INDUSTRY REPORT ON MAIZE STARCH AND DERIVATIVE PRODUCTS

A Frost & Sullivan Report

21st July 2025

CONTENTS

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Frost & Sullivan has prepared this study in an independent and objective manner, and it has taken adequate care to ensure its accuracy and completeness. We believe that this study presents a true and fair view of the global and Indian Maize Starch and derivates industry within the limitations of, among others, secondary statistics, and primary research, and it does not purport to be exhaustive. Our research has been conducted with an "overall industry" perspective, and it will not necessarily reflect the performance of individual companies in the industry. Frost & Sullivan shall not be liable for any loss suffered because of reliance on the information contained in this study. This study should also not be considered as a recommendation to buy or not to buy the shares of any company or companies as mentioned in it or otherwise."

Abbreviations

Abbreviation	Description
AIF	Agriculture Infrastructure Fund
APEDA	Agricultural and Processed Food Products Export Development Authority
BOD	Biochemical oxygen demand
Bn	Billion
CACP	Commission for Agricultural Costs & Prices
CAGR	Compound annual growth rate
CIPMC	Central Integrated Pest Management Centers
CY	Calendar Year
DDGS	Distillers Dried Grains with Soluble
DE	Dextrose Equivalent
EMEA	European Union, Middle East and Central Asia, and Sub-Saharan Africa
e-NAM	National Agriculture Market
ETP	Effluent Treatment Plant
EU	European Union
FAO	Food and Agriculture Organization
FAW	Fall Army Worm
FSSAI	Food Safety and Standards Authority of India
FY	Financial Year
GAEL	Gujarat Ambuja Exports Limited
GDP	Gross Domestic Products
GM	Genetically Modified
GMP	Good Manufacturing Practices
Ha	Hectare
ICAR	Indian Council of Agricultural Research
IMF	International Monetary Fund
KSA	Kingdom of Saudi Arabia

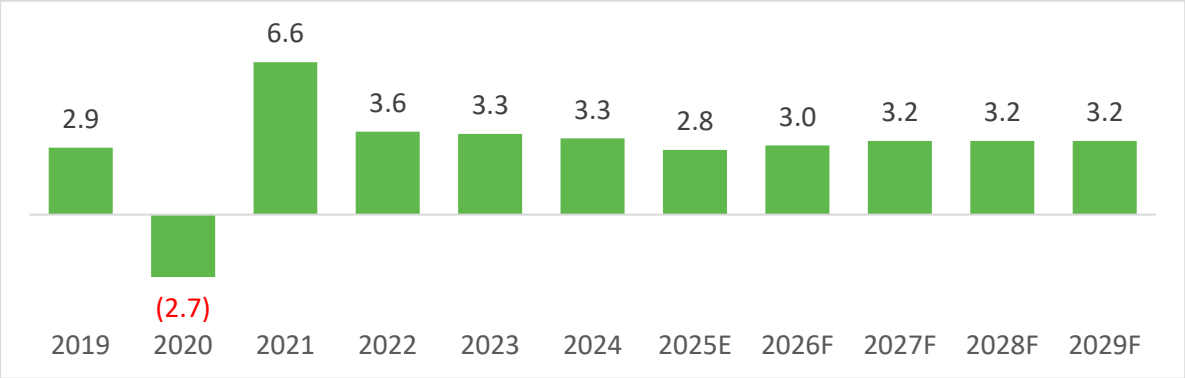
Mn	Million
MSP	Minimum Support Price
TPD	Tons Per Day
NABARD	National Bank for Agricultural & Rural Development
NAFED	National Agricultural Cooperative Marketing Federation of India Limited
NCCF	National Cooperative Consumers' Federation of India Limited
OECD	Organization for Economic Co-operation and Development
PBL	Paramesu Biotech Limited
PLI	Production-linked Incentive
PPM	Parts Per Million
PMFBY	Pradhan Mantri Fasal Bima Yojana
ROA	Return on Assets
ROCE	Return On Capital Employed
Rs	Rupees
RTE	Ready to Eat
SAU	State Agriculture Universities
SDG	Sustainable Development Goal
Tons/Ha	Tons Per Hectare
UAE	United Arab Emirates
UK	United Kingdom
USA	United States of America
Y/Y	Year on Year

1. Macroeconomic Overview – Global

1.1. Real GDP growth and forecasts – Global and Key Regions

After growing by 6.6% in 2021, global economic expansion decelerated to 3.6% in 2022 amid the Russo-Ukrainian war and further eased to 3.5% in 2023. Stabilizing inflation and the initial phase of monetary easing helped sustain a 3.3% growth rate in 2024. However, escalating trade tensions are expected to further slow growth, with global GDP projected to rise by just 2.8% in 2025. Despite ongoing geopolitical challenges, emerging markets are projected to outperform advanced economies through 2029, fuelled by technological progress and favourable demographic trends. In contrast, developed nations continue to grapple with supply chain disruptions, persistent inflation, and the complexities of energy transition, underscoring the importance for investors to focus on long-term opportunities.

Exhibit 1: Real GDP Growth, Global, 2019-2029F (%)



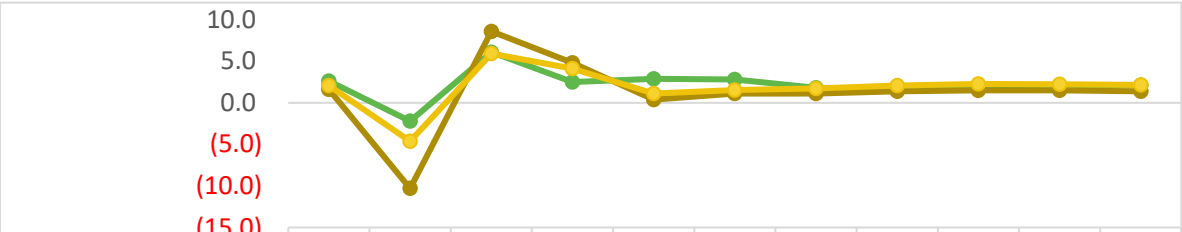
Note: E: Estimates; F: Forecasts. Negative numbers are in parentheses.

Source: International Monetary Fund (IMF); Frost & Sullivan

In the Middle East, Saudi Arabia and the United Arab Emirates will face near-term growth headwinds amidst volatile oil prices, however, long-term growth momentum will remain steady as oil revenues get redirected to non-oil sectors. As these nations prioritize economic diversification, growth of their manufacturing and services industries will drive their investment attractiveness over the long-term.

In Africa, short-term growth outlook is vulnerable to risks such as geopolitical instability, extreme climate events, and growing debt servicing costs. However, over long run, abundant natural resources trade, demographic dividend, and improving fiscal health will foster growth.

Exhibit 2(a): Real GDP Growth, US, UK, EMEA[1], 2019-2029F (%)



	2019	2020	2021	2022	2023	2024	2025E	2026F	2027F	2028F	2029F
United States	2.6	(2.2)	6.1	2.5	2.9	2.8	1.8	1.7	2.0	2.1	2.1
United Kingdom	1.6	(10.3)	8.6	4.8	0.4	1.1	1.1	1.4	1.5	1.5	1.4
EMEA	2.1	(4.6)	5.9	4.1	1.1	1.5	1.7	2.1	2.3	2.2	2.2

Note: E: Estimates; F: Forecasts. Negative numbers are in parentheses.

Source: U.S. Bureau of Economic Analysis (BEA); Office for National Statistics (ONS) – UK; Eurostat; IMF; World Bank; Frost & Sullivan

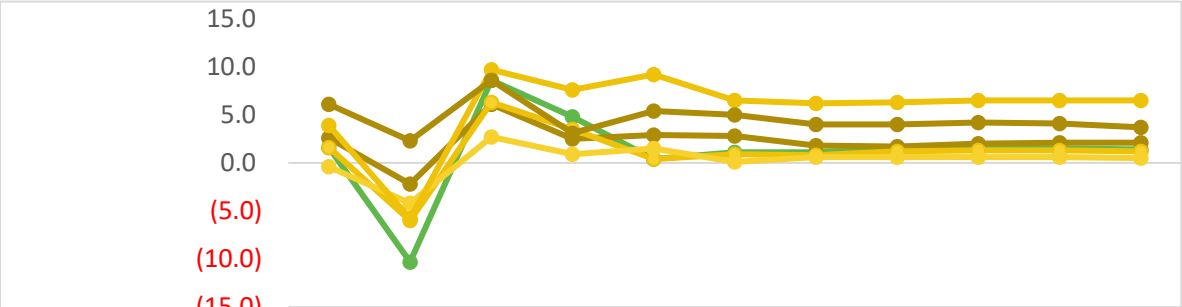
[1]EMEA (Europe, Middle East, and Africa): The following countries were considered for the regional calculation:

Europe: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Spain, Latvia, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, San Marino, Serbia, Slovakia. Slovenia, Sweden, Switzerland, Türkiye, United Kingdom

Middle East: Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, Yemen

Africa: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Republic of Congo, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, The Gambia, Togo, Tunisia, Uganda, Zambia, Zimbabwe

Exhibit 2(b): Real GDP Growth, UK, US, Euro Area1, Japan, India, China, 2019-2029F



	2019	2020	2021	2022	2023	2024	2025E	2026F	2027F	2028F	2029F
United Kingdom	1.6	(10.3)	8.6	4.8	0.4	1.1	1.1	1.4	1.5	1.5	1.4
United States	2.6	(2.2)	6.1	2.5	2.9	2.8	1.8	1.7	2.0	2.1	2.1
Euro Area	1.6	(6.0)	6.3	3.5	0.4	0.9	0.8	1.2	1.3	1.3	1.2
Japan	(0.4)	(4.2)	2.7	0.9	1.5	0.1	0.6	0.6	0.6	0.6	0.5
India	3.9	(5.8)	9.7	7.6	9.2	6.5	6.2	6.3	6.5	6.5	6.5
China	6.1	2.3	8.6	3.1	5.4	5.0	4.0	4.0	4.2	4.1	3.7

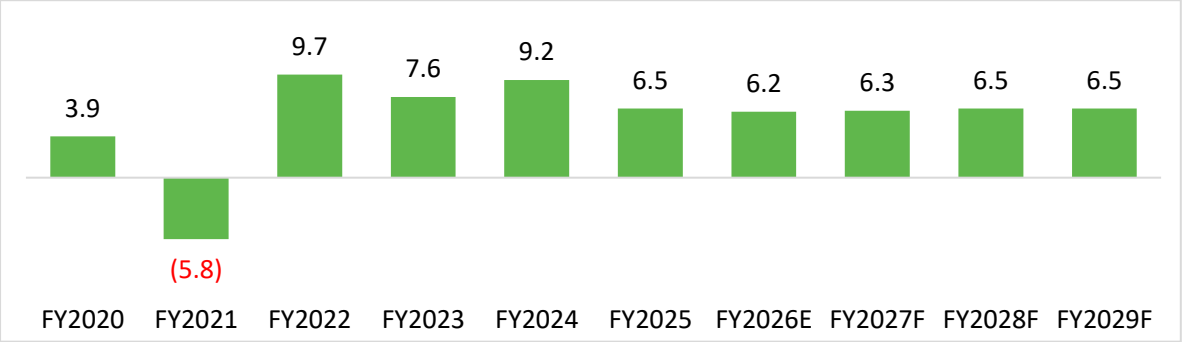
Note: E: Estimates; F: Forecasts. Negative numbers are in parentheses. India's data is for fiscal years i.e., 2019 data refers to FY2020 (April 2019 to March 2020). 1. Euro Area includes the following countries: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, and Spain.

Sources: IMF; Frost & Sullivan

With a 6.2% growth forecast for FY2026 (Exhibit 3), India continues to be a global growth frontrunner. While global tariff war tensions are a key downside, steady government spending and buoyant domestic demand will be the key growth drivers.

During the FY2023- FY2029 period, India's real GDP growth is likely to average at 7.0% per annum stemming from factors such as demographic dividend, steadily rising urban household income levels, technological advancements, and climate change mitigation policies. By 2030, a strong growth outlook will see India overtaking Germany and Japan to become the 3rd largest economy globally.

Exhibit 3: Real GDP Growth, India, FY2020 – FY2029F (%)



Note: E: Estimates; F:Forecasts. Negative numbers are in parentheses. Data for India is presented for fiscal years (FY). For example, India's FY2023 data refers to April 2022 to March 2023.

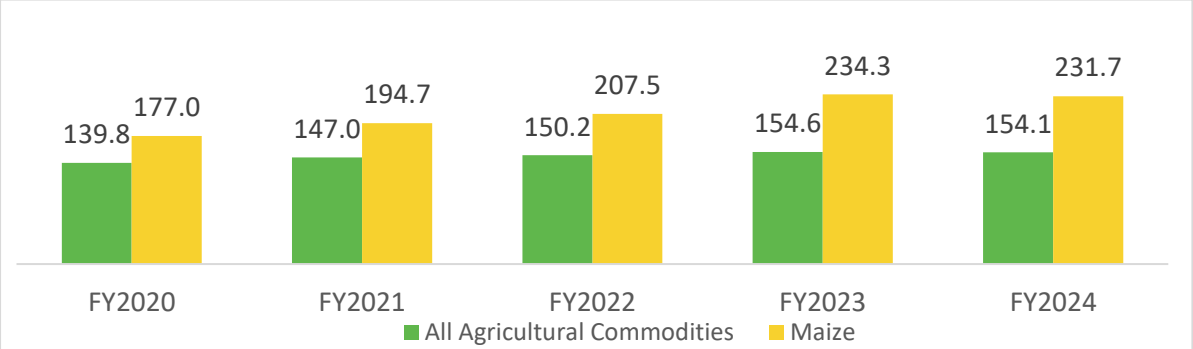
Source: Reserve Bank of India; IMF; World Bank; Frost & Sullivan

1.2. Overview of Agriculture Statistics and Performance

As per the Statistical Report on Value of Output from Agriculture and Allied Sectors 2011-12 to 2023-24, the FY2023 total crop production increased by 9.1% as compared to the previous year (at current price levels) rising from INR 30.8 lakh crore to INR 33.6 lakh crore, whereas at constant 2011-12 prices it rose by 1.3% from INR 15.7 lakh crore to INR 15.9 lakh crore. Similarly, in FY2024, the value of India's maize production rose by 1.1% at current prices compared to FY2023.

