

RISK MANAGEMENT IN THE WHEAT INDUSTRY OF UZBEKISTAN AND THE DEVELOPMENT OF ITS STRATEGY

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Abstract. Wheat is the strategic food-security commodity of Uzbekistan. According to FAO, aggregate cereal production in 2025 reached an above-average 8.9 million tonnes, yet the country still imports around 22 percent of annual consumption from Kazakhstan. Building on ISO 31000 and COSO ERM, this thesis systematically analyses the main sectoral risks — climatic, water, soil salinisation, price volatility, import dependence, and agro-biotic — and proposes a three-tier (micro–meso–macro) risk-management strategy. The analysis draws on Scopus-indexed sources together with FAO GIEWS, the World Bank, USDA FAS, and the State Statistics Committee of Uzbekistan.

Keywords: *wheat, food security, agricultural risk, drought, soil salinisation, ISO 31000, COSO ERM, Uzbekistan, cluster, import dependence.*

Introduction

Wheat anchors both the Uzbek diet and the country's food-security policy. Following the post-independence expansion of the cereal sector, sown area grew from 0.63 million hectares in 1991 to 1.31 million hectares by 2019, with average yields stabilising around 4.6 t/ha [1]. FAO estimates 2025 cereal output at 8.9 million tonnes, of which 7.3 million tonnes are wheat [2]. Despite this growth, three structural pressures threaten long-term sustainability. First, Central Asia is among the regions most exposed to climate change, with projected wheat-yield losses of 13–32 percent by 2050 [3]. Second, irrigated agriculture accounts for 90 percent of national water withdrawals while flows in the

Amu Darya and Syr Darya basins are declining [4]. Third, the abolition of the state procurement system in 2022 has shifted farmers into a transition period requiring market adaptation [5]. Without a systematic risk-management framework, the gross margin of private wheat producers — currently around USD 273/ha [1] — remains highly vulnerable. The relevance of this study lies in adapting ISO 31000 [6] and COSO ERM [7] to Uzbek conditions to deliver an evidence-based response to these compound risks.

Methodology

The study uses a mixed-methods secondary data design. Sources are organised in three tiers: (i) Scopus- and Web-of-Science-indexed publications; (ii) reports from international organisations (FAO GIEWS, the World Bank, USDA FAS, UNEP, IFPRI, ICARDA); and (iii) open data from the State Statistics Committee and the Ministry of Agriculture of Uzbekistan, covering 2013–2025 with selected long-run series from 1991. Analytical techniques include structured literature review (PRISMA), an ISO 31000-based probability × impact risk matrix, and triangulation of quantitative indicators across independent sources, with the most recent international data prioritised in cases of conflict.

Results and Discussion

The analysis reveals a dual dynamic: while output and yields have continued to grow, structural vulnerabilities — import dependence, water scarcity, and thin farm-level margins — persist. Six risk categories are identified using the Hardaker et al. typology [8] and the ISO 31000 framework: climatic, water, soil-salinisation, market and price, import-and-geopolitical, and institutional risk.

Climatic and drought risk dominate the exposure profile. Uzbekistan ranks among the world's twenty most drought-prone countries [4], and rainfall in the main grain regions in October–November 2024 fell 20 percent below average, materially affecting the 2025 winter-wheat harvest [2]. Each 1°C increase during the flowering stage can

reduce yield by up to 20 percent [9]. Water scarcity reinforces this exposure: water productivity is among the world's lowest (USD 0.6 per m³ versus a global average of USD 15 per m³) [10]. Soil salinisation now affects roughly 60 percent of pastureland [11], and integrated climate–salinity modelling projects a substantial wheat supply–demand gap by the end of the twenty-first century under SSP3-RCP4.5 [12].

Market risks have intensified during the post-2020 liberalisation. After the abolition of state procurement and price controls in 2022, regional wheat-price re-equilibration following a shock now takes 2.3 months, directly straining farmers' working capital [13]. On the import side, wheat and flour imports reached around 3.5 million tonnes in 2024/25, with flour imports rising 70 percent over the decade and Kazakhstan acting as a single dominant supplier [14] — a textbook single-supplier vulnerability that periodic Kazakh export restrictions have already exposed. Institutional risk persists despite the formal end of state procurement: research conducted in 2023–2025 documents that, at the district level, farmers are in some cases still pressured to sell to a designated cluster [15], constraining price discovery and customer choice.

Proposed Three-Tier Risk-Management Strategy

Because these risks are systemic, they cannot be resolved at the farm level alone. Adapting ISO 31000:2018 [6] and COSO ERM [7] to Uzbek conditions, the thesis proposes a three-tier strategy.

Micro tier (farm/cluster): introduction of drought-tolerant wheat varieties developed with ICARDA [1], drip irrigation (subsidised since 2022), crop rotation (cotton–wheat–legumes), and precision-agriculture practices.

Meso tier (markets and financial instruments): weather-index insurance, credit-linked insurance bundles, the development of a regional grain exchange to enable forward and futures contracts, and transparent management of state strategic reserves [13].

Macro tier (state policy and institutional framework): elimination of the de facto remnants of state procurement [15], adoption and localisation of a National Drought Management Plan, financing of national AKIS centres [1], diversification of import sources beyond Kazakhstan (Russia, Pakistan), and WTO-aligned trade policy.

Conclusion

Three findings stand out. First, although wheat-sector output has consolidated at 7.3 million tonnes in 2025, climate change and water scarcity threaten long-term sustainability; without localised adaptation, the projected 13–32 percent yield decline [3] is highly likely. Second, the 2018–2022 price liberalisation was strategically correct but introduced new transitional risks — price volatility, weak regional market integration, and the persistence of de facto cluster ties [13], [15] — that limit the effectiveness of farm-level technical solutions until they are addressed at the institutional and macro levels. Third, the proposed three-tier strategy aligned with ISO 31000 [6] and COSO ERM [7] offers a coherent path to long-term economic and food-security objectives, contingent on building a high-quality farm-level data infrastructure, removing residual procurement coercion, and developing a functioning regional grain market. The principal limitation of this study is its reliance on secondary data; farm-level primary research using panel data is the necessary next step to consolidate these findings into a quantitative model.

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