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Spatial Planning for Agro Based Industries in Rajasthan, India

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Abstract: The growth of India's economy in recent years has been impressive, with the development of new economic centers like Jaipur, Kota, Lucknow, and GIFT1 city playing a key role in this success. The agriculture sector has also contributed significantly to this growth, as it is a major source of raw materials for many industries, including the food processing industry. However, one of the main challenges facing the agro-based industry is maintaining the quality of the products as they move through the supply chain. The demand for packaged food has increased with the growth of economic centers, but the supply chain is not yet well-developed enough to meet this demand. The quality of packaged food items is critical to maintaining consumer demand and needs careful planning of agro-based industry to ensure that the products are delivered in the freshest and highest quality possible. Despite these challenges, the agro-based industry has significant potential for growth and employment generation, thanks to its forward and backward linkages with other industries. The industry plays a crucial role in developing infrastructure and creating employment opportunities, particularly in rural areas. As India continues to develop its economy and expand its economic corridor, the agro-based industry will likely remain a key player in this growth story. The Rajasthan government has implemented various policies and schemes to promote agro-based industries in the state. The purpose of this research paper is identifying a suitable location for industrial area in the state of Rajasthan and planning a spatial layout of the industrial area.

Keywords: Economic centers, Agro Based Industries, Rajasthan, Spatial Planning, Economic Corridor

I. INTRODUCTION

Agro-based industries are those industries that use agricultural products as raw materials to manufacture new products, process them for later use, or manufacture essential products or equipment to support farming. These industries play a crucial role in the country's economy by contributing to its GDP², generating employment, and attracting investments. In fact, agro-based industries are expected to be a major driving force behind the country's growth in the near future. These industries are critical in terms of their potential to drive economic expansion, and their impact on the overall development of the country cannot be overstated. As it not only stops the migration of people from rural to urban area but also narrow down the gap between them. Despite having several advantages, such as a large agricultural base, a diverse range of food products, and a growing consumer market, the food processing industry in India has not been able to achieve the growth it deserves. The processing activities in India are still at a nascent stage and have not kept pace with other developed countries. As figure-1 shows the percentage of different type of food-processing done in India. There is abundant production of fruits, vegetables, milk, and other perishable products. However, post-harvest losses in these products are still very high, resulting in significant wastage of food and resources. Improvements in processing facilities and cold supply chains are critical in reducing post-harvest losses and catering to the growing demand for processed food. The figure-2 shows the distribution of market share of supply chain in food processing sector in India which is mainly dominated by the unorganized sector (Government of Rajasthan, 2019).

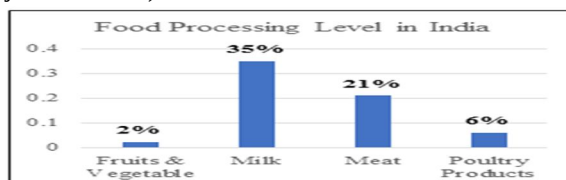


Figure 1: Food Processing Level in India, Source: Rajasthan Agro Policy, 2019

¹ Gujarat International Finance Tec-City

² Gross Domestic Production: is a measure of the total value of all goods and services produced within a country's borders over a specific period of time, usually a year.

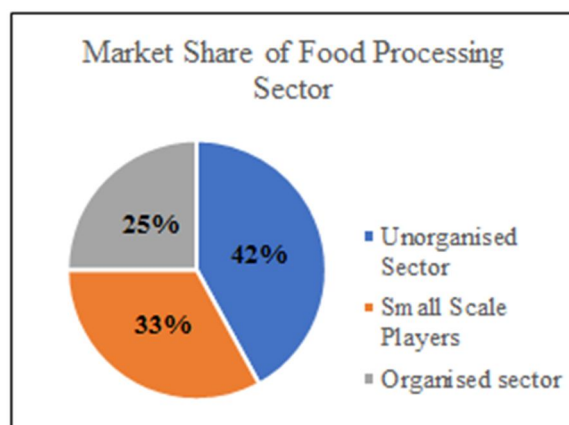


Figure 2: Market Share of Food Processing Sector, Source: Rajasthan Agro Policy, 2019

Several factors are driving the need for sophistication in various segments of agribusiness, including procurement, storage, transportation, and distribution. To minimize post-harvest losses and avoid distress sales, an efficient and sufficient logistics system is a basic necessity. This requires timely and speedy movement of goods to the marketing destination while keeping them safe for availing in the off-peak season. With increasing urbanization and positive growth in the organized retail, food servicing, and food processing sectors, there has been a surge in the demand for organized supply chains with cold chain facilities for storage and transportation. Therefore, a sufficient and efficient supply chain with favorable infrastructure will play a significant role in boosting the domestic and export trade of perishable products. It is essential to invest in logistics infrastructure to minimize post-harvest losses, improve profitability, and support the growth of the agriculture and food processing sectors. This can provide a significant boost to the economy by creating job opportunities, increasing income, and promoting rural development (Government of Rajasthan, 2019). The Government of India, Ministry of Finance (14th-12-2018) stated as in figure-3 that the Agriculture, Forestry & Fishing Sector has a share of 17.1% in India's total GVA³ (Ministry of Finance, 2018). And as per Agricultural Statistics at a Glance – 2021, it is estimated as in figure-4 the agriculture and allied sector's share will be raised to 18.6% by 2022 in India's total GVA (Government of India et al., 2022).