In FY2023, production in agriculture and allied sectors witnessed a record jump. While population growth and rising exports were the key demand-side drivers; factors such as good climate conditions, improving quality of irrigation infrastructure, the Green Revolution in Eastern India were the supply-side drivers. In recent years, India's expanding policy and infrastructure support through "Krishi Nivesh" portal, Paramparagat Krishi Vikas Yojana, Pradhan Mantri Gram Sinchai Yojana, and Sansad Adarsh Gram Yojana, as well as the Krishi Udaan Scheme have played an essential role in boosting agriculture sector growth. In FY2024, production of agricultural commodities as well as maize slowed due to delayed and poor monsoon conditions. In FY2025, however, strong monsoons ensured that overall agricultural production maintained a steady upward climb.

Exhibit 4: Index Numbers of Agricultural Production, India, FY2020 - FY2024



Note: Figures for 2023-24 are sourced from final estimates; Base: Triennium ending 2007-08= 100; The index number of production for a specific year for an individual crop is the percentage of current year production of the crop with respect to the base year production of the crop.

Source: Economic Survey 2023-24; Ministry of Finance, India; Frost & Sullivan

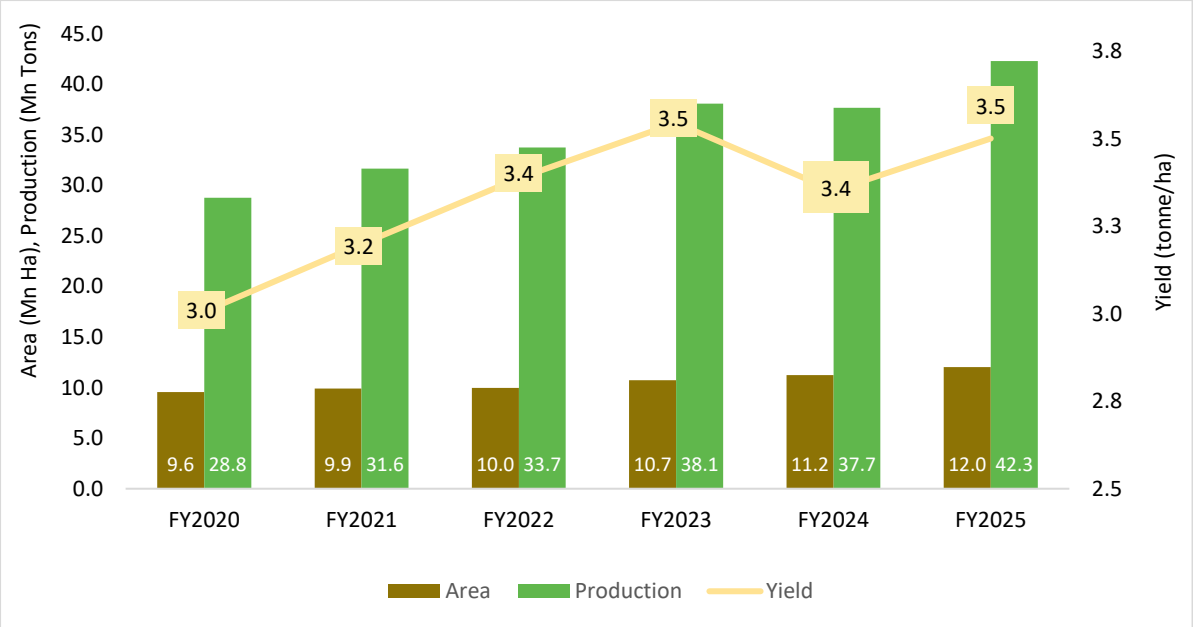
Maize production in India rose by 12.2% in FY2025, owing to improved seed availability, expansion of storage and marketing infrastructure, rising public-private partnerships, and conducive agricultural subsidies. The index number for maize production crossed 200 in FY2022 and also recorded a consistent rise between FY2020 and FY2023.

Maize is an important crop in India responsible for the employment of over 650 million farmers. As of Local Marketing Year 2022/23 (November 2022 to October 2023), India is the sixth[1] largest maize producer globally. India's maize production grew at a CAGR of 7.3% between FY2020 and FY2025, rising from 28.8 million tonnes to 42.3 million tonnes.

The annual increase in production in FY2025 stood at 12.2%, primarily driven by a significant number of farmers choosing to plant maize instead of pulses and cotton, in response to a delayed and slow-progressing monsoon. In order to meet the country's domestic demand, India will need to increase its maize production by 10 million tonnes over the next five years compared to FY2023's 38.1 million tonnes. To meet this target, India must systematically channel investments into its national maize supply chains and distribution networks.

However, India witnessed below average rainfall in 2023 due to the El Nino adversely impacting maize output. As a result, FY2024 maize production fell to 37.7 million tonnes, posting a 1.1% annual contraction. Climatic phenomenon such as El Nino are likely to impact India's kharif season agricultural production. Erratic monsoons are likely to have a significant impact on country's rice, moong, urad, soybean, and sugarcane production. Consequently, a drop in kharif production could push up food inflation and increase dependency on agricultural imports

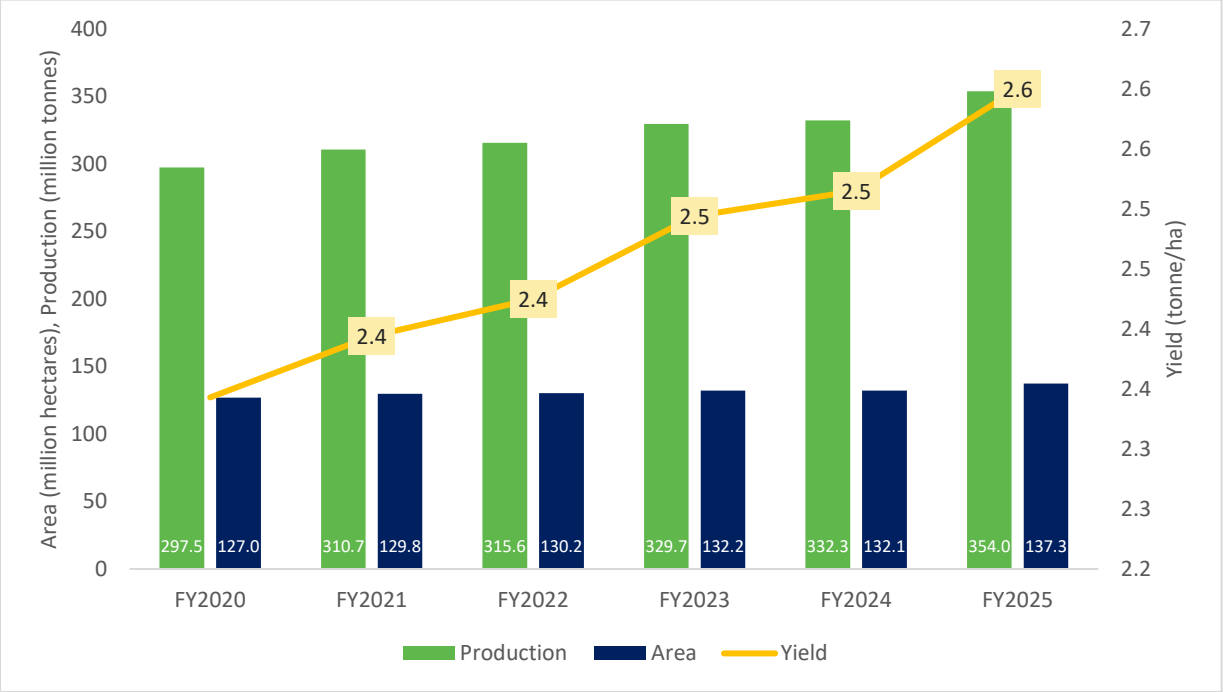
Exhibit 5 (a): Area, Production and Yield of Maize Crop, India, FY2020 – FY2025



Source: Ministry of Agriculture and Farmers Welfare – India (Final Etimate of Production and Food Grains); Economic Survey 2024-25; Frost & Sullivan

[1] According to Grain: World Markets and Trade April 2023, United States Department of Agriculture

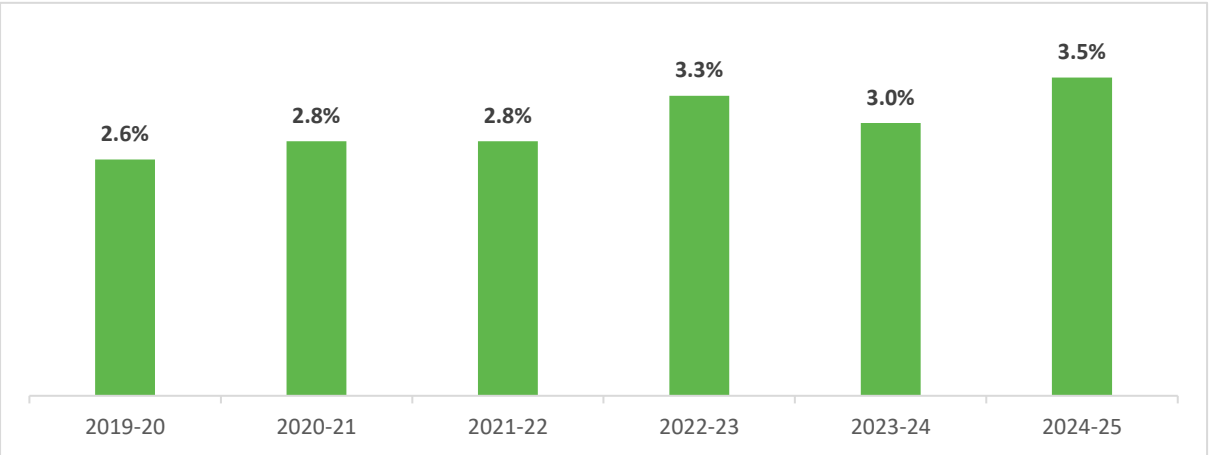
Exhibit 5(b): Area, Production and Yield of All Agricultural Commodities, India, FY2020 – FY2025



Source: Unified Portal for Agricultural Statistics, Reserve Bank of India; Frost & Sullivan

India's contribution to global maize production rose from 2.6% in FY2020 to 3.5% in FY2025 and fell slightly to 3.0% in FY2024 (Exhibit 6) owing to increased output coming from countries like Brazil and Argentina. India has the potential to increase its maize production from the current levels of ~38 million tons to 50 million tons by raising yield to 5 tons/ha over the next five years. Appropriate policy measures and steps to strengthen post-harvest infrastructure, improve storage facilities, implement price stabilization mechanisms, and development of an integrated value chain plan will bolster overall productivity and farmers' income.

Exhibit 6: Production Contribution in Global Maize Production, India, FY2020 – FY2025 (%)



Source: Unified Portal of Agricultural Statistics, Economic Survey 2024-25; United States Department of Agriculture; Frost & Sullivan

2. Market overview

2.1. Introduction to maize starch and its application

Starch, α-D glucan polymer (glucan polymers building up the starch granules are amylose and amylopectin) is an edible and most abundantly found carbohydrate stored in plants. it is one of the most important polymers being used extensively in both food and non-food applications. Starch is derived from natural polymer sources such cereal grain seeds, tubers, roots, legume seeds, fruits, and leaves. Maize, potato, rice, wheat, and tapioca are the major source of commercially manufactured starches in the market.

Starch is manufactured by the combination of grinding the starch-rich-crop followed by wet separation techniques. Starch can be modified using physical or chemical methods and hence is considered as a versatile source. The three main classes of starch-based products are unmodified or native starch, modified starch (dextrin, pre-gelatinized starch, oxidized starches) and derivatives (high fructose maize syrup, glucose).

Starch is used for various industrial applications such as viscosifiers, for encapsulation, emulsifiers, defoaming agents, and as sizing agents. Starches are used majorly for their ability to impart textural characteristics and supporting in gelling and/or film formation.

Maize starch is a white, odourless and tasteless powder which has wide application in food processing, papermaking, and production of industrial adhesives. One of the many applications is in cosmetics and oral pharmaceutical products.

2.2. Industrial Applications of Maize Starch

FOOD & BEVERAGE

As a food ingredient, to thicken the food such as in gravies, sauces, puddings, in bakery industry for improve the texture and tenderness of cakes.

PAPER

Used as a key agent to enhance the bonding strength of paper as well as corrugated boxes by providing dry strength to surfaces. It acts as an adhesive for the paper industry.

TEXTILE

To soften fabric and to provide the required stiffness. Starch allows the strength of the warp yarn to be easily increased.

PHARMACEUTICAL

Maize Starch is used as filler, binder diluents, humectant, and disintegrant. The function of maize starch as a disintegrant is to enable capsules and tablets to break down into smaller fragments. This helps to dissolve the drug so it can be released for absorption by the body.

BIOPLASTICS

Bioplastics or PLA (polyactic acid) is made from the sugars in maize starch. It is biodegradable, carbon-neutral and edible.

CHEMICAL

Used as an economical feedstock, to manufacture organic chemicals such as ethanol.

2.3. Overview of Maize consumption trend – Global

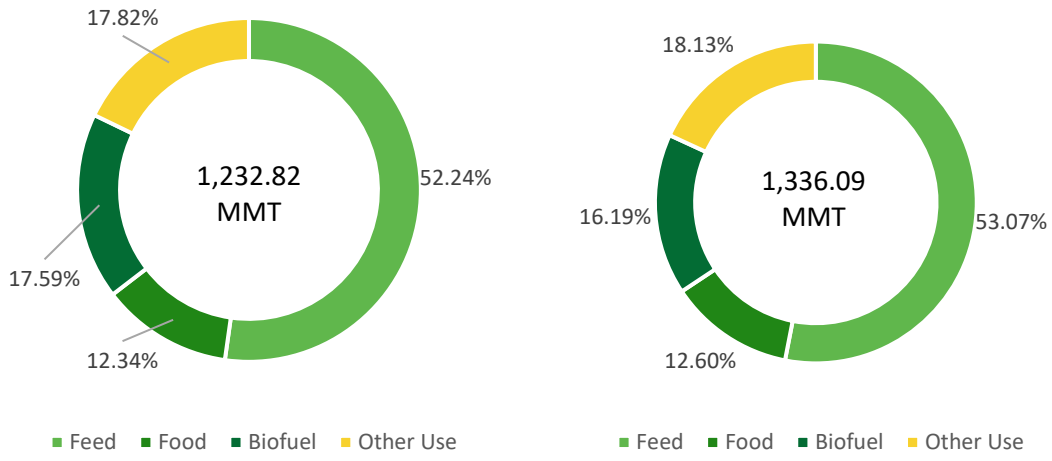
Global maize consumption is projected to grow at a slower rate than in previous years, with animal feed demand and population-driven food consumption as the primary drivers. According to the OECD report for 2024-2033, the annual growth rate is expected to be around 1.2%, compared to 2.1% over the last decade.

