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Trend and Spatial Pattern in Productivity of Major Crops in Odisha, India

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Abstract:

Agriculture has a crucial significance in the economy of Odisha, contributing directly to the livelihood of a majority of its residents. Although there have been notable developments in the domain of agriculture in the past few decades, considerable disparities exist among the various regions of the state in terms of crop productivity. The current research work aims at analysing the productivity trend as well as the spatial variations in productivity of major crops in Odisha vis-à-vis India. In this regard, the data on production of crops such as rice, pulses, oilseeds and food grains, obtained from Agricultural Statistics of Odisha, have been used to analyse long term trend and spatial variation in crop productivity through descriptive statistics and Z-scores respectively, during the period 1971-72 to 2018-19.The findings indicate that there is an enormous rise in the productivity of major crops in Odisha and India during the specified period. Nonetheless, productivity level in the former has remained below the national average for most crops studied in this research. Highly productive districts include Jagatsinghpur, Cuttack, Balasore, Rayagada, and Subarnapur, while Malkangiri, Nuapada, Kandhamal, Sundargarh, and Deogarh are very less productive. These gaps exist due to the disparity in terms of irrigation facilities, types of soil, technology, and agro-climatic conditions. From the above study, it is clear that there is a necessity to formulate agricultural policies based on regions, provide irrigation facilities, and adopt climate-friendly agriculture along with the use of new agricultural technology in Odisha.

Key Words: Agricultural Productivity, regional variation, trend analysis, Odisha

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1.1 Introduction

Odisha is considered one of the poorest states in India, where poverty remains highly concentrated (Haan & Dubey, 2005). Despite receiving widespread recognition for its improved performance in several economic and human development indicators since the early 2000s (Sahu & Panda, 2018), the state was ranked as the least developed in India in 2013 based on a composite economic index prepared by the Government of India (Government of India, 2013). According to the most recent Multidimensional Poverty Index (MPI), about **15.58 percent** of Odisha's population lives below the poverty line, which is slightly higher than the national average of **14.96 percent** (NITI Aayog, 2023).

Historically, food insecurity resulting in starvation deaths and severe malnutrition has been a recurring phenomenon in the state. This situation has been documented from the time of the **Great Famine of 1866** (Samal, 2000; Das, 1989) to the more recent occurrences of severe malnutrition in several pockets of the state (Ambagudia, 2010).

Frequent natural hazards such as cyclones, droughts, and floods, coupled with extreme poverty, have been closely associated with hunger and food insecurity in Odisha (Bahinipati, 2014). Declining purchasing power has also compelled many households to shift towards less nutritious diets as a coping mechanism (Bahinipati & Venkatachalam, 2015). Furthermore, the state has reported significant structural challenges in the agricultural sector, including underutilization of land and agricultural labour, degradation and diversion of cultivable land, and stagnation in crop and resource productivity. In 2023, Odisha recorded a cropping intensity of **117 percent**, considerably lower than the national average of **156 percent**. Similarly, the state's total food grain productivity stood at **1798 kg per hectare**, compared to **2515 kg per hectare** at the national level. Several studies highlight a "process of pauperisation of agriculture," wherein farming has increasingly become a **high-risk and low-return activity** due to rising input costs and persistent bottlenecks in the marketing of agricultural products (Sahoo et al., 2020).

Agriculture and allied sector are the backbone of the Indian economy so as of our state Odisha. Near about 60% people of the state earn their livelihood through agriculture and allied activities. Sustainable growth of this sector is crucial for ensuring food security as well as the overall socioeconomic growth of the farming community along with that of the state. Odisha has a geographical area of 1,55,707 sq. Kms and is divided in to ten agro-climatic zones depending upon various parameters like soil types, topography, rainfall and cropping pattern. The total cultivated land of the state is 61.80 lakh ha out of which 29.14 lakh ha (47%) is high land, 17.55 lakh ha (28%) Medium land and 15.11 lakh ha (25%) low land and about 65% of cultivated land in Kharif season is irrigated.

1.2 Review of Literature:

In past years, several empirical studies on agricultural development in Odisha have been published in reputed journals and research institution reports. The following few studies have explored the nature of the relationship between the temporal nature of the productivity of crops in Odisha. Agriculture has for decades been viewed as the driving force behind the economy of Odisha. According to Swain (2002) and Swain et al. (2009), there have been decreases in regional differences during the period after reforms due to governmental efforts to develop backward areas. Similar findings were made by Tripathy et al. (2011), who found high levels of inter-district differences in the measures used to determine agricultural development. It is, therefore, evident that although agricultural development in Odisha has improved, regional differences still exist.