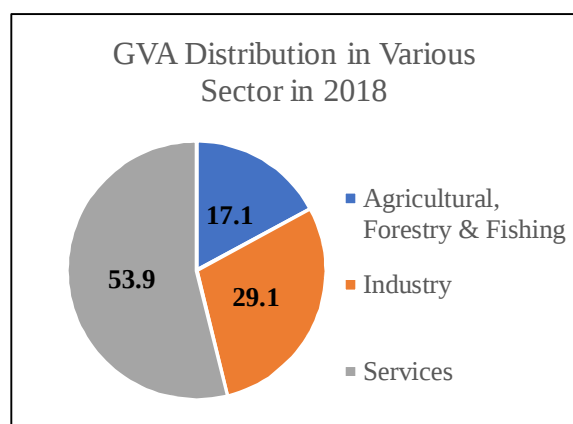


Figure 3: GAV Distribution in Various Sector, 2018
Source: Ministry of Finance, 2018,

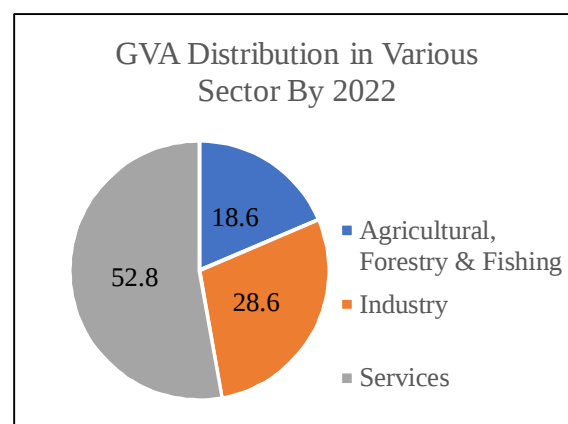


Figure 4: GVA Distribution in Various Sector, 2022
Source: Agricultural Statistics at a Glance, 2021

Rajasthan comes 1st at area wise and holds 8th position in population wise across all India. The states also hold 2nd position in population of farmers and labors across India. In figure-5 share of agriculture & allied sector is 29.77% of total Rajasthan's GVA (Statistics Times, 2021) and with its diverse agro-climatic conditions, is richly endowed in the cultivation of a variety of crops and a strong animal husbandry sector.

³ Gross Value Added: is a measure of the value of goods and services produced by an industry, sector, or company, minus the cost of inputs such as raw materials and services used in the production process.

The state also holds the good position in production of coarse cereals, pulses, oilseeds, cotton, spices, wool, milk, honey mainly as per table-1, 2& 3. State boasts of net supplier in commodities like oilseeds, pulses in which country is dependent on imports for fulfilling the nutritional requirement of burgeoning population. State is having production surplus in many crops not only in country but also in world e.g., Isabgol, Guar, Henna etc. Similarly, in case of horticultural crops, state holds 1st position in production of carom-seeds, coriander, fenugreek, 4th in garlic, 6th in oranges, 8th in pomegranate (*Government of Rajasthan, 2019*).

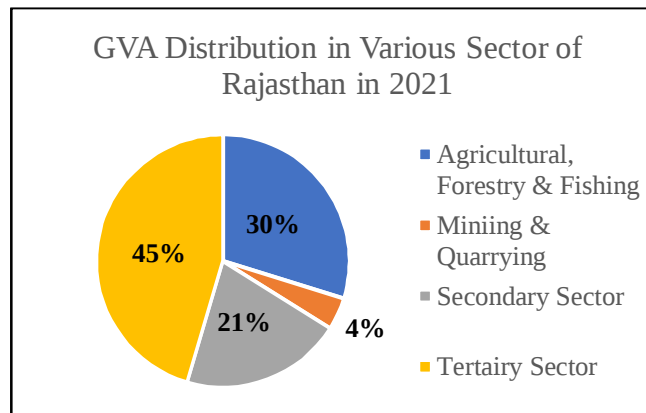


Figure 5: GVA Distribution of Rajasthan in 2021,
Source: Statistics Times, 2021

Table 1: Major Crop data of Rajasthan,

Source: Agricultural Statistics at a Glance 2021, Ministry of Agriculture & Farmer Welfare, Department of Agriculture & Farmer Welfare, Director of Economics & Statistics

Rank at India Level	Crop Name	Production in (Million Tons)	% to all India
1 st	Coarse Cereals ⁴	7.33 of 47.75	15.36
1 st	Bajra	4.69 of 10.36	45.22
4 th	Jowar	0.46 of 4.77	9.55
5 th	Wheat	10.92 of 109.52	10.12
6 th	Maize	1.21 of 28.77	4.20
1 st	Total Pulses ⁵	4.50 of 23.03	19.53
2 nd	Gram	2.66 of 11.08	23.99

Table 2: Major Oilseeds data of Rajasthan

Source: Agricultural Statistics at a Glance 2021, Ministry of Agriculture & Farmer Welfare, Department of Agriculture & Farmer Welfare, Director of Economics & Statistics

Rank at India Level	Crop Name	Production in (Million Tons)	% to all India
1 st	Nine Oilseeds ⁶	6.77 of 33.22	20.38
1 st	Rapeseed & Mustard	4.20 of 9.12	46.06
2 nd	Groundnut	1.62 of 9.95	16.27
2 nd	Spices	1228.86 of 10,679.22	8.96
3 rd	Soybean	0.52 of 11.23	4.67
4 th	Cotton	2.79 of 36.07	7.73

⁴ Coarse Cereals except Bajra, Jowar, Wheat, Maize and included like Ragi, Barley, Sorghum, etc.