The main driver behind this growth is increasing demand for animal feed, which constitutes 56% of total maize utilization. By 2033, global feed consumption is predicted to rise by 99 million tons, with major contributions from China, the US, Brazil, Argentina, Mexico, India, and Southeast Asia. China's rapidly expanding livestock sector will account for a significant portion of this increase, as will the poultry sector in Southeast Asia.

Maize consumption as food is also expected to rise, particularly in Sub-Saharan Africa, where population growth is high, and white maize remains a dietary staple. The average growth rate of food-based maize consumption in African countries is forecast at 2.5% annually.

While biofuel use of maize is still growing, the pace has slowed significantly due to changes in national biofuel policies, particularly in the US and Brazil, which account for the majority of biofuel-related maize demand. Despite this, the global trade in maize is expected to expand, driven by higher exports from Brazil and stronger import demand from the European Union, which is facing reduced domestic production due to unfavourable weather conditions.

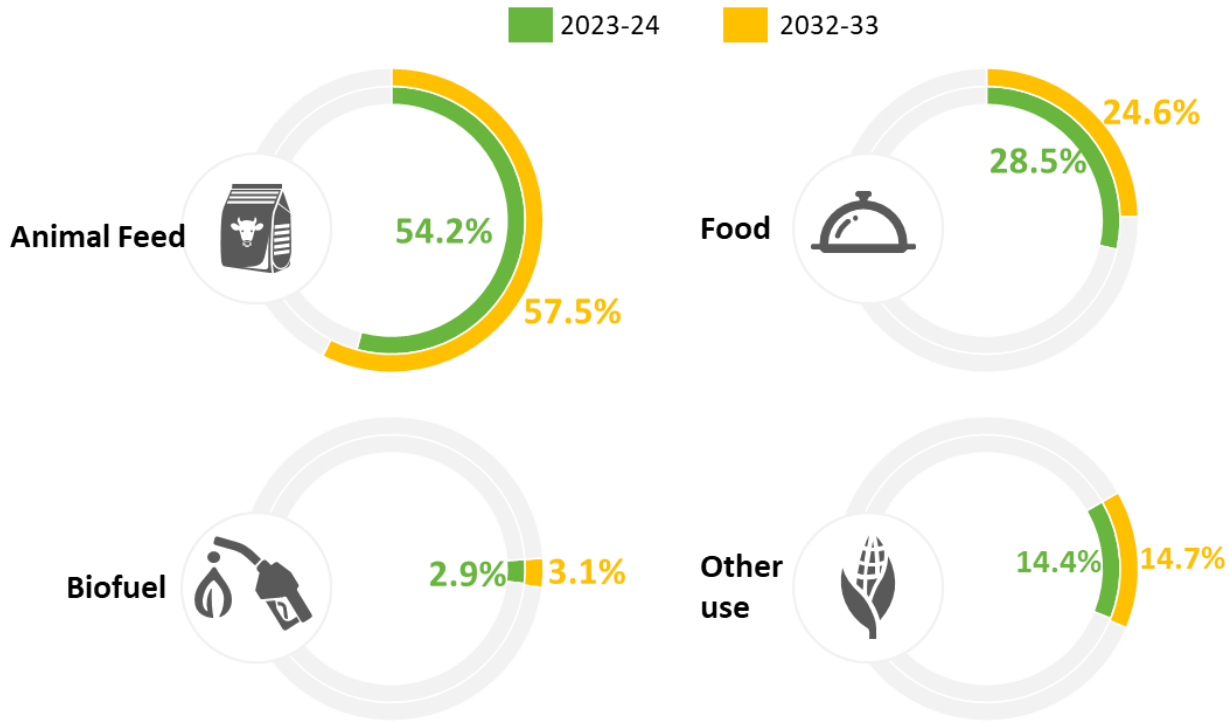
Exhibit 7 : Global Maize Consumption Pattern and Future Outlook (2024-2030)



Source: OECD-FAO Agriculture Outlook 2024-2030, Frost & Sullivan Analysis

Overview of Maize consumption trend – India

Exhibit 8: Maize Consumption Trend in India, CY 2023-CY 2032F



Source: OECD Outlook 2023-32 & Frost & Sullivan Analysis

In the coming years, it is expected that the India's growing feed and silage sectors will lead to a continuous increase in the demand for maize. The OECD 2023-32 report states that feed consumption in India is expected to increase from the present (2023-24) 54% to approximately 58 in 2032-33. India has made major progress in producing more maize than ever before. However, productivity needs to be prioritized because of the effects of climate change, which are lowering the amount of arable land available and increasing demand rapidly. Mechanized maize farming and the adoption of single cross hybrids have the potential to boost output and profitability. Creating a competitive maize supply chain is as crucial in the current climate as focusing on output and productivity.

2.4. Key Trends and Growth Drivers for End use Industries for Maize Consumption

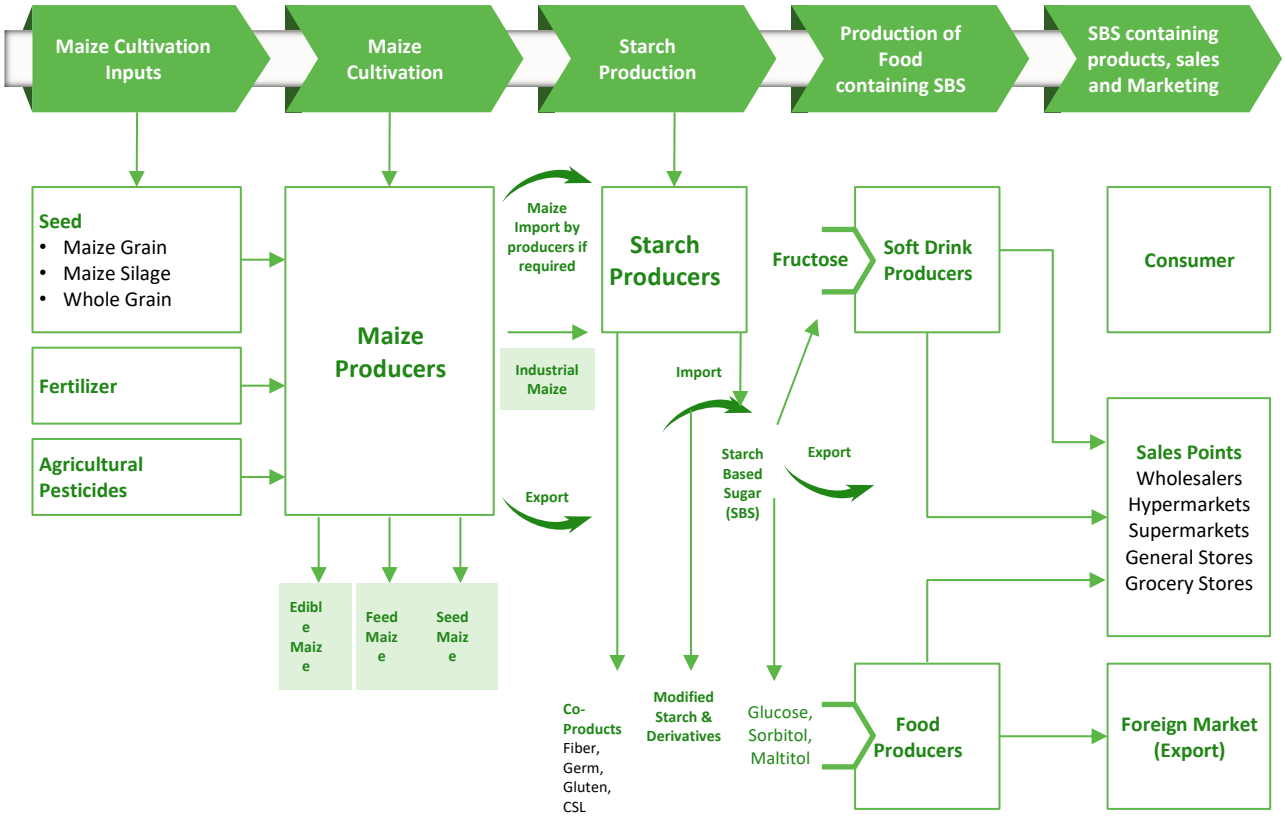
Accelerating Urbanization & Nuclearization of Families: According to last census of 2011, India has experienced steady urban growth from 216 million in 1991 to 377 million in 2011. Growing urbanization is driving up demand for processed foods like bakery products, ready to eat and cook items and maize flakes. In the processed food industry, the need for convenient and simple-to-prepare food items has led to an increase in the demand for maize and maize-based flour. Numerous food items, such as baked goods, snacks, soups, sausages and breakfast cereals, contain maize flour. Furthermore, factors including population increase, shifting food choices, and economic situations all have an impact on the growth. Many of the urban households are offshoots of rural extended or joint families and according to census – 2011, of all households, nuclear family constitutes 70%. This has led to increased demand of processed food.

Growing processed Food Industry: India's food processing sector is expected to grow from US$ 866 billion in 2022 to US$ 1,274 billion in 2027, driven by shifting dietary and lifestyle patterns brought on by urbanization, nuclearization of families, and increased disposable income. In 2020–21, the food processing industry accounted for 10.54% of the manufacturing sector's gross value added (GVA) and 11.57% of the agriculture sector's GVA. In order to provide financial, technical, and business assistance for the establishment of food processing enterprises, the Ministry of Food Processing Industries (MoFPI) has put in place programs such as the Pradhan Mantri Kisan SAMPADA Yojana (PMKSY), the PM Formalization of Micro Food Processing Enterprises (PMFME) Scheme, and the Production Linked Incentive Scheme for Food Processing Industry (PLISFPI).

Growing Organized Dairy sector: The organized dairy sector requires more of Fine Cereals or Maize-based concentrates: The dairy sector in India, largely backyard & small-scale operations (2-3 animals), consumes limited amounts of compound feed and depends on home-made feed mixes - oil cakes, household food waste, spoiled/broken wheat and rice, and other cheap grain mixes – to feed to lactating cows/buffaloes while in milk. There is a growing trend among dairy farmers to replace low-yielding local dairy cattle breeds with higher-yielding crossbred cows and buffaloes, which require higher-energy feeds including maize based feed concentrates, driving a 10- 12 percent per annum growth in demand for commercial dairy feed. Further, India's dairy industry is expected to see healthy revenue growth of 11-13% this financial year 2025-26, as strong consumer demand continues along with an improved supply of raw milk.

Demand from Feed Industry: Increasing demand from the aquafeed and poultry industries, which account for almost half of domestic production. The poultry and aqua feed industries' steady demand helped to sustain maize consumption in 2022–2023. India's poultry and aquaculture feed sector has expanded after the COVID-19 epidemic has ended due to increased consumer demand for poultry products and export demand for aqua goods, especially shrimp.

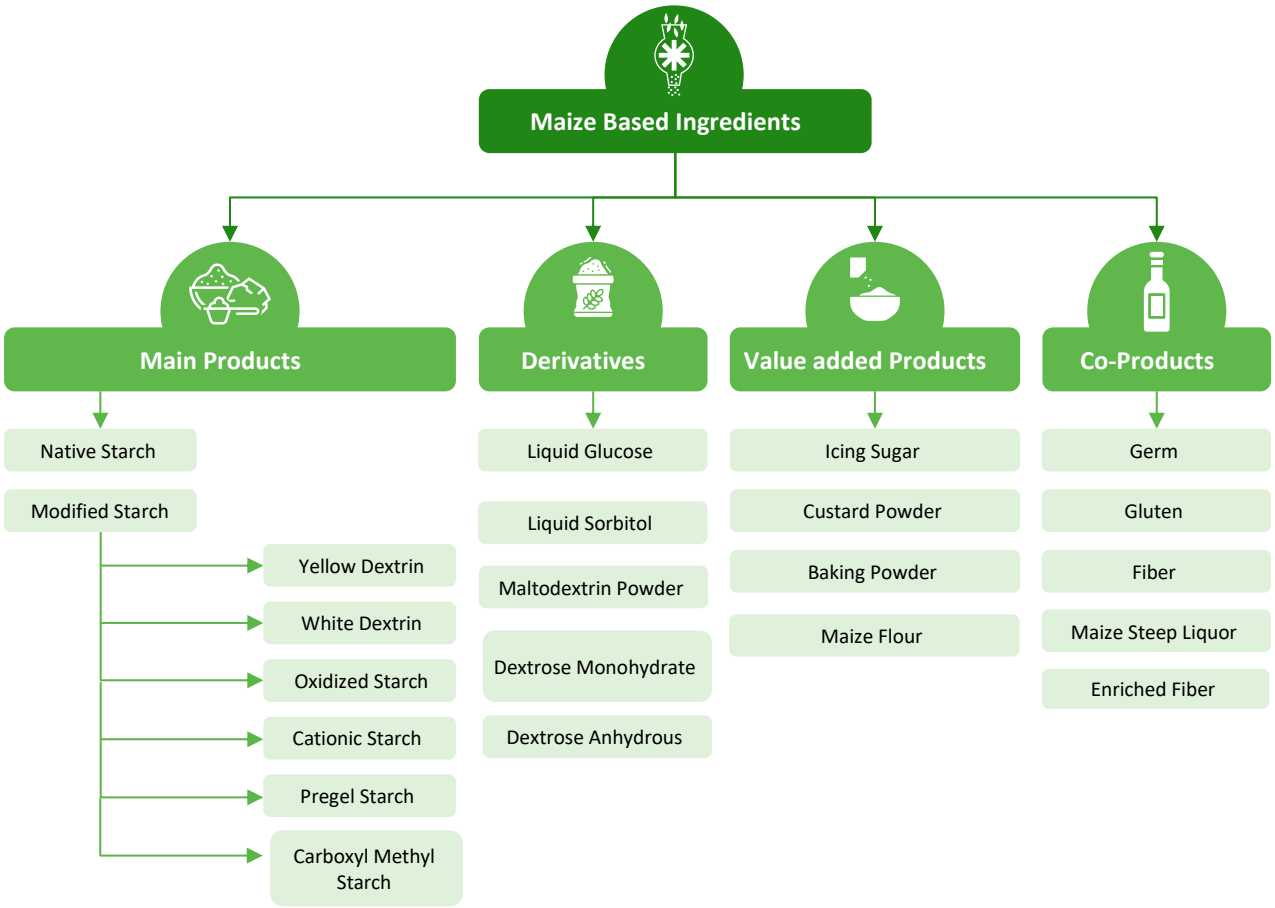
Along with the above factors rising use of maize in Biofuel, supportive government policies for maize cultivation and growing industrial application are driving the demand and consumption of maize.



