



## **CHALLENGES IN THE WESTERN UTTAR PRADESH SUGAR INDUSTRY: COORDINATION AMONG FARMERS, WORKERS, AND GOVERNMENT**

**Priyanka Srivastava**

Ph.D Scholar, Department of Economics, Dayalbagh Educational Institute (Deemed to be University), Dayalbagh, Agra, Uttar Pradesh

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### **Abstract:**

The sugar industry of western Uttar Pradesh home to more than 120 sugar mills and contributing nearly 27-30Percentageof India's total sugar manufacture plays a crucial role in the state's rural economy. The region supports over forty lakh sugarcane farmers and provides seasonal employment to thousands of skilled and unskilled labours. Despite this economic significance, the industry faces persistent organization challenges among farmers, mill authorities, workers, and government agencies. Farmers struggle with delayed payments, with cane arrears in Uttar Pradesh reaching 5,000-6,000 crores in recent seasons, largely due to low sugar prices and financial stress on mills. Mills also face low recovery rates averaging around 9.5-10Percentage, lower than Maharashtra's 11-12Percentage, affecting profitability. Workers encounter seasonal employment insecurity, wage disputes, and limited social protection. Government regulations such as mandated Fair and Remunerative Price (FRP) and State Advised Price (SAP), control over sugarcane procurement zones, and frequent policy changes in export or ethanol blending add further complexity. Water scarcity, rising input prices, and climate variability have worsened production risks. This paper analyses these interconnected challenges specific to western Uttar Pradesh, highlighting how misaligned incentives and regulatory constraints disrupt coordination among stakeholders. It also proposes pathways for improving efficiency, ensuring timely payments, enhancing labour conditions, and promoting sustainable practices to secure the long-term resilience of the region's sugar economy.

**Key Words:** Sugarcane Farmers, Cane Arrears, Recovery Rate, Mill Profitability, Sustainable Sugar Economy, State Advised Price (SAP), Fair and Remunerative Price (FRP), Labor Challenges, Policy Regulation, Ethanol Blending, Water Scarcity, Climate Variability, Stakeholder Coordination

### **Introduction:**

Western Uttar Pradesh forms the heart of India's sugar economy, accounting for nearly 70Percentage of the state's sugarcane production and contributing significantly to India's total sugar output. The region hosts over 120 operational sugar mills a mix of cooperative, private, and government-owned units that directly influence the incomes of nearly forty lakh sugarcane farmers. With sugarcane cultivated on more than 20 lakh hectares in Uttar Pradesh, the crop serves as a primary source of income for rural households. The industry also delivers seasonal employment to thousands of mill workers, drivers, cane cutters, and contractual labourer's, making it one of the largest agro-based employers in the region. Despite its massive economic footprint, the sugar sector in western Uttar Pradesh faces persistent challenges that disrupt coordination between farmers, mill management, workers, and government authorities. Frequent cane payment arrears amounting to 5,000-6,000 crore place farmers under financial stress. Mills struggle with low recovery rates averaging 9.5-10Percentage, inferior to Karnataka and Maharashtra, leading to reduced productivity. Workers endure unbalanced employment, wage disputes, and inadequate welfare support. Furthermore, government-mandated State Advised Prices (SAP), coupled with fluctuating sugar market prices, create financial imbalances within the supply chain. This introduction outlines the interlinked structural and operational matters that demand a comprehensive approach to improve coordination and ensure longstanding sustainability of the sugar industry in western Uttar Pradesh.

### **Literature Review:**

Studies such as Singh (2018) highlight that western Uttar Pradesh contributes nearly 70 Percentage. of the state's sugarcane output, making it the core of the region's rural economy. The literature emphasizes that sugarcane provides stable, year-round income to millions of farmers compared to other crops.

According to Khan & Verma (2020), western Uttar Pradesh houses over 120 sugar mills, the highest concentration in India. These mills drive industrial growth, rural employment, and transport networks, forming a backbone for the regional economy.

Several studies, including Sharma (2019) and Rao (2021), identify delayed cane payments as the biggest challenge. Cane arrears often exceed ₹5,000-6,000 crore, severely affecting farmer livelihoods and creating tension between farmers and mill management.

