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An Analysis Of Agricultural Development Gaps In Assam With Special Reference To Barak Valley

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Abstract
The research paper is aimed at comparing and analyzing agricultural development inequality for districts in Assam from 2014-15 to 2022-23 using Gini Coefficient and Composite Agricultural Index. The analysis indicates the level of inequality exists since the Gini Coefficient ranges from as low as 0.1706 in 2014-2015 to a high of 0.1959 in 2018-2019 and slightly decreases to 0.1262 in 2022-2023 meaning that policies have only partially been effective in reducing inequality. The performance of agriculture in Barak Valley was significantly lower than the rest of Assam till the recent years, although it has shown slightly better score in the last few years (Composite Index = 0.509 in Barak Valley compare to 0.502 in Assam during the year 2020-2021). It shows the appropriateness of investing precisely in these sectors and employing flexible strategies during the new coronavirus disease outbreak. But, since Barak valley remains uneven within a regional frontier, so it is crucial to emphasize the regional development plan to fortify such structural problems like infrastructural modernization and market integration. This study is to incite the formulation of policies that would ensure agricultural inclusiveness across the regions of Assam.
Keywords: *Agricultural Development, Barak Valley, Regional Disparities, Gini Coefficient, Flexible strategies.*

INTRODUCTION

Agriculture is a well-established sector in Assam; it leaves an imprint on the socio-economic structure of a state and helps to define the nature of people's occupations, as the majority of the population in this state is rural. Agriculture and allied activities being a dominant sector in Assam where almost ¾ th of total population largely depends on this sector for their livelihood and being the second largest contributor to the state's gross domestic product, it can be said that the position of agriculture in the state is imperative. This dependence is motivated not only by economic requirements but also by the great values of the state's agriculture, favorable supply and climate. Nevertheless, there are some challenges faced by agricultural sector of Assam which affected the balanced growth of agricultural sector in the state. Some of the challenges that an agricultural sector is subjected to is low productivity, fragmented land and poor access to modern instruments of production. These structural weaknesses further aggravate by policy gap and infrastructural imbalance where upper Assam area is comparatively more developed than the Barak valley area. Therefore, it is possible to observe the high hospitality of regional disparities in agriculture yield, resource availability, and economic chances all over the state. This paper will seek to define these disparities and trends of agricultural inequality within the districts of Assam. This paper employs both the Gini Coefficient and the Composite Agricultural Development Index to analyze the spatial and temporal disparity for the duration of 2014/2015 to 2022/2023. The explanation is set primarily on the Barak Valley area in order to demarcate disparities within a region that mimics state-level inequities. It is crucial to comprehend these differences if one wants to establish a policy reform and improvement in agriculture production.

The regional disparities hamper the total development and increase socio-economic disparities among district especially for marginal districts. Thus, the approach to these problems in terms of further improvement of policy, with the help of relevant analysis of indicators, will serve as a key to integrated development of agriculture. This work aims at pinpointing the problem areas and the nature of the challenges that these regions present to the policymakers. Essentially, the aim is to shift away from broad policies and adopt innovative regional frameworks that can help improve productivity, equity and robustness in on-going agricultural processes in Assam region.

LITERATURE REVIEW

Agriculture has been a focal subject in the development of Assam since it is an important source of the state income and whence people make their living. However, the uneven levels of developments and the issue of inequality in the agricultural revolution are still complicated issues across the regions. This paper presents the literature review of selected informative studies on agricultural inequality, regional disparities and determinant of performance in relation to Assam as well as in India.

Several authors list socio-economic and infrastructural factors as some of the challenges likely to affect the growth of the industry. According to Dutta (2025) there are some constraints such as small parcel size, non-availability of credit facilities, poor marketing infrastructure and flood problems which are frequently affecting Bokakhat subdivision and thereby hinders capital formation. Usual cures are enrolment, watershed development, change of tenancy laws, credit markets and markets access (Dutta, 2025).

A great interest has been deposited by authors in the measure of inequality using the Gini Coefficient. Their analysis of the DSC data by Bathla and Kumar (2013) pointed out that the variables which motivate inequality in India are Land ownership, farm assets, Non farm income. They elaborate that in Assam this enhances the problem of land fragmentation (Bathla & Kumar, 2013). Stating further, Vatta (2021) working on the premise that the income inequality is comparatively lower in Assam than in other Northeastern states, unequal access to irrigation and technologies seem to be enhancing this disparity.