The study conducted by (Pattanaik & Mohanty, 2017) on the growth in the area, production and productivity of major types of crops in different physiographic regions over a period from 1993–94 to 2010–11 concluded that there is considerable spatial diversity in the growth of agricultural activity. This finding highlighted the need for more investments and infrastructural developments to increase productivity and achieve food security. From recent studies (Pal et al., 2022) it is evident that there have been significant fluctuations in agricultural productivity in Odisha. This fluctuation has been observed especially in cereal crops, pulses and oil seeds due to the dependency of agriculture on climatic factors.

Irrigation, technological progress, and agricultural inputs have been recognized as important factors affecting crop production. In their study, (Pattanayak, 2018) established that there was a significant positive correlation between the intensity of irrigation and agricultural production in districts of Odisha by applying Kendall's rank correlation technique. Similarly, (Nayak, 2016) pointed out the importance of fertilizer use in determining the foodgrain production, whereas (Senapati & Goyari, 2019) emphasized the role of rainfall variability and temperature in agricultural production. Productivity improvement through high-yielding variety, better irrigation system, and advanced cultivation method has occurred in many districts, but due to uneven distribution of these resources, disparities remain

Spatial patterns in agricultural productivity in Odisha have been seen to be associated with variations in physiography, soils, irrigation facilities and socio-economic conditions. According to Pattnaik and Nayak (2004), coastal and plain districts have shown higher levels of agricultural productivity compared to interior and plateau areas. (Pattanaik & Mohanty, 2017), observed that there was variability in the level of agricultural performance among different physiographic areas. It has been shown through studies that coastal districts enjoy the advantage of rich alluvial soils, improved irrigation facilities and greater technology use, while Eastern Ghats and KBK districts continue to exhibit low productivity due to rugged terrain, poorer quality soils, inadequate irrigation facilities and heavy reliance on rain-fed agriculture (Reddy, 2013; Dash & Kumar, 2015)

1.3 Research Gap

While the existing body of literature provides a better understanding regarding agricultural development, irrigation, crop development, and regional disparities in the state of Odisha, most of the previous research works were either focused on agricultural development in more generalized regional levels or considered particular factors like irrigation, crop development or physiographic disparity. There is only a minimal number of research studies that have attempted to integrate long-term productivity trends in major crops with new spatial disparities in recent districts through Composite Productivity Analysis. Apart from that, there is not much attention paid in comparing productivity trends in Odisha with national level productivity trends as well as considering spatial disparities among districts. This study attempts to fill in this research gap by analyzing the long-term trends in major crops productivity in Odisha as compared to India through Composite Z-score analysis.

1.4 Objectives of the Study

In the current study, it is attempted to investigate the changes over time and spatial distribution in the productivity of major crops in Odisha compared with that of the nation as a whole. The particular objectives include:

1. Examining the long-term trends in the productivity of major crops (rice, pulses, oilseeds and food grains) of Odisha and India from 1971-72 to 2018-19.

2. Analysing the spatial differences among the districts in the productivity of major crops of Odisha through the application of Composite Z-Score.

3. Locating high and low productivity zones in Odisha along with discussing the reasons responsible for regional disparity in Odisha.

1.5 Materials and Methods

1.5.1 Study Area:

Odisha is located between 17° 49' and 22° 34' North latitudes and between 81° 27' and 87° 29' East Longitudes. It is bounded by the Bay of Bengal on the east; Jharkhand in the north; Chhatisgarh on the west and Andhra Pradesh on the south. It spreads over an area of 155,707 square kilometers accounting for about 4.87% of the total area of India. Odisha is the eleventh most populous state in India with about 45 million people contributing 3.47% to the total population of India. The climate is represented by tropical monsoon weather. Southwest monsoon arrives in the state by early June and departs by the middle of October. Rainfall is the main source of water in Odisha and the annual value varies from 1200 to 1700 mm across the state with average of 1482 mm. About 76% of rainfall is received during the monsoon season/ rainy season from 1st June to end of September and the remaining 24% is received throughout the year.

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1.5.2 Data Sources

All the data employed in this current study have been taken from the authentic sources of government publications. The long period data about the productivity of main crops such as rice, pulses, oilseeds and food grains during the years 1971-72 to 2018-19 have been gathered from Agricultural Statistics at a Glance, Agricultural Statistics of Odisha, and publications of Directorate of Agriculture and Farmers' Empowerment, Government of Odisha.

Data relating to area and production of main crops on district level basis were taken from Statistical Abstract of Odisha, published by the Directorate of Economics and Statistics, Government of Odisha. In order to reduce the impact of yearly variation in climate and natural calamities, productivity data were calculated using five-year averages (2014-15 to 2018-19). Data related to administrative boundaries were taken from the authentic sources of government publication and analyzed using GIS techniques.

1.5.3 Methodology

To examine temporal trends and spatial variations in agricultural productivity, both descriptive statistical techniques and spatial analytical methods were employed.

Descriptive Statistical Analysis

For the trend analysis (1971–72 to 2018–19), descriptive statistics including the mean, standard deviation, and coefficient of variation were computed to examine the average productivity and temporal variability of major crops in Odisha and India.

