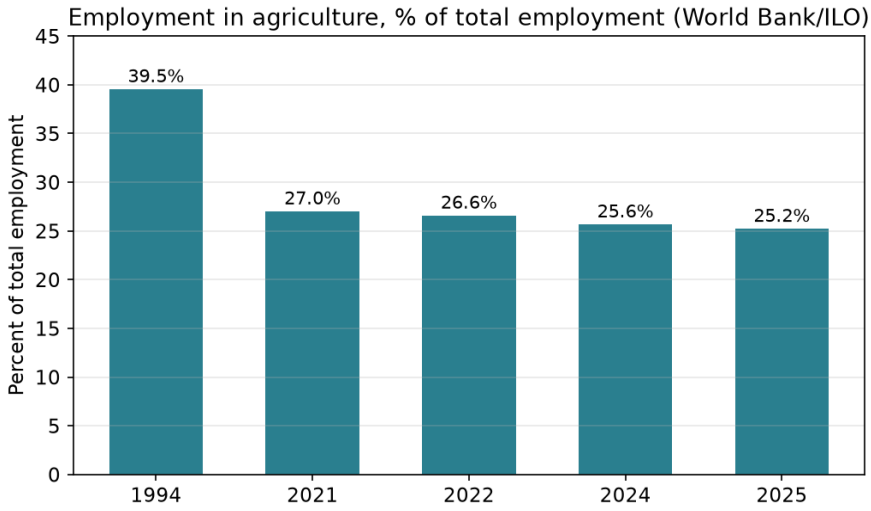


Figure 2. Employment in agriculture, selected observations.

4.2 Reform, agro-industrial clusters, and value addition

Uzbekistan's reform program has shifted towards a strategy that combines liberalization and coordinated value-chain development. The World Bank assessment includes trading liberalization, removing cotton and wheat quotas, diversification, helping small producers, efficient irrigation, and reforming land tenure in the reform agenda. [4] Such a combination differs from the laissez-faire approach because, despite the continuing influence on the state, the focus of the policy has changed to productivity, processing, exports, and participation of the private sector.

The descriptive yield comparison shows a potentially important cluster signal. Reported average raw cotton yield was 2.89 tons per hectare in cluster areas, 0.53 tons per hectare higher than outside clusters, implying an approximate 22.46% premium. [12] A separate report described the cluster average as 0.77 tons per hectare above the 2018 average, implying a 36.32% comparison with the 2.12 tons per hectare baseline. [13] However, cluster farms may differ from non-cluster farms in land quality, capital, irrigation access, management, location, or state support. The observed gap is therefore an association, not evidence that clusterization itself caused the productivity difference.

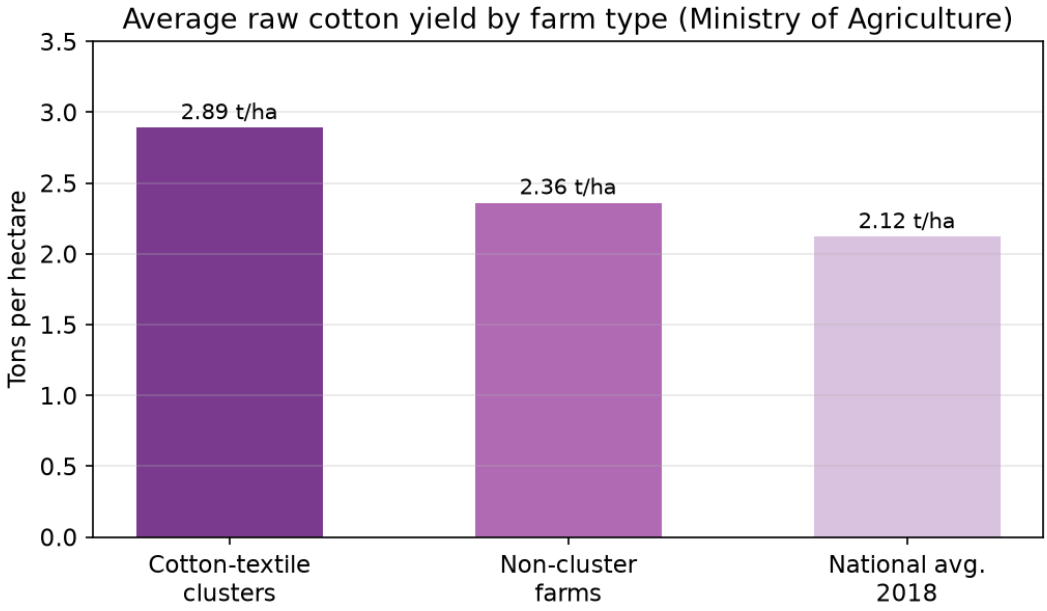


Figure 3. Reported cotton yield comparisons associated with clusterization.