⁵ Total Pulses except Tur, Masur and included like Udad, Moong, Kabuli Chana etc.

⁶ Nine Oilseeds except Groundnut, Mustard, Soybean and Sunflower & included others like til, castor, etc.

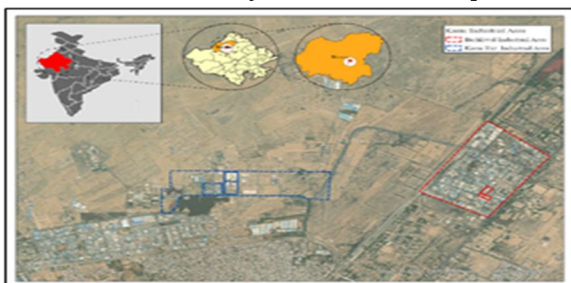
Table 3: Major Product from Livestock of Rajasthan

Source: Agricultural Statistics at a Glance 2021, Ministry of Agriculture & Farmer Welfare, Department of Agriculture & Farmer Welfare, Director of Economics & Statistics

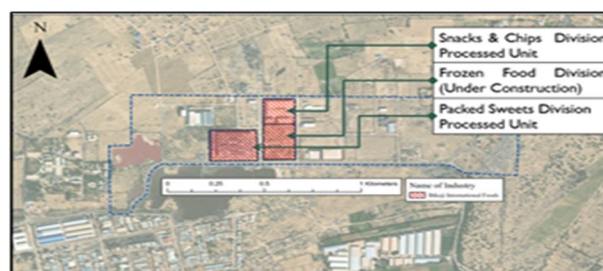
Rank at India Level	Crop Name	Production in (Million Tons)	% to all India
1 st	Wool	12,717 of 36,761	34.60
2 nd	Milk	25,573 of 1,98,440	12.88
5 th	Honey	11.20 of 125	8.96

In order to comprehend the connections between agro-based industries, the operations of the food processing industry in India, governmental policies and their implementation in Rajasthan, the minimum requirements for establishing an industrial area, and the functioning of this industry, it is essential to conduct a physical case study. Two potential study areas have been identified: Bikaner, situated in Rajasthan and home to the prominent food processing company Bikaji Foods, and Hajipur in Vaishali District, Bihar, which houses several well-known companies such as Britannia, Kurkure, Sudha, and Agrawal Food Products etc.

- Case Study-1:** Karni Industrial Area, Bikaner, RajasthanThe Karni Industrial Area is situated near the main Bikaner City in the Bikaner district of Rajasthan, as depicted in map-1. The scheme covers a total area of 730 acres, comprising of the Bichhwal Industrial area (red), which spans over 312.20 acres, and Karni Ext. (blue), which covers the remaining 417.80 acres. The site is conveniently connected to the nearest highway, NH11, which is situated 6km away, the nearest railway station, Lalgarh Junction, which is 2km away, and the nearest airport, Civil Airport Bikaner, which is 16km away.



Map 1: Location of Karni Industrial Area, Bikaner District, Rajasthan
Source: Author



Map 2: Bikaji Food Division, Bikaner, Rajasthan
Source: Author

The area is maintained and developed by RIICO⁷ and predominantly consists of industries related to agriculture and allied sectors, such as woolen, oil, dal and flour mills, packaged food, packaging, and service providers. The plot sizes vary from 700 sqm to 10,000 sqm, depending on the industry's requirements. The road hierarchy is based on a 45m main road, followed by 30m, 24m, and 18m. The larger plots are planned alongside wider roads, while the smallest industrial units are allotted 18m wide roads.

To ensure segregation within the industries, the industrial park is further divided into two zones - the 'Food Park Zone' and the 'General Zone'. The area provides essential amenities such as warehouses, cold storage, electric sub-stations, overhead water tanks, and a healthcare center.

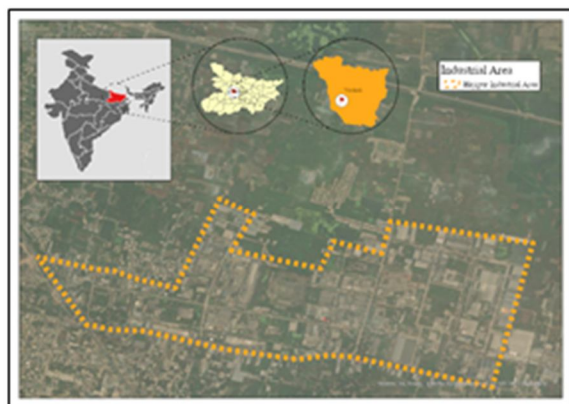


Figure 6: Plot Layout of Karni Ext. Industrial Area, Bikaner Rajasthan, Source: RIICO: Rajasthan State Industrial Development & Investment Corporation Ltd.

