Indian Public Distribution System: An Analysis

A POWER BI PROJECT REPORT

Submitted to
DR. PIYUSH CHAUHAN
Associate Professor
Department of Computer Science & Engineering
Symbiosis Institute of Technology, Nagpur Campus

Submitted by
SUJAL JUNGHARE
VI SEM
PRN: 22070521089
Department of Computer Science & Engineering
Symbiosis Institute of Technology, Nagpur Campus

Under the Guidance of
AMIT MAKODE SIR

Course Name: *Power BI*
Course Code: *TE7284*

॥वसुधैव कुटुम्बकम्॥

SYMBIOSIS
INSTITUTE OF TECHNOLOGY, NAGPUR

Table of Contents

I) Objective

The primary objective of this Power BI dashboard is to analyse the efficiency and trends in the **Public Distribution System (PDS)** in India, focusing specifically on wheat and rice distribution. The dashboard aims to provide stakeholders with a clear, data-driven understanding of allocation vs. distribution, temporal patterns, and regional differences.

II) Dashboard Features

Interactive Navigation Pane: A sidebar with toggle icons that switch between:

 **Overview View**

 **Location View**

 **Time View**

Dynamic Filters: Filters for states and districts for granular analysis.

Geographic Visuals: Integration of maps using Bing Maps and OpenStreetMap.

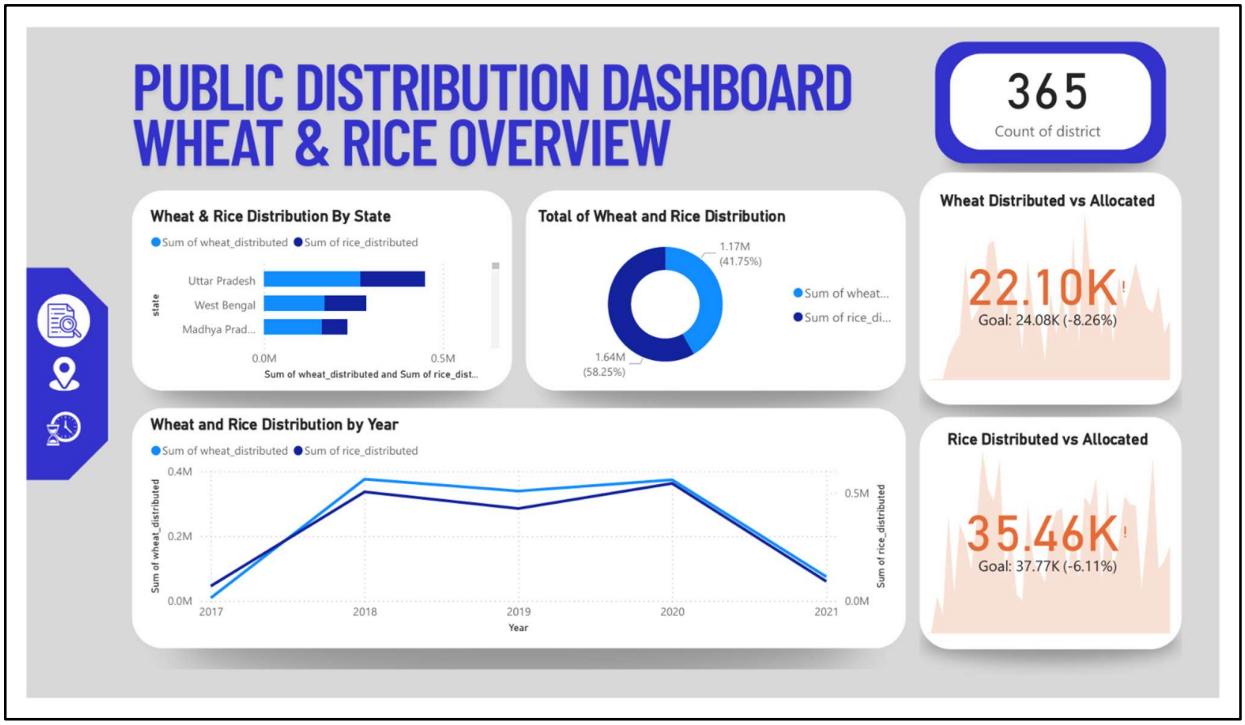
Comparative Visuals: Allocation vs. Distribution, Distribution Efficiency, and Regional Split.

Clean, Consistent Layout: Consistent colour palette and layout for user-friendly navigation.