2.5. Value Chain of Maize Based Speciality Products and Ingredients Solutions Industry in India

Source: NISAD, Frost & Sullivan

2.6. Introduction to Maize Starch Derivatives



A. Main Products- Starches

i. **Native Starch-** Maize is used to make native starch & hence it is a plant-based food ingredient. Starch slurry is often just dried to create Native Starch. The resultant powder is a natural starch that can be used in a variety of food preparations and industrial applications.

ii. **Modified Starch-** Modified starch, also called starch derivatives, is prepared by physically, enzymatically, or chemically treating native starch to change its properties.

A (ii) Modified Starch

i. **Dextrin -** Dry heating, roasting unmodified starch with or without an acid or alkaline catalyst (pyrolysis or roasting) produces Dextrin. Dextrin produced by heat are also known as Pyrodextrin. The major difference between Dextrin and other modified starches is that Dextrin is reduced in viscosity, they have better cold-water solubility, increased reducing power and reduced tendency to gel. The three major types of Dextrin include white dextrin, yellow dextrin, and British gums.

White Dextrin- White Dextrin are partially water-soluble and yields optically active solutions of low viscosity. The white colour of this Dextrin is similar to original Maize Starch with cold water solubilities ranging from 5 to ~90%. The White Dextrin that exhibits higher solubility (40-90%) could be used at much higher concentrations to yield very soft gels.

Industrial Applications: Textile finishing and coating agent, thickening, and binding agent in pharmaceuticals and paper coatings, stabilizing agent for certain explosive metal azides.

Yellow Dextrin- Yellow Dextrin or Canary Dextrin are water-soluble Maize derivative used in adhesives, gums, and pastes. These are produced using less acid, higher temperatures for a long time-period. The Yellow Dextrin is used to produce high solids pastes (40-60%). These dry rapidly when applied in thin films. The major application of Yellow Dextrin is as adhesives, majorly in the paper industry.

Industrial Applications: Derivatives are used as binder in adhesive applications, widely used as extenders in dyes and as a binder in abrasive industry, adhesive for envelopes, corrugation, gummed labels, and tapes along with others.

British Gums- British gums are impure form of dextrin. These are produced by roasting white and yellow dextrin with little or no acid. The high temperature roasting produces a dark coloured dextrin that is used in industry as a paper adhesive. British gum is soluble in warm water, and it is used in concentrations of 10-35%.

Industrial Applications: British gums are used as carriers for colourant, spices, flavouring agent.

ii. **Oxidized starches**: Oxidized starch having a range of viscosity and fluidity to suit the requirement of different applications. It is used mainly in paper processing for surface sizing.

Industrial Applications: Used for coating applications for their adhesion ability. It is used in fabric and textile industry for yarn smoothing and flattering.

iii. **Pre-gelatinized starch**- Modified starch is processed using the standard drum drying process followed by slightly cross linking the granules to form pregelatinized starch. Pregelatinized starch is soluble in cold water as it easily takes up the water and swells at room temperature. It forms paste when mixed with cold water.

Industrial Applications: Used in cream fillings, canned, sauces, soup mixes, gravies, tomato ketchup, pasty creams, dairy desserts, and other food product industries.

iv. **Cationic starch**- Cationic starch is a modified starch used in wet-end starches. Wet-end starches can be made from native starch, however cationic starches are better. The negatively charged cellulose fiber and fillers readily attract the positively charged cationic starches.

Industrial Applications: Used in textile, paper, chemicals, agricultural, construction engineering, and healthcare industries. Also used as an additive in papermaking, e.g. in the wet end of papermaking, among other things to improve retention, water permeability, strength of the produced paper and to remove anionic impurities.

v. **Carboxyl Methyl Starch-** The water-soluble polysaccharide carboxymethyl starch (CMS) is used extensively as an additive; its non-toxic and biodegradable derivatives are finding more and more uses.
Industrial Applications: Used mainly as adhesive sizing material for warp sizing, to size cotton yarn of small and medium size, linen yarn and blended yarn. Used a printing thickener. CMS can be used in Adhesives, paints, water treatment, Mining Industries.

B. Value added Products

i. **Maize Flour-** Maize Flour is a fine powder produced by grinding dried maize kernels (maize). During harvest, millers remove the tough outer hull and nutritious germ from whole maize kernels, then use metal rollers to grind the kernels into a fine powder. Maize Flour is a gluten-free ingredient (due to the production process it undergoes) which contains nutrients and fiber. **Industrial Applications**: Derivatives are used in bakery industry to produce breads, muffins, pancake mixes, infant foods, biscuits, wafers, doughnuts, breakfast cereals along others. It is also used as filler, binder and carrier in meat products.

ii. **Baking Powder-** Baking powder is a white solid composed typically of three components, including an acid, a base, and a filler. These materials have a significant impact on the taste and texture of the finished product. The dry base used in baking power is sodium bicarbonate or baking soda. The four major acids that are used typically include monocalcium phosphate (CaHO4P), sodium acid pyrophosphate (H2Na207P2) sodium aluminium phosphate (H304P), and sodium aluminium sulphate (NaAl08S2). The inert filler used commonly in the production is maize starch.

The maize starch used in the baking powder helps to keep the product dry and easy flowing. It also keeps the acid and bases separated which further prevents them from reacting while in storage.

Industrial Applications: Baking Powder is used in various industrial applications including baking and cooking, metal polishing, water treatment, meat curing, personal care products and pharmaceuticals.

iii. **Custard Powder-** Custard is composed of a mixture of maize starch, milk and eggs which is thickened by heat. Maize-starch is the commonly used thickener which make up the bulk of custard powder. Maize-starch is effective at thickening liquids; it dissolves quickly and hence is majorly used in custard powder. Vanilla is the flavouring which is generally used in custard powder in a very subtle amount.

Industrial Applications: The sauce produced using custard powder is used for the preparation of cakes, puddings, ice-creams, sweet pies among other deserts. It finds major application in making cookies and instant puddings.

vi. **Icing sugar –** Icing sugar is also known as powdered sugar or confectioner's sugar. It is made by grinding granulated sugar into a very fine powder and produced industrially using a small amount of anticaking agent, such as maize- starch or tricalcium phosphate (E341). These are

added to absorb moisture and supports the free flowing of the powder by preventing sticking together in clumps.

Industrial Applications: Icing sugar is used in preparation of bakery and confectionery products such as cakes, chocolates, fudge among other desserts. It is also used in frostings and coatings as it does not produce a grainy texture.

C. Derivatives

i. **Liquid glucose-** Liquid glucose or maize syrup is produced by the process of partial hydrolysis of the starch slurry using enzyme or acid. Liquid glucose is a clear, viscous, colourless solution. The functional properties of liquid glucose include viscosity, humectancy, high fermentability, colligative properties, along with imparting sweetness.

Industrial Applications: Liquid Glucose is an ideal additive for sweets, confectionary, biscuits, Ice creams, Jams, Jellies, preserves pastries & liquors. It also forms the base of artificial honey.

ii. **Maltodextrin Powder-** Maltodextrin is a polysaccharide with major application as a thickener and a food additive. Partial hydrolysis is used to produce it from starch. Maltodextrin occurs as a white hygroscopic spray-dried powder.

Industrial Applications: It is used in Food, Pharmaceutical, agriculture, and healthcare industries to improve as it improves texture, solubility, flavour, and shelf life of the product. Maltodextrin is used as a food additive, anti-caking agent, bulking agent, and food flavour carrier. It is also used in artificial sweeteners.

iii. **Dextrose Monohydrate -** Dextrose Monohydrate is the Monohydrate form of D-glucose which is a natural Monosaccharide and Carbohydrate. Dextrose Monohydrate has a sweet taste and is used as a sweetener and texturizing agent. It is also used as a fermentation substrate.

Industrial Applications: Dextrose Monohydrate can be used as nutritional supplement and sweetener in food such as in confectioneries, jams, jellies; bakery such as cakes, biscuits, cookies; beverages, and honey products. Dextrose Monohydrate is also used as nutritional supplement in pharmaceutical industry. It could also be used in Agriculture/Animal Feed/Poultry feed industry as well as in pet foods.

iv. **Dextrose Anhydrous-** Dextrose Anhydrous is also known as “Maize Sugar Anhydrous” or “Anhydrous Dextrose” or “Anhydrous Sugar”. It is purified and crystallized D-glucose with the total solids content not less than 98.0% m/m. It is a colourless, odourless white powder with less sweetness than cane sugar.

Industrial Applications: Dextrose Anhydrous has wide application in industries including food & beverage, pharmaceutical, agriculture/animal feed, among others. It could be used as a nutritional supplement and sweetener in baked goods, candy, and gum, jarred and canned foods, creams and frozen dairy products (like some ice-creams and frozen yogurts), and cured meats.

v. **Liquid Sorbitol –** Sorbitol is a polyol or sugar alcohol. It is a bulk sweetener that is found in numerous food products. It is an excellent humectant and texturizing agent. Sorbitol is about 60% as sweet as sucrose offering one-third fewer calories.

Industrial applications: Sorbitol is non-cariogenic sweetener. It has been safely used in processed foods along with applications in pharmaceuticals and cosmetics. Sorbitol offers functional properties in bakery, confectionery, and seafood (cryoprotectant qualities).

D. Co Products

i. **Germ -** The endosperm of maize, or maize germ, is a yellow seed which is rich oil content.

Industrial Application: Used in the production of feed supplements and the extraction of maize oil.

ii. **Gluten-** Maize gluten is mostly derived from maize bran and steep liquor, though it can also include some germs and broken maize kernels. Typically, 90% of dry matter, including a significant amount of crude protein, is present in dry maize gluten.
Industrial Application: Used as feed additive in cattle diets as a source of energy and protein

iii. **Fiber-** After removing the starch, gluten, and germ, the seed coat and leftover endosperm are combined to form maize fiber. Fiber is an excellent ingredient for animal feed because it is made up of protein, starch, and fiber.
Industrial Application: Used to prepare ethanol. sweeteners, animal feed.

iv. **Maize Steep Liquor-** A co-product of maize milling is Maize Steep Liquor. An essential component of various growth media, it is a viscous concentrate of maize soluble that includes vitamins, minerals, and amino acids.
Industrial Application: Used as a feed additive for livestock. Used in food production of yeasts, leavened dough products, and beer.

v. **Enriched maize fiber**- The pericarp of the maize grain is known as maize enhanced fiber; it is light brown to yellow in color, odorless, and free of rancidity and other substances.
Industrial Application: Because maize fiber includes vital vitamins and amino acids, it is a valuable source of energy for cattle and poultry.

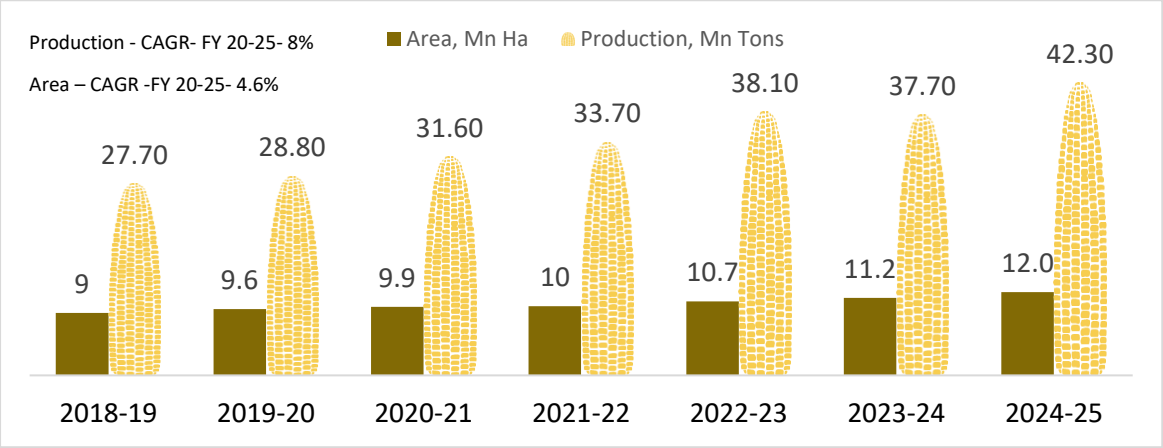
2.7. Overview of maize cultivation in India

Maize (Zea mays L) is one of the most versatile crops in cereals which has wider adaptability under wide range of agro-climatic conditions. It is also known as queen of cereals globally because it has the highest genetic yield potential among all the cereals. It is cultivated in about 160 countries having wider diversity of soil, climate, biodiversity and management practices across globe.

In India, maize is grown & harvested in two seasons, kharif (rainy) and rabi (winter). Around 80-83% of Maize in India is cultivated in Kharif and remaining 17-20% is grown in Rabi.

Maize is also the third most important food crop in India, after rice and wheat. Maize serves as staple food for human consumption and quality feed for animals. Maize is also used as basic raw material as an ingredient to thousands of industrial products that includes starch, protein, oil, beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, adhesives-gum, package and paper industries etc.

Exhibit 9: Maize Acerages & Production, India



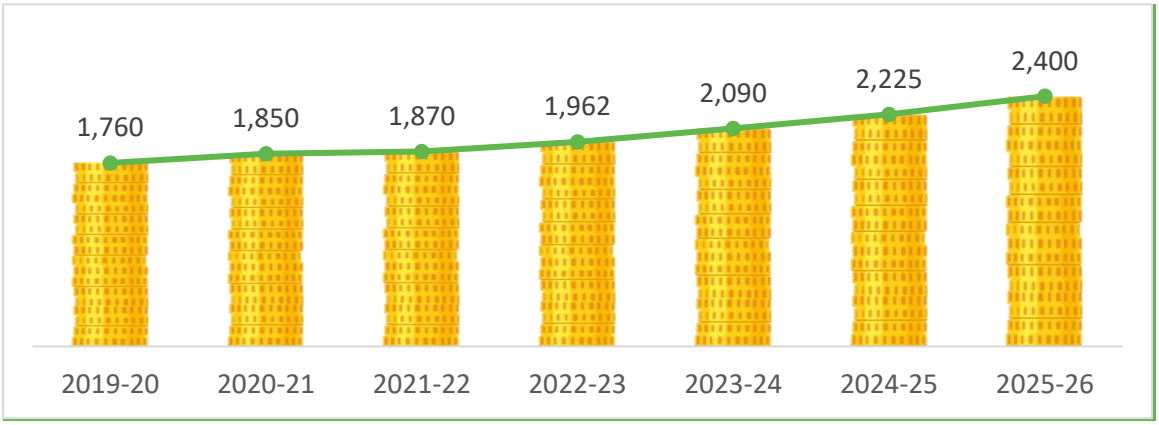
Source: Unified Portal for Agricultural Statistics, Economic Survey 2022-23, Ministry of Finance, India; Frost & Sullivan

2.8. Overview of prices for maize in India

Maize is the largest crop in the Feed grain segment in India. Maize prices were below Rs. 2,000 per quintal in commercial markets till 2022-23 but have crossed Rs 2,000 / quintal mark in 2023-24. For 2025-26 the minimum support price for maize is Rs 2,400/quintal which is Rs 175 more than the last year price.