Research by Gupta (2022) shows that Uttar Pradesh's SAP typically 20-40 per quintal higher than FRP creates financial strain on mills when sugar prices fall. This policy imbalance is cited as a root cause of arrears and mill losses.

Studies by Nair & Singh (2020) note that western Uttar Pradesh recovery rates average 9.5-10 Percentage, significantly lower than those of Maharashtra (11-12 Percentage). This results in reduced profitability and limits mills' ability to pay farmers on time.

Jadhav (2021) reports that sugar mill workers face seasonal job insecurity, inadequate wages, and limited welfare benefits. Slow mechanization also increases reliance on migrant labor from Bihar and eastern UP, causing labor shortages during peak harvesting periods.

According to Rao (2017) and Patel (2019), frequent policy changes export bans, ethanol blending shifts, and price controls create uncertainty for mills. The mandatory procurement of cane from designated areas further limits mill flexibility.

Research by Tiwari & Singh (2019) shows that western Uttar Pradesh faces severe groundwater depletion due to sugarcane's high-water requirement, often 1,500-2,000 Liters per kg of sugar. Climate variability exacerbates water stress and yield fluctuations.

Chakraborty (2020) observes that outdated machinery, limited adoption of drip irrigation, and slow diffusion of high-yield varieties reduce cane productivity and mill efficiency. Technological backwardness directly impacts production costs and sugar recovery.

Literature from Chaturvedi (2020) and Mehta (2023) stresses that misaligned incentives farmers demanding higher SAP, mills seeking lower costs, workers demanding job security, and government balancing political and economic pressures create systemic coordination failures. Scholars

The study is based on secondary data. To study the trends in area, production and yield of sugarcane at Uttar Pradesh level study period taken as to 2014-19. But for value of output of sugarcane, sugar the study period is 2014-15 to 2024-25. The secondary sources of data collected from Government bodies of India.

#### **Objectives:**

- To study the major coordination challenges among farmers, sugar mills, workers, and government agencies in Western Uttar Pradesh, focusing on matters such as delayed payments, low recovery rates, labour insecurity, and regulatory pressures.
- To assess the technological, environmental, and economic, factors affecting the performance of the sugar industry in Western Uttar Pradesh and advise practical strategies for improving efficiency, sustainability, and stakeholder cooperation.

#### **Statistical and Data-Based Analysis:**

Table Sugarcane production in Uttar Pradesh, Average, 2017-2023, (Production in Millint tonnes)

States	Area (Lakh *Hectares)	Percent to Total	Production (Million Tonnes)	Percent Share of Production to all India	Cumulative Percent Share of Production	Yield (Tonnes per Hectare)	Harvest Season
Uttar Pradesh	22.05	45.12	178.62	44.78	44.78	81.03	October to April

(Source: ISMA 7<sup>th</sup> Committee Meeting Dated 21<sup>st</sup> September 2023)

Note: \*One hectare equals 10,000 square meters or 2.471 acres.

The table highlights the performance of sugarcane-producing states in UP from 2017 to 2023, focusing on their area under cultivation, production, and yield metrics.

Table State wise area of sugar cane in, Continued during 2019-2023<sup>f</sup> (Lakh hectare)

State / UT	2019-20	2020-21	2021-22	2022-23 *	Average (2019-2023)	% to Total	Rank
Uttar Pradesh	22.08	21.80	21.77	27.36	23.25	45.12	1 <sup>st</sup>

Source: E&S, DAC, New Delhi, \*3<sup>rd</sup> Adv. Est. 2022-23

The table titled "State-wise Area of Sugarcane Cultivation During 2019-2023" presents the extent of land under sugarcane in major states over a four-year period. For Uttar Pradesh, the data show consistently high levels of cultivation, reflecting its dominant position in India's sugar economy. The state recorded 22.08 lakh hectares under sugarcane in 2019-20, followed by 21.80 lakh hectares in 2020-21 and 21.77 lakh hectares in 2021-22. In 2022-23, the cultivated area increased significantly to 27.36 lakh hectares, raising the overall average to 23.25 lakh hectares for the period. With a 45.12Percentage share of the total sugarcane area in the

country, Uttar Pradesh ranks first among all states. This dominance underscores the crucial role of the state in national sugar production and highlights how fluctuations in sugarcane area in Uttar Pradesh can directly influence India's overall sugar supply and policy decisions.