4.3 Water productivity and climate resilience

Water is the key resource linking Uzbekistan's agricultural economy to regional sustainability. Research in Central Asia reports long-term differences in water-use efficiency across crops and countries, while field research in Uzbekistan and neighboring Tajikistan shows substantial variation between farms and irrigation practices. [8, 14]

According to the data obtained at the trials conducted in the fields around the Fergana Valley, the coefficient of efficiency of irrigation of cotton by water varied from 0.35 to 0.89kg/m3 with an average of 78% used. [8] The trials in the Karshi Steppe showed relatively similar values for cotton water productivity in accordance with various methods of irrigation. [15]

Therefore, the implications of such findings are very important for the water policy. In other words, the efficiency of irrigation is based not only on water availability but other aspects as well. Thus, the efficiency of irrigation will depend on field leveling, irrigation scheduling, soil monitoring, technology used, farmer skills, energy costs as well as the provision of incentives for water saving. Hence, the water-efficient technologies that could significantly increase yields but are too

expensive for small-scale farmers may lead them just to the opposite results of making agricultural production less productive while worsening the rural poverty.

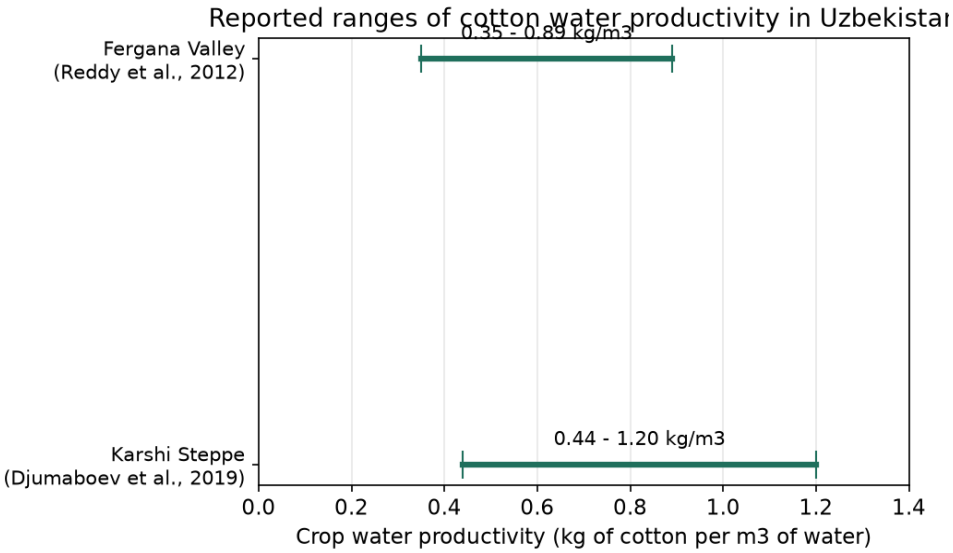


Figure 4. Reported ranges of cotton water productivity in Uzbekistan and the Fergana Valley.

5. Discussion

The findings provide evidence for three conclusions. Firstly, Uzbekistan's agriculture is undergoing a process of structural transformation although agriculture is still important for employment, exports, food security, and welfare in rural areas. Thus, the shift in the share of agriculture in GDP and employment needs to be regarded as a transformation in a relative sense and not as a transformation in an absolute sense.

Secondly, the most efficient means of connection between agricultural production and inclusive growth is to increase value-added. Raw materials (cotton, fresh products, etc.) contribute the least amount of income compared to processed goods (spun yarn, textiles, packaged foods, cold-chain products, etc.). Therefore, the goal of the policy is to keep as many processes of the whole production process as possible domestically while ensuring that farmers obtain proper and fair compensation.

Thirdly, productivity improvement needs both changes in technology and institutions. Clustering and irrigation technologies can enhance the output; however, their results depend on the level of contract enforcement, financial resources availability, transparency of data, land ownership, and farmers' decisions.

Research implications. The next generation of agro-economic studies should move from descriptive comparisons to farm-level identification. A useful design would combine farm surveys with administrative data on yields, input use, water delivery, credit, contract terms, and selling prices.

6. Policy Recommendations

Priority	Recommended action
Make cluster contracts transparent	Publish standard contract terms, quality rules, payment schedules, deductions, dispute procedures, and buyer obligations in accessible Uzbek and local languages.
Protect farmer choice and competition	Allow farmers meaningful choice among buyers and service providers, and monitor concentration so that clusters do not become local monopsonies.
Target water-saving investment to productivity and equity	Prioritize technologies with measurable water savings and yield benefits, while providing credit or targeted subsidies for smallholders who cannot finance adoption.
Expand domestic processing	Support ginning, spinning, textile production, food processing, storage, cold chains, packaging, certification, and logistics rather than focusing only on raw commodity exports.
Strengthen land and investment security	Longer and more predictable land-use rights can encourage soil improvement, orchards, irrigation investment, and farm-level innovation.

Build a public agricultural data system	Integrate farm, crop, water, price, climate, and export data so that policies can be evaluated using consistent indicators across regions and years.