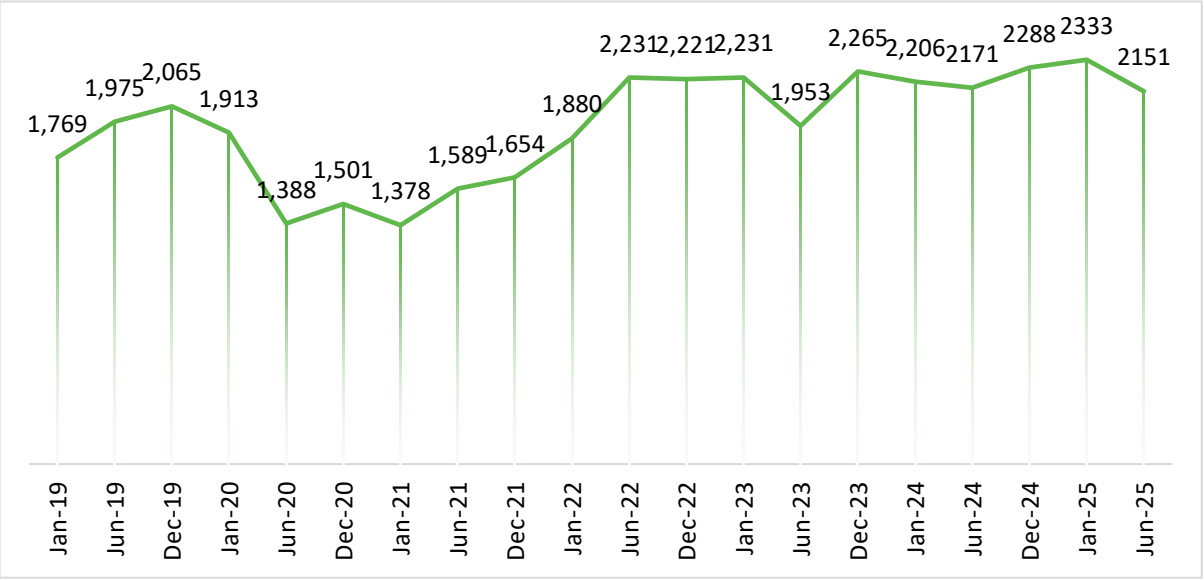
Karnataka, Maharashtra, Madhya Pradesh, Uttar Pradesh & Rajasthan are some of the key Maize producing states. Bihar is key maize producing state in country. Seemanchal and Koshi regions have become major hubs for maize farming in recent years owing to abundant rainfall they receive. Maize has replaced other crops as the main cash crop for farmers in the Seemanchal districts of Bihar such as Purnea, Kishanganj, Araria, and Katihar. The same effects can be seen in Saharsa, Madhepura, Supaul, and Khagaria districts of Koshi. Farmers in the districts of Bhagalpur and Samastipur are also growing maize intensively. For poultry and cattle feed, Uttar Pradesh, Maharashtra, Madhya Pradesh, and Tamil Nadu procure maize from Bihar. In Indore, Madhya Pradesh, purchasers were paying between Rs. 2,300 - 2,400 per quintal for new maize that was sourced from Bihar.

Exhibit 10 (a): Maize Minimum Support Prices (MSP), India, FY2019-20 – FY2024-25 (Rs per quintal)



Source: Farmers portal, Govt. of India; Frost & Sullivan

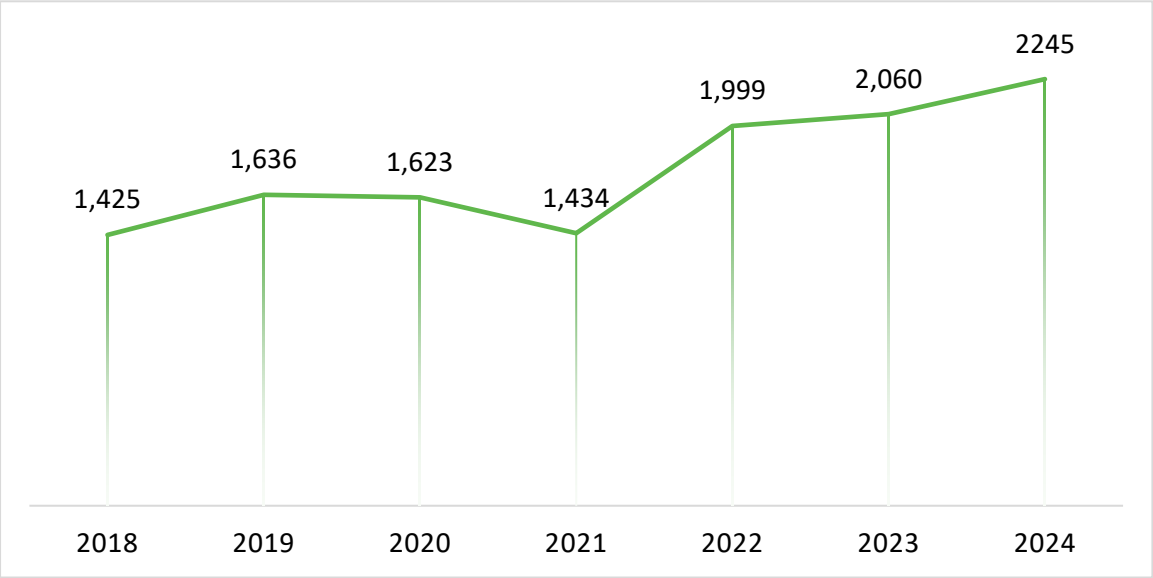
Exhibit 10 (b): Wholesale prices of Maize in India, 2019 – 2025 (Rs per quintal)



Source: Agmarknet

Wholesale prices for maize have seen a wide variation, ranging from INR 1,769 /quintal in January 2019 to INR 2,151/ quintal in June 2025. In January 2025, the wholesale maize prices recorded peak values of INR 2,333/quintal. High prices are attributed to increased activity in both procurement and ethanol production in country.

Exhibit 10 (c): Wholesale prices of Maize in Bihar, 2018 – 2024 (Rs per quintal)



Source: Agmarknet, Directorate of Economics & Statistics

Prices of Maize in Bihar have moved linearly since 2018 before reaching its low in 2021 which was INR 1,434/ quintal. In 2022, prices of maize have soared INR 1,999/ quintal. They reached an all-time high price in December of 2022 with per quintal of maize costing INR 2,083 in Bihar. Prices of maize in 2023 were Rs 2,060/quintal. In 2024 Wholesale average prices were around Rs 2,245/quintal.

2.9. Overview of Competencies required for the Maize Starch Derivatives.

1. **Developing Distributor Relationship and Global Exposure** – Establishing strong trade linkages is essential for effectively marketing maize starch and its derivatives. A well-established network of distributors and traders ensures consistent sales volumes. India, being the world's largest exporter of maize starch, exports a significant portion of its production to markets such as

Malaysia, Indonesia, and Sri Lanka. Success in this segment depends on selecting strategic markets for distribution. Therefore, it is crucial to continuously monitor global export opportunities rather than focusing solely on a limited, predefined geography.

2. **Optimize Raw Material Sourcing for Cost Efficiency and Competitive Advantage-** Sourcing raw material (RM) in India is relatively straightforward, as the country is a major producer of maize. RM costs constitute approximately 70-80% of the total product cost, and competition within the industry is intense. Therefore, it is crucial for the company to adopt distinct RM sourcing strategies to ensure both local and regional competitiveness.
3. **Creating a Value Proposition around the total cost of ownership-** In a commodity business like maize starch, demonstrating value goes beyond competing solely on price per metric ton. It is essential to effectively communicate the total cost of ownership to encourage potential customers to switch suppliers. One effective approach is to help customers reduce inventory costs by shortening lead times, which can lead to significant savings and strengthen the overall value proposition.

2.10. Assessment of State-wise Production, Yield & Acreages of Maize and Groundwater Level

1. State-wise Production, Yield & Acreages of Maize

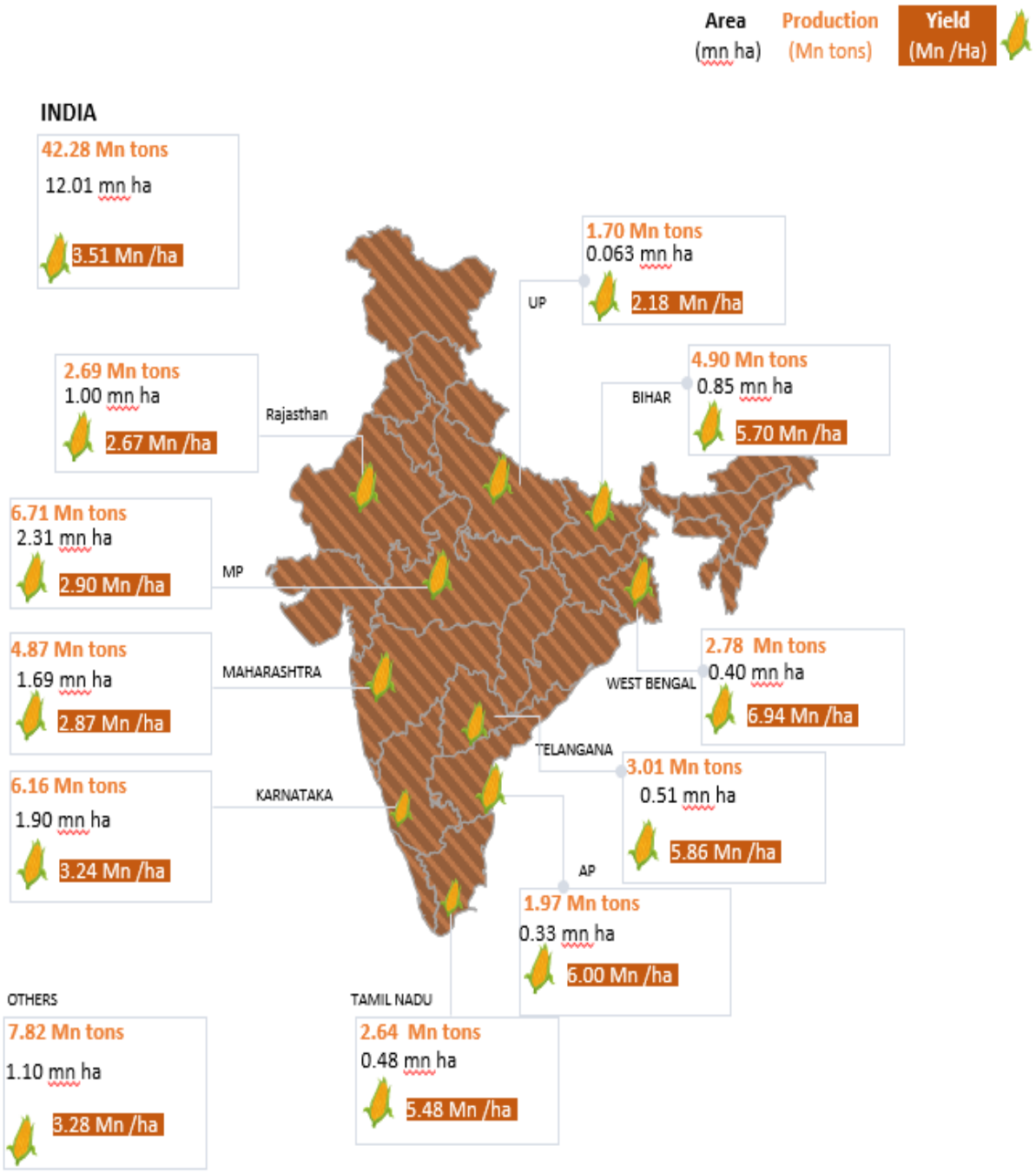
In 2024-25, the predominant maize growing states that contribute more than 80% of the total maize production are Madhya Pradesh (15.87%), Karnataka (14.57%), Bihar (11.58%), Maharashtra (11.52%), Telangana (7.12%), West Bengal (6.57%), Rajasthan (6.36%), Tamil Nadu (6.24%), Andhra Pradesh (4.66%) and Uttar Pradesh (4.02%). Apart from these states maize is also cultivated in Jammu and Kashmir, Himachal Pradesh and North-Eastern states of Chhattisgarh and Jharkhand. Maize is also cultivated in Assam in rainfed hilly upland conditions. Andhra Pradesh, Tamil Nadu, Bihar, West Bengal, Karnataka and some parts of Maharashtra harvest maize in rabi season.

Maize has emerged as important crop in the non-traditional regions i.e., peninsular India. State like Madhya Pradesh which ranks 1st in both area (2.31 Mn ha) and production (6.71 Mn tons) has much lower productivity (2.9 Mn/Ha) compared to states of, Tamil Nadu (5.48 Mn/ha) and West Bengal (6.94 Mn/ha). Bihar and West Bengal is amongst one of the traditional maize producing state.

According to third advance estimates published in May 2025 by Department of Agriculture & Farmers Welfare, Madhya Pradesh is the largest producer of Maize in India. It contributed 14.83% of the total Maize production in India. The other top 3 maize producing states of India are Bihar, Madhya Pradesh and Tamil Nadu. In Bihar, districts of Saran, Siwan, Gopalganj, East Champaran, West Champaran, Sheohar, Sitamarhi, Madhubani, Darbhanga, Muzaffarpur, Vaishali, Samastipur and Begusarai are majorly the maize growing districts. High seed replacement rates for Rabi Maize in Bihar helps in above average productivity of state in maize cultivation.