⁷ Rajasthan State Industrial Development and Investment Corporation

Other amenities include vending zones, commercial shops, parks, banks, and postal services, as well as a weighing machine and a fire station. However, certain amenities such as dedicated parking spaces for trucks, a waste dumping site for industries, a drainage system, a motel, food corners for truck drivers, and an Exhibition Centre are not provided within the park. The industrial area caters to around 200 small and medium-scale industries and meets its water requirements through the Indira Gandhi canal. During the site visit, an industry survey was conducted to identify the forward and backward linkages with other industries. One of the industries surveyed was Bikaji Food, which has a snacks and sweets division spanning over 16 acres of land and employs around 400-450 people. The production output of this division is approximately 180-200 tons per day, based on demand. Since this unit maintains the primary supply chain in the market, it has both cold and dry storage warehouses within its premises to meet daily requirements. The raw materials, such as spices, oil, cereals, and milk, are procured from local or nearby markets, while the remaining ingredients and packaging materials are procured from various vendors in nearby districts.

2) Case Study-2: Hajipur Industrial Area, Vaishali, Bihar



Map 3: Location of Hajipur Industrial Area, Vaishali District, Map 4: Types of Different types of Agro-Based Industries at Hajipur Industrial Area

The Hajipur Industrial Area is situated near Hajipur City, in Vaishali district, Bihar, as depicted in map-2. The scheme spans over an area of 270 acres, and a new phase of 54 acres is proposed in Goral, which is currently under development. The industrial area is connected to Hajipur in the north, Patna in the south, and Begusarai in the east. It is located along the national highways NH22 (leading to Patna and Hajipur) and NH322 (leading to Begusarai). The nearest railway station is Hajipur Junction, which is situated 3 km away, while the nearest airport is Jayprakash Narayan Airport, Patna, located at a distance of 25 km. The area is developed and maintained by BIADA⁸.

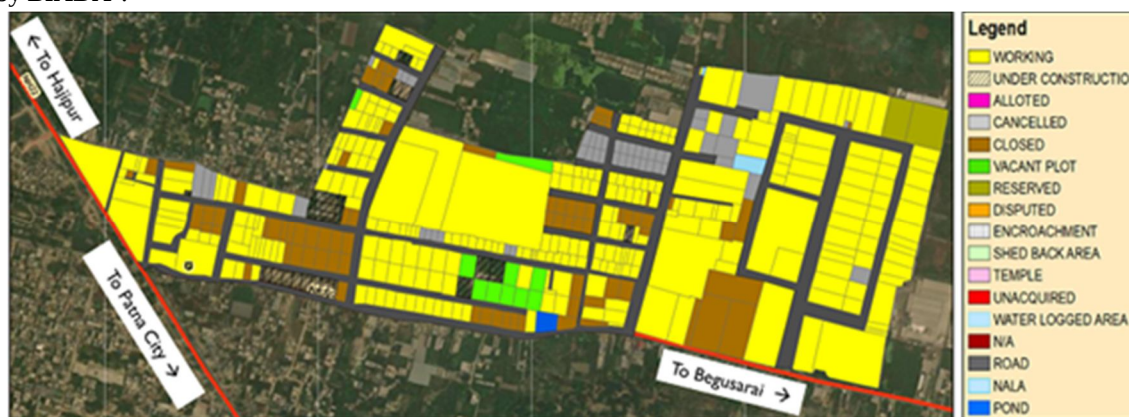


Figure 7: Plot Layout of Hajipur Industrial Area, Hajipur, Vaishali District, Bihar,
Source: BIADA: Bihar Industrial Area Development Authority

⁸ Bihar Industrial Area Development Authority

Although the industrial area was not initially planned as a food park, it currently houses a variety of industries, including those related to agriculture and allied sectors, plastic, rubber, pharmaceuticals, paper, iron and metal, pre-cast concrete (drainage pipes), and PVC pipes, among others. The main agro-based industries operating in the area are rice mills, dal mills, flour mills, milk and dairy product processing units, beverage and food industries, and frozen food industries. Plot sizes vary depending on industry requirements, and the site follows a road hierarchy of 30m, 15m, and 9m wide roads. No specific zone is provided for non-agro-based industries. The site offers various amenities such as warehouses, cold storage, electric sub-stations, overhead water tanks, an effluent treatment plant (plot allotted), a fire station, healthcare centers, vending zones, banks, postal services, and weighing machines. However, there are some essential amenities not provided in the park such as parking space for trucks, dedicated areas for waste dumping sites generated by industries, drainage systems, motels, food corners for truck drivers, exhibition centers, and parks. The industrial area caters to about 148 small and medium scale industries, and the water requirements are fulfilled by bore wells and underground water. During the site visit, an industrial survey was conducted to gather information about the inter-industry connections in the area. The Britannia biscuit factory, covering an area of 10.5 acres, employs around 2000 people and produces 120-130 tons of biscuits per day as per the demand. Although the company has many products, only four of them are manufactured at this facility to maintain the supply chain in Bihar. The raw materials, such as flour, sugar, and butter, are procured from nearby factories in the area, while the packaging material is sourced from specific vendors. Another survey was conducted on Agrawal Food Products, which is spread over 6 acres of land, produces its own products and also supplies Kurkure on a contract basis. The company employs 150-200 people and has a daily production capacity of 55-60 tons. Raw materials like spices, oil, and cereal grit are procured from nearby markets. For Kurkure, the company provides all the necessary ingredients to maintain the quality and taste of the product.

Observation and Inference during site survey of the industrial area

The industrial site is conveniently located near highways, railway stations, and airports, allowing for efficient transportation of goods. The proximity to local markets has helped small-scale industries thrive, contributing to the growth of the nearby settlements and overall economy. Despite facing challenges during the pandemic, the industry has managed to maintain demand. However, the site surveys have revealed that crucial physical infrastructure such as drainage systems, waste collection sites, effluent treatment plants, and truck parking spaces are inadequately developed. The absence of such facilities causes traffic congestion, increases the risk of accidents, and impedes development in the urban and regional areas. The absence of security measures such as CCTV cameras, guard rooms, and traffic control junctions, as well as improper entry and exit points, further exacerbates these issues.

Table 4: Positive and Negative traits of Both Industrial Area, Source: Author

	Positive traits	Negative traits
Karni Industrial Area, Bikaner, Rajasthan	Wider and quality Roads, Grand entry/exit points, ideal size of plots, parks, in-site cold and dry storage, Mandi. electricity substation, over-head water storage tank, solar power road light	Dedicated space for truck parking, common waste collection point, green cover alongside road, drainage, CCTV Camera, no space for Driver and Lascar to Stay during off hour
Hajipur industrial Area, Vaishali, Bihar	Near to town, police station, green cover space alongside road, in-site cold and dry storage, electricity sub-station, over-head water storage tank	Dedicated space for truck parking, common waste collection point, small entry/exit point, drainage, CCTV Camera, no space for Driver and Lascar to Stay during off hour

Rajasthan Agri Business Policy:

Rajasthan launched its Agri business policy in 2019, to become a supply hub of processed agriculture products which comprises of main objective to promote cluster of industries for production and value added products, to minimize the post-harvest loss, attract capital investment in supply chain of agriculture and allied sector, to build a strong brand state by supplying ethnic food items to domestic and international market, to promote forward backward linkages of industries based on agriculture and allied sectors, by skill upgradation to raise sustainability employment opportunities to the people through training institutes, to develop state as logistic hub by developing infrastructure near the NCR and DMIC catchment area and many more.

The eligible sectors in this policy are fruits and vegetable processing, spices processing, oilseeds products, rice and flour mills, cereal/other consumer food product, pulse processing, honey processing, herbal, medicinal, flower and aromatic products, milk processing, minor forest produce processing, cattle feed, poultry feed, fish meal products, meat (other than beef), agri waste processing units, non-edible agriculture produce processing etc. a state level sanctioning and monitoring committee has formed which ensure all-inclusive growth of agriculture and allied sector in the state. There are some ineligible sectors also mentioned which is not entertain in this policy like tobacco products, pan masala, guthka, liquor and wine factories, carbonated drinks, package mineral water bottles or pouch, beef meat processing, paper industries, production of fire wood and charcoal etc. (Government of Rajasthan, 2019)

Theoretical Study About Location of Industrial Area:

- Weber theory of Industrial location: on Basis of Weight-** Alfred Weber's shown in figure-8 theory suggests that if raw materials are weight-losing or impure, then industries should be located closer to the source of raw materials example: sugar industries, jute industries. if the raw material is weight-gaining or pure, then industries should be located between the source of raw materials and the market example: electronics, furniture. if the raw material is universally available, then the industry should be located near the market example: carbonated drinks, chips (Weber, n.d.). So, in reference to the above industry this theory cannot be applied fully to the agro based industry as it has both weight gaining or losing type of products shown in figure-9 which is processed by the same company and cannot compromise with the quality and the reach to the market is not restricted to a limit.
- Weber theory of Industrial location: on Basis of Labour cost-** According to Alfred Weber as shown in figure-10, there are two locations, L1 and L2, and each of them would add 15 bucks per unit transportation cost. The point "P" represents the location with the lowest transportation cost. The circles surrounding point P represent the Isodopanes or the lines of equal transportation cost per unit of production. The market represents the point where the manufactured goods are consumed. Any location within the 15 P Isodopane would save more on labour costs than on transportation costs because it is closer to the consumption point. Therefore, it can be concluded that L1 is a more profitable location than P because it is within the 15 P Isodopane (Weber, n.d.). In agro based Industries the labour cost also plays a vital role as large scale industries are support by small scale industries and they require local labour to support. Here Bagru & Sanganer are the two nearest town with support by several small rural areas and settlements.

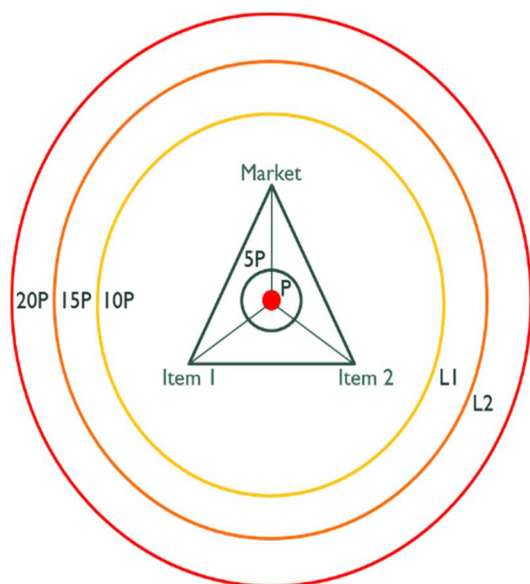


Figure 8: Representation of Industry Preferred Location as per Weber Theory of Industrial Location, Source: Author

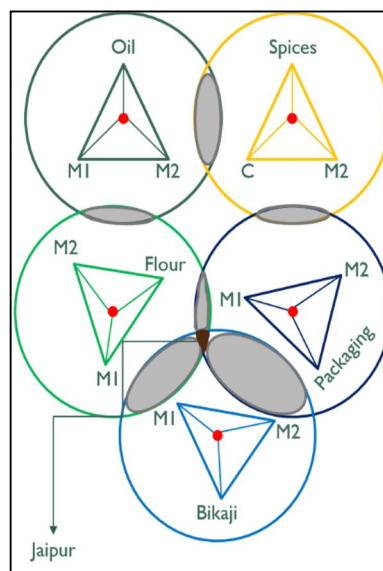


Figure 9: Representation of Agglomeration at Jaipur as per Weber Theory of Industrial Location, Source: Author

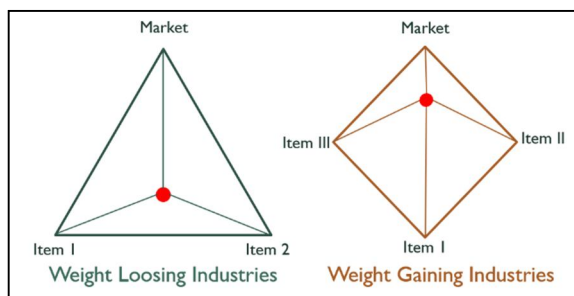


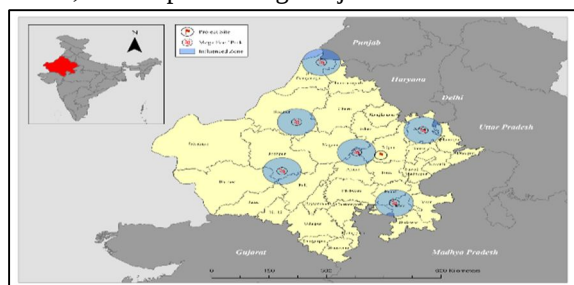
Figure 11: Representation of Triangle Method as per Weber Theory of Industrial Location, Source:



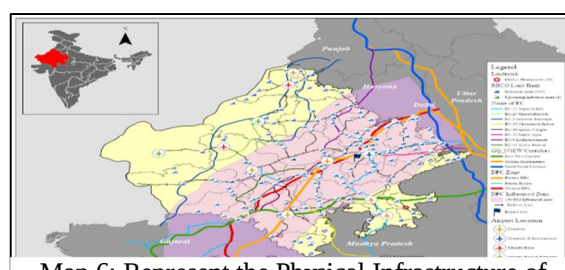
Figure 10: Example of Weight Gaining & Weight Losing Industries, Source: Author

- c) Weber theory of Industrial location: on Basis of Agglomeration- As per Alfred Weber if the agglomeration factor is more significant than the combined influence of labour and transportation costs, then industries should be relocated towards the agglomeration. In some cases, infrastructural factors can also be a more significant factor in determining the location of an industry than transportation and labour costs. This is particularly true for light industries and footloose industries that may not be able to invest in their own infrastructure. Relocating towards an agglomeration can lead to mutual sharing of services and specialization among industries. This is evident in the development of software, electronics, and ready-made industries in metropolitan regions (Weber, n.d.). In agro based Industries many big companies are supported by small scale industries. For example, Bikaji Industries make Bhujia but the ingredients like Gram Flour (Besan), Spices, Salt, Oil, Packaging Pouch is supplied by the local or small-scale industries. Now for the merchandise like Bikaji they have good amount of infrastructure or built it if they required, but their supplier haven't had such economic bone. So, if this small-scale industry will setup along with big merchandise they will not only get good infrastructure but also get enough opportunities to grow. So, in reference to the above as per figure-11 the Agglomeration center will be developed at Jaipur city as it had good infrastructure, connectivity and linkages with rest of the market so it will help these industries to grow.
- d) Perroux's Growth pole theory- The economic development or growth of any region is not uniform through entire region. It develops or grow around some specific region. So, if any core industry of a particular sector is setup than it will help it other linked industries to grow. Here the Core industry is the growth pole in that region which helping to evolve other linked units. Later on, there are enough possibilities that another Secondary Industry of same sector will emerge and that helps to evolve other linked units to it. Now this pole act as Secondary Growth pole which develop in region (Perroux, n.d.). In recent year government of Rajasthan planned to develop 6 Mega Food Park in the state. This mega food park will require such Industrial zone which is based on agriculture and their allied industries as they add the value in the product. On the basis of government agro policy and planning this can be setting various growth pole in the state region. Due to setup this core industry in Jaipur it will help to grow other linking industries. Which will further create secondary Industries to the core. In reference to the below map-5.

In map-6 shown all the present (345) and upcoming (8) industrial area of RIICO (Government of Rajasthan, n.d.) along with connectivity along with road, rail, airport. 47 National Highways totaling over 10,000 km and over 85 State Highways spanning over 12,000 km pass through Rajasthan.



Map 5: Upcoming Mega Food Park in Rajasthan, Source Author

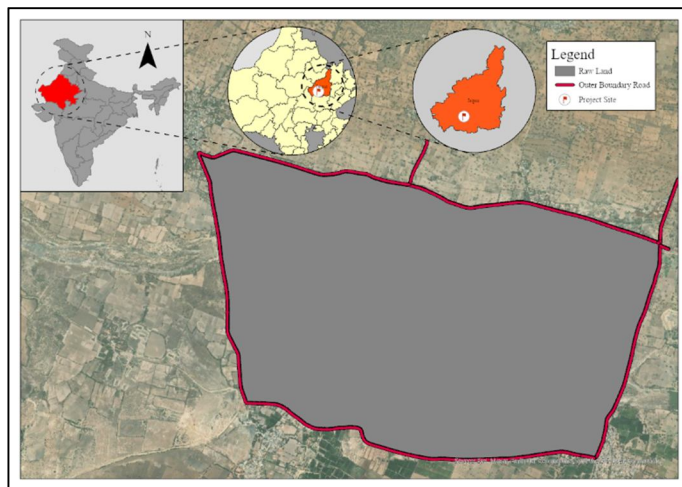


Map 6: Represent the Physical Infrastructure of Rajasthan Railway Line, Economic Corridors, Airports, Passing Dedicated Freight Corridor, RIICO Sites along with Project Site, Source: Author

The total road network of the state exceeds 2 lakh kilometers. Rajasthan has the 3rd largest network of high-quality roads in the country. The Mega Fortune project of India Golden Quadrilateral, NS-EW Corridors also passes through the state. In Bharatmala Pariyojna 44 Economic corridors (4 lane min.) are identified in which 8 corridors pass through the state (Ministry of Road Transport and Highways, n.d., 2017, 2018a, 2018b). Rajasthan has the second largest rail network in the country with around 6,000 kilometers of rail network providing train connectivity to major Indian cities. It comes under North-Western Railway (NWR) Zone from the 18-railway zone in India. Bikaner (198) & Jodhpur (144) Comes in North Railway Zone, while Ajmer (141) & Jaipur (128) comes in Western Railway Zone. NWR is the key enabler of Delhi Mumbai Industrial Corridor Project. The Delhi-Mumbai industrial Corridor (DMIC) has 14 Primary Station, & 32 Secondary Station supported by 12 feeder routes. In which 4 Primary station Rewari, Atelia, Phulera & Marwar are in Rajasthan State, 16 Secondary Station and 2 feeder route falls under Rajasthan. As of now Western Dedicated Freight Corridor (WDFC) comes under in Rajasthan state are fully operational. The feeder routes from Phulera joins WDFC to EDFC in Tundla (Uttar Pradesh) (Ministry of Railway & Dedicated Freight Corridor Corporation of India Limited, 2006).

About Site, Project and Proposal:

The site chosen for the development of this industrial cluster is located at Kunjbiharipura village in Phagi tehsil, Jaipur District, Rajasthan. The reason for selecting this land bank is that it has already been acquired by RIICO. The site was chosen based on the availability of land and infrastructure linkages, which are essential for the growth of industrial areas. One of the reasons for selecting this site is the presence of three already functional industrial areas within a 15 km radius, which will aid in the development of this industrial park. The nearest national highway is NH-48, which is located 18km away and is also a part of the Delhi Mumbai Expressway. The state highway SH-12 is located 13.40km away, and the major district road (MDR-81) is 3km away. The nearest railway station is Renwal Chittor, which is 24.70km away, while the nearest major station of the dedicated freight corridor is located in Phulera, a part of the Delhi-Mumbai Industrial Corridor, which is 15km away. The nearest airport, which also operates international flights, is located 41.60km away (Government of Rajasthan, n.d.).



Map 7: Site Location, RIICO Raw Landbank, Kunjbiharipura, Jaipur Source Author

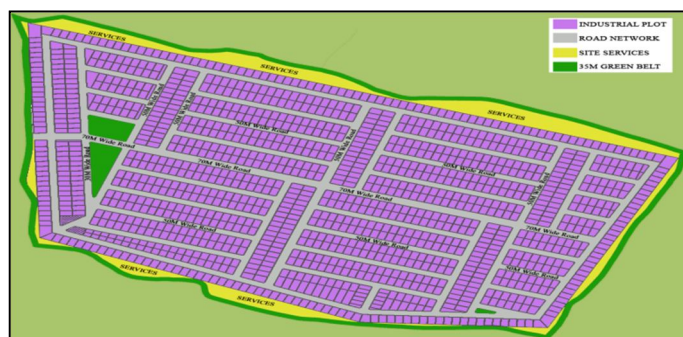


Figure 12: Site Zoning & Plot Layout of Agro Food Park, Source: Author

The site area is approximately 800 hectares and is surrounded by an existing 6m-wide road. Since the site will be developed as an agro-based industrial park, an offset of 35m along the boundary of the site has been provided, which can serve as a green belt and can also be used for the expansion of the existing road. The ideal plot size is 50m x 80m, which is equivalent to 4000 sqm as per figure-12.

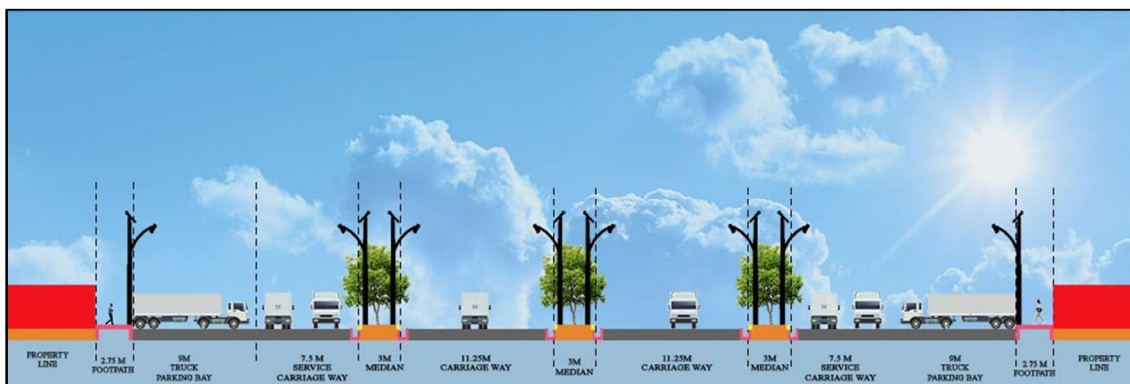


Figure 13: Road Section of 70m Wide Road of The Agro-Based Industrial Park,
Source: Author

The requirement of land depends on the production capacity and can be merged with an adjacent site if necessary. The 50m side of the plot is considered the front side. The road hierarchy within the site is 70m, 50m & 30m as per figure-13,14,15. Truck parking space is provided along the road only, as shown in the figure below. Considering the general width of a truck to be 3.5m, if a 15m gate is provided for entry/exit, there will still be a 35m span, allowing for the parking of up to 10 trucks at a time. Each plot is given parking space for 8 trucks at 60°. The industrial park also includes other amenities such as a health center, convention hall, hotels, vending zones, stay-in complex for truck drivers and lascar, banks, postal services, electricity sub-station, recreational space, commercial space, foot over bridge, rainwater harvesting alongside roads, overhead storage tank, cold and dry storage, water treatment plant, common effluent treatment plant, waste management area, and solar power street lights. There is a proposal for an underground water pipeline to Bisalpur Dam to meet the daily water supply demands. A new 10km-long, 4-lane road will connect the industrial park to the existing road infrastructure in the state.

II. CONCLUSION

The study highlights that Rajasthan has the potential to become a hub of agro-based industries, which will not only enhance the state's reputation but also contribute significantly to its economic development. The state already has good road and rail infrastructure, facilitating the rapid movement of products both domestically and internationally. As there is a high demand for Indian food globally, value addition to agricultural products will generate significant foreign exchange. This industrial park will create numerous employment opportunities for both skilled and unskilled workers and boost other linked industries, such as farm equipment manufacturing, fertilizers and pesticides industries, service providers, machine spare parts industries, and more.

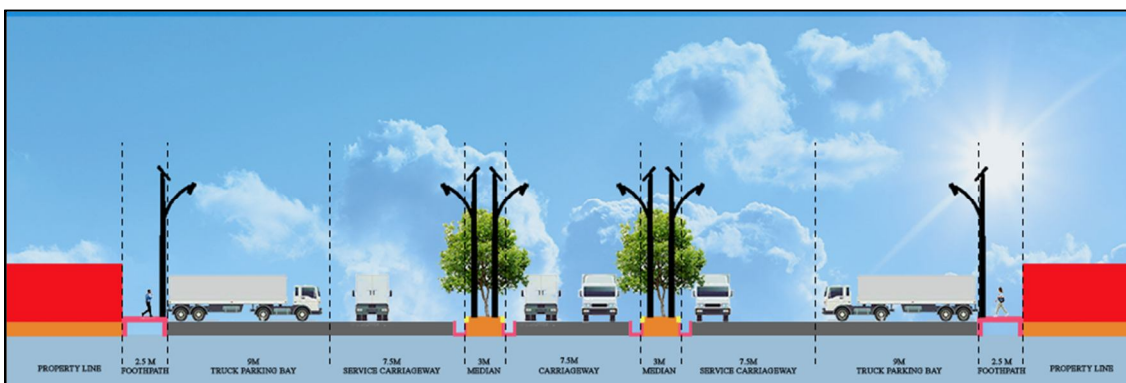


Figure 14: Road Section of 50m Wide Road of The Agro-Based Industrial Park,
Source: Author

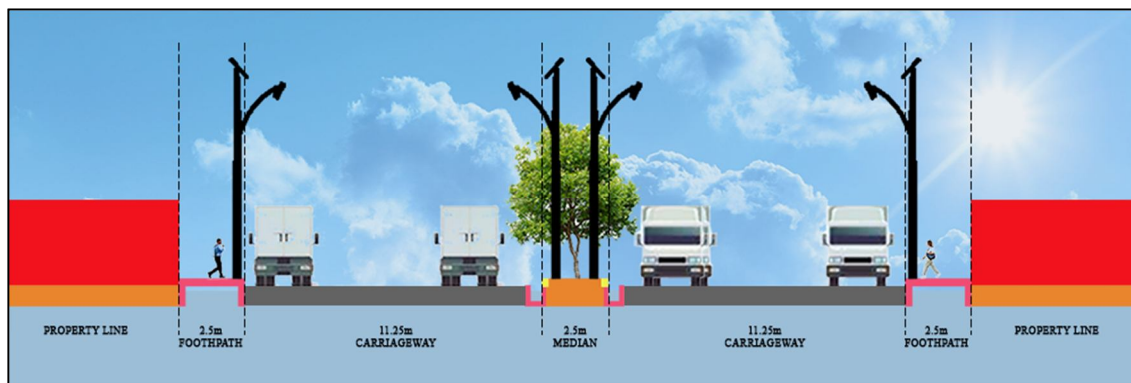


Figure 15: Road Section of 30m Wide Road of The Agro-Based Industrial Park,

Source: Author

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