Analyses of the Production, Yield, And Area of the Food crops and Non-food crops In the Maharashtra State of India Using the Pivot Table

Parvejsaba A. Sayyad [*1], Dr. Prakash Kolhe[*2]

[*1]M. Tech, College of Agricultural Engineering and Technology, Dr. BSKKV, Dapoli Maharashtra, India.

[*2]Associate Professor (CAS), College of Agricultural Engineering and Technology, Dr. BSKKV, Dapoli Maharashtra, India.

***Corresponding author – Parvejsaba A. Sayyad**

altafsayyad705@gmail.com

ABSTRACT

This study analyzes the production, yield, and area of food and non-food crops in Maharashtra, India, utilizing pivot tables for comprehensive data examination. By aggregating and summarizing agricultural data through pivot tables, the research identifies key trends and patterns in crop production across various regions of the state. The analysis highlights the comparative performance of food crops versus non-food crops in terms of yield per hectare and total production volume. The study also examines how different crops influence land use patterns and contributes to understanding regional agricultural dynamics. This approach provides valuable insights for policymakers and stakeholders aiming to optimize crop production strategies and enhance agricultural sustainability in Maharashtra.

Keywords – Data analysis, India, State, Food and Non-food crops, Dashboard, Pivot table.

I. INTRODUCTION

Agriculture is a cornerstone of the Indian economy, with Maharashtra standing out as a major agricultural state contributing significantly to the country's food and non-food crop production. Given the diverse climatic conditions and soil types across the state, Maharashtra supports a wide range of crops, each varying in its production efficiency and land use requirements. Understanding the dynamics of crop production, yield, and land allocation is crucial for effective agricultural planning and resource management. This study focuses on the analysis of production, yield, and land area dedicated to both food and non-food crops in Maharashtra. By leveraging pivot tables a powerful data analysis tool. This research aims to provide a detailed examination of agricultural patterns within the state. Pivot tables facilitate the organization and summarization of large datasets, enabling a clearer comparison of crop performance across different regions and time periods. The primary objectives of this analysis are to identify trends in crop production and yield, evaluate the spatial distribution of agricultural activities, and assess the relative performance of food versus non-food crops. By uncovering these insights, the study aims to inform policymakers, agricultural planners, and stakeholders about optimal strategies for enhancing crop productivity and sustainability in Maharashtra.

REVIEW OF LITERATURE

Big Data in agriculture and food by Irena Knezevic and Kelly Bronson1 (2016): Farming is currently experiencing a significant digital transformation. Our review of current Big Data applications in the agri-food sector has highlighted several data collection and analytics tools that could impact the balance of power among stakeholders in the food system, such as between farmers and large corporations. Questions arise regarding who retains ownership of data generated by tools like Monsanto Corporation's Weed I.D. app and whether there are privacy concerns associated with data collected by John Deere's precision agricultural equipment. A comprehensive research objective for Big Data scholarship should involve systematically tracking the digital revolution in agriculture and mapping both the advantages and limitations of Big Data applications in the food and agriculture sectors. This objective connects data scholarship with food studies and emphasizes the tangible effects of Big Data on society.

"Application of Pivot Tables in Agricultural Research" by S. K. Mishra et al. (2017) This article explores the application of pivot tables in agricultural research, illustrating their use in summarizing and analyzing data such as crop yields, soil nutrient levels, and weather patterns. The authors highlight the simplicity and versatility of pivot tables for managing large datasets.

"Data Analysis Using Pivot Tables in Agriculture" by M. H. Ali et al. (2018): The use of pivot tables in the analysis of agricultural data is the main topic of this paper. It offers a step-by-step tutorial on how to condense and analyze big statistics in agriculture using pivot tables. The advantages of pivot tables are emphasized by the writers, including their speedy report generation and capacity to spot patterns or trends in data.

Kumar and Sharma (2020) provided a comprehensive overview of yield trends for major crops in India, including Maharashtra.