Z-score Standardization

For the district-level spatial analysis, the productivity values of individual crops were standardized using the Z-score technique, which requires only the mean and standard deviation.

GIS-Based Spatial Mapping:

The district boundary shapefile was obtained from the **Bhuvan Geoportal** of the **National Remote Sensing Centre (NRSC), Indian Space Research Organisation (ISRO)**. Spatial data processing, attribute integration, and thematic map preparation were carried out using **QGIS (Version 3.x)**.

Based on the Composite Z-score values, the districts were classified into five productivity categories—Very High, High, Moderate, Low, and Very Low—to facilitate the visualization and interpretation of regional disparities in agricultural productivity across the state.

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1.6 Results and Discussion

Trend in Productivity of Major Crops in Odisha and India (1971–72 to 2018–19)

Figure 1 illustrates the temporal trend in per hectare productivity of major crops such as rice, pulses, oilseeds, and food grains in India and Odisha over the period from 1971–72 to 2018–19. The overall trend indicates a steady increase in agricultural productivity in both India and Odisha, although India consistently maintained higher yield levels than Odisha throughout the study period. Rice productivity shows a significant upward trend in both India and Odisha. In India, rice yield increased from around 1100 kg/ha in the early 1970s to over 2600 kg/ha by 2018–19, reflecting substantial technological advancement, expansion of irrigation, and adoption of high-yielding varieties. Odisha also experienced an increase in rice productivity, rising from about 800–900 kg/ha to nearly 2000 kg/ha during the same period. However, the trend in Odisha shows greater fluctuations, particularly during drought and flood years, indicating higher vulnerability to climatic variability. Pulses productivity exhibits relatively slow growth compared to rice and food grains. In India, pulses yield increased gradually from around 450 kg/ha to about 800–850 kg/ha, while Odisha shows only a modest increase from approximately 400 kg/ha to about 500–550 kg/ha. The slower growth in pulses productivity reflects lower priority compared to cereal crops, and cultivation mainly confined in marginal and rainfed areas. Oilseed productivity shows moderate improvement over time in both India and Odisha. In India, oilseed yields increased from around 500 kg/ha in the early 1970s to over 1200 kg/ha by 2018–19. Odisha also experienced an increase, although the productivity remained lower than the national average.

The overall food grain productivity trend reflects cumulative improvement driven largely by increases in rice production. In India, food grain productivity increased steadily from about 850 kg/ha in the early 1970s to more than 2300 kg/ha by 2018–19. Odisha also experienced improvement, with yields increasing from around 700–800 kg/ha to about 1500–1700 kg/ha. However, the gap between Odisha and India persisted throughout the study period.

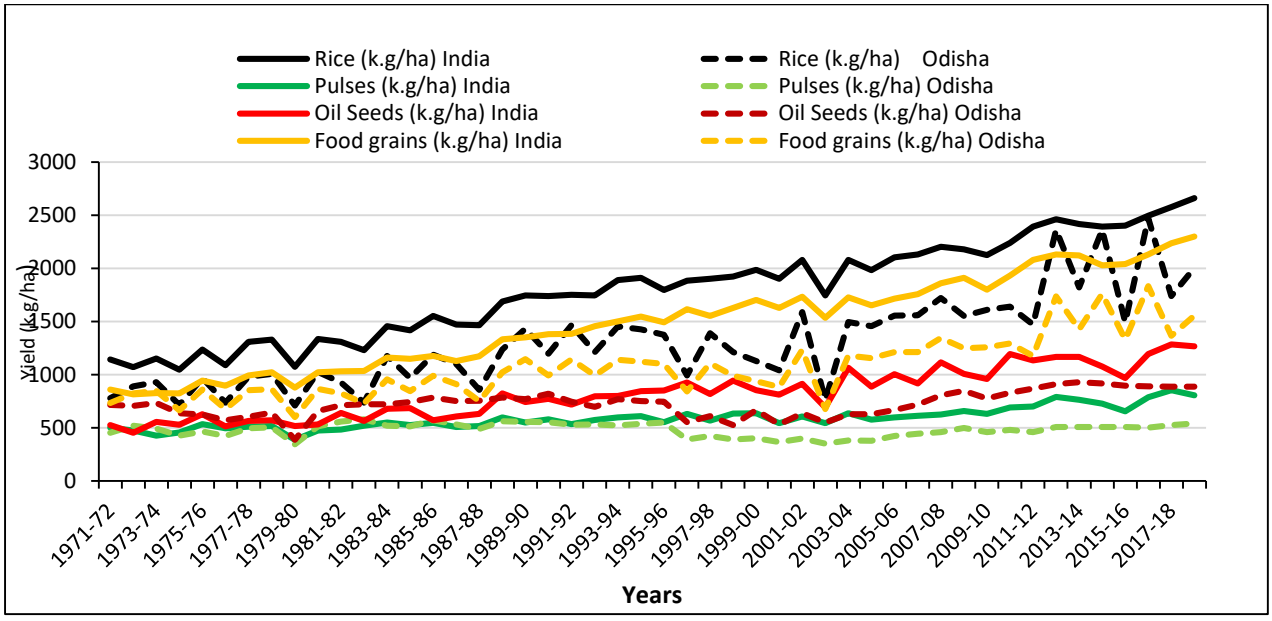

Fig 1 Trend in productivity of major crops in Odisha and India from 1971-72 to 2018-19

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The graph (Figure1) clearly demonstrates that although Odisha has made significant progress in improving crop productivity over the last five decades, it continues to lag behind the national average. The higher and more stable productivity levels in India can be attributed to better irrigation coverage, wider adoption of modern agricultural technology, use of improved input, and stronger institutional support. In contrast, relatively lower productivity and higher fluctuations in case of Odisha reflect structural constraints such as dependence on rainfall, limited irrigation infrastructure, and socio-economic challenges.

Table 1Variation in Per Hectare Yield of Major Crops in India and Odisha (1971–72 to 2018–19)

1971-72 to 2018-19	Rice (k.g/ha)		Pulses (k.g/ha)		Oil seeds (k.g/ha)		Food grains (k.g/ha)	
	India	Odish	India	Odisha	India	Odisha	India	Odisha
Mean	1795.5	1310.4	588.95	479.81	821.8	722.7	1482.5	1066.2
Std.Dev	459.34	432.25	101.18	63.37	232.3	119.29	433.43	289.08
C.V (%)	25.58	32.98	17.17	13.20	28.27	16.50	29.23	27.11

The comparative analysis of per hectare yield of major crops between India and Odisha during the period 1971–72 to 2018–19 reveals significant differences in productivity levels and yield stability. The mean yield of rice in India was 1795.52 kg/ha, which was substantially higher than Odisha's mean yield of 1310.47 kg/ha. This indicates that Odisha has consistently lagged behind the national average in rice productivity despite rice being the dominant crop of the state. Similar trend is observed in pulses, where the mean yield in India was 588.95 kg/ha compared to 479.81 kg/ha in Odisha. In the case of oilseeds, India recorded a higher mean yield of 821.89 kg/ha compared to 722.7 kg/ha in Odisha, indicating a moderate productivity gap. Likewise, the overall food grain productivity was significantly higher in India (1482.5 kg/ha) than in Odisha (1066.2 kg/ha), reflecting the cumulative effect of lower yields across major crops in the state.

The standard deviation values indicate considerable fluctuations in crop productivity over time in both India and Odisha. Rice shows relatively high variability in both India (459.35) and Odisha (432.26), reflecting the sensitivity of rice cultivation to climatic variability. However, the coefficient of variation (CV), which measures relative variability, shows that Odisha experienced greater instability in rice production (32.98%) compared to India (25.58%). This suggests that rice productivity in Odisha is more vulnerable to environmental and climatic uncertainties. In contrast, pulses and oilseeds in Odisha show lower CV values (13.20% and 16.50%, respectively) compared to India (17.17% and 28.27%), indicating relatively greater stability, though at lower productivity levels. The CV of food grains was slightly lower in Odisha (27.11%) than in India (29.23%), suggesting comparable levels of variability.

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Overall, the analysis indicates that India has achieved higher agricultural productivity and relatively better stability due to improved irrigation, adoption of high-yielding varieties, use of fertilizers, and technological advancement. On the other hand, Odisha continues to experience lower productivity and higher instability, particularly in rice cultivation, due to structural, environmental, and technological constraints. These findings highlight the need for strengthening irrigation infrastructure, promoting modern agricultural practices, improving access to quality inputs, and adopting climate-resilient agricultural strategies to enhance productivity and stability in Odisha's agriculture.

Overall Yields of Major Crops in Odisha based on Composite Score (Year 2014-15 to 2018-19)

The table 2 presents the spatial variation in overall crop productivity across districts of Odisha using composite Z-score values derived from selected major crops. The composite Z-score is a standardized statistical measure that integrates multiple crop yield indicators into a single index, enabling comparative assessment of agricultural productivity across districts. Based on this index, districts are classified into five categories: very high, high, moderate, low, and very low productivity.