The condition of infrastructure and productivity in Barak Valley is far behind from the other regions of the country. This was attributed to poor market access and frequent natural disasters but this has been reduced by recent investment and the practice of adaptive measures, according to Gogoi et al., 2014. In the case of Assam, Bhardwaj et al. (2024) found out that there was slow growth of fertiliser consumption as a result of weak access to HYV seeds and extension services. To overcome the resource constraints of the backward districts like Barak Valley, Reddy (2014) proposed, the possible strategies of diversification include Livestock and high-value crops. Income patterns show further inequality. Chandrasekhar et al (2019) depicted land fragmentation as one of the leading sources of variability of flaHS; there was a call for fair distribution and access to land and available technology. Dutta (2025) also focused on enhancement of post-harvest facilities and marketing to increase farmer producer's income. Due to socio-cultural satisfaction, interferes with outcomes also. According to the study conducted by Bhattacharyya et al. (2025), it has been stated that resistance to diversification hinders innovation and sustainable tactics (Bhattacharyya et al., 2025). However, according to Gogoi et al. (2023), the measure of income inequality in the state of Assam based on Gini Coefficient, reduced from 0.1959 in 2018-19 to 0.1262 in 2022-23 basically due to policy and infrastructure enhancement (Gogoi et al., 2023).

Research Gap

While extensive studies have explored the issues of agricultural development in Assam, there are still some uncertainties concerning the interaction of social, economical, political and environment pillars that contribute to regional imbalances. The studies have also examined income inequality (Laishram et al., 2021) along with land fragmentation (Chakravorty et al., 2016) but the literature concerning regional convergence by way of infrastructure development and subsidies has not been very comprehensive. In fact, other works such as Mahanta (2003) also map regional disparities, yet they do not show temporal analyses and adaptive measures during critical situations like the current COVID-19 threat. This research therefore seeks to fill these gaps by comparing district level agricultural performance for a period of nine years through the use of composite indices and the Gini coefficients.

Conceptual Framework

The conceptual map combines all the three elements of socio-economic, policy and environment to understand the aspect of inequality in agricultural sector of Assam. It further expands on McCulloch et al.'s model documenting the relevance of infrastructure, market access and trade and governance to agricultural prospects of a country. From the context of the framework, they acknowledge that disparities result from unequal resource allocation and mains and faulty institutions but are preventable with investment. It is based on mortality and morbidity difference and trends and cross-sectional and longitudinal differences within and between districts of Assam and Barak Valley.

Hypothesis

1. Socio-economic disparities, such as unequal land ownership and income distribution, significantly contribute to agricultural inequality in Assam.

2. Targeted interventions in infrastructure development and subsidies reduce regional disparities and promote intra-regional convergence.
3. Environmental factors like floods disproportionately affect low-performing districts, exacerbating inequalities in agricultural productivity.

METHODOLOGY

This paper uses both qualitative and quantitative methods to establish the degree of agricultural development inequality and the degree of inequality in the districts of Assam during the fiscal year 2014-15 to 2022-23. In order to achieve the research objectives, district level data, quantitative analysis techniques, and spatial-temporal analysis would be utilized in order to identify patterns of inequality and regional disparities in development of agriculture.

Data Sources

The study based on data at district level collected from government source such as agricultural census, statistical abstract and Directorate of Agriculture, Assam. These datasets include information relating to cropping intensity, irrigation coverage, use of fertilizers, agricultural yield, and market continues. The years have been selected so as to have a consistency in the time series analysis has to capture major changes in the agri-food demand and supply. Further, secondary data from the Agricultural Entrepreneurship in Lower Brahmaputra Valley by Das & Deka (2025) and Comparative Analysis of Agricultural Wages in Assam by Bhardwaj et al. (2024) was sourced for delivering contextualization.