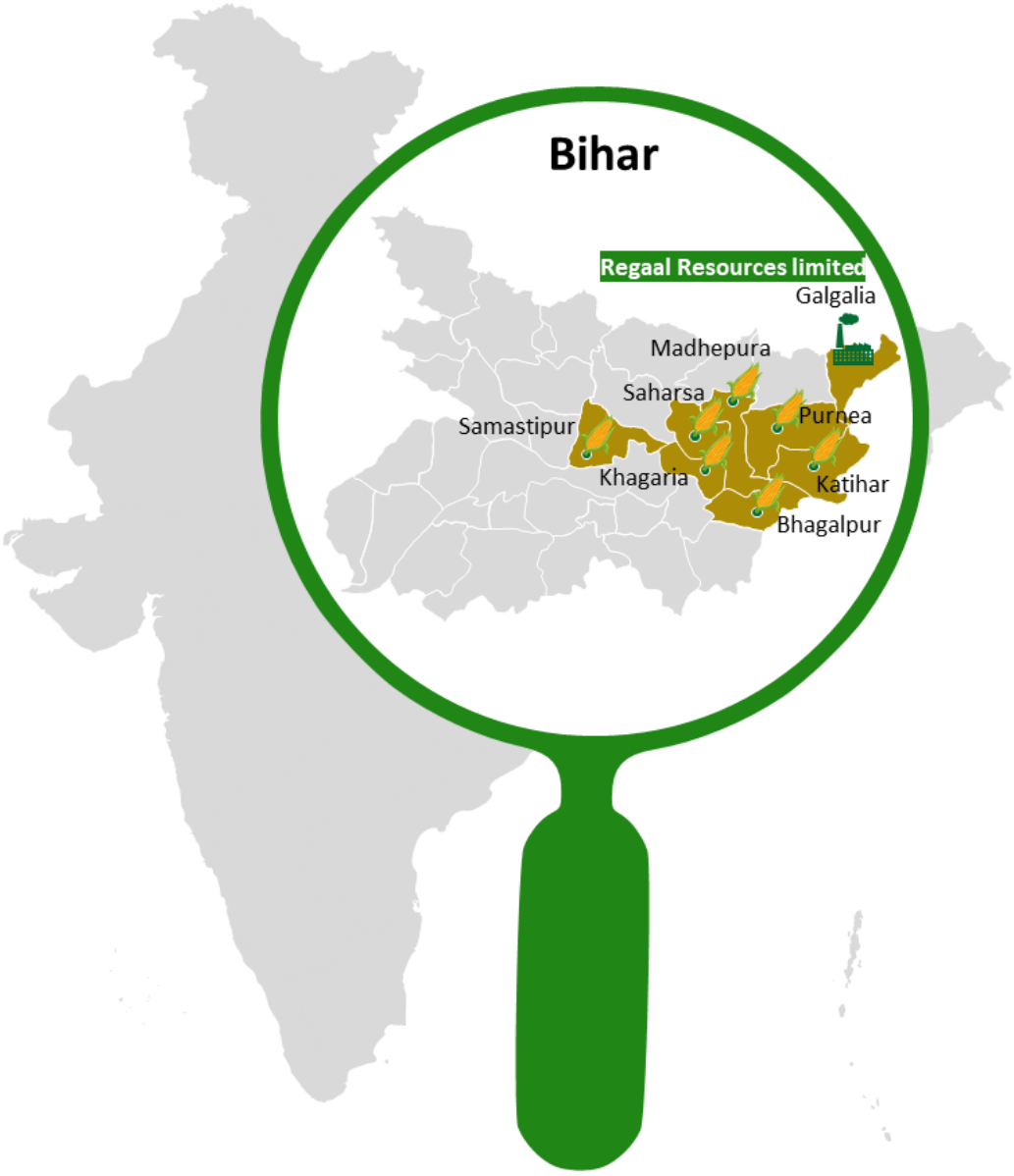
Harvesting window of Rabi Maize in Bihar & West Bengal is unique as it does not overlap with harvesting of Maize in any other maize producing states hence it provides for an 'Exclusive Availability Window' of Maize crop. Maize milling yields multiple products which are used in Food & Beverage, Paper, Textile, Pharmaceutical, Cattle & Poultry Feed Industry. These industries together account for consumption of over 90% of maize milled products. Hence, domestic demand, supply dynamics and pricing trends of maize are linked to performance of these industrial segments. Due to limited presence of industrial segments in Bihar, the downstream processing of Maize is negligible within the state, leading to export of most of the harvest to other states such as Maharashtra, Gujarat, Tamil Nadu, Haryana, Karnataka, Andhra Pradesh and Punjab.

Exhibit 11(a): Statewise Maize Area, Production & Yield in India, 2024-25



Source: Third Advcance Estimates, Directorate of Economics & Statistics

Exhibit 11 (b): Major Maize Growing Districts in Bihar



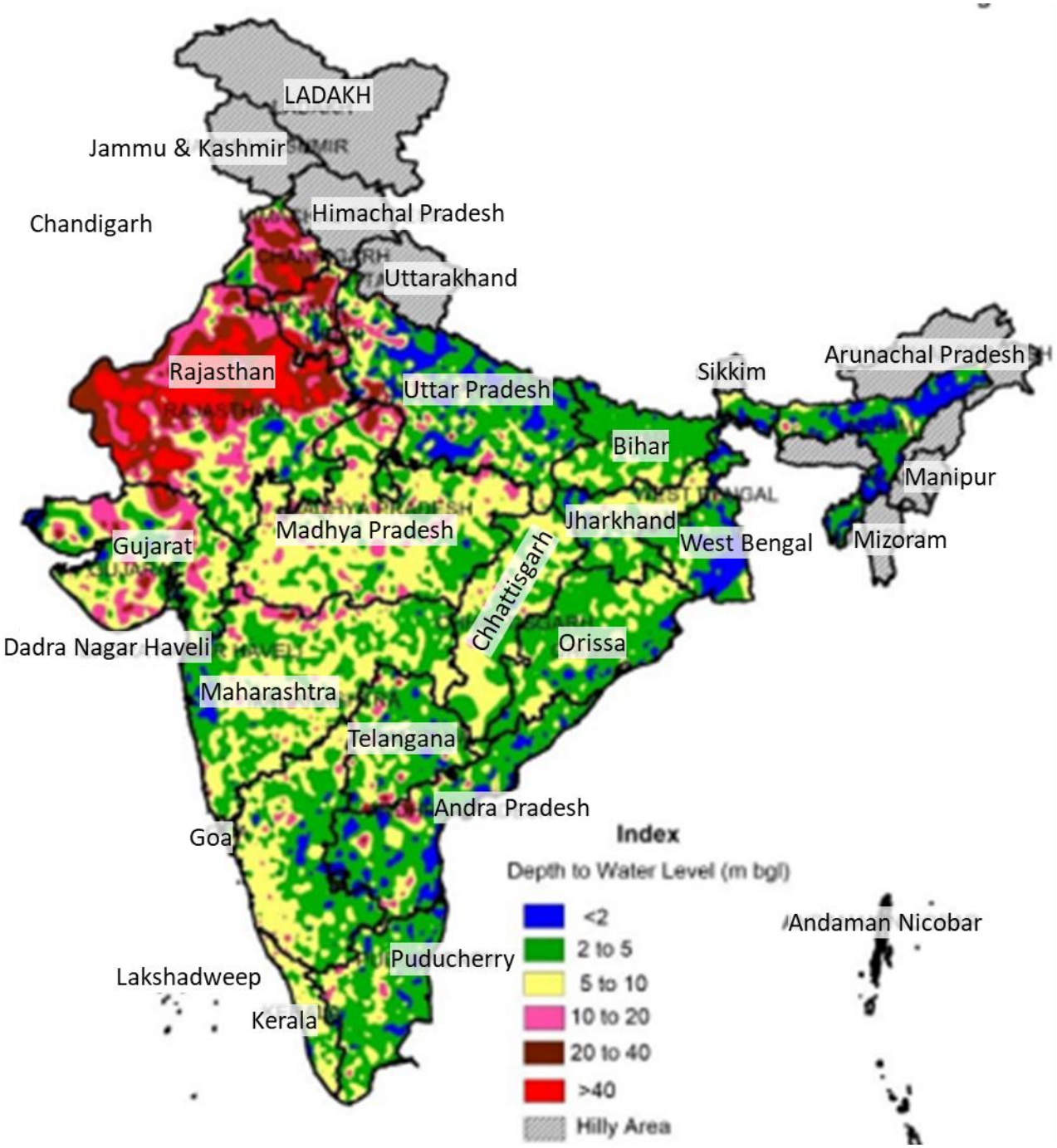
Source: Frost & Sullivan

Regaal Resources Limited is the first maize milling company to have established its plant in Kishanganj district of Bihar which is the maize catchment area and has a bumper harvest in Rabi season (i.e. an increase of in maize production from 91,680 MT in Fiscal 2023 to 417,511 MT in Fiscal 2024) which ensures smooth supply of maize during the season. Company's plant is also in close proximity (110 km) to the Gulabbagh which is one of the largest Maize mandi/ markets.

2. State wise Ground Water Level Assessment

Ground Water level in the range of 2-5 mbgl (meters below ground level) is seen in Bihar, Assam, northern parts of Uttar Pradesh, Coastal parts of Odisha, few pockets in Andhra Pradesh, Telangana, Karnataka, Kerala, Tamil Nadu, Gujarat and Maharashtra.

Exhibit 12: Depth of water level map – January 2023



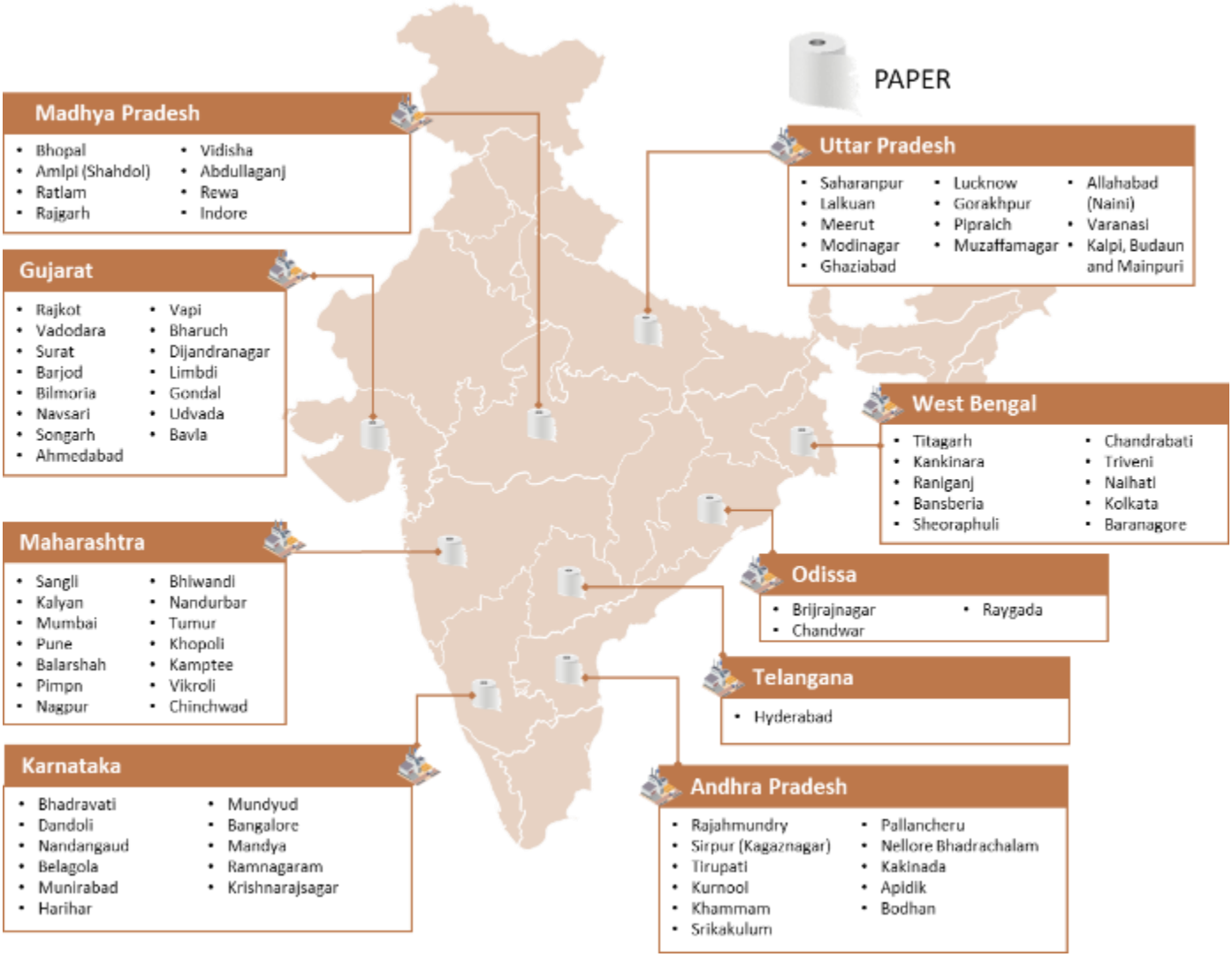
Source: Central ground water board, Department of Water Resource

2.11. Overview of Clusters for End-use Industries across various states in India

a) Paper Industry

Maharashtra, Andhra Pradesh, and Madhya Pradesh are the top paper manufacturing states in India accounting for ~37% of the total paper produced in India, a key end use industry. As of 2023-24, India has 850-900 pulp and paper mills, with a total production of around 23 million tonnes per annum, according to Central Pulp & Paper Research Institute data (2023-24). Maize starch is largely used in the paper industry wherein it is used for increasing the strength of the paper and as an adhesive for paper board.

