**FINAL PROJECT REPORT**

**DATA VISUALIZATION**

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**REPORT ON AGRICULTURE SECTOR**

*TOPIC: Regulated Market Production of Punjab*

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**Market Production Of Different Districts In Punjab**

**1.ABSTRACT**

Regulated agricultural markets have been playing a pivotal role inprocurement of farm produce. With rising agricultural production, growthof regulated market facilities reveals that Punjab has been a leading statein development of marketing infrastructural facilities for orderly marketing

of agricultural produce in the best interest of both producers and consumers. Punjab state accounts for about six per cent of the total regulated markets in the country. The density of existing regulated agricultural markets in Punjab is adequate as 443 regulated agricultural markets already exist in the state against requirement of 641 regulated agricultural markets. Further village economy is widely linked with markets through village/link roads maintained by Punjab State Agricultural Marketing Board and Public Works Department which has smoothened the selling and buying of farm inputs and farm produce. Also a remarkable rise in income from market fee for all the markets in the state is there which indicates the good economic condition of these markets. All this indicates that the regulated agricultural markets of the state are performing well but the need of the hour is further expansion and strengthening of these markets for enhancement of efficiency and consistent development of the economy

**2. INTRODUCTION**

Agricultural marketing has become an inevitable issue at hand for the policy makers as an adequate marketing system is a pre- condition for the growth and development of agriculturally dependent economies. No doubt, the level of farm technology is the key determinant of growth of agricultural sector but an efficient marketing system plays an important role for ensuring better returns to the farmers. Marketing is as critical to betterperformance in agriculture as farming itself.Further, the density of the regulated markets determines the production and productivity of crops. A market is a regulated one where buying and selling are regulated or controlled through a specified market committee. Efficient marketing through regulated markets can help to correct snags which have discouraging effects on production and thus help in improving the economic lot of the farmers.

This project focuses on visualizing key data related to regulated markets in Punjab, an essential part of the state's agricultural economy. Regulated markets play a critical role in ensuring fair trading practices and stable prices for farmers. By analyzing data related to these markets, the project aims to provide insights into their operations, challenges, and the distribution of agricultural produce in Punjab. Using Java's Abstract Window Toolkit (AWT), this visualization helps stakeholders easily understand complex datasets through intuitive and interactive charts.

Agricultural data visualization plays a crucial role in transforming complex datasets into comprehensible insights. In the context of the regulated markets in Punjab from 2000 to 2018, this visualization allows stakeholders to better understand market trends and agricultural patterns.

Here, users can select a district from a dropdown menu, representing various districts across Punjab. By visualizing data in different chart types—Pie Chart, Bar Chart, Scatter Chart, Line Chart, and Area Chart—users gain diverse perspectives on the data.

**3.METHODOLOGY**

* Planning and Requirements

Objectives:

* To identify core functionalities required for district-wise agricultural data visualization.
* To gather and document requirements for integrating chart types (e.g., Pie Chart, Bar Chart, Line Chart) using JFreeChart.

Activities:

* Stakeholder Interviews: Conducted interviews to understand user preferences for visualizing agricultural production across districts.
* Requirements Analysis: Defined functional requirements like data import, chart generation, and storytelling features to explain data insights.
* Project Planning: Established timelines for coding, integrating charts, and testing user interactions with various chart types and storytelling features.
* **Design**

Objectives:

* To design an intuitive Java Swing-based GUI for data selection and visualization.
* To ensure proper integration of JFreeChart for rendering charts.

Activities:

* Wireframing and Prototyping: Developed simple UI sketches and mockups to gather feedback on interface design and user flow.
* Component Selection: Chose appropriate Java Swing components like JComboBox, JButton, JTextArea, and JPanel for layout and user interaction.
* Data Structures Design: Created data structures (HashMap) to store district-wise production data and manage dynamic chart rendering based on user input.
* Implementation

Objectives:

* To implement functionalities such as data selection, chart generation, and data storytelling in the GUI.

Activities:

* Development of Core Features: Implemented dropdown selections (JComboBox) for districts and chart types, and buttons for viewing and resetting charts.
* GUI Development: Designed a clean interface using Java Swing for displaying data visualizations, with clear layout and color schemes.
* Chart Integration: Integrated JFreeChart to display Pie Charts, Bar Charts, Line Charts, and more. Configured the charts to respond dynamically based on selected districts and years.
* **Implemetation**

Objectives:

* To verify the application’s functionality and fix issues before deployment.

Activities:

* Unit Testing: Verified data handling and chart generation for each district to ensure accuracy.
* Integration Testing: Ensured smooth interaction between GUI components (e.g., combo boxes, buttons) and JFreeChart charts.
* Usability Testing: Collected user feedback to improve interface responsiveness and storytelling clarity.
* Deployment

Objectives:

* To distribute the application and provide installation and usage guidance.

Activities:

* Packaging: Packaged the application into an executable JAR file, ensuring all necessary libraries (JFreeChart) are included.
* Documentation: Developed user guides explaining how to use the application, including selecting districts and viewing charts.
* Distribution: Made the application available for stakeholders to visualize district-wise agricultural data.
* Maintenance and Updates

Objectives:

* To continuously improve the application based on user feedback.