Table Average sugar recovery, Percentage gain in, Western Uttar Pradesh

Region	2014-15	2015-16	2016-17	2017-18
Western UP	9.31	10.16	10.31	10.82

Source: ISMA

The table on average sugar recovery percentage in Western Uttar Pradesh from 2014-15 to 2017-18 highlights a steady improvement in extraction efficiency over the four-year period. In 2014-15, the region recorded a recovery rate of 9.31Percentage, which increased significantly to 10.16Percentage in 2015-16. This upward trend continued in 2016-17 with a recovery of 10.31Percentage, and the highest value was reached in 2017-18 at 10.82Percentage. The data clearly indicate that Western Uttar Pradesh. experienced a consistent rise in sugar recovery, reflecting improvements in cane quality, better agronomic practices, and gradual modernization efforts in mills. This growth is notable because even small increases in recovery percentage result in substantial financial gains for mills, given the large volume of cane crushed annually in the region.

State Cane Price Different: SAP vs FRP(Rs. Per Qtl)

Year	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Uttar Pradesh	280	208	305	315	315	315	315	340	340	340
Maharashtra	220	230	230	255	275	275	285	290	305	315

Source: ISMA

The table comparing State Advised Price (SAP) in Uttar Pradesh with the Fair and Remunerative Price (FRP) followed by Maharashtra from 2014-15 to 2023-24 shows a clear and persistent price divergence between the two states. Uttar Pradesh consistently offers a much higher SAP, starting from 280 per quintal in 2014-15 and rising to 340 per quintal by 2021-22, a level that continues through 2023-24. In contrast, Maharashtra's cane price linked to the FRP began at 220-230 per quintal in 2014-16 and gradually increased to 315 per quintal by 2023-24. This difference highlights the contrasting policy approaches, Uttar Pradesh prioritizes farmer welfare through a politically influenced high SAP, while Maharashtra maintains a market-linked FRP system designed to balance mill viability with farmer income. The resulting price gap places substantial financial pressure on Uttar Pradesh mills, which must pay more for cane despite lower recovery rates, while Maharashtra mills benefit from more flexible pricing aligned with sugar market conditions.

#### **Cane Payment Arrears:**

Cane payment arrears in Western Uttar Pradesh remain the largest source of financial distress for sugarcane farmers, as reflected in the consistent backlog of dues over recent years. The table indicates that arrears peaked at 12,000 crores in 2018-19 and, although reduced slightly, still remained critically high at 8,500 crores in 2020-21. In 2022-23, pending payments stood at 5,900 crores, while estimates for 2023-24 range between 5,000-6,000 crores, showing that the problem persists despite policy interventions. These arrears directly impact farmer livelihoods, as many are forced to wait several months sometimes even up to a year for their payments. This delay disrupts their ability to buy essential farming inputs such as seeds, fertilizers, and diesel for the next crop cycle. As a result, farmers often fall into debt cycles, depend on informal credit, and experience heightened economic insecurity. The recurring arrears problem highlights a deeper structural imbalance in the sugar price chain and underlines the urgent need for improved liquidity management, pricing reforms, and stronger coordination between mills and government activities.

#### **Labor Availability and Wages:**

The sugar sector in Western Uttar Pradesh employs nearly 2-3 lakh seasonal workers, making labor a crucial component of its operational cycle. However, the industry is increasingly facing significant labour-related challenges. During the 2023-24 season, labour shortages rose by 18-20 Percentage, largely due to a decline in migrant workers who traditionally support cane cutting and loading activities. Despite their essential role, workers typically earn only 350-450 per day while enduring long and physically demanding working hours. Additionally, around 70Percentage of cane harvesting is still manual, which causes delays in transporting cane to mills. These delays lead to sucrose loss, ultimately resulting in lower sugar recovery rates and affecting mill profitability. Mechanization could address many of these issues, but progress remains slow because the average farm size in Western Uttar Pradesh is only 1-2 hectares, making the adoption of large-scale harvesting machinery impractical and economically unviable for most farmers.