They identified factors influencing yield variations and recommended the use of advanced data analysis techniques to derive actionable insights.

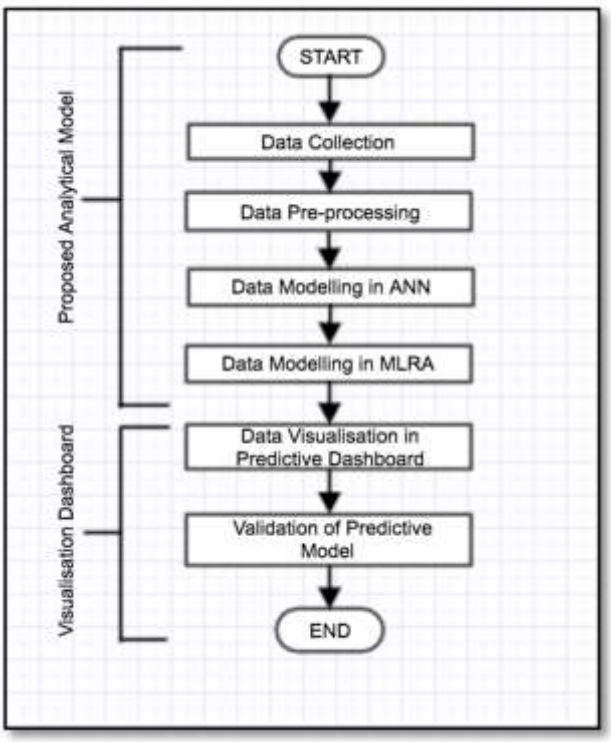
Data analytics for crop management by Nabila Chergui and Mohand Tahar Kechadi, 2022 :The global economy is significantly impacted by recent developments in information and communication technologies across all economic sectors. The emergence of digital agriculture as a result of the democratization of digital devices and developments in data science and artificial intelligence. New methods for increasing farming's output and efficiency while protecting the environment were made possible by digital agriculture. Agronomists, farmers, and other professionals can now better comprehend farming chores and make better judgments thanks to the collecting and analysis of large agricultural statistics made possible by recent and sophisticated digital equipment and data science. We provide a thorough analysis of data mining approaches applied to digital agriculture in this research. We present the components of the crop yield management procedure.

'Analyses of The Rice And Ragi Production, Yield And Area Data of Maharashtra Using Pivot Table'by Khatal et al. (2023) This study examines the area, yield, and output of the rice and ragi crops farmed in Maharashtra using big data analytic technologies including pivot tables and dashboards. Researchers, farmers, and decision-makers in Maharashtra can all gain from knowing the production patterns of two significant cereal crops grown there: ragi and rice. A substantial dataset including data on the acreage, yield, and production of rice and ragi over a number of years was acquired in order to conduct this study. The dataset includes data on the area under cultivation for both crops, yield per hectare, and production at the district level. To start, a pivot table is made to collect information and give a general idea of the amount of land, yield, and production of rice and ragi in each.

'Analyses of The production, Yield and area of the Jowar (Millet) in the states of India Using Pivot Table' by Kahar et al. (2023)

This study uses big data analytic tools like pivot tables and dashboards to examine the production, yield, and output of jade crops in India State. Researchers, decision-makers, and farmers in Maharashtra may all benefit from an understanding of the production patterns of Jowar, a grain crop. In order to do this study, a sizable dataset comprising data on area, yield, and production of jowars from several years is gathered.. Data-visualized approaches are used to produce an interactive dashboard that displays the results. The dashboard includes a number of graphs and charts that display the production, yield, and area trends over time. The data was sorted by users according to their favorite years or geographical areas. The pivot table and dashboard analysis provides crucial information on the state of Jowar production in Maharashtra. It identified any significant changes in yield over time and gives an understanding of the areas where these crops are primarily cultivated. It also highlighted the districts with the highest production of jowar in Maharatra,Karanataka,Rajastan and the lowest production of Jowar inUttar Pradesh,Telangana as well as the highest production of jowar in Maharastra and Karnataka.

I. MATERIALS AND METHEDOLOGY



Flow chart

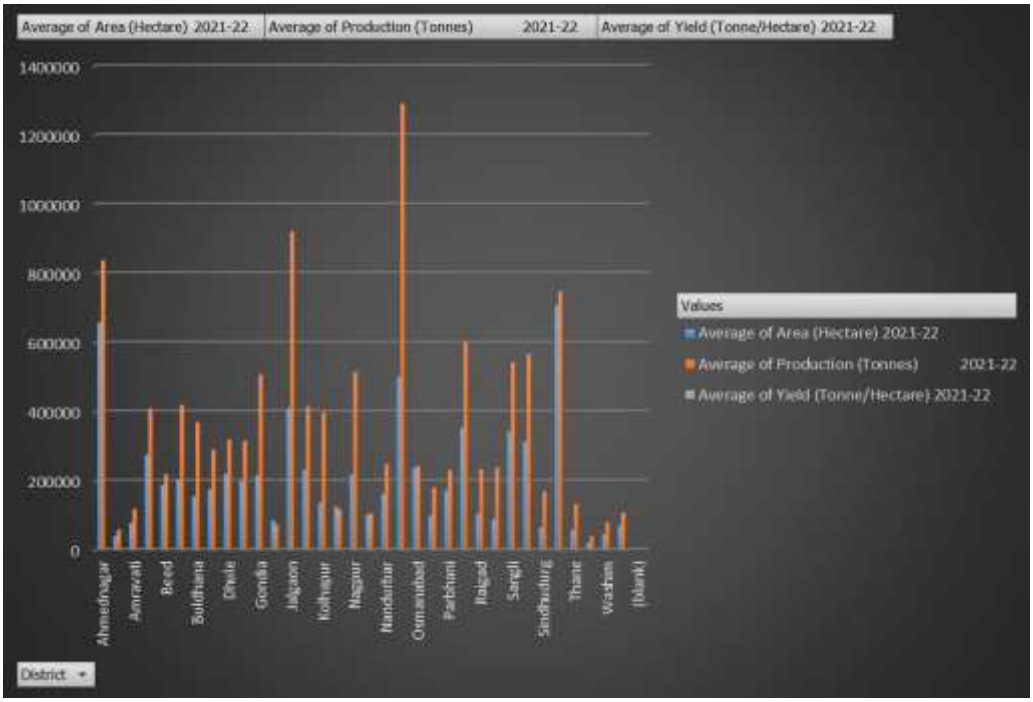
1. Data Collection: The Department of Agriculture of the Maharashtra State Government provided annual reports, which served as the main source of data for this analysis. Information on land acreage, yield, and crop production obtained from the Ministry of Agriculture & Farmers' Welfare. Research papers and surveys specifically for agricultural output in Maharashtra. Examples of data types are production data, which is the total amount of crops produced (measured in metric tons). Crop yield per hectare, expressed in kilos per hectare, is the yield data. Area Data: The total area in hectares that is farmed for various crops.
2. Data Preparation: During this stage, data cleaning makes sure that all datasets have the same units and format. Managing Missing Values: Depending on the kind and degree of missing values, missing data points may be imputed or excluded. Cross-checking data accuracy with secondary sources is known as validation, and it serves to validate reliability. Additionally, data integration is merging datasets from several sources into a single dataset using common identifiers like crop kind, region, and year. Normalization is then used to the data to correct for inflation or other changes in the economy, if needed.
3. Data analysis: To create a pivot table, use Microsoft Excel or a comparable spreadsheet program that has pivot table capabilities. Rows can also be used to help with fields and layouts. crop kinds (such as food versus non-food crops), geographical areas (Maharashtra districts or divisions), and years. Metrics like area, yield, and production are displayed in columns. Principles: aggregate metrics such as overall area, average yield, and production. Filters: Use filters to concentrate on eras, areas, or crop types. Utilize pivot tables to track changes in crop yield, area, and production over time. Determine whether there have been any notable increases or decreases, and then link them to any potential explanations (such as modifications to agricultural policy or changes in the weather). Examine the differences in yield between food and non-food crops. Examine production quantities, land allocation, and yield efficiency to ascertain whether crop types are more resource-intensive or productive. Analyze regional differences within Maharashtra to see how various regions affect total yield and production. Determine which areas are productively high or low, then look into the underlying causes.
4. Interpretation and Visualization: Use the results of pivot tables to get understanding into agricultural yield and production patterns. Examine the ways in which various elements like time period, crop type, and location affect these patterns. Find any outliers or anomalies in the data that could need more research. To effectively communicate the results, create visual aids like pie charts, line graphs, and bar charts. Clear illustrations of trends, comparisons, and regional distributions are made possible by these representations. If possible, depict the spatial distribution of crop acreage and productivity throughout Maharashtra using geographic maps.
5. Validation and Reliability: To guarantee correctness, validate results against secondary sources or historical data. Try changing important assumptions or data inputs to test the findings' robustness and see if the conclusions hold true. Write a thorough report outlining the approach, conclusions, and interpretations. Provide illustrations to back up the analysis.Make suggestions for enhancing crop production, resource allocation, and policy formation based on the findings.