Activities:

* Monitoring: Monitored user experience and performance post-deployment, gathering suggestions for improvement.
* Bug Fixes: Released updates to fix any visualization or data handling issues.
* Feature Enhancements: Implemented additional features, such as new chart types or expanded data sets based on user requests.

**RESULTS AND DISCUSSION**

**I. An overview of Regulated Agricultural Markets in India**

The regulated markets have an utmost significance for fair and efficient marketing of commodities in general and for agricultural produce in particular. The number of regulated agricultural markets that existed in different states of India differed in different time periods. In some states number of regulated markets is adequate according to their geographical area whereas some states are lacking in magnitude of markets and their effectiveness. In most of markets in the country, the proportion of the produce brought by the cultivators themselves is very little as compared to total arrivals in the

market (Prasad, 1985). In India, total number of markets was 27,777 as on 31st March, 2011 (Anonymous, 2011) which includes 6539 wholesale and 21,238 rural primary markets. Further, there are 7246 regulated agricultural markets in the country constituting 2433 principal markets and 4813 submarket yards. The number of regulated markets is relatively more in geographically

larger states viz. Andhra Pradesh, Bihar, Maharashtra, Madhya Pradesh, Uttar Pradesh

and West Bengal. These six states account for 53 per cent of total regulated markets in the

country. The number of regulated markets is very high in Andhra Pradesh (905) and Maharashtra (880). Similarly, regulated markets in West Bengal, Uttar Pradesh and MadhyaPradesh are 684, 605 and 517, respectively. Four states namely Karnataka, Punjab, Rajasthan and Gujarat have regulated markets within the range of 410-510. However, another six states namely Orissa, Tamil Nadu, Haryana, Assam, Jharkhand and Chattisgarh have markets within the range of 175-325 markets. All the remaining states of Indian union have less than 100 regulated markets in each of the states

I. Regulated Agricultural Markets in Punjab

Regulated agricultural markets in Punjab play a crucial role in ensuring fair and transparent trade between farmers and buyers. Established under the Agricultural Produce Markets Act, these markets aim to eliminate the exploitation of farmers by middlemen, ensuring that agricultural commodities are sold at fair prices. Punjab, being a leading agricultural state in India, has a vast network of regulated markets known as "mandis," where farmers bring their produce such as wheat, rice, and maize for sale.

The functioning of these markets is overseen by Agricultural Market Committees (AMCs), which are responsible for maintaining infrastructure, setting market rules, and ensuring transparency in transactions. The prices of commodities are determined by auction in these markets, which helps farmers get competitive rates based on demand and supply. Regulated markets also offer facilities like warehousing, cold storage, and market intelligence, empowering farmers with better market access.

The introduction of the Minimum Support Price (MSP) system in Punjab has further strengthened the role of regulated markets by providing assured prices to farmers, particularly for wheat and rice, which are procured by the government. However, challenges such as delayed payments, lack of modernization, and poor infrastructure in certain areas remain concerns for the smooth functioning of these markets.

III. Development of Regulated Agricultural Markets in Punjab

The development of regulated agricultural markets in Punjab has been a continuous process, beginning in the early 20th century with the objective of protecting farmers from unfair trade practices. The first regulated market in Punjab was established under the Agricultural Produce Markets Act of 1939. Over the years, the network of these markets expanded significantly, and after the Green Revolution in the 1960s, the demand for well-regulated markets became even more critical to handle the increased agricultural output.

Punjab's government has undertaken various initiatives to modernize these markets by introducing e-trading platforms like e-NAM (National Agriculture Market), which connects farmers to a nationwide digital platform, enabling them to sell their produce beyond the physical boundaries of their local mandis. This system has improved transparency and efficiency in market operations.

Additionally, the infrastructure within regulated markets has seen significant improvements, with upgraded facilities such as weighing bridges, storage warehouses, and better transportation networks. However, ongoing reforms are required to further enhance the competitiveness of these markets, attract private investment, and integrate small and marginal farmers more effectively into the market system.

**CONCLUSION**

The evolution of regulated agricultural markets in Punjab has played a pivotal role in shaping the state’s agricultural landscape. Initially established to protect farmers from unfair practices and ensure stable prices, these markets have undergone significant transformations, especially since the Green Revolution. The development of infrastructure, introduction of support prices, and establishment of market committees have provided farmers with better opportunities and security. However, the journey has not been without challenges. Despite the progress, issues such as outdated facilities, limited market reach for small and marginal farmers, and inefficiencies in market operations have persisted. The integration of technology through initiatives like the National Agriculture Market (e-NAM) has been a step forward, enhancing market transparency and accessibility. To ensure the continued success and relevance of these markets, ongoing reforms are necessary. Updating infrastructure, expanding digital platforms, and improving farmer education and access to market information are critical steps. By addressing these challenges and leveraging technological advancements, Punjab can enhance the efficiency and effectiveness of its regulated agricultural markets, ultimately benefiting both farmers and consumers while supporting the state's agricultural economy.

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