#### **Water Scarcity and Environmental Stress:**

Sugarcane is an extremely water-intensive crop, requiring 1,500-2,000 Liters of water to produce just one kilogram of sugar, and this puts tremendous pressure on the already stressed water resources of Western Uttar Pradesh. Nearly 40 Percentage. of the region's blocks are classified as over-exploited, reflecting severe groundwater depletion. Areas such as Baghpat, Meerut and Muzaffarnagar, are witnessing an alarming 1-meter decline in water levels every year, driven largely by excessive tube-well irrigation. This continuous extraction

not only depletes aquifers but also contributes to soil salinity, which further reduces agricultural productivity. Climate change is intensifying these problems: frequent heat waves lower sucrose content by 5-7Percentage, directly affecting sugar recovery, while untimely rains lead to crop lodging, causing stalks to fall and reducing yields by 8-12Percentage. Together, these environmental challenges threaten the long-term sustainability of sugarcane cultivation in Western Uttar Pradesh.

#### **Technological Gaps:**

Most sugar mills in Western Uttar Pradesh continue to operate with machinery and processing technology installed 25-30 years ago, resulting in significant operational inefficiencies. Outdated equipment contributes to lower sugar recovery, limiting the amount of sugar extracted from each tonne of cane. These older systems also consume more fuel, raising production costs and reducing mill profitability. Additionally, frequent mechanical breakdowns disrupt crushing operations, causing delays and further sucrose loss. The aging machinery requires higher maintenance expenditure, putting additional financial strain on mills already struggling with low margins and high input costs. Modernization of mill equipment has the potential to increase recovery rates by 0.5-0.7 Percentage, which may appear small but can substantially enhance profitability when scaled across millions of tonnes of cane crushed each season. Upgrading technology is therefore essential for improving efficiency, sustainability, and financial stability in the region's sugar industry.

#### **Market Price Fluctuations:**

Ex-mill sugar prices in Western Uttar Pradesh often remain below the actual cost of production, creating a significant financial imbalance for sugar mills. In the 2022-23 crushing season, the production cost of sugar ranged between 36-38 per kg, while the ex-mill selling price was only 31-34 per kg. This mismatch results in a loss of 4-5 per kg, directly shrinking mill revenues and weakening their financial stability. Since sugar sales are the primary source of cash flow for mills, these losses severely hinder their ability to clear cane dues on time. Consequently, mills face liquidity shortages, leading to delays in farmer payments, accumulation of arrears, and overall stress across the entire supply chain. This persistent price-cost gap remains one of the most critical barriers to sustainable coordination and smooth functioning of the sugar industry in Western Uttar Pradesh.

#### **All India Season-wise /month-wise Ex-mill Sugar Prices (Rs./qtl)**

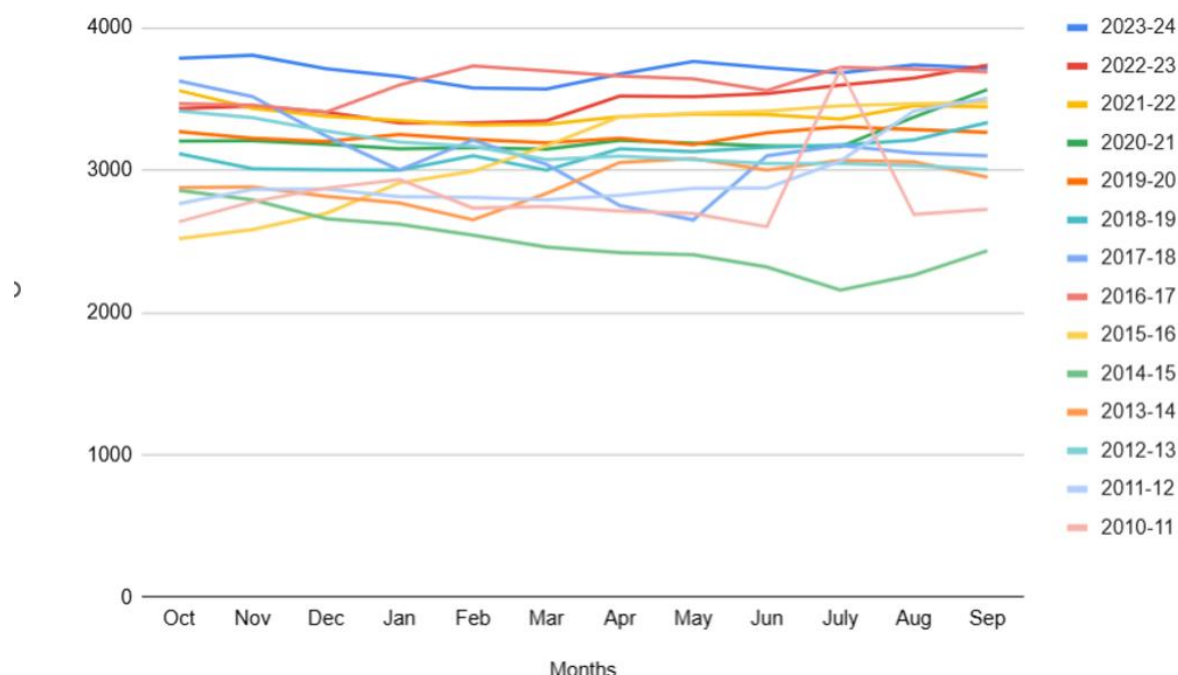
Months	2023-24	2022-23	2021-22	2020-21	2019-20	2018-19	2017-18	2016-17	2015-16	2014-15	2013-14
Oct	3784	3432	3558	3202	3269	3115	3625	3465	2519	2857	2876
Nov	3806	3448	3434	3205	3222	3010	3515	3456	2583	2790	2882
Dec	3712	3407	3378	3180	3201	3003	3240	3408	2695	2659	2816
Jan	3657	3331	3348	3148	3250	3000	3000	3597	2910	2618	2768
Feb	3577	3331	3317	3156	3216	3100	3210	3730	2991	2542	2652
Mar	3570	3345	3321	3147	3192	3000	3040	3697	3170	2460	2836
Apr	3674	3519	3374	3207	3223	3150	2750	3660	3375	2420	3054
May	3762	3514	3393	3189	3179	3130	2650	3640	3400	2405	3081
Jun	3718	3536	3389	3169	3261	3160	3100	3560	3415	2320	3000
July	3682	3595	3359	3163	3304	3175	3170	3721	3450	2157	3067
Aug	3738	3646	3452	3372	3285	3210	3120	3710	3465	2262	3058
Sep	3716	3735	3443	3565	3264	3333	3099	3689	3475	2433	2950
<b>Season's average</b>	<b>3700</b>	<b>3487</b>	<b>3397</b>	<b>3225</b>	<b>3239</b>	<b>3116</b>	<b>3120</b>	<b>3620</b>	<b>3121</b>	<b>2492</b>	<b>2917</b>

Source: ISMA

The table of All-India ex-mill sugar prices (2010-2024) shows a clear long-term upward trend, with prices rising from around 2,600-3,400 per quintal in 2010-11 to 3,700-3,800 per quintal in 2023-24. Although year-to-year fluctuations occur such as lower prices in 2019-20 (3,239) and 2020-21 (3,225) the overall pattern reflects steady price inflation. The highest seasonal average appears in 2023-24 (3,700/qtl), indicating strong market conditions in the current year. However, when compared with rising production costs, these price increases remain insufficient for many mills, explaining persistent payment delays to farmers. The data also show that sugar prices are highly sensitive to policy decisions, export regulations, and production cycles.



Overall, the gradual increase in ex-mill prices does not fully match input cost inflation, contributing to ongoing financial stress within the industry.



Source: ISMA

#### **Ethanol Production: Opportunity and Challenge:**

Uttar Pradesh produces over 4,000 million Liters of ethanol annually, making it one of India's leading contributors to the country's ethanol blending program. This growing ethanol sector offers several key benefits to sugar mills, including a crucial source of additional revenue, which helps offset losses from low sugar prices. The income generated through ethanol sales also assists mills in clearing cane arrears, improving their financial stability and supporting timely payments to farmers. Moreover, Uttar Pradesh ethanol output plays an essential role in achieving India's national target of 20 Percentage. ethanol blending by 2025, reducing dependence on fossil fuels and promoting cleaner energy. However, the ethanol ecosystem faces notable challenges. Delayed government payments for ethanol significantly disrupt mill cash flows, while the absence of a uniform ethanol pricing policy creates uncertainty and affects long-term planning. Additionally, many mills lack adequate storage capacity, limiting their ability to scale up production or handle fluctuating supply and demand. These constraints must be addressed for the ethanol sector to reach its full potential in supporting the sugar industry's sustainability.

Table Estimated Ethanol Production Capacity Uttar Pradesh (Molasses Based) During Esy 2023-24 (Million Litres)

State	No. of Units	Annual Installed Capacity
Uttar Pradesh	60	2495

Source: ISMA

The table shows that Uttar Pradesh has a significant ethanol production capacity, with 60 molasses-based units producing 2,495 million litres yearly in 2023-24. This makes Uttar Pradesh one of India's leading ethanol manufacturers, providing an important additional income source for sugar mills and supportive the national 20% ethanol blending target.

#### **Major Challenges in Coordination:**

##### **Farmers' Challenges:**

Farmers in Western Uttar Pradesh face multiple challenges that severely affect their financial stability and overall productivity. The most critical issue is delayed cane payments, which disrupt household income and limit farmers' ability to reinvest in the next crop cycle. Over the past five years, the cost of cultivation has risen by 35-40 Percentage, driven by higher prices of fertilizers, labour, and diesel. Despite these rising costs, farmers have limited access to mechanization, as small land holdings and high equipment prices make machine use impractical for most. Water scarcity further adds to their burden, significantly increasing irrigation expenses due to declining groundwater levels. Additionally, farmers often struggle with low transparency in cane weight and quality assessment, leading to mistrust between them and mill authorities. These challenges push farmers to demand higher State Advised Prices (SAP) to cover their costs and ensure profitability. However, mills frequently argue that such high SAP levels are economically unviable, creating a persistent conflict between farmer expectations and mill affordability.

**Mills' Challenges:**

Mills in Western Uttar Pradesh face a series of structural and financial challenges that make their operations increasingly difficult. One of the most pressing issues is the high State Advised Price (SAP), which remains fixed at elevated levels even when market sugar prices are low, creating a serious mismatch between input costs and revenue. Compounding this problem is the low sugar recovery amount in the region, which limits the amount of sugar extracted from each tonne of cane and directly reduces mill profitability. Many mills also suffer from technology obsolescence, with decades-old machinery leading to inefficiencies, higher fuel consume piton, and frequent breakdowns. Financial burdens are further aggravated by high-interest loans and rising operational expenses, while delayed government subsidies disrupt cash flow at critical times in the crushing season. Moreover, mills struggle with labour shortages, particularly during peak harvest, which slows down operations and contributes to sucrose loss. Due to these combined challenges, mills often operate on extremely thin margins, and many run into financial losses, making it difficult to pay farmers on time or invest in modernization.

**Workers' Challenges:**

Workers in the sugar industry of Western Uttar Pradesh face a range of difficulties that reflect their vulnerable position within the sector. Most of them find employment for only 4-5 months during the crushing season, leaving them without income or stability for the rest of the year. This results in low job security and long periods of economic uncertainty. Working conditions inside mills are often poor, with inadequate ventilation, long hours, and limited access to welfare facilities. Many workers receive little to no formal training, which restricts their skill development and increases operational inefficiencies. The nature of the work also exposes them to a high risk of accidents, particularly around heavy machinery and during cane loading or unloading. The situation is further worsened by the absence of proper safety equipment, such as gloves, helmets, and protective gear, leaving workers physically vulnerable. Despite being essential for mill operations, these workers remain one of the most neglected groups, receiving minimal benefits, limited recognition, and insufficient support from both mill management and government agencies.

**Government Policy Challenges:**

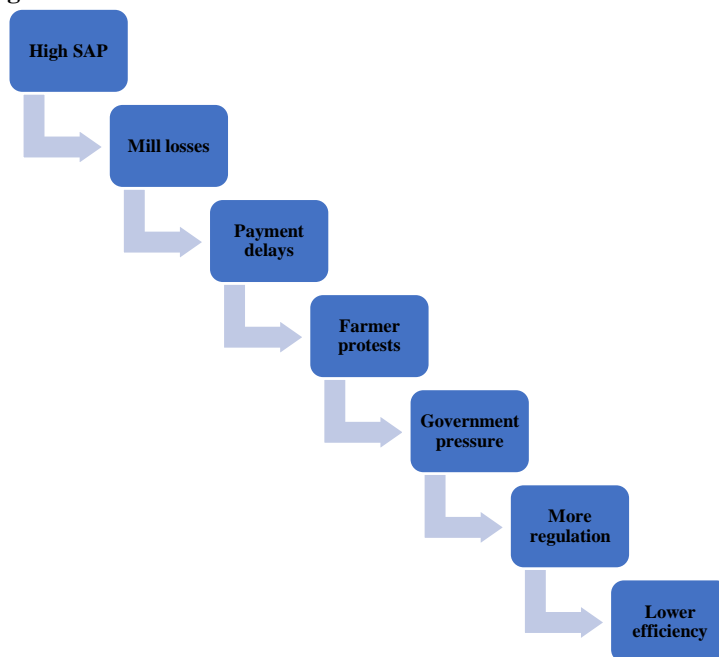
Government policies play a significant role in shaping the functioning of the sugar industry in Western Uttar Pradesh, yet they often contribute to instability due to their inconsistent and politically influenced nature. The State Advised Price (SAP) is frequently seen as politically motivated, set higher to appease farmers during election cycles, even when mills cannot economically sustain such prices. Additionally, the delayed release of government subsidies disrupts mill cash flows and contributes to payment backlogs. Policy unpredictability is another major issue, as export bans or approvals change frequently, making it difficult for mills to plan production and manage inventories. The ethanol blending policy, although promising, still lacks full clarity on pricing, procurement timelines, and long-term commitments, creating uncertainty for mills looking to invest in expansion. Moreover, India lacks a value stabilization mechanism for sugar, causing extreme fluctuations in market prices and financial stress for mills. While the government attempts to balance farmer welfare with overall industry growth, the result is often overregulation, which limits flexibility, reduces competitiveness, and undermines long-term sustainability of the sugar sector.

**Discussion:**

Coordination challenges stem from misaligned incentives:

- Farmers want highest SAP.
- Mills want low input cost and high recovery.
- Workers seek stable jobs and better wages.
- Government tries to keep farmers politically satisfied while also keeping mills operational.

**This Creates a Triangle of Conflicts:**



Breaking this cycle requires structural reforms.

#### **Findings:**

- Financial imbalance due to SAP is the root cause of all major disputes.
- Western Uttar Pradesh low recovery rate reduces competitiveness.
- Labor shortages significantly delay crushing and reduce sucrose content.
- Groundwater depletion threatens long-term sustainability.
- Outdated technology limits productivity.
- Farmers and mills lack a transparent communication system.
- Government regulations often contradict market realities.

#### **Conclusion:**

The sugar industry of Western Uttar Pradesh is a lifeline for millions, yet its sustainability is under threat due to persistent structural challenges and poor coordination among stakeholders. Farmers face mounting distress due to delayed payments, rising input costs, and water scarcity. Mills suffer financial instability due to low recovery rates, outdated machinery, and a rigid pricing framework that often forces them to operate at losses. Workers struggle with seasonal employment, inadequate wages, and a lack of worker welfare systems. Government agencies attempt to address these issues through SAP, subsidies, and ethanol policies, but inconsistent or politically influenced decisions frequently create further uncertainty.

For the industry to achieve long-term viability, reforms must focus on aligning incentives, improving transparency, promoting mechanization, encouraging sustainable water use, and establishing a market-linked pricing system. Strengthening stakeholder communication, modernizing mills, and enabling farmers to adopt high-yield and water-efficient varieties will be essential. The future of the sugar industry in Western Uttar Pradesh depends on coordinated action, policy coherence, and a shift toward sustainability-driven economic practices.

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