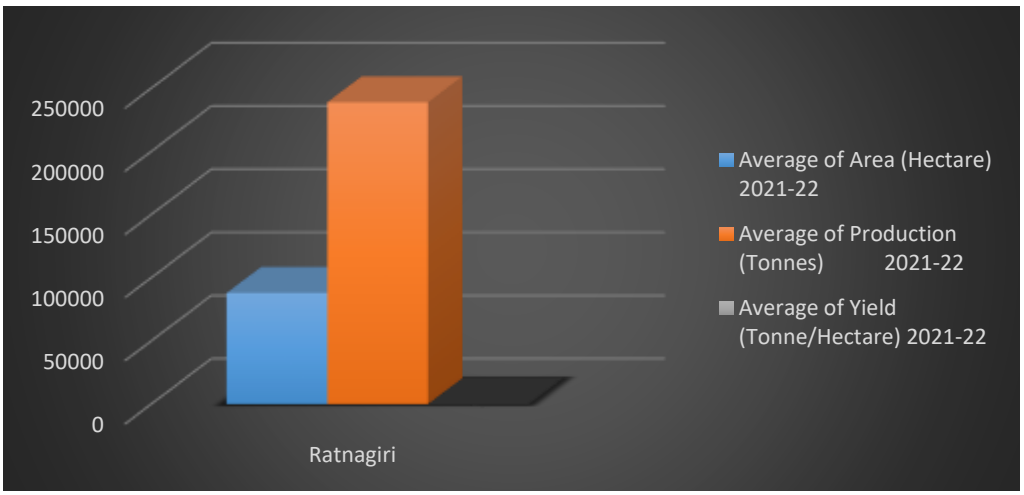
II. RESULTS AND DISCUSSION

1. Overview of Data Analysis: Maharashtra's agricultural environment may be better understood by looking at the pivot table analysis of crop production, yield, and area. Through the use of pivot tables and data aggregation from several sources, the research presents a clear picture of the various ways in which Maharashtra's agriculture is impacted by different crops.
2. Production Trends: The analysis of food crops as a whole reveals that cereals and pulses, in particular, control the production environment. Grains like rice, wheat, and lentils make up a large amount of the world's agricultural production. Top Producers in Certain Areas of Maharashtra: The Konkan and Vidarbha regions, for example, have high levels of production because of their favorable climate and cutting-edge farming techniques. Regarding Non-Food Crops: Production Contribution: crops that are not food, including oilseeds, cotton, and sugarcane, all contribute significantly. Among the principal non-food crops, sugarcane stands out due to Maharashtra's significance in the production of sugar. Regional Variations: Large-scale commercial agricultural operations and irrigation infrastructure are the main drivers of high non-food crop output levels in regions like Western Maharashtra.