III) View-wise Analysis

A) Overview View – System Summary at a Glance

The **Overview View** presents a high-level summary of the Public Distribution System's performance across India, focusing on two key staples: wheat and rice. This view offers key performance indicators (KPIs), trends across time, commodity share proportions, and the overall distribution spread across top states. It's designed to give users a **quick but comprehensive understanding** of how well the PDS is functioning nationally.



Key Visuals & Insights:

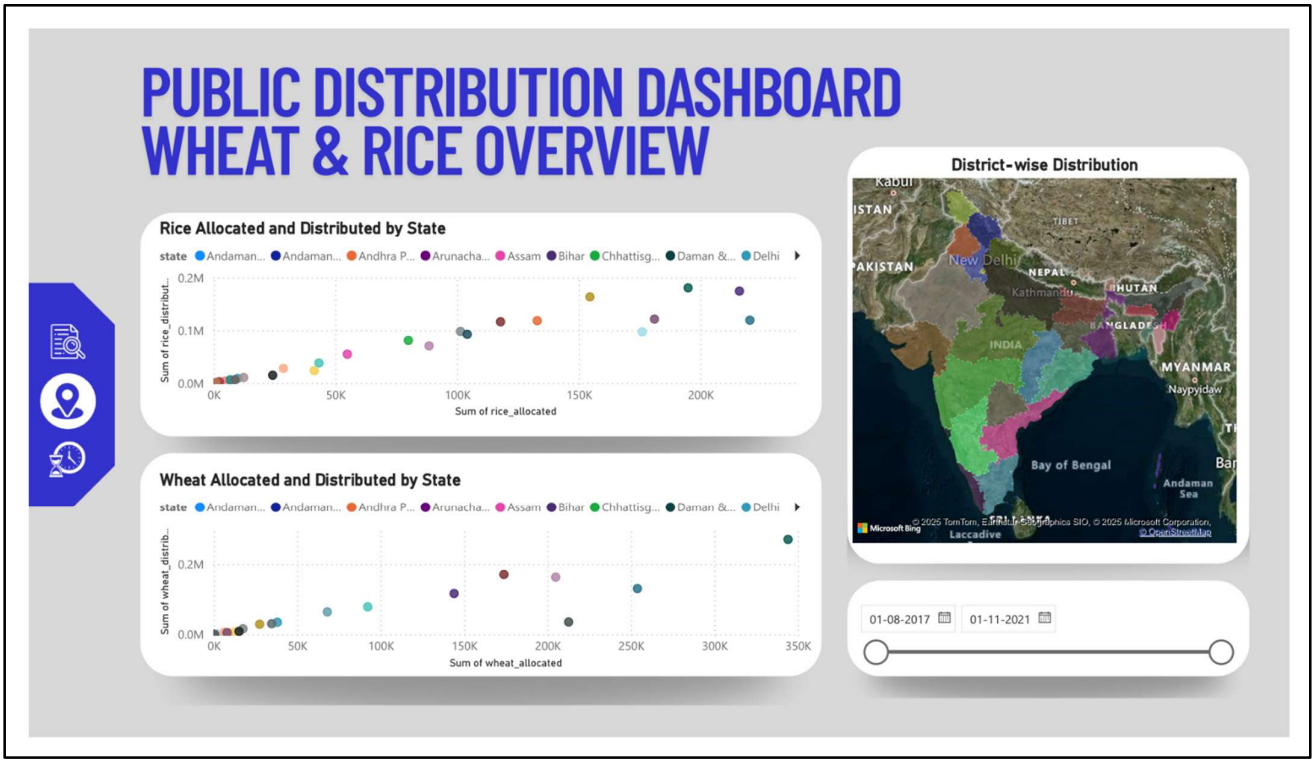
- **KPI Cards for Wheat and Rice Distributed vs. Allocated:**
  - Wheat shortfall: -8.26%, Rice shortfall: -6.11%
  - *Insight*: Distribution targets are consistently unmet, hinting at inefficiencies.
- **District Count Indicator:**
  - Total number of districts involved: 365
  - *Insight*: High district-level participation suggests a widespread reach of the PDS.
- **Year-wise Wheat and Rice Distribution (Line Chart):**
  - Covers distribution trends from 2017 to 2021
  - *Insight*: Trends indicate stable annual distribution with some fluctuations, potentially linked to external factors like harvest or policy shifts.

- **Commodity Share (Donut Chart):**
  - Rice: 58.25%, Wheat: 41.75%
  - *Insight*: Rice holds a larger share of total distribution, reflecting demand or availability.