7. Conclusion

Uzbekistan's agricultural economy is changing from a system dominated by strategic commodity production toward a more diversified model based on productivity, processing, exports, and resource efficiency. The descriptive evidence shows a substantial decline in agriculture's relative GDP and employment shares, rapid growth in reported agricultural export value between 2023 and 2024, higher reported cotton yields in cluster areas, and wide variation in cotton water productivity across irrigation settings. The policy challenge is not simply to produce more. It is to produce more value per unit of land and water, distribute that value fairly, and reduce exposure to climate and market riskThe results of this article are descriptive, so a definitive assessment of reform effects requires harmonized farm-level panel data and stronger causal methods.

References

[1] World Bank. (2020). *Uzbekistan: Agri-Food Job Diagnostic*. Washington, DC: World Bank. https://documents1.worldbank.org/curated/en/249531601269906462/pdf/Uzbekistan-Agri-Food-Job-Diagnostic.pdf

[2] TheGlobalEconomy.com. (2026). *Uzbekistan: GDP share of agriculture*. World Bank-based indicator. https://www.theglobaleconomy.com/Uzbekistan/share_of_agriculture/

[3] TheGlobalEconomy.com. (2026). *Uzbekistan: Employment in agriculture*. World Bank-based indicator. https://www.theglobaleconomy.com/Uzbekistan/Employment_in_agriculture/

[4] World Bank. (2022). *Uzbekistan: Review of Agriculture Strategy Implementation in 2020 and 2021*. Washington, DC: World Bank.

https://documents1.worldbank.org/curated/en/099235005262218526/pdf/P1777350ef54ee03f0abb302afebb4015e9.pdf

[5] Djanibekov, N., Herzfeld, T., & Petrick, M. (2024). Agriculture and rural development reforms. In *Agricultural Transformation and Rural Development in Central Asia*. Routledge. https://doi.org/10.4324/9781003473497-5

[6] Bloch, P. C. (2002). *Agrarian reform in Uzbekistan and other Central Asian countries*. Land Tenure Center Working Paper No. 49. University of Wisconsin-Madison. https://doi.org/10.22004/ag.econ.12789

[7] Lerman, Z. (2013). *Structure and performance of agriculture in Central Asia*. Department of Agricultural Economics and Management, The Hebrew University of Jerusalem. https://doi.org/10.22004/ag.econ.164530

[8] Reddy, J. M., Muhammedjanov, S., Jumaboev, K., & Eshmuratov, D. (2012). Analysis of cotton water productivity in Fergana Valley of Central Asia. *Agricultural Sciences, 3*(6), 822-834. https://doi.org/10.4236/as.2012.36100

[9] Babakholov, S., Bobojonov, I., Hasanov, S., & Glauben, T. (2022). An empirical assessment of the interactive impacts of irrigation and climate on farm productivity in Samarkand region, Uzbekistan. *Environmental Challenges, 7*, 100502. https://doi.org/10.1016/j.envc.2022.100502

[10] Horská, E., Pulatov, A., & Pirmatov, K. (2017). Economic aspects of value added agriculture in Uzbekistan. In *Rural Development 2017: Bioeconomy Challenges* (pp. 1050-1053). Vytautas Magnus University. https://doi.org/10.15544/RD.2017.213

[11] Statbase. (2026). *Value of agricultural exports, Uzbekistan*. FAOSTAT-based statistical series. https://statbase.org/data/uzb-agricultural-exports-value/

[12] Reidy, S. (2023). Country focus: Uzbekistan. *World Grain*. https://www.world-grain.com/articles/18051-country-focus-uzbekistan

[13] Khalikov, T., Prus, Y., Chelombitko, T., Urazov, K., Shirinov, U., & Ratynskiy, V. (2023). Cotton textile industry. *E3S Web of Conferences, 452*, 01002. https://doi.org/10.1051/e3sconf/202345201002

[14] Liu, S., Luo, G., & Wang, H. (2020). Temporal and spatial changes in crop water use efficiency in Central Asia from 1960 to 2016. *Sustainability, 12*(2), 572. https://doi.org/10.3390/su12020572

[15] Djumaboev, K., Manthrithilake, H., Ayars, J., Yuldashev, T., Akramov, B., Karshiev, R., & Eshmuratov, D. (2019). Growing cotton in Karshi Steppe, Uzbekistan: Water productivity differences with three different methods of irrigation. *Proceedings of the 9th International Micro Irrigation Conference*, 391-397. https://archive.iwmi.org/wle/growing-cotton-karshi-steppe-uzbekistan-water-productivity-differences-three-different-methods/

Appendix A. Calculation notes

Calculation	Result
GDP share change	(16.56 - 37.09) / 37.09 x 100 = -55.35%.
Employment share change	(25.20 - 39.53) / 39.53 x 100 = -36.25%.
Agricultural export growth	(3,467,230,190 - 2,263,401,480) / 2,263,401,480 x 100 = 53.19%.
Cluster yield premium	(2.89 - 2.36) / 2.36 x 100 = 22.46%.
Cluster yield versus 2018 baseline	(2.89 - 2.12) / 2.12 x 100 = 36.32%.