Exhibit 13: Statewise Paper Industry Clusters in India

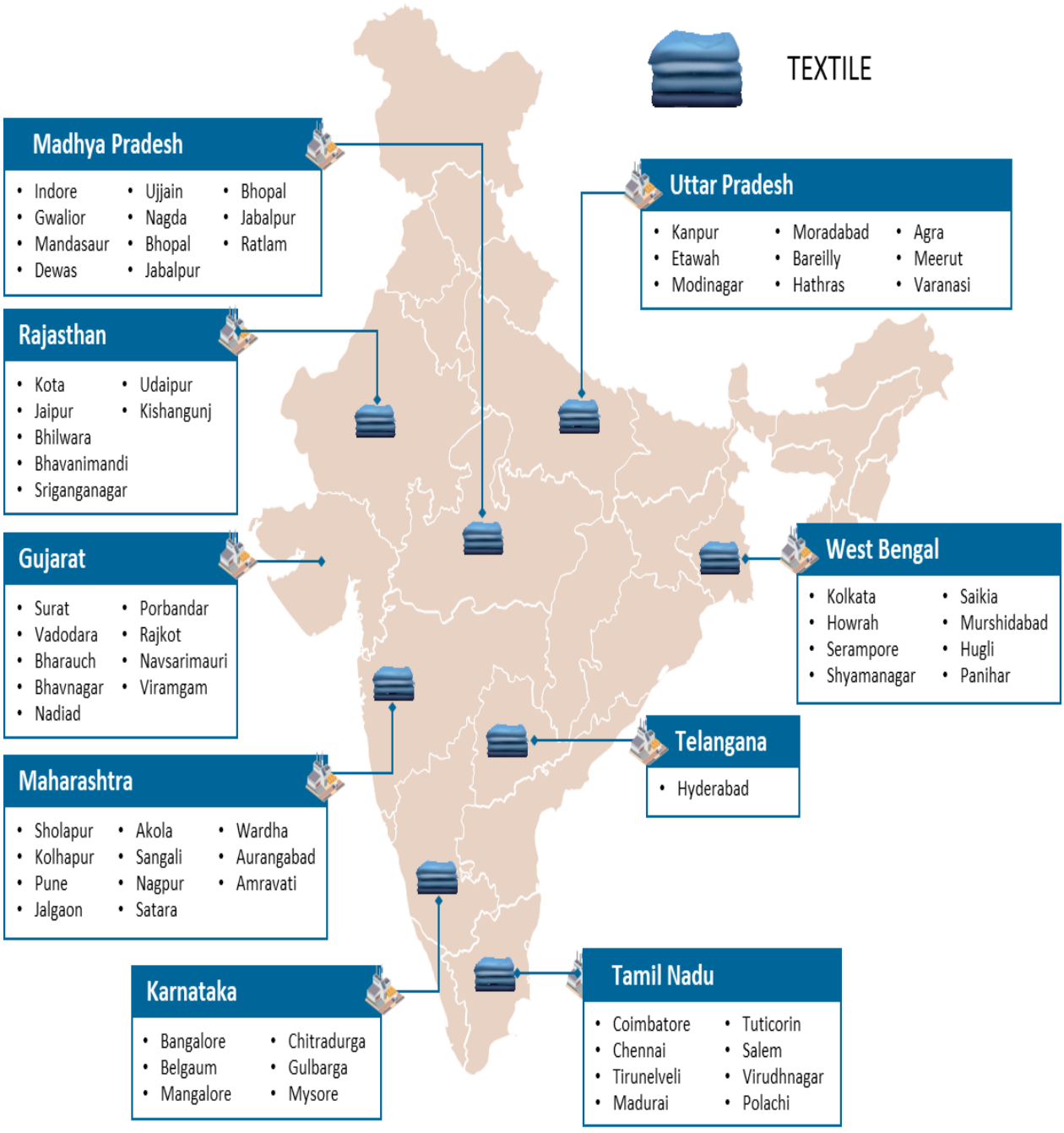


Source: Company websites, Secondary research

b) Textile Industry

Maharashtra, Gujarat, Uttar Pradesh, Madhya Pradesh, Tamil Nadu, Karnataka, Rajasthan, and West Bengal have very high degree of concentration when we consider textile industry. Major cities include Ahmedabad, Bombay, and Coimbatore. Mumbai is called as **'Cottonopolis of India'**. The second largest state after Maharashtra for textile production is Gujarat where Ahmedabad is the second largest centre of textile industry after Mumbai. Maize starch has high application in cotton textile industry where it is used to soften fabric as well as providing cloth with the required stiffness.

Exhibit 14: Statewise Textile industry clusters in India

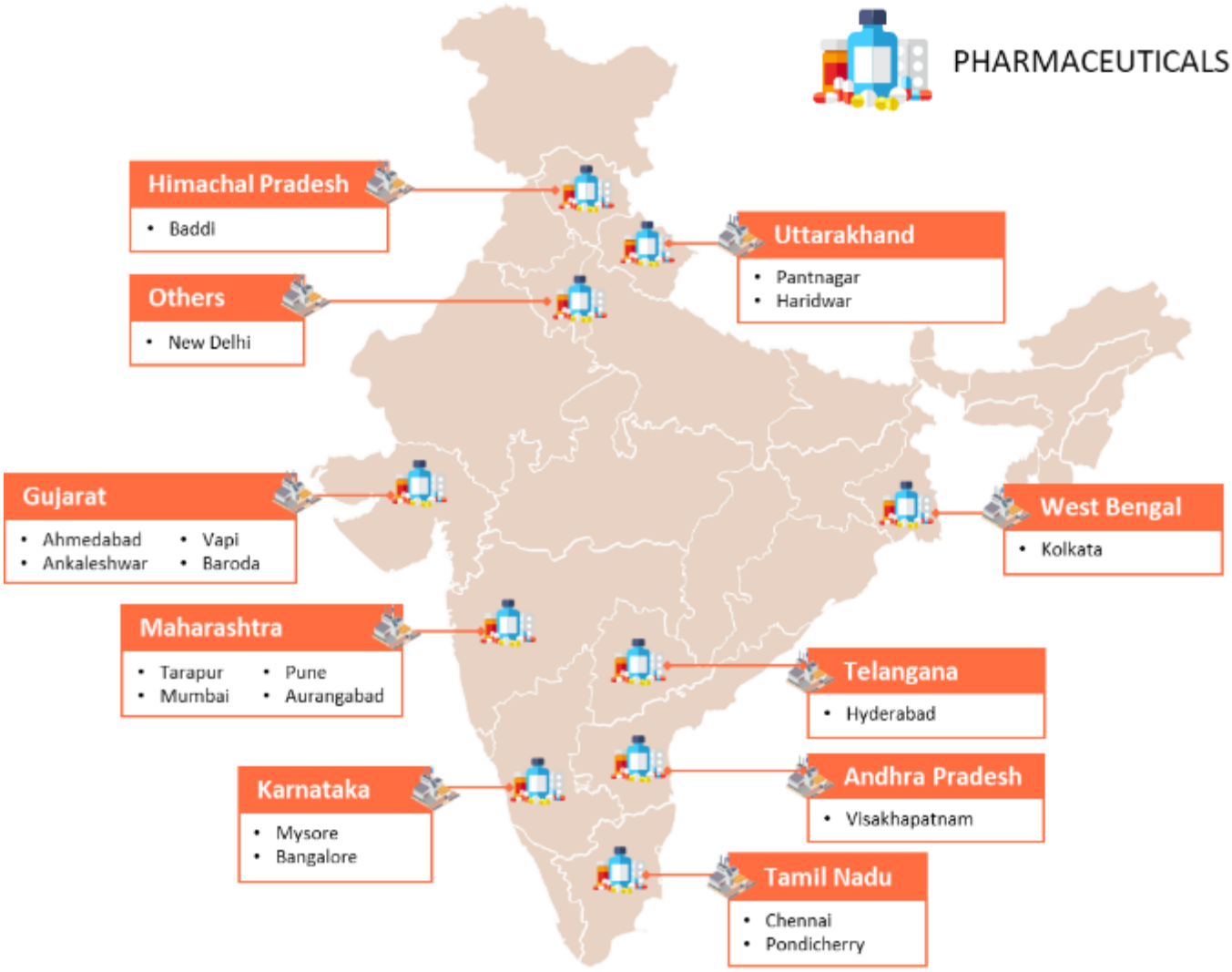


Source: Company websites, Secondary research

c) Pharmaceutical Industry

Indian pharmaceutical industry ranks 3rd worldwide for production by volume. India also has the highest number of US-FDA compliant pharmaceutical plants when considered at a global level. Aurangabad in Maharashtra and Hyderabad in Telangana are the two major established drug formulation centres in India while Pondicherry, Sikkim, Baddi (Himachal Pradesh) and Pantnagar (Uttarakhand) are the emerging centres in India. Oral solid dosage forms such as bulk granules, tablets, and capsules use maize starch on large scale. Cosmetic and medicated powders also use maize starch. Maize starch acts as binder, disintegrating agent or diluent as per the application.

Exhibit 15: Statewise Pharmaceuticals Industry Clusters in India

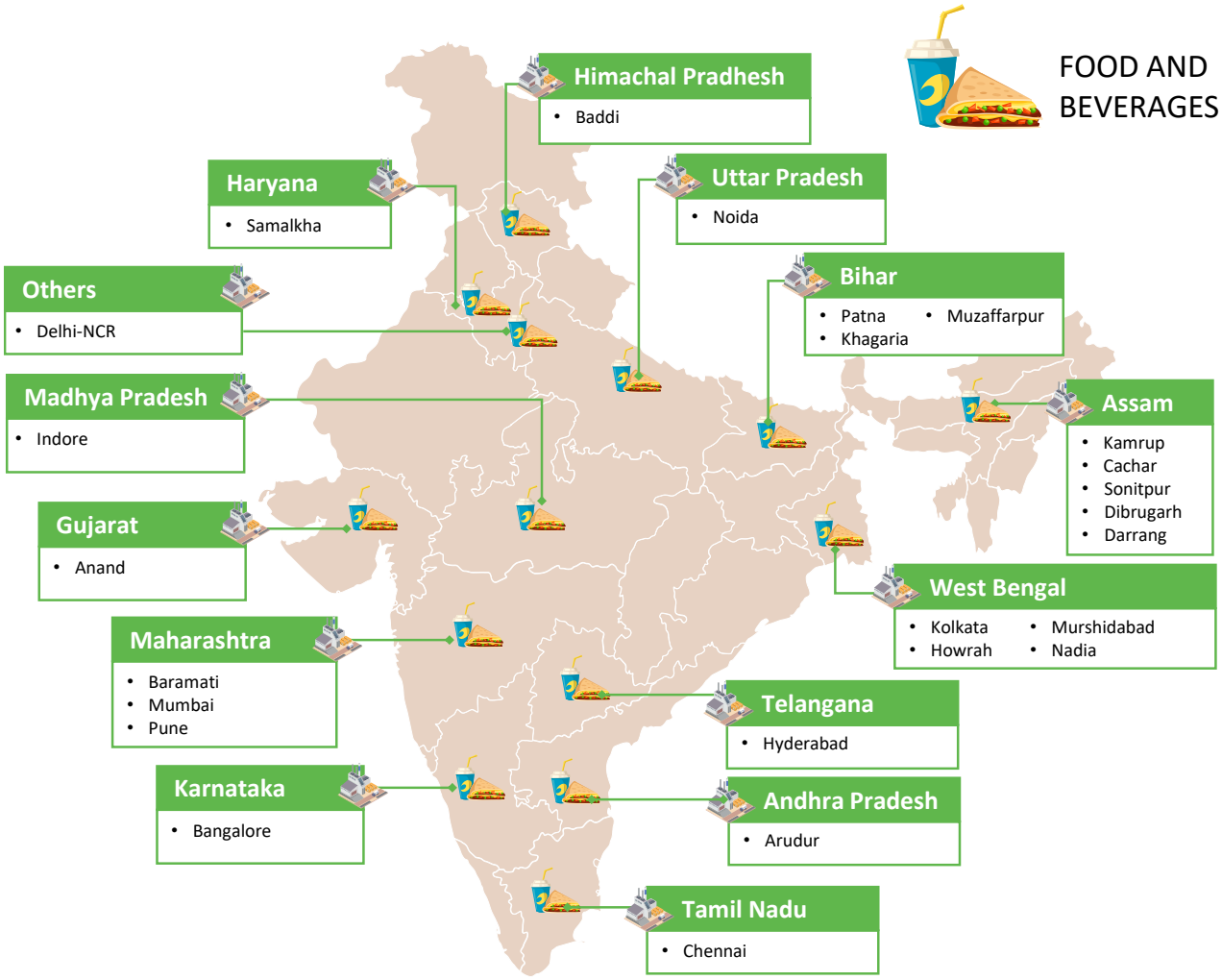


Source: Company websites, Secondary research

d) Food & Beverage Industry

Maize starch has application majorly in the bakery and confectionery sub-sector of the F&B industry. Majority of these food processing plants are clustered in states including Maharashtra, Karnataka, Delhi NCR, Gujarat, and Telangana. Bakery and confectionery industry use maize starch as thickener and texturizers.

Exhibit 16: Statewise F&B industry clusters in India

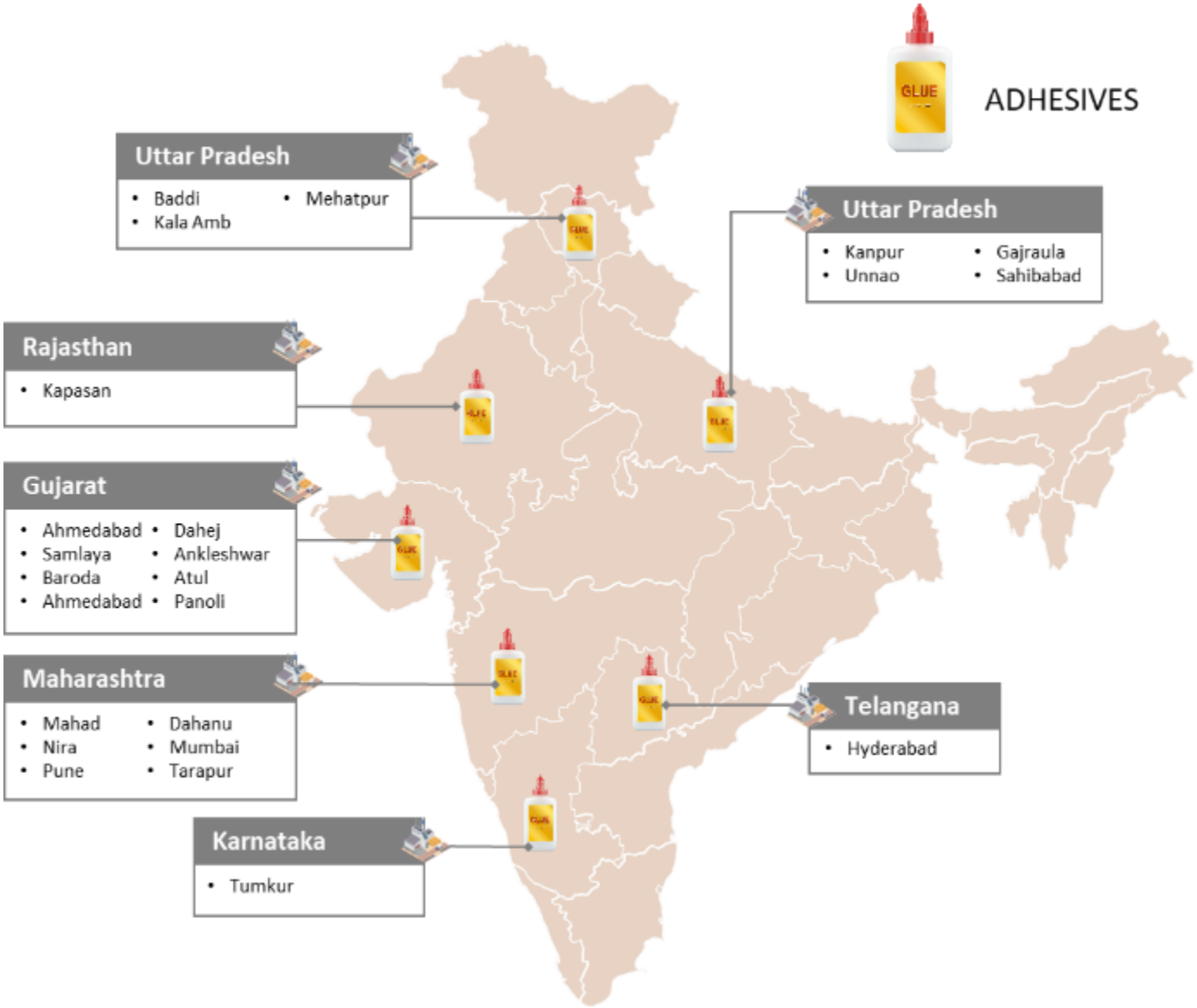


Source: Company websites, Secondary research

e) Adhesive Industry

Adhesive industry in India is majorly classified in Industrial adhesive and consumer adhesive. Industrial adhesive plant locations are majorly concentrated in Gujarat and Maharashtra followed by UP. Maize starch has excellent adhesive properties, and it is used as an adhesive for the manufacturing of corrugated papers in cigarette sealing, paper bags and paper boxes.