- **Top States by Distribution (Bar Chart):**
  - Highlights leaders such as Uttar Pradesh, West Bengal, and Madhya Pradesh
  - *Insight*: A few key states dominate distribution, possibly due to higher population or better infrastructure.

B) Location View – Geographical Drill-down

The Overview View presents a high-level summary of the Public Distribution System's performance across India, focusing on two key staples: wheat and rice. This view offers key performance indicators (KPIs), trends across time, commodity share proportions, and the overall distribution spread across top states. It's designed to give users a quick but comprehensive understanding of how well the PDS is functioning nationally.

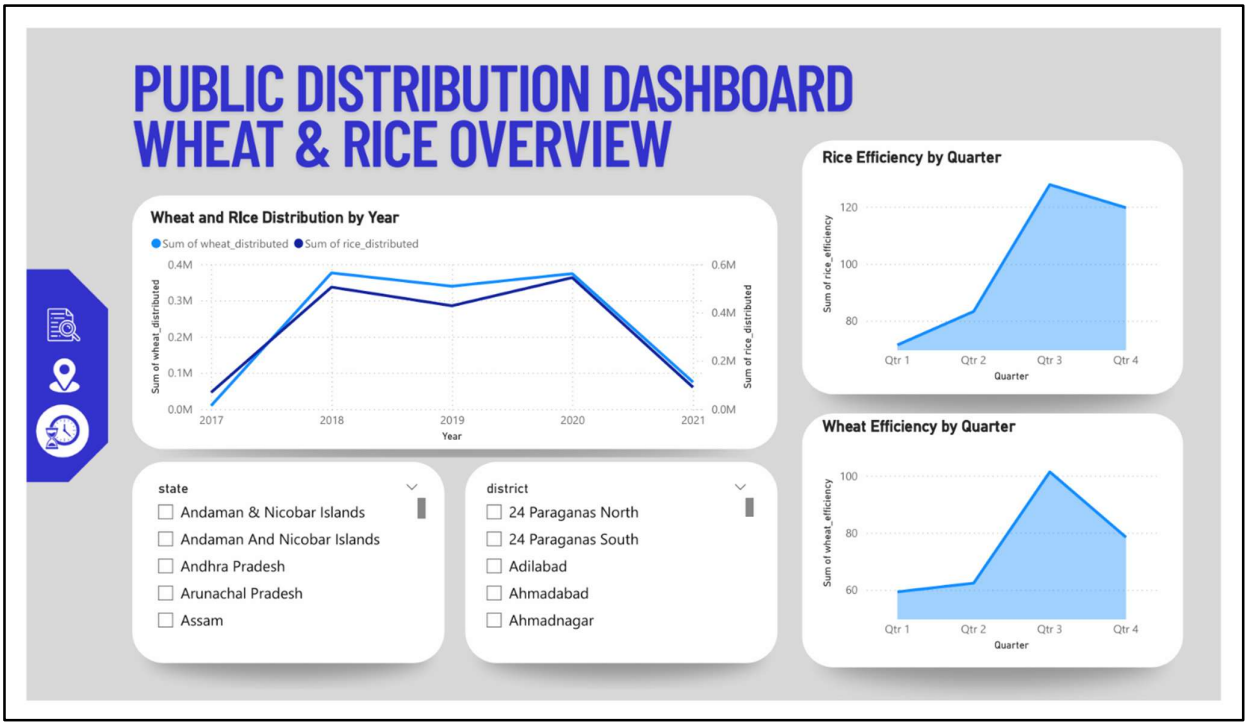


Key Visuals & Insights:

- **Map-Based District Distribution (Bing/OpenStreetMap Integration):**
    - Displays the geographical spread of distribution using maps.
    - *Insight*: Enables identification of distribution hotspots and coverage gaps.
- **State-wise Rice: Allocated vs. Distributed (Bar Chart):**
    - Reveals allocation/distribution differences across states like Bihar, Delhi, etc.
    - *Insight*: Some states consistently fall short in meeting allocation with actual distribution.
- **State-wise Wheat: Allocated vs. Distributed (Bar Chart):**
    - Similar view for wheat distribution performance.
    - *Insight*: States like Andhra Pradesh, Chhattisgarh show varying degrees of mismatch, suggesting local inefficiencies.
- **Monthly Slicer for Temporal Focus**
    - This view includes a **month-based slicer**, allowing users to **filter distribution and allocation data by specific months**.
    - *Impact*: This adds a valuable layer of temporal granularity, enabling users to identify **monthly trends or anomalies** in distribution performance—such as sudden drops due to supply chain disruptions or spikes due to festivals and seasonal demand.
- ***Overall Insight*:** While state totals may seem acceptable, district-level details expose specific problem areas that require focused strategies.

C) Time View – Temporal and Efficiency Analysis

The **Time View** focuses on how efficiently wheat and rice are distributed **quarter by quarter**, offering insights into **seasonal patterns, efficiency dips, and performance cycles**. It is crucial for understanding **operational timing**, and for **forecasting** and planning improvements in distribution during low-efficiency periods.



Key Visuals & Insights:

- **Quarter-wise Wheat Efficiency (Bar/Line Chart)**:
    - Shows fluctuation in distribution efficiency across Q1–Q4.
    - *Insight*: Efficiency is inconsistent, with Q2 or Q3 performing better. May correlate with harvest seasons or holidays.
- **Quarter-wise Rice Efficiency (Bar/Line Chart)**:
    - Similar layout for rice.
    - *Insight*: Peak efficiencies likely tied to **Kharif harvest** or demand periods like festivals.

- **Year-wise Distribution Recap (Line Chart)**:
    - Mirrors the overview's yearly trends for deeper temporal focus.
    - *Insight*: Cross-checks long-term consistency with seasonal dynamics, offering a full-spectrum time-based analysis.
- **State Filter for Regional Efficiency Analysis**
    - Users can filter the dashboard by selecting one or more states.
    - *Impact*: This enables a **focused comparison of quarterly efficiency** for rice and wheat across different states, helping administrators evaluate and benchmark regional performance over time.
- **District Filter for Micro-level Insight**
    - A district-level slicer allows users to narrow down efficiency and distribution data to specific districts.
    - *Impact*: This is especially powerful for **localized decision-making**—administrators can pinpoint which districts are contributing most to inefficiencies and respond with targeted interventions like increased monitoring, infrastructure support, or policy changes.
- ***Overall Insight*:** Timing is critical — the efficiency variation across quarters underscores the need for **better seasonal planning**, **pre-stocking**, and **supply chain readiness**.

IV) Decision Analysis

Despite a large-scale distribution effort across 365 districts, there is a **consistent shortfall in actual distribution versus allocated quantities** of both wheat and rice. Distribution efficiency also fluctuates over time and varies widely across regions. This leads to suboptimal resource utilization and potential food insecurity in target populations.

A) Decision Objective

To maximize the efficiency and effectiveness of the Public Distribution System by:

- Minimizing shortfall between allocated and distributed commodities
- Improving quarterly distribution efficiency
- Ensuring equitable regional distribution

B) Decision Criteria

Criteria	Description
Allocation-Distribution Gap	Minimize the % shortfall from allocation targets
Efficiency Score	Maximize efficiency in quarterly distribution
Regional Equity	Ensure fair distribution across all districts/states
Resource Planning Accuracy	Align supply timing with seasonal and regional demand
Operational Feasibility	Consider logistical capacity and infrastructure in decision-making

C) Prescriptive Recommendations

Decision Area	Option A: Status Quo	Option B: Optimized Strategy (Recommended)
1. Allocation Planning	Continue static allocation	Implement demand-based dynamic allocation using past data
2. Seasonal Forecasting	No change	Integrate crop cycles & festival-based demand forecasting
3. Regional Customization	Uniform strategy nationwide	Deploy region-specific distribution strategies
4. District Performance	Monitor at state level	Drill down into districts, identify low performers, intervene
5. Efficiency Improvements	Quarterly reviews	Use real-time monitoring and quarter-wise pre-stocking
6. Data-Driven Decisions	Manual reporting	Use AI/ML models in Power BI to predict shortfall zones

V) Conclusion

The Public Distribution System (PDS) dashboard in Power BI offers a **comprehensive and interactive visualization** of wheat and rice distribution across India. Through its three structured views—**Overview**, **Location**, and **Time**—it highlights both the **strengths and inefficiencies** in allocation, regional equity, and seasonal performance.

With features like drill-down filters and real-time comparisons, the dashboard serves as a **powerful decision-support tool** rather than just a reporting solution. It enables administrators to move from reactive planning to **data-driven, targeted interventions**.

The prescriptive analysis emphasizes that **maintaining the status quo will sustain inefficiencies**, while an optimized strategy—focusing on dynamic allocation, predictive analytics, and regional customizations—can significantly enhance efficiency and equity.

In conclusion, this dashboard doesn't just display data—it provides a **clear roadmap for transforming** the PDS into a more intelligent, responsive, and equitable system.