Table 2 Overall Yields of Major Crops Based on Composite Z-Score Value of Selected Crops

Level of Productivity	**Composite score**	**No. of districts**	**District Name**
Very High Productivity	(>3. 433)	05	Jagatsinghpur, Rayagada, Cuttack, Baleshwar and Subarnapur
High Productivity	(1.451 to 3.433)	06	Dhenkanal, Kalahandi, Mayurbhanj, Puri, Bhadrak and Nabarangpur
Moderate Productivity	(0.014 to 1.451)	05	Koraput, Boudh, Keonjhar, Ganjam, Bargarh
Low Productivity	(0.014 to -2.003)	05	Bolangir, Kendrapada, Ganjam, Khurdha, Jajpur
Very Low Productivity	< -2.003)	09	Malkangiri, Angul, Sundargarh, Kandhamal, Nayagarh, Deogarh, Sambalpur, Jharsuguda, Nuapada

Source : Computed by authours based on Composite Z- score value

Very High Productivity Districts (> 3.433)

A total of five districts such as Jagatsinghpur, Rayagada, Cuttack, Baleshwar, and Subarnapur fall under the very high productivity category. These districts represent the most agriculturally advanced regions of the state except Rayagada. The high productivity in these

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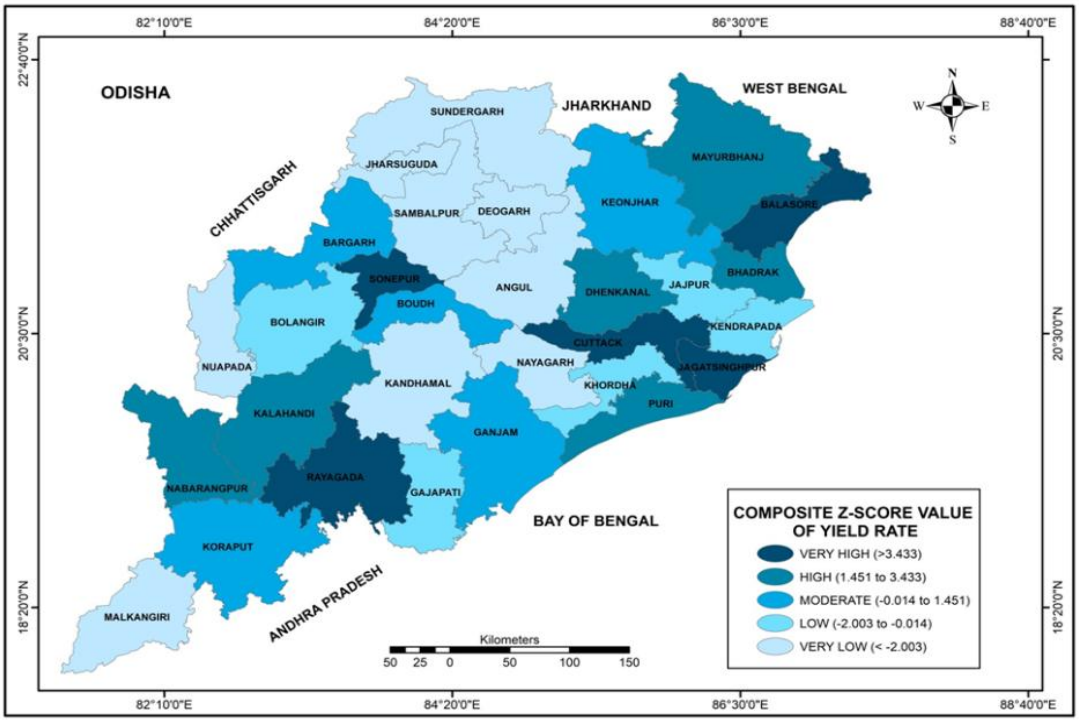
districts can be attributed to favorable physical conditions such as fertile alluvial soil, better irrigation facilities, and relatively advanced agricultural practices. Coastal districts like Jagatsinghpur, Cuttack, and Baleshwar benefit from fertile deltaic soils and better water availability, while districts like Rayagada and Subarnapur have shown improved productivity due to irrigation development and agricultural modernization.

High Productivity Districts (1.451 to 3.433)

Six districts like Dhenkanal, Kalahandi, Mayurbhanj, Puri, Bhadrak, and Nabarangpur fall under the high productivity category. These districts demonstrate above-average agricultural performance. The relatively high productivity may be attributed to moderate irrigation coverage, increasing use of high-yielding variety seeds, and improved farming practices. Coastal districts such as Puri and Bhadrak benefit from favorable agro-climatic conditions, while districts like Kalahandi and Nabarangpur have shown improvements due to agricultural development programs and expansion of irrigation.



Moderate Productivity Districts (1.451 to 3.433)

Five districts included in this category are Koraput, Boudh, Keonjhar, Ganjam, and Bargarh. These districts represent transitional zones where agricultural productivity is neither very high nor very low. Productivity in these districts is influenced by mixed physical and socio-economic conditions. For example, Bargarh is known for irrigated agriculture due to canal irrigation systems, while districts like Koraput and Keonjhar face constraints such as

undulating topography, less fertile soils, and limited irrigation in some areas. Bargarh is exceptionally better in rice cultivation but not in other crops taken for analysis.

Low Productivity Districts (-2.003 to -0.014)

Five districts which fall under this group are Bolangir, Kendrapada, Ganjam, Khurdha, and Jajpur. These districts experience relatively lower crop yields due to various limiting factors such as inadequate irrigation, soil degradation, climatic variability, and traditional farming methods. Despite some districts having favourable conditions, uneven distribution of irrigation and technological inputs contributes to lower overall productivity.

Very Low Productivity Districts (< -2.003)

Nine districts-Malkangiri, Angul, Sundargarh, Kandhamal, Nayagarh, Deogarh, Sambalpur, Jharsuguda, and Nuapada-fall under the very low productivity category. These districts represent the most agriculturally backward regions of Odisha. The low productivity in these areas can be attributed to unfavourable physical conditions such as hilly terrain, poor soil quality, low irrigation coverage, and high dependence on rainfall. Tribal-dominated districts such as Malkangiri, Kandhamal, and Nuapada face additional socio-economic constraints, including limited access to modern agricultural technology, infrastructure, and institutional support.

Conclusion and Policy Implications

The research work analyzes the time trend and spatial pattern of productivity of major crops in Odisha vis-à-vis the national level between 1971-72 to 2018-19. The findings show that there is a significant rise in productivity of rice, pulses, oilseeds, and food-grains both at Odisha and India levels over the period under study. However, it must be noted that the level of productivity in Odisha has always remained below the national level which implies that there has not been any significant progress in this regard.

As per the district-wise Composite Z-score analysis, there is substantial spatial variation in agricultural productivity in Odisha state. The districts having high agricultural productivity include Jagatsinghpur, Cuttack, Balasore, Subarnapur, among others which enjoy high irrigation facilities. In contrast, many other western and southern parts along with tribal belts suffer from low agricultural productivity due to lack of irrigation, adverse climatic conditions, etc. From the results, it is clear that there is a need for area-specific planning when addressing disparities between regions in terms of agricultural productivity. There is a need for investments in irrigation facilities, use of resilient techniques in agriculture, access to better-quality input materials, and provision of good agricultural extension services in order to improve the agricultural productivity of underdeveloped areas of the state. Future studies can consider using smaller scale analysis as well as other climatic and socio-economic factors.

References

- Ambagudia, J. (2010). Tribal rights, dispossession and the state in Odisha. *Economic and Political Weekly*, 60–67.
- Bahinipati, C. S. (2014). Assessment of vulnerability to cyclones and floods in Odisha, India: A district-level analysis. *Current Science*, 107, 1997–2007.
- Bahinipati, C. S., & Venkatachalam, L. (2015). What drives farmers to adopt farm-level adaptation practices to climate extremes: Empirical evidence from Odisha, India. *International Journal of Disaster Risk Reduction*, 14, 347–356.
- Dash, B., & Kumar, C. S. (2016). Agricultural development disparity among districts of KBK region of Odisha. *International Journal of Physical and Social Sciences*, 5(9), 553–560.
- Government of India. (2013). *Report of the Committee for Evolving a Composite Development Index of States*. Ministry of Finance, New Delhi.
- Haan, A. D., & Dubey, A. (2005). Odisha: Poverty, disparities, development of the underdevelopment? *Economic & Political Weekly*, 40(28), 2321–2329.
- Kannan, E. (2014). Trends in agricultural growth and its determinants.
- Nilesh, V., & Shrirang, K. (1999). An analytical study of Indian agriculture crop production and export.
- NITI Aayog. (2023). *National Multidimensional Poverty Index: A Progress Review 2023*. Government of India.
- Patra, R. (2014). Agricultural development in Odisha: Are the disparities growing? *International Journal of Food and Agricultural Economics*, 2(3), 129–144.
- Pattanaik, F., & Mohanty, S. (2016). Growth performance of major crop groups in Odisha agriculture: A spatio-temporal analysis. *Agricultural Economics Research Review*, 29(2).
- Pattanaik, F., & Mohanty, S. (2017). Changes in cropping pattern in Odisha agriculture in neo-liberal period. *Journal of Rural Development*, 36(1), 121–154. https://doi.org/10.25175/jrd/2017/v36/i1/112707
- Pattnayak, M., & Nayak, B. P. (2004). Performance of agriculture in the changing structure of the Orissa economy: Issues revisited.
- Pattanayak, U., & Mallick, M. (2018). A study on irrigation and agricultural productivity in Odisha. *Economic Affairs*, 63, 317–323. https://doi.org/10.30954/0424-2513.2.2018.4
- Panwar, S., & Dimri, A. (2017). Trend analysis of production and productivity of major crops and its sustainability.
- Reddy, A. A. (2013). Sources of agricultural productivity and growth in Odisha: A district-level analysis.
- Sahoo, B. K., & Mohapatra, S. (2019). Spatio-temporal variations in agricultural diversification in India: Determinants and convergence. *Journal of Agribusiness in Developing and Emerging Economies*, 9(5), 476–502. https://doi.org/10.1108/JADEE-11-2018-0161

- Sahoo, P., Sahoo, D., & Chandra, S. (2020). Changes in rural poverty among occupational groups in Odisha: An analysis of the post-reform period. *Journal of Land and Rural Studies*, 8(2), 150–165.
- Sahu, J. P., & Panda, S. (2018). Political regime persistence and economic growth in Odisha: An empirical assessment of the Naveen Patnaik rule. *Economics Bulletin*, 38(1), 610–622.
- Swain, M. (2002). Performance of agriculture in Orissa: Intertemporal and spatial variations. In *Orissa Development Report*. Planning Commission, New Delhi.
- Swain, M., Swain, M., & Das, D. K. (2009). Regional disparity in agricultural development in Orissa in the pre and post-reform period. *Social Change*, 39(2), 195–215.
- Tripathy, U., Das, M., & Padhi, P. L. (2011). Regional variation in development profile of Orissa: An econometric analysis of indicators of development. *International Journal of Multi-Disciplinary Research*, 1(6), 107–130.

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- **ANNEXURES**
- **Table-1**

Year	Rice (k.g/ha)		Pulses (k.g/ha)		Oil Seeds (k.g/ha)		Food grains (k.g/ha)	
	India	Odisha	India	Odisha	India	Odisha	India	Odisha
1971-72	1141	779	501	453	526	714	858	732
1972-73	1070	890	474	520	452	707	813	822
1973-74	1151	930	427	493	555	734	827	848
1974-75	1045	714	455	427	529	635	824	663
1975-76	1235	967	533	465	627	625	944	858
1976-77	1089	735	494	423	512	571	894	675
1977-78	1308	981	510	495	563	603	991	853
1978-79	1328	1007	515	505	570	643	1022	863
1979-80	1074	709	385	343	516	386	876	600
1980-81	1336	1026	473	514	532	658	1023	865
1981-82	1308	926	483	558	639	711	1032	822
1982-83	1231	737	519	580	563	721	1035	731
1983-84	1457	1176	548	520	679	722	1162	956
1984-85	1417	969	526	512	684	742	1149	843
1985-86	1552	1187	547	569	570	783	1175	989
1986-87	1471	1100	506	532	605	751	1128	910
1987-88	1465	856	515	489	629	753	1173	751
1988-89	1689	1237	598	560	824	784	1331	1021
1989-90	1745	1431	549	555	742	769	1349	1144
1990-91	1740	1198	578	551	771	821	1380	992
1991-92	1751	1464	533	529	719	744	1382	1141
1992-93	1744	1213	573	532	797	697	1457	993
1993-94	1888	1452	598	522	799	769	1501	1140
1994-95	1911	1426	610	538	843	752	1546	1122
1995-96	1797	1375	552	548	851	746	1491	1101
1996-97	1882	993	630	390	927	552	1614	841
1997-98	1900	1390	567	424	817	610	1552	1105
1998-99	1921	1212	634	391	945	525	1627	989
1999-00	1986	1127	635	403	854	668	1704	937
2000-01	1901	1041	544	365	810	531	1626	884
2001-02	2079	1589	607	400	913	635	1734	1232
2002-03	1744	759	543	349	691	550	1535	675
2003-04	2078	1496	635	379	1064	626	1727	1178
2004-05	1984	1455	577	378	885	627	1652	1154
2005-06	2102	1554	598	422	1004	668	1715	1211
2006-07	2131	1557	612	444	916	719	1756	1213
2007-08	2202	1720	625	458	1115	804	1860	1344
2008-09	2178	1553	659	497	1006	848	1909	1249
2009-10	2125	1609	630	460	958	776	1798	1258
2010-11	2239	1640	691	481	1193	828	1930	1293
2011-12	2393	1472	699	460	1133	867	2078	1175
2012-13	2461	2361	789	508	1168	912	2129	1737
2013-14	2416	1821	764	507	1168	928	2120	1426
2014-15	2391	2363	728	508	1075	917	2028	1761
2015-16	2400	1491	656	506	968	895	2041	1330
2016-17	2494	2472	786	502	1195	889	2129	1832
2017-18	2576	1739	853	526	1284	887	2235	1365
2018-19	2659	2004	806	540	1265	887	2299	1554
Mean	**1795.52**	**1310.47**	**588.95**	**479.81**	**821.89**	**722.7**	**1482.5**	**1066.2**
Std.Dev	**459.346**	**432.259**	**101.18**	**63.37**	**232.35**	**119.29**	**433.43**	**289.08**
C.V (%)	**25.58**	**32.98**	**17.17**	**13.20**	**28.27**	**16.50**	**29.23**	**27.11**

- *Source:* Computed by author from Odisha Agricultural statistics -2018-19.