Exhibit 17: Statewise Adhesive industry clusters in India



Source: Company websites, Secondary research

2.12. Assessment of Geographical Location of Maize Starch Manufacturing Plants in India

India's Maize milling industry is highly concentrated in maize growing belts of Karnataka, Maharashtra and Gujarat. Other plants are situated in Madhya Pradesh, Telangana, Uttar Pradesh, and Uttarakhand. Locals find job opportunities at these manufacturing units and farmers benefit from the local demand thereby reducing inefficiencies, increasing incomes and improving their livelihood in the process.

In terms of Zone wise split, North Zone has 7 major plants located in Haryana (1), Uttar Pradesh (2), Uttarakhand (2), Punjab(1) and Himachal Pradesh(1). South Zone has 13 major plants located in Andhra Pradesh (4), Karnataka (5), Telangana (3), Tamil Nadu(1-2). East Zone has 5 plants – Three of them are in West Bengal, one is in Bihar and one in Chhattisgarh. West zone has majority of plants with 15 of them operating and 5 in non-operational state. Gujarat has seven operational plants; Maharashtra has five operational plants whereas Madhya Pradesh has three plants.

Exhibit 18: Statewise location of major maize starch producing plants in India, 2024

Source: Primary reserach, Frost & Sullivan

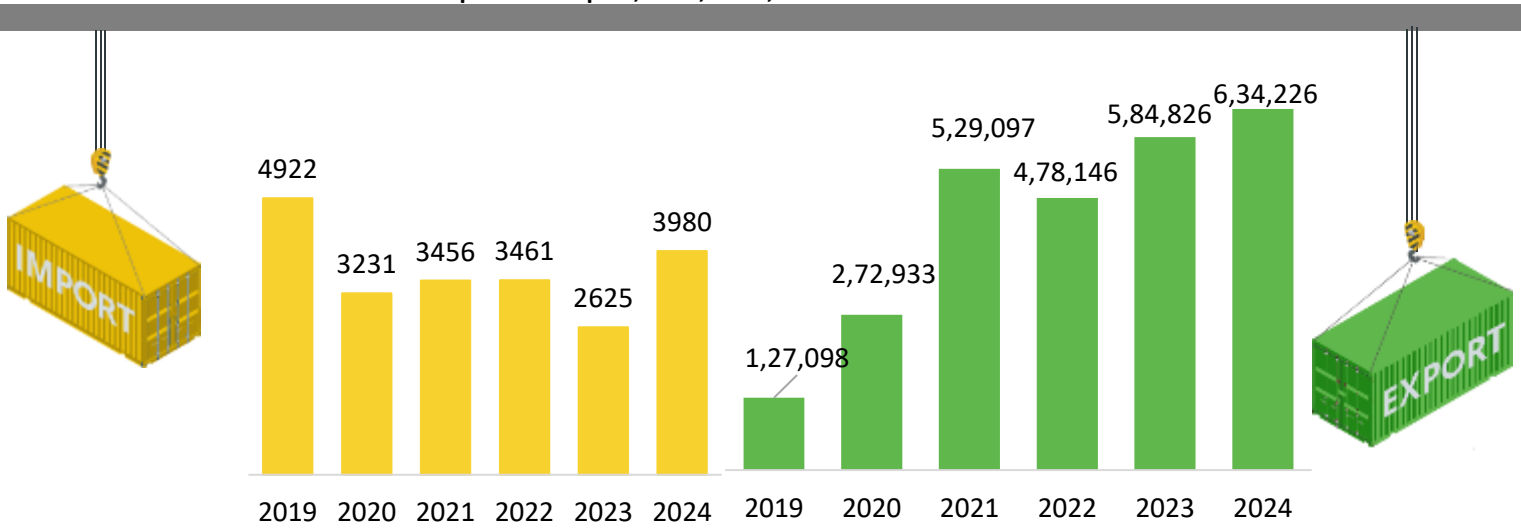
The demand for maize-derived products is expected to grow significantly, particularly in developing countries like India, driven by increasing usage across various industries such as food and beverage, pharmaceuticals, textiles, paper, and animal feed. Below are the growth rates for a few of these key industries:

Sr No	End Use industry	Global, 2024-2029 Growth rate, %	India, 2024-2029 Growth rate, %
1	Animal Nutrition	7.52%	8.32%
2	Snacks	6.43%	9.10%
3	Confectionary	5.95%	8.91%
4	Convenience Foods (RTE, Soups)	6.76%	9.89%
5	Sauces & Spices	6.61%	8.59%
6	Spreads	6.62%	6.89%
7	Pharma	5.79%	6.94%
8	Paper	3.50%	4.50%
9	Apparel (Textile)	2.85%	3.67%

Source: Statista, Frost & Sullivan Analysis

2.13. Overview of Maize Starch Exports and Imports in Indian Market

Exhibit 19: Maize Starch Import and Export, Tons, India, CY2019 – CY2024



Note: HS code: 110812

Source: Trademap; Frost & Sullivan

Exhibit 20: Maize Starch Import and Export, USD Thousand, India, CY2019 – CY2024

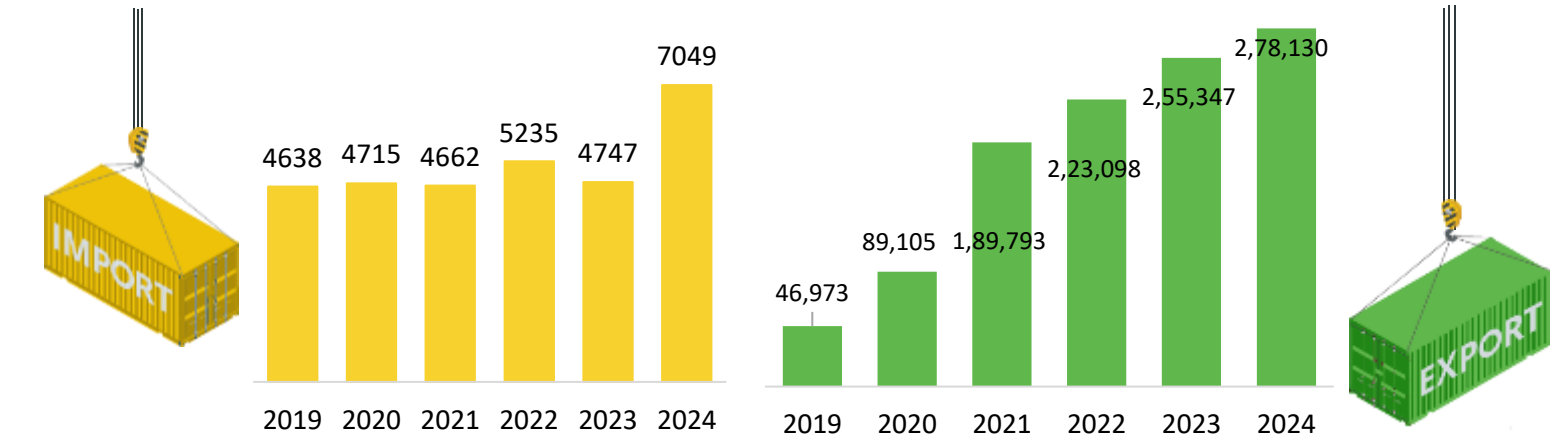
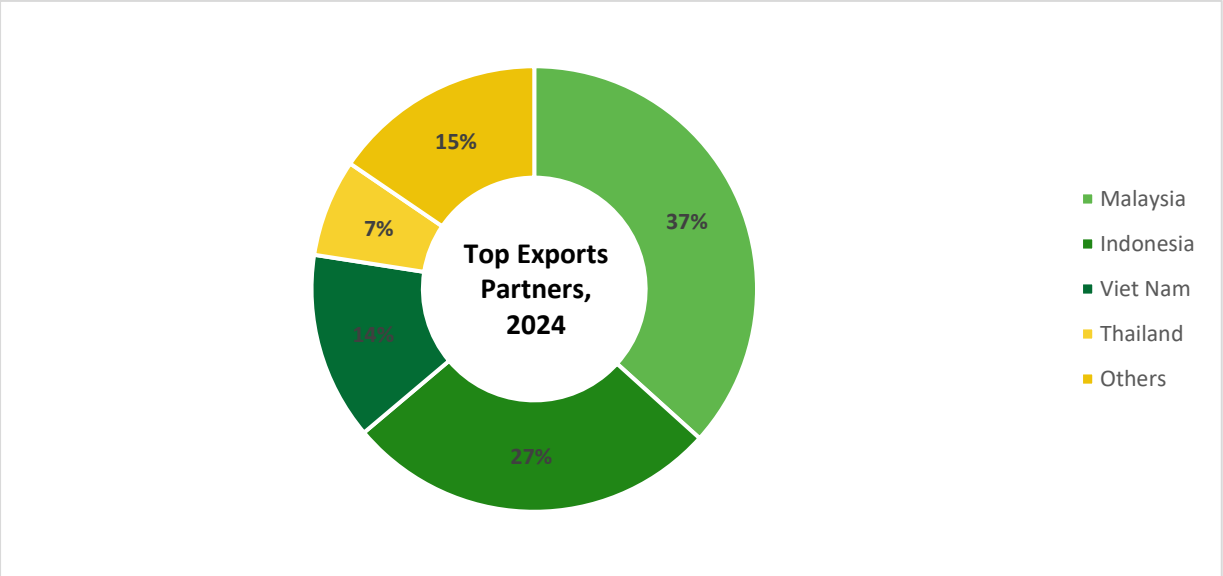


Exhibit 21: India's Top Export Destinations for Maize starch based on Volume, CY 2024



Source: Trademap; Frost & Sullivan

Exhibit 22: Export of Maize Starch from India , Tons, CY2021-CY2024

Country Name	2021	2022	2023	2024
Malaysia	194,325	203,266	213,333	232,674
Indonesia	160,886	99,346	105,404	172,286
Vietnam	603,36	26,470	90,507	86,308
Thailand	162,52	17,323	34,284	44,799
Korea	7,653	11,347	25,063	19,441
United Arab Emirates	23,180	37,402	23,295	13,079
Nepal	9,171	9,907	8,993	10,846
Bangladesh	9,193	11,151	8,493	12,661
Kenya	5,754	10,124	8,366	5,149
Sri Lanka	11,057	8,866	7,970	8,721
Others	31,290	42,944	59,118	28,262
Total	**529,097**	**478,146**	**584,826**	**634,226**

2.14. Maize Based Speciality Products & Ingredient Solutions Market Summary

Exhibit 23 :Global Maize Based Speciality Products & Ingredient Solutions Market Summary

Particluars	2029F		2024		2023		2022	
	Volume, Million Tons	Value, USD Millions	Volume, Million Tons	Value, USD Millions	Volume, Million Tons	Value, USD Millions	Volume, Million Tons	Value, USD Millions
Starch	**107.1**	**58,021.4**	**88.5**	**47,210.2**	**84.5**	**45,195.0**	**81.5**	**43,140.1**
Derivatives	**17.1**	**8,905.1**	**14.0**	**7,214.7**	**13.4**	**6,899.2**	**12.8**	**6,591.8**
Co Products	**33.0**	**9,512.2**	**27.9**	**7,903.5**	**26.3**	**7,634.4**	**26.1**	**7,339.2**
Value Added Products	**22.1**	**13,336.1**	**15.9**	**9,702.7**	**14.9**	**9,096.4**	**13.9**	**8,491.8**

CAGRs	2024- 2029F	
	Volume basis	Value basis
Starches	**3.90%**	**4.21%**
Derivatives	**4.17%**	**4.30%**
Co- Products	**3.43%**	**3.77%**
Value Added Products	**6.83%**	**6.57%**

Note: - Following Products are included-

Starch- Native and Modified Starch

Derivatives- Liquid Glucose, Maltodextrin, Dextrose Anhydrous, Dextrose Monohydrate, Liquid Sorbitol

Co Products- Germ, Gluten, Fiber, Enriched Fiber, Maize Steep Liquor

Value Added Products- Maize Flour, Baking Powder, Custard Powder, Icing Sugar

Source: Industry sources, Frost & Sullivan

Exhibit 24 : Indian Maize Based Speciality Products & Ingredient Solutions Market Summary

Particluars	2029F		2024		2023		2022	
	Volume, Million Tons	Value, USD Millions	Volume, Million Tons	Value, USD Millions	Volume, Million Tons	Value, USD Millions	Volume, Million Tons	Value, USD Millions
Starch	9.6	4,210.0	7.6	3,292.8	7.3	3,121.0	6.9	2,979.9
Derivatives	1.5	758.4	1.2	593.0	1.1	561.5	1.0	536.7
Co Products	1.6	719.5	1.3	570.4	1.3	549.0	1.2	530.4
Value Added Products	1.6	1,032.9	1.1	749.3	1.1	702.0	1.0	655.2

CAGRs	2024- 2029F	
	Volume basis	Value basis
Starches	4.77%	5.04%
Derivatives	4.74%	5.04%
Co- Products	4.72%	4.75%
Value Added Products	6.70%	6.63%

Note: - Following Products are included-

Starch- Native and Modified Strach

Derivatives- Liquid Glucose, Maltodextrin, Dextrