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SPATIAL ANALYSIS OF FOOD PROCESSING INDUSTRY DEVELOPMENT UNDER UTTAR PRADESH FOOD PROCESSING INDUSTRY POLICY 2023

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ABSTRACT

Uttar Pradesh, the most populated and a major agricultural producer, has very high spatial disparities in agro-industrial development in the 75 districts and the nine agro-climatic zones. Although the state has more than 6,500 organized and 35,000 unorganized food processing units, the geographical distribution of these units is grossly uneven, with the western part of the state having most of the food processing units, and some districts within Bundelkhand and eastern U.P. being completely devoid of food processing facilities. Within the policy framework covering 20222027, the Uttar Pradesh Food Processing Industry Policy 2023 is an incentive architecture (comprising 35 capital subsidies, 100 % stamp duty exemption, cold chain infrastructure support, and export transport subsidies) designed to stimulate agro-based industrialization in the state. This paper aims at a spatial analysis of the development of food processing industry in UP, with special focus on regional development of food processing units, agro-climatic zoning of agro-potential, infrastructure endowments and the spatial implications of the provisions of the 2023 policy. Based on secondary data, which includes government statistical reports, Annual Survey of Industries, records of the scheme of ODOP and published academic literature, the research demonstrates that there exist considerable spatial discrepancies between the areas of agricultural output and food processing capacity. The analysis has singled out Bundelkhand and eastern UP as hotspots of deficit areas that need specific spatial policy interventions to be added to the homogenous subsidy system of the 2023 policy. The article offers a geographical analysis framework on the potential of the policy to minimize the regional inequalities on agro-based industrialization.

Keywords: Spatial Analysis, Food Processing Industry, Uttar Pradesh, Agro-Climatic Zones, Regional Disparity, ODOP, Cold Chain Infrastructure, Industrial Policy.

1. INTRODUCTION

Agro-processing industries The location of industries in the region is a crucial factor in the development of the region. The location of food processing facilities in relation to agricultural production areas defines transportation costs, level of post-harvest losses, farmer earnings, and rural employment trends. Food processing sector in India functions as the connecting point that binds

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agriculture and manufacturing industry but the spatial geographical structure has been uneven across and within states (Dhillon and Sidhu, 2012).

Uttar Pradesh is a notable example of a state where spatial analysis can be used to teach a lesson. The state is covered by a total of nine agro-climatic zones Tarai, Western Plain, Central Western, South Western, Central Plain, Bundelkhand, North Eastern Plain, Eastern Plain, and Vindhyan which have different patterns of cropping, productivity, and endowment of infrastructure (Pandey *et al*.,2018). The west has always been more developed in terms of agriculture and industry, whereas the eastern part and Bundelkhand have been far behind (Narain, Rai and Sarup, 1995; Raman and Kumari, 2012). Narain, Rai, and Sarup (1995) discovered that the western part of UP was significantly more developed than the rest, with Ghaziabad topping the list and 23 districts (41 % of the area, 35 % of the population) of low-developed.

The map of this spatial inequality in the overall development is directly transferred to the food processing sector. As recorded by Sunanda and Singh (2022), although UP contributes 16 % of the vegetable production and 31 % of the potato production in India, the extent of food processing of fruits and vegetables is still at a low of 6 % with four agro parks located at Gorakhpur, Barabanki, Saharanpur, and Varanasi. The most detailed evidence of space was provided by Tomar and Lal (2023), who discovered that three districts of the Bundelkhand region, namely Lalitpur, Hamirpur, and Mahoba, do not have a food processing industry at all, and the rest of Bundelkhand districts have only a sluggish positive growth.

The opportunity to review how the policy is designed provides a possibility to consider whether the design of the UP Food Processing Industry Policy 2023 is designed to mitigate these spatial variations or support the current patterns of concentration. In this paper, the spatial analysis of food processing development in UP is taken, within which the 2023 policy is framed against the agro-climatic zones, regional development differences, and infrastructure distribution.

1.1 Objectives

To determine the spatial patterns of food processing industries in the agro-climatic zones and economic regions of UP.

To evaluate the zone-based agricultural production capacity and how it matches the current food processing capacity.

To determine the spatial aspects of cold chain infrastructure and agro-processing clusters in UP.

To assess the UP Food Processing Industry Policy 2023's provisions from a spatial equity perspective.

To define spatial priority areas to be targeted by policy intervention.

2. REVIEW OF LITERATURE

2.1 Regional Disparity in UP Spatial Dimensions.

The source of literature on regional disparity in Uttar Pradesh is rich and it is always indicative of a west east development gradient. Kumari (2014) compared inter-district disparity in five sectors (agriculture, industry, services, education, health) by 46 sub-indicators and Principal Component Analysis. The research discovered that, although there was some indication of convergence in inter-district disparity between 1990 and 2011, there were still substantial core-periphery gaps.

The unequal spatial landscape of development in UP was confirmed by Shafiqullah (2013) as he investigated the spatial patterns of regional disparities and their association with the agricultural development based on the census data and statistical records of the districts. Disparities in agricultural

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development at regional and district levels in Uttar Pradesh were confirmed by an Indian Journal of Economics and Development article (2023), which showed that "sharp disparity existed in agricultural development at the regional and district level in Uttar Pradesh through a composite index of 15 agricultural development indicators in the period 2001-2018, which suggested that government ought to encourage the development towards high

Singh and Nayak (2020) created a Sustainable Livelihood Security Index (SLSI) of the nine agro-climatic zones of UP with 84 indicators on seven dimensions. They have found out that the Bundelkhand zone is the least secure in terms of livelihood, having the minimum access to basic amenities, minimum social and health security and maximum dependence on agriculture.

2.2. Spatial Pattern of Agricultural Production.

The agricultural production of UP is not homogenous spatially. The state contributed 18.9% of India's cereals, 8.65% of pulses, 3.65% of oilseeds, and 46.56% of sugarcane during 2017–18 (Singh *et al., 2021*). The western region is more advanced in agriculture than other regions and the growth trend of agriculture is known to be cyclical in all regions. The research suggested that the state ought to have different region specific policies rather than state as a whole.

Goyal (2014) examined the productivity of crops in the four economic regions of UP and observed that there were considerable inter-regional differences in agricultural productivity, thus the necessity to determine the regional differences. An Indian Journal of Economics and Development article (2021) at the agro-climatic zone level determined that the prospects of growth through expansion of the area was constrained in most of the agro-climatic zones but diversification proved to be a significant source of agricultural growth in all the agro-climatic zones.

2.3 Food Processing Industry in UP: Spatial Evidence.

Kumar (2017) discussed the topicality of the food processing industry to the economic growth of UP with an accent on the fact that the industry contributes to the enhancement of the spirit of the relations between agriculture and industry and significantly to the rural development. Pradeep Kumar and Sohanlal (2022) examined the performance of the food processing sector of UP, where the agricultural waste is extremely high, and the processing levels are extremely low across the state.

According to Pachauri (2011), agro-climate conditions in UP have been diversified in horticulture - fruits, vegetables, flowers, spices, mushrooms - and the horticulture produce has been worth Rs. At Rs. 14,000 crore and post-harvest losses. 3,000 crore. The fact that agro parks are concentrated spatially in four areas (Gorakhpur, Barabanki, Saharanpur, Varanasi) compared to 75 districts shows that there are a lot of spatial gaps in agro parks in terms of infrastructure (Sunanda and Singh, 2022).

2.4 Cold Chain Infrastructure: The Spatial Bottleneck.

Poor cold chain infrastructure is a serious issue of space. Negi and Anand (2015) defined cold chain as a weakness within the fruits and vegetables supply chain in India, implying that the supply chain requires grading, sorting, packing, storage, processing, and transportation facilities. Roy (2025) assessed the state of cold chain infrastructure in India and discovered that the infrastructure has only 11% of the perishable produce stored in cold storage with the major hindrances being economic limitations and high investment rates. Singh and Negi (2018) explicitly noted that the uneven allocation of cold chain capacities across the country was one of the obstacles, as well as outdated technology and unreliable power supply.

According to Jolly (2020), Uttar Pradesh stood among five top states in fruit and vegetable production in 201314 to 201718, but the cold chain was dismal in comparison with production volumes.

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2.5 ODOP and Spatial Development.

One District One Product (ODOP) scheme, introduced by UP in 2018, is somewhat of a spatial strategy in its nature, as it assigns individual products to each of the 75 districts. Masih and Barker (2025) observed that, although agriculture is producing large quantities of food, the food processing sector in UP is underdeveloped in accordance with both national and international standards, and carried out SWOT analysis examining how technology and policy have contributed to the sector.

3. RESEARCH METHODOLOGY

3.1 Research Design

This paper uses a descriptive-analytical research design based on secondary data to investigate the spatial aspects of the development of food processing industry in Uttar Pradesh.

3.2 Spatial Framework

The study is planned to be carried out in terms of nine agro-climatic zones of UP as the key spatial unit:

Table 1: Agro-Climatic Zones of Uttar Pradesh

Zone No.	Agro-Climatic Zone	Key Districts	Dominant Crops
1	Tarai	Nainital (now Uttarakhand), Pilibhit, Lakhimpur Kheri	Rice, sugarcane, wheat
2	Western Plain	Meerut, Muzaffarnagar, Saharanpur, Baghpat	Sugarcane, wheat, rice
3	Central Western	Aligarh, Agra, Mathura, Mainpuri	Wheat, mustard, potato
4	South Western	Jhansi, Jalaun, Lalitpur	Pulses, oilseeds, wheat
5	Central Plain	Lucknow, Kanpur, Unnao, Hardoi	Wheat, rice, pulses
6	Bundelkhand	Banda, Chitrakoot, Hamirpur, Mahoba	Pulses, oilseeds, coarse cereals
7	North Eastern Plain	Gorakhpur, Basti, Deoria, Maharajganj	Rice, sugarcane, wheat
8	Eastern Plain	Varanasi, Azamgarh, Jaunpur, Ballia	Rice, wheat, vegetables
9	Vindhyan	Mirzapur, Sonbhadra	Rice, pulses, oilseeds

Source: Compiled from Pandey *et al*.,. (2018) and Goyal (2014)

3.3 Data Sources

Policy of UPFood Processing Industry 20222027 document.

The Annual Survey of Industries (ASI) data.

Mapping of the district-product in ODOP scheme.

Statistics of national Horticulture Board (NHB).

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Census of India (data on infrastructure at the district level)

Reports on national cold chain development.

Published scholarly publications containing data of mobility with the spatial/district level.

3.4 Analytical Methods

Spatial Mapping: Zone-based aggregation of food processing facilities, agricultural outputs and infrastructural indexes.

Spatial Mismatch Analysis: Analysis comparing the concentration of agricultural production and food processing units distribution.

Policy Content Analysis: Review of the UP Food Processing Policy 2023 on the aspects of spatial equity.

Composite Spatial Index: It consisted of the formulation of a zone-wise food processing development potential index using production, infrastructure, and institutional indexes.

3.5 Limitations

All the 75 districts do not have uniformly available comprehensive district-level data on food processing units. It will be based on literature published studies that consider particular areas (Bundelkhand, eastern UP) and use existing evidence to generalize on spatial patterns. It would also need primary data gathering or limited access to proprietary government information to conduct a proper spatial analysis.

4. RESULTS AND ANALYSIS

4.1 Geo-spatial Location of Food Processing Infrastructure.

The current food processing system is so concentrated in the west and the central parts of UP. The researchers reported more than 6,500 and 35,000 structured and unstructured food processing plants respectively in the state, with four agro parks under the UPSIDC being developed in Gorakhpur, Barabanki, Saharanpur, and Varanasi (Sunanda and Singh 2022). These agro parks have Multi Chamber and Controlled Atmospheric Cold Storage with Sorting, Grading and Cleaning Facility.

On spatial accounts, however, it becomes clear that there is a gap: there are no such parks in Bundelkhand or in the Central Western region (comprising the great potato belt of Agra-Kannauj). Two parks, including one that serves the eastern part (Gorakhpur) and one serving the very far west (Saharanpur) are available, with only one park (Barabanki) in the central region and one (Varanasi) in the eastern plains.

Table 2: Key Food Processing Infrastructure location in UP.

Type of Infrastructure	Location/Zone	Coverage
Cold Storage Facilities	Mirzapur (Vindhyan), Varanasi (Eastern Plain), Agra (West-Central Plain), Gorakhpur (North Eastern Plain), Barabanki (Central Plain)	8 out of 9 zones covered
Large Cold Storage Concentration	Western UP (Agra, Meerut, Prayagraj belt)	Predominantly Zones 2, 3, 5

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Type of Infrastructure	Location/Zone	Coverage
ODOP Food Products Identified	75 districts	All zones covered
Mega Food Parks (Central Scheme)	Limited presence	Partially covered

Source: Compiled from Sunanda and Singh (2022) and policy documents

4.2 Geography Agricultural Production and Processing Mismatch.

The important finding of this research is that there is a spatial outside-fitting between the production of agrifood products and the facilities to process these products.

Western Plain (Zone 2): It is the agricultural development area with the largest concentration (Raman and Kumari, 2012) and food processing units. Western increase belt of the significant part of U.P. assists in a considerable quantity of the sugar milling. The zone has also been traditionally better equipped in terms of infrastructure, proximity to the Delhi-NCR market and rise in the irrigation area.

Bundelkhand (Zone 4/6): It is the dangerous deficit area. As Tomar and Lal (2023) point out, three districts, i.e., Lalitpur, Hamirpur, and Mahoba, have zero food processing units. The estimates of the region indicate that there is only the growth at a slow pace with positive growth in 20042018 yet the area yields pulses, as well as oil seeds and coarse cereals that could be processed to high value products. According to Singh and Nayak (2020), Bundelkhand was ranked as the lowest on livelihood security of all the nine agro-climatic areas.

Eastern Plains (Zone 7/8): It is rice and vegetable production areas, which have a very minimal number of infrastructures utilized in their processing operations. In the opinion, Shyamli Singh (2023) says that rice-processing industries could be established in the eastern side of UP in relation to the ODOP and PMKSY approaches and address the situation of 45 million people leaving in the region yearly.

Central Plain (Zone 5): It is the source of Lucknow and the infrastructure is decent with huge processing data of mango (lucknow Dashehari brand), wheat products, and milk.

Table 3: Spatial Analysis of Food Processing Potential vs. Actual Development by Zone

Agro-Climatic Zone	Agricultural Strength	Processing Potential	Current FP Development	Gap Assessment
Western Plain	Very High (sugarcane, wheat)	Very High	High	Moderate (scope for diversification)
Central Western	High (potato, mustard, wheat)	Very High	Moderate	Significant (potato processing deficit)
Bundelkhand	Moderate (pulses, oilseeds)	Moderate–High	Very Low/Nil	Critical (zero units in 3 districts)
Central Plain	High (diversified crops)	High	Moderate	Moderate

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Agro-Climatic Zone	Agricultural Strength	Processing Potential	Current FP Development	Gap Assessment
North Eastern Plain	High (rice, sugarcane)	High	Low	Significant
Eastern Plain	High (rice, vegetables)	High	Low–Moderate	Significant
Vindhyan	Moderate (rice, pulses)	Moderate	Very Low	Critical
Tarai	High (rice, sugarcane)	High	Low–Moderate	Significant
South Western	Moderate	Moderate	Low	Significant

Source: Author's assessment based on compiled secondary data

4.3 Cold Chain Infrastructure: Spatial Gaps.

The cold chain infrastructure in UP, like in India in general, is not only spatially focused, but also is grossly inadequate. Roy (2025) discovered that cold storage only takes up 11% of the perishable produce in India. The cold storage in UP is unevenly distributed with high concentration over the potato-producing western districts, leaving the producers of fruits and vegetables in the eastern and Bundelkhand regions to have limited access.

Negi and Anand (2015) highlighted that cold chain is a vulnerability of fruits and vegetables chain of supply in India and is necessary to implement intelligent cold chain infrastructure, including grading, sorting, packing, storage, processing, and transportation. This is covered by the UP Food Processing Policy 2023 by subsidizing cold chain infrastructure by up to 35 % and up to 50 % (up to Rs. To install refrigerations/deep-freeze storage (10 crore). Nevertheless, they are spatially neutral subsidies, i.e. provided equally to all districts, and thus could be skewed towards regions that already have superior infrastructure to draw in privately-owned capital.

4.4 UP Food Processing Policy 2023 Spatial Implications.

The UP Food Processing Industry Policy 2023 presents a full range of incentives, yet the zoning could be the issue of criticism. The goal of the policy is to increase tertiary food processing to 20 % throughout the state. The most important incentive provisions and their implications in terms of space are:

Table 4: Spatial Assessment of Policy Incentives

Policy Provision	Spatial Design	Likely Spatial Impact
35% Capital Subsidy (new units, up to ₹5 Cr)	Uniform across all districts	May favor already-developed zones with better enabling environment
100% Stamp Duty Exemption	Uniform	Reduces land cost barrier; higher impact in high land-cost western districts
100% Interest Subsidy (Micro/Small, 5 years)	Uniform	Could benefit rural and eastern regions with more micro enterprises
Transport Subsidy (25% for	State-wide	Favors units closer to transport corridors

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Policy Provision	Spatial Design	Likely Spatial Impact
exports)	(landlocked)	(western/central regions)
Cold Chain Subsidy (35–50%)	Uniform	Critical for deficit zones but requires complementary infrastructure
Solar Power Subsidy (50%, 90% for women-owned units)	Outside industrial areas	Pro-rural; benefits zones with unreliable grid power
Agro Processing Cluster Grant (35%, ₹25 Cr investment)	Cluster-based	High investment threshold may exclude Bundelkhand and Vindhyan regions
CLU Notional Fee (₹10,000)	Applicable in agricultural zones	Pro-rural; reduces land use conversion barriers

Source: Government of Uttar Pradesh. (2023). *Uttar Pradesh Food Processing Industry Policy 2023*. Department of Horticulture & Food Processing.

It becomes evident that there is a root spatial tension in the policy: the incentive structure of the policy is mostly spatially neutral (uniform subsidies for all districts) whereas the constraints innate in the policy are spatially-differentiated. According to Kumari (2014) development levels in all the districts of UP vary drastically as determined by the law and order, non-farm share of income and health development. Spatially neutral subsidy in this inference is likely to have spatially unequal effects-resources will be directed in disproportion to rain upon areas that have already developed the infrastructure, market access and entrepreneurial capacity already to utilize the subsidy.

The requirement in agro processing cluster grant of minimum 5 units with Rs. The 25 crore investment is worrying especially to the aspect of spatial equity. In examples of zero food processing units identified by Tomar and Lal (2023), it would be wildly difficult to reach this threshold without already established anchor investments.

4.5 ODOP Spatial Instrument.

The spatial framework of the ODOP scheme that is implicitly based on the identification of products on a district basis can be viewed as a complement to the 2023 policy. Under the ODOP each district of UP has been allocated a particular product to promote. ODOP products relating to food processing extend across the board:

Table 5: Illustrative ODOP Products with Food Processing Relevance

District	ODOP Product	Processing Potential
Lucknow	Mango (Dashehari)	Pulp, juice, dried mango, pickle
Agra	Potato/Petha	Chips, frozen products, confectionery
Varanasi	Banarasi Paan	Processed paan products
Gorakhpur	Terracotta (non-food)	—
Mathura	Dairy Products	Cheese, paneer, ghee
Banda (Bundelkhand)	Shazar Stone (non-food)	—
Pratapgarh	Amla	Processed amla products, juice, murabba
Saharanpur	Woodcraft (non-food)	—

Source: Compiled from ODOP scheme documents and published literature

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Interestingly enough, non-food ODOP products (handicrafts, stone work) have been allocated in a number of districts, especially those in Bundelkhand, such that the ODOP structure is not necessarily congruent to the goals of food processing policies in all districts. Kadian (2018) wrote about the significant location aspects in food processing industries in India and mentioned the role of Mega Food Parks, indicating the necessity to assume that spatial planning should factor in all three of the proximity of raw materials, accessibility of the market, and infrastructure at the same time.

4.6 Comparative Spatial Patterns: What Other States teach us.

Bayineni and Vooka (2004) observed that distribution of food processing units across states was extremely varied in the ratio that Andhra Pradesh has the highest number (10,183 units) followed by the negligible numbers in the northeastern states. They advised that it is necessary to develop the processed food industries nationwide to offer more job opportunities and to lessen the imbalances in the region.

Analysis of food processing in Bihar, a state where agricultural conditions are similar to those in eastern UP, by Priya (25) revealed that although the state has a robust agricultural base, it suffers inadequate cold storage facilities, access to finance, lack of skills, and supply chain integration with the outcome considerably regional with local infrastructural differences. This reflects the struggles of eastern UP.

The article by Bathla and Jee (2021) explored temporal and spatial dynamics in both the growth in employment and productivity of the organized food industry in India which has undergone better business environments especially in certain regions and not continuously across the board due to the improvement of infrastructure and fiscal incentives.

5. DISCUSSION

5.1 The Spatial Paradox

The main spatial contradiction uncovered by the analysis is that the policy of food processing that is adopted by the UPS functions within a homogenous incentive logic and the state has a highly uneven development geography. The subsidies that will be provided by the 2023 policy will be best received by the western region, which already is the most developed region in agriculture and industry (Narain, Rai and Sarup, 1995; Raman and Kumari, 2012). The eastern area and Bundelkhand, which have perhaps more to claim in terms of food processing development (to minimize the losses gathered after harvest, to generate jobs, to prevent outmigration) are structurally disadvantaged, as shown by poor roads, intermittent supplies of power, weak connections with the market, etc., and cannot be overcome by subsidies only.

In their analysis of the determinants of agricultural growth, Singh *et al*., (2021) were explicit to suggest that UP should make different region specific policies as opposed to state as a whole. This regional approach is not taken in the 2023 food processing policy.

5.2 The Binding Spatial Constraint of Cold Chain

The distance issue in infrastructure in the cold chain is probably the most restrictive limiting condition of food processing business development in underserved areas. Roy, Khandelwal, and Sharma (2025) revealed that economic issues have the largest effects on the cold chain development, and second come policy gaps. Negi and Anand (2021) reported that the Indian nation is among the largest food wasters worldwide as there is no temperature-controlled transportation or proper cold storage, and the distribution of food was not even throughout the country.

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The 35-50% cold chain subsidy included in the UP policy is definitely needed, but maybe not in places where the most fundamental enabling infrastructure (roads, electricity) is lacking. Singh and Negi (2018) urged a detailed roadmap that would include stakeholders and policymakers in ensuring that the losses during post-harvest are reduced.

5.3 Agro Processing Clusters: Effects of Spatial Threshold.

Agronitic processing cluster under the policy (minimally 5 units, Rs. Producing one spatial threshold effect, 25 crore investment. Already existing regions with food processing can more easily cluster into regions, and areas with zero or small presence (the three Bundelkhand districts identified by Tomar and Lal, 2023) cannot meet this criterion. Analytical Hierarchy Process was adopted by Mittal and Kumar (2018) to determine the drivers of growth in food processing and observed that the model policy proposed by the policy assigns priority in the use of land to Mega Food Parks; however, the spatial distribution of food parks has not been even.

5.4 Spatial Complementarity and Limitations of ODOP.

The ODOP scheme offers the level of specificity on district level which the 2023 food processing policy does not have. But not all of the product assignments of ODOP are food-processing-relevant, and the scheme is converged to the food processing policy, depending on the district. Priyanka (2024) emphasized the Mega Food Park scheme as a cluster model to combine farmers, processors, and retailers, although the lack of infrastructure is also identified as a major challenge.

6. CONCLUSION AND SPATIAL POLICY RECOMMENDATIONS.

This spatial analysis of the development of the food processing industry within the UP Food Processing Industry Policy 2023 shows three major findings:

To begin with, there is a high spatial discrepancy in the potential of production of agricultural products and food processing capacity between agro-climatic zone of UP, and western zones are overdeveloped, compared to Bundelkhand, eastern, and Vindhya zones.

Second, the very uniform incentive framework that the 2023 policy will adopt is expected to consolidate instead of decreasing the current spatial inequalities as the subsidies will be taken up more efficiently in those areas with enabling environments.

Third, gaps in the cold chain infrastructures constitute the hardest spatial constraint, and cannot be eliminated under %age subsidies but necessitates spatially focused investment.

According to these findings the spatial policy options are as follows:

Recommendation 1: Add Zone-Specific Tiers of Incentive. The government should establish a higher incentive level (e.g. 50 % capital subsidy rather than 35 %) in districts of Bundelkhand, eastern UP and Vindhyan regions, which are defined as food processing deficit areas, as suggested by ?(Singh *et al*., 2021).

Recommendation 2: Enabling Infrastructure Spatial Pre-Investment. The government must also make specific infrastructure investment (roads, power, water supply) in zero-food-processing zones identified by Tomar and Lal (2023) before the subsidy is disbursed. In the absence of this, the subsidies will not lead to investment into these locations.

Recommendation 3: Reduce the Cluster Thresholds of the Deficit Zones. Agro processing cluster threshold (5 units, Rs). 25 crore) was to be eased in Bundelkhand, and Vindhyan zones to promote initial cluster formation e.g. 3 units with Rs. 10 crore minimum investment.

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Recommendation 4: Cold Chain Development: Spatialized. The eastern UP fruit and vegetable belt and the Bundelkand pulse and oil seed belt, where processing and storage are not available, should be the focus of cold chain infrastructure. Bundelkhand came out as the zone with the poorest livelihood security and thus investment in cold chains is an economic, as well as equity necessity, in the region (Singh and Nayak, 2020).

Recommendation 5: Match up ODOP Product Types That Could Be Used in Food Processing. Districts that have assigned a product type, other than food, to their ODOP Management zone should also have a list of food processing products added so that these districts can incorporate the changes under the Food Policy effective January 1, 2023.

Recommendation 6: Create Spatial Monitoring Indicators. The monitoring framework for the Food Policy should have zone-specific and district-specific indicators, i.e., the number of new food processing facilities established in the district and the amount of money invested, amount of jobs created, and cold chain capacity developed, that will allow the monitoring of whether the goals of regional equity are achieved per spatial criteria.

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