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- Table -2

Sl.	District	Rice	Pulses	Oilseeds	Food Grains	Cereals
1	Sundargarh	1668.8	540.4	543.4	1397.6	1678.8
2	Deogarh	1814.2	426.8	574.6	1342.4	1822.4
3	Mayurbhanj	1912.4	597	961.2	1678.6	1914.8
4	Keonjhar	2010.6	549.4	538.2	1688.8	2094.4
5	Balasore	2351.8	482.2	1476.4	2175.8	2351.6
6	Bhadrak	2157.2	501.2	1086.2	2031.2	2157
7	Jajpur	1757.8	491.4	1797.6	1356.2	1762.6
8	Cuttack	2546	493.4	1459	1655.4	2546.6
9	Jagatsingpur	2364.6	479	1695	1571.8	2364.6
10	Kendrapara	1741.2	475.8	1406.8	1249.6	1741.6
11	Puri	2179	491.6	1712.2	1639.4	2177
12	Khurda	2007.6	486.2	1028.8	1474	2010
13	Nayagarh	1801.6	456	587.8	1201	1816.8
14	Ganjam	2162.2	530.8	911.4	1440.8	2044.6
15	Gajapati	1642.2	541.4	981.2	1299.8	1647.2
16	Rayagada	2258.8	665	592	1594.6	2110
17	Kandhamal	1605.2	511.4	501.8	1424.8	1822.6
18	Koraput	2298.2	516	451.4	1691.6	1904.4
19	Nabarangpur	1984	505	874.2	2176.8	2379.2
20	Malkangiri	1737.4	489.6	752.8	1596.2	1742
21	Kalahandi	2030.6	572	1013.2	1397.4	2128.4
22	Nuapada	1323.6	494	994.4	922.4	1345.2
23	Bolangir	1693.6	503.4	1237.6	1198.2	1722
24	Subarnapur	2912	518.4	1045.4	2291.8	2908.2
25	Boudh	2202.8	513.4	589.4	1521	2199.2
26	Sambalpur	1516.4	504.6	486	1295	1547
27	Bargarh	2060.8	477.2	1179.8	1734.6	2062
28	Jharsuguda	1280.6	516.6	534.4	1122.6	1316.2
29	Dhenkanal	2454.8	463.8	890.2	1544.2	2440.4
30	Angul	1928.4	497.8	686	1157.2	1953
	Odisha	**1980.14**	**505.63**	**952.94**	**1529.02**	**1990.32**

- *Source:* Computed by author based on 5 years average data of (*2014-15 to 2018-19)* drawn from Agricultural Statistics of Odisha

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- **Table-3**

- **Z-SCORE**

District	Food Grains	Cereals	Pulses	Rice	Oil Seeds	Sum of Z Score
Sundargarh	-0.407	-0.888	0.687	-0.855	-1.029	-2.492
Deogarh	-0.578	-0.479	-1.854	-0.456	-0.95	-4.317
Mayurbhanj	0.463	-0.215	1.953	-0.186	0.021	2.036
Keonjhar	0.495	0.297	0.888	0.084	-1.042	0.722
Balasore	2.003	1.03	-0.615	1.021	1.315	4.754
Bhadrak	1.556	0.475	-0.19	0.486	0.335	2.662
Jajpur	-0.535	-0.649	-0.409	-0.611	2.121	-0.083
Cuttack	0.391	1.586	-0.364	1.554	1.271	4.438
Jagatsingpur	0.132	1.067	-0.686	1.056	1.864	3.433
Kendrapara	-0.866	-0.709	-0.758	-0.656	1.14	-1.849
Puri	0.342	0.532	-0.405	0.546	1.907	2.922
Khurda	-0.17	0.056	-0.525	0.075	0.191	-0.373
Nayagarh	-1.016	-0.495	-1.201	-0.49	-0.917	-4.119
Ganjam	-0.273	0.155	0.472	0.5	-0.104	0.75
Gajapati	-0.71	-0.979	0.709	-0.928	0.071	-1.837
Rayagada	0.203	0.341	3.474	0.765	-0.907	3.876
Kandhamal	-0.323	-0.478	0.038	-1.03	-1.133	-2.926
Koraput	0.504	-0.245	0.141	0.874	-1.26	0.014
Nabarangpur	2.007	1.109	-0.105	0.011	-0.198	2.824
Malkangiri	0.208	-0.708	-0.449	-0.667	-0.503	-2.119
Kalahandi	-0.408	0.394	1.394	0.139	0.151	1.67
Nuapada	-1.879	-1.84	-0.351	-1.803	0.104	-5.769
Bolangir	-1.025	-0.765	-0.141	-0.787	0.715	-2.003
Subarnapur	2.363	2.618	0.195	2.559	0.232	7.967
Boudh	-0.025	0.596	0.083	0.612	-0.913	0.353
Sambalpur	-0.725	-1.264	-0.114	-1.274	-1.173	-4.55

- **Source:** *Computed by author from Table-2*