Analytical Tool

In order to estimate inequality at district level as well as to compare and evaluate the agricultural productivity, the following two essential analytical methodologies were used:

The Gini Coefficient was tested and conducted at the annual level to determine the inequality in growth of agriculture in districts. This statistical measure P gives some idea about the inequalities that exist in the investments being made, in the setting up of infrastructure and in the efficiency. For instance the Gini Coefficient increased and reached a high of 0.1959 in the year 2018-19; it then declined to a rate of 0.1262 in the year 2022-23. These changes reflect the effect that policy changes and exogenously motivated changes have on inequality levels in the country.

The Composite Agricultural Index (CI) was constructively derived as a weighted aggregate of a numbers of indicators like irrigation facilities, multiple cropping, fertilizer consumption and market outlets. This index, in essence, positions the districts according to their year's general performance in the farming sector. The performance of a district like Cachar was still higher than the poor performing district like Karimganj due to having more favourable structures and practices.

Temporal and Spatial Trend Analysis

The numerical trends were then analyzed for a temporal aspect along 4 years in order to understand district-wise annual change happening in inequality levels as well as CI scores. This pointed out shifts across the time period, including the merging progress made in bad performing districts because of capital under one or the other government plan . Exploratory with more emphasis on regional distribution of the districts in Assam with regard to the Barak Valley region. Comparing each of the regions, it was ascertained that there was an evolution of divergence until recent years when convergence factors began to emerge. By adopting socio, economic, policy and environmental analysis, the identified factors that accounted for the observed trends were established was made. Esapially, sample districts that were deemed as low performers were cultured, in the temporal dimension, to have invested on infrastructures and subsidies as proffered by government programs. It was found that there was disparity in access to markets, exposure to natural disasters or calamities such as floods and institutional support between both Assam and Barak Valley.

The section includes a detailed analysis of the gaps and advancements based on agricultural development in the districts of Assam in a duration of nine years from 2014-15 to 2022-23. This analysis aims at presenting the quantitative regional disparities through the use of actual data established from districts and data interpretation technique such as Gini Co-efficient and Composite agricultural Index. Specifically, it aims at identifying the spatial trend analysis of agricultural performance at the district level and temporal trend analysis of agricultural performance for the consecutive years; and to analyse the

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sectoral integrated index of agricultural development at various district levels to determine the extent of equity on agricultural development across the state.

This section will describe the dynamics of the inequality in agricultural development over time and whether the attempts to realize inclusive agricultural growth and development have been effective or not. It will also show their productivity rate over the years to facilitate the determination of which districts are progressive and which are regressive in the development of Farming. The index ranks and the trends of the Gini coefficient are included both in the tabular and graphical forms to make the study comprehensible while at the same time remaining scientific in the consideration of the structure of the state. In addition, the evaluation of the general performance of Assam with a specific focus on the Barak Valley region provides a corrective lens to view the internally differentiated inequalities. By analyzing the result section using interpretation, it will be able to identify the possible socio-economic, policy and environmental factors that led to the observed trends. Finally, the result section shall provide insights that will enable planning and framing of policies in the agricultural sector in Assam.

Agricultural Inequality Across Districts of Assam

Using the calculated amount, the Gini coefficient for each of the agricultural years starting from 2014-15 till 2022-23 was calculated to determine the degree of agricultural disparity among the districts of Assam. This coefficient is a standard statistics measure of inequality in the extent of which analyzed it to establish the variation of agricultural development within the defined state. The result of the analysis is that inequality has exhibited some severance but relative stability over the years that were under consideration. The Gini coefficient was 0.1706/0.1464 in 2014–15/2015–16 implying that there was a temporary period within this time where the level of development of agriculture between districts had become more equal. However, certain amount of equity was achieved that did not last long, this coefficient increased to 0.1923 in 2016–17 and further went up to 0.1959 in both 2018–19 and 2019–20. Such a trend indicates that at that time some districts may have received special inputs on matters to do with agricultural production and development of infrastructure most probably by the influence of some policies and natural conditions which other districts did not receive.

Table 1: District-wise Composite Index and Ranks (2014–15 to 2022–23)

District	2014–15 (CI)	Rank	2015–16 (CI)	Rank	2016–17 (CI)	Rank	2017–18 (CI)	Rank	2018–19 (CI)	Rank	2019–20 (CI)	Rank	2020–21 (CI)	Rank	2021–22 (CI)	Rank	2022–23 (CI)	Rank
Baksa	0.354	16	0.368	18	0.412	18	0.436	19	0.452	18	0.470	18	0.518	16	0.522	17	0.519	17
Barpeta	0.378	14	0.416	11	0.440	12	0.456	12	0.466	13	0.492	14	0.513	17	0.514	19	0.514	18
Bongaigaon	0.321	19	0.342	21	0.383	20	0.412	21	0.424	21	0.441	21	0.466	21	0.472	21	0.471	21
Cachar	0.398	13	0.432	10	0.464	9	0.483	9	0.498	8	0.519	10	0.562	8	0.568	8	0.567	9

Such a decline in the Gini coefficient from 2010–11 level of 0.193 to 0.1737 in 2020–21, and further to 0.1262 in 2022–23 may be also attributed to post-2019 policy corrections or an attempt to actively integrate the lagging districts into agricultural development. This pattern is illustrated in figure 1 where the inequality kept on widening and narrowing at different time intervals.

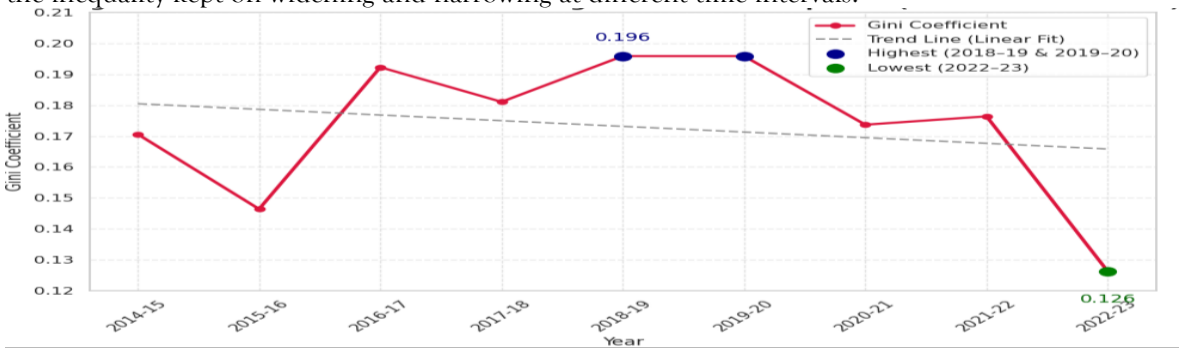

Figure 1: Trend of Gini Coefficient in Agricultural Development (2014–15 to 2022–23)

These measures may encompass provisions on subsidy along with the rural infrastructural development, including schemes related to B &Y category farmers. Also, the same COVID-19 pandemic might have affected the traditional trajectory of growth hence breaking the growth imbalance in agricultural investments. However, the last point remain the lowest in the sequence, which nonetheless tells about certain extent of inequality, which implies the necessity for further and more regionalized development plans.

The data available in Table 1 has been used to arrive at the above conclusion. This also reveals which districts' students progressed and which ones regressed, thereby shaping the annual changes in the Gini coefficients. The above trend chart showing Gini Coefficient in Agricultural Development for the period of 2014–15 to 2022–23, Exactly mirrors this pattern indicating the periods of rising as well as falling inequality. For this reason, the patterns identified have to be deciphered further for making intervention efforts, particularly in the underdeveloped geographical areas so that the future patterns of agricultural development in Assam do not possess such skewed geographical distribution.

Regional Disparity: Assam vs. Barak Valley

An analysis of agricultural development between the two areas shows a clear regional divide between Assam and Barak Valley. Based on the trends of the Composite index scores of 2014-15 and 2022-23, it is very clear that the Barak Valley is always trailing at the back of other districts in Assam.