3. Yield research: The research shows that, on average, food crops have moderate yields per hectare for food crops. For example, yields of rice and wheat are comparatively higher than those of pulses. The yield differs greatly between places due to regional differences. For instance, yields in irrigated areas within the command areas of large dams are higher than in rain-fed areas. Regarding Non-Food Crops: The Comparative Yield is Non-food crops with high output per hectare include sugarcane and cotton. These high production levels are a result of the improved crop types and cultivation methods. Measures of Performance Cotton produces exceptionally high yields thanks to considerable irrigation and technology inputs, which is essential for Maharashtra's textile sector.

4. Amount under cultivation: The data for food crops reveals a sizable area devoted to these crops, indicating their significance for food security. The biggest regions are covered by pulses and cereals. In locations with improved irrigation systems, there is a tendency for food crop area to increase, while less productive areas see a reduction. Regarding crops that are not food a large amount of the area under cultivation is used for non-food crops, the two main contributors being cotton and sugarcane. Changes in market demand and profitability are reflected in recent regional moves towards non-food crops that yield higher profits. For example, growing sugar mills and processing capacity in Western Maharashtra are correlated with increased area planted to sugarcane.





CONCLUSION

Maharashtra's crop output, yield, and area pivot table analysis sheds light on the agricultural dynamics of the state. The data emphasizes the strong productivity of non-food crops and the area-dominant position of food crops. Comprehending these trends facilitates the development of efficient policies and procedures aimed at augmenting agricultural output and guaranteeing equitable distribution of resources.

III. REFERENCES

[1] Ali M. H. (2018) "Data Analysis Using Pivot Tables in Agriculture".
[2] Chen M., Zhang Y., Leung C. V., 2014. "In Text Book Big Data: Related Technologies, Challenges and Future Prospects".
[3] Ch. Chandra Sekhar, J. Uday Kumar, B. Kishor Kumar, Ch. Sekhar, "Big Data Analytics on Indian Crop Planning to Increase Agricultural Production," Advanced Science and Technology Letters, vol. 147, p. 7, November 2017.
[4] https://data.desagri.gov.in/website/crops-report-major-contributing-district-web
[5] https://www.mospi.gov.in/

[6] Nandyala C. S., (2016) "Big and Meta Data Management for U-Agriculture Mobile Services", International Journal of Software Engineering and Its Applications Vol. 10, No. 2 (2016).
[7] National Academy of Agricultural Sciences NAAS 2021. "Big Data Analytics in Agriculture". Policy Paper No. 101, New Delhi, pp16.
[8] Mishra S. K. (2017) "Application of Pivot Tables in Agricultural Research".
[9] Mishra A. K. (2019) "Big Data Analytics in Agriculture: A Review".
[10] Kumar M., Mayura N., "Big Data analytics in agriculture and distribution channel," in IEEE International Conference on Computing Methodologies and Communication, 2017.
[11] Kumar. P, Kumar. A., Panwar. S., and Ray M. "Role of big data in agriculture- A statistical perspective" Ann. Agric. Res. New Series Vol. 39 (2): 210-215 (2018)
[12] S. Arjun, A. Joshi, H. P. Das, R. Amutha, "Big Data Analytics for Agricultural Development in India," International Journal of Engineering Research & Technology (IJERT), vol. 4, no. 22, 2016.
[13] Joshi, A., Kaushik, V. (2021). Big Data and Its Analytics in Agriculture. In: Upadhyay, A.K., Sowdhamini, R., Patil, V.U. (eds) Bioinformatics for agriculture: High-throughput approaches. Springer, Singapore. https://doi.org/10.1007/978-981-33-4791-5_4 (13