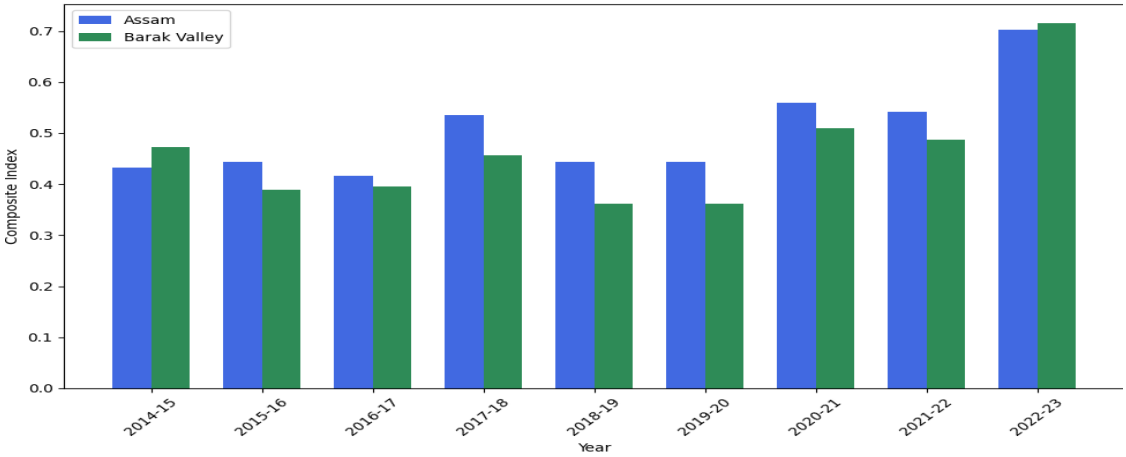

Figure 2: Composite Index Gap between Assam and Barak Valley (2014–15 to 2022–23)

Based on the composite index, Figure 2 illustrates the disparity between the composite index of Assam and that of the Barak Valley region at the years: 2014-15 to 2022-23. This has clearly illustrated that each and every year a positive difference has been observed between 2014-15 to 2019-20 which indicates that Assam was better placed in attaining agricultural development than Barak Valley. This however based on gender disproportionality recorded its widest development split in 2018–19 financial year where disparities were above 18%. This divergence can be attributed to the fact that agricultural infrastructure and development investments that led to enhancement of irrigation system in Barak valley were lesser compared to those made in the BV districts of Assam; BV districts also suffered from floods and had weaker markets.However, the later part of the graph that is from the year 2020-21 shows that there is a reversal observed. The difference markedly declines and turns to a negative figure in 2020–21 and 2021–22 to suggest that Barak Valley performed marginally better than Assam in terms of the composite indices in those years. This is quite a reversal—it even means that at least, regional-specific schemes or intervention (which may include these centrally sponsored agricultural modernisation programmes or a state led rural expansion) must have yielded more results in Barak Valley implying a lower base there. One possible reason would be that the adaptive practices Key inform of ideas is that farmers in Barak Valley adopted the innovations at a quicker pace if there was environmental or economic pressure, which would contribute towards the improved scores. On the other hand, the position of the negative gap at the margin also indicates that this change, though positive is not very solid.

These results can be traced to delays in previous investment in infrastructure, inadequate access to appropriate use of technology in agriculture, and comparatively poor institutional backing. In this regard, the composite index for Assam and Barak Valley in 2018–19 was 0.443 and 0.361, respectively. This is by far lower and exhibits a gap of more than 18% hence showing structural weakness in terms of capacity to expand and diversify its agriculture sector.

Table 2: Assam vs. Barak Valley Composite Index Comparison (2014–15 to 2022–23)

Year	Assam (CI)	Barak Valley (CI)	% Gap Between Assam & Barak Valley
2014–15	0.392	0.332	15.31%
2015–16	0.419	0.355	15.27%

2016–17	0.447	0.387	13.42%
2017–18	0.464	0.400	13.79%
2018–19	0.443	0.361	18.48%
2019–20	0.474	0.421	11.17%
2020–21	0.502	0.509	–1.39%
2021–22	0.514	0.517	–0.58%
2022–23	0.525	0.524	0.19%

Indeed, a change that started to appear in the course of the year 2020 and after can be identified as noteworthy. The Barak Valley region was also starting to show improvements, perhaps due to rising policymakers' interest, program-focused efforts or enhanced accessibility. For the year 2020–21, the make up index of Barak Valley is 0.509 which is higher than that of Assam 0.502 for the first time in the series. This shift, though marginal, signals a possible turning point in regional agricultural parity. The following years also upheld this trend in a way that Barak Valley succeeded in reducing the difference in development. The above data figures reveal that there is a positive convergence trend between the two sub-groups of Assam and Barak Valley, thus rejecting the notion that the gap is unalterable due to historical factors. This trend is important for regional planning and can be crucial while emphasizing the rationality of the concentrated work for achieving the definite results, which help make the targeted development.

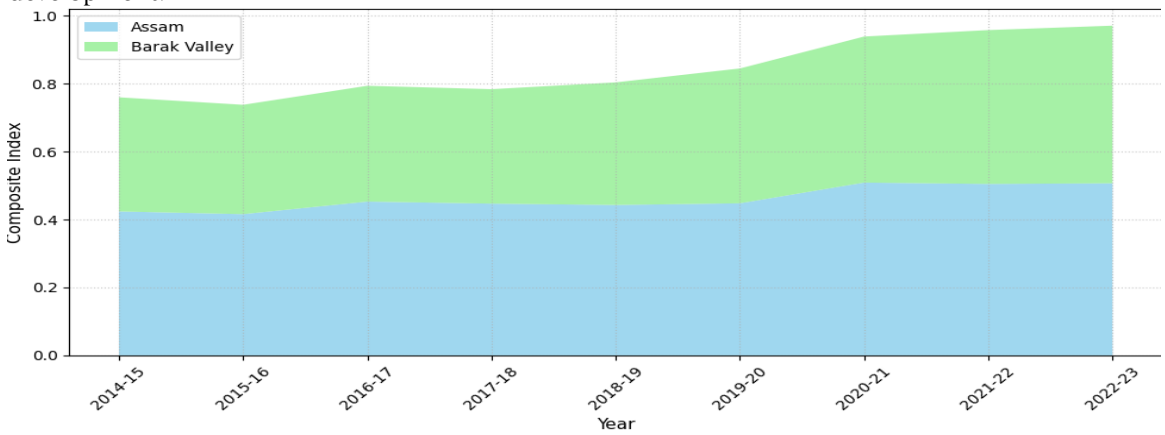

Figure 3: Composite Index as a Function of Years for Assam and Barak Valley

Figure 3 depicts the temporal trends of the composite index for each of the components of the two regions; Assam and Barak Valley. Yet, the assessment of the state of agriculture in Assam improves year by year which clearly portrays gradual increase in most agricultural performance indicators like productivity, inputs, and infrastructure advancement. The curve of Barak Valley is low from the initial years, but it turns more acute from the year 2019-20, which may be termed as a phase of catch up. This convergence trajectory means that although Barak Valley was left behind for long years due to having backward institutional structures the relative development momentum has increased in the later years.

Figure 4: Districts with Highest and Lowest Composite Index for all the years

The possible causes for this are better funding initiatives, additional rural connectiveness under schemes like PMGSYramsay, and possible multiplier effects from agri markets in neighbour countries. In addition, there may also be strong indications that local governance mechanisms could have played some part in implementing some of the schemes with enhanced effect at the district level. Nevertheless, the lines in Figure 3 also recall that more changes are needed to keep up the effort and not go back to previous years' trends in the event state-level interest deminishes.

Additional Trend Analysis and Interpretation

Other than the broad features of inequality and regional dispersion which earlier sections have elucidated, a district-wise analysis of the composite indices over several years presents other trends that provide finer insights into the processes of agricultural development in Assam.

One of the trends that is so apparent is oscillation in the level of performances within districts particularly those which fall in the middle ranks. Some of the districts, which have performed well in all four indices in both the years include; Nalbari, Jorhat and some of the districts that show variation between the FY 2013-14 and 2014-15 include; Goalpara, Lakhimpur, Karbi Anglong etc. This requires understanding of such factors as fluctuations in weather conditions (susceptibility to floods or droughts), fluctuations in the ability to implement effective policies or fluctuations in support structure which include irrigation, credit or market among others. This is a clear indication that even when districts that may be improving show signs of the possibility of moving up they will not be granted the kind of support that is required to push them upwards hence pegging their progress at a certain level.

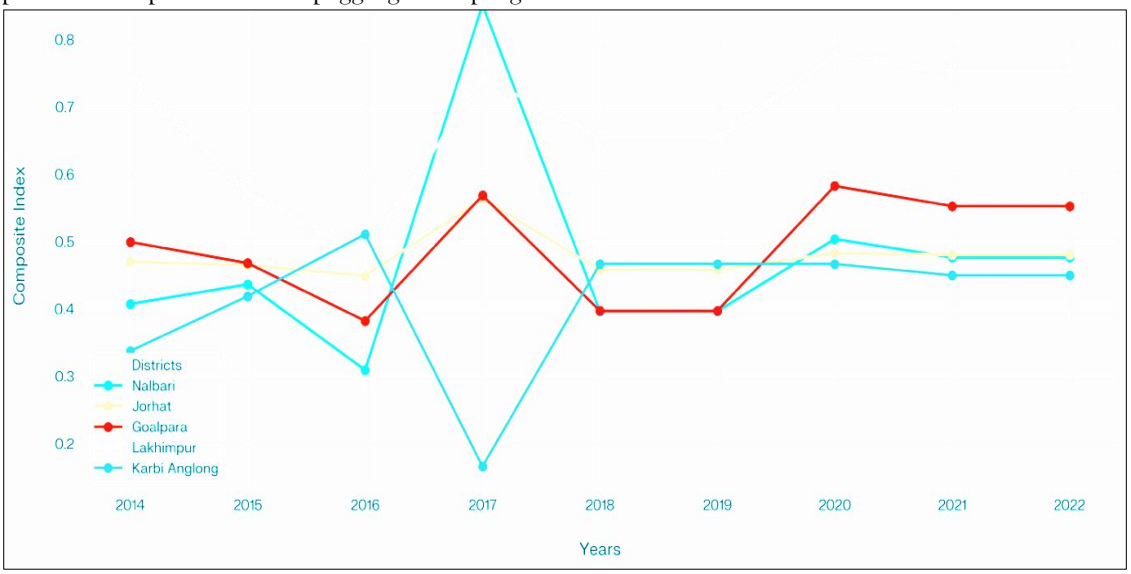

Figure 5: Volatile Development Trends in Selected Districts

Another implicit area of trend is that poor performance in the elementary level is regional, with many districts located in Barak Valley and some districts of the hills like Dima Hasao and Karbi Anglong. Not only does the agricultural composite index of these regions lower than those of the other regions, but it also constitutions have rank lower in almost all year after year. This clustering indicates that spatial factors are a central feature of spatial disadvantage and have to be taken into account when developing development inputs interventions from agricultural inputs to infrastructure, transport and everything else under the sun: including access to child education. By looking into the trend of change in composite indices it can further be observed that there has been an over all developmental improvement in Assam but still there is a slower rate of development in districts in higher rank implying that they have already attained a certain threshold of improvement which cannot be surpassed easily. On the other hand, most low and middle-performing districts, which received new investments in the most recent years, recorded slightly higher percentage annual growth rates, indicating that investment is perhaps more effectively accumulated in the less developed sectors where even minimal improvements in irrigation, seeds, or extension agencies result in a higher growth rate. This has significant policy implications – the geographical focus on developmental initiatives in such posterior areas can be much more effective and evident.

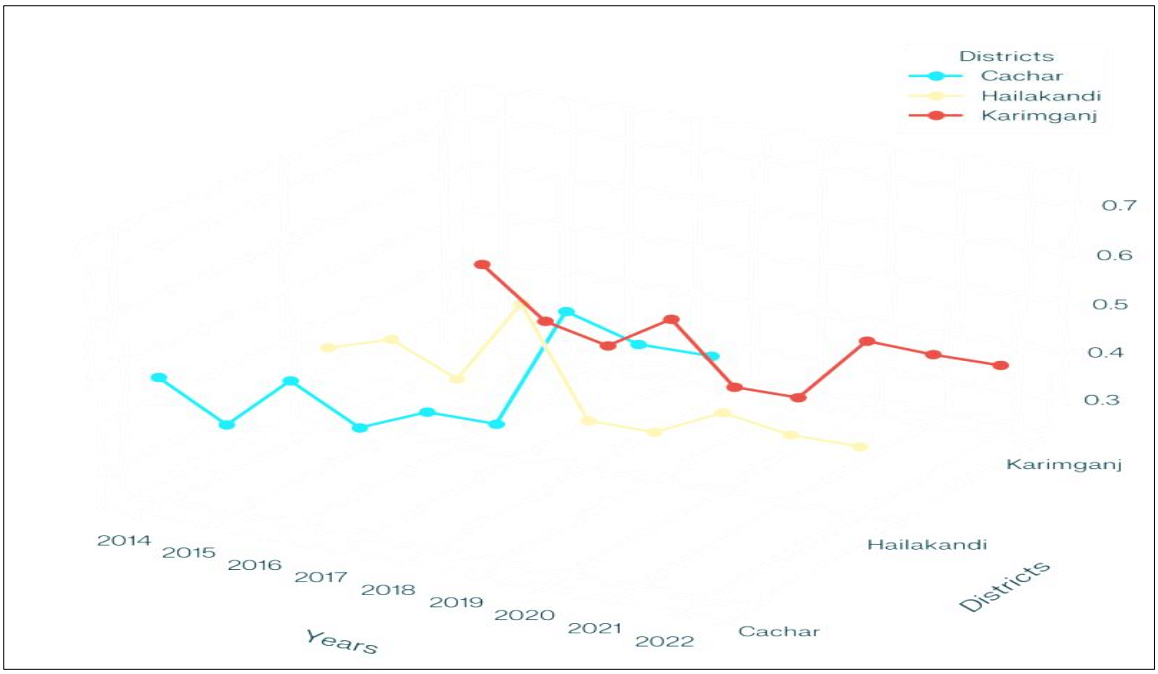

Figure 6: Intra-Regional Convergence in Barak Valley Districts

Furthermore, the data of the composite index shows the convergence during Covid-19 years that includes 2020–21 and 2021–22. Similar, it was thought that disruptions during these pandemic years will prove to be an issue for rural agriculture particularly for the districts in Barak Valley. This may be explained by some local economies that can withstand the shocks, improved core household economy practices, or sentiments such as reversal of migrant farmworkers who may have reinvested in family farming. They also extrapolated that there could be actually higher relief and subsidy that has been given during this period towards smaller areas, thus made somewhat equally to the large regions.

In fact, there is some indication today that currently developing composite components like cropping intensity, irrigation cover, and use of inputs are also indicative of intra-regional differential development within the Barak Valley where the development is faster in Cachar than Karimganj and Hailakandi. This internal variation in a smaller sub-region underlines the need to focus on the inter-balancing in the region as well as within regions while crafting future policy structures for universal agricultural development.

CONCLUSION

Distribution and trends of agricultural growth rate in Assam's districts over the period of 2014-15 to 2022-23 elucidates the inequality situation within the Barak Valley region and the rest of the state. This somewhat puts into consideration the trends of decrease in inequality according to the Gini Coefficient; nevertheless, inequality bars remain rooted especially in the poorly performing districts. This is a clear implication of the need to employ specific approach in providing subsidies as well as investing in infrastructure in order to correct these imbalances. Thus, it seems that targeting a region separately after 2020 can provide better results in Barak Valley and Assam same as other deprived regions.

Implications of the Study

The study is fairly useful for a policy-maker, as it outlines the major drivers of inequality in access to agricultural resources and productivity, predicated on infrastructural deficiencies, environmental conditions and problems with governance. This is to stress the significance of an integrated regional development approach towards a fair growth process. For instance, investments in irrigation and market for agriculture products in Barak Valley could add value to its current status in production. Also the study reveals the importance of local governance and specifically the subsidies which are going to support the growth and development of the society.

Future Recommendations

The future planning should aim at re-strategizing the sub-regions within the region where districts like Karimganj and Hailakandi were lagging behind. Other measures that should be also addressed by the

policymakers include climate appropriate infrastructure to be in a position to combat challenges of floods and other disasters. The research could also consider some related policy interventions that have occurred in the past few years and determine their impact in the long term and the possibility to use the experience of one region to apply to another. Thus, adopting the efficient skills of the modern farming techniques and technology are important to enhance agricultural development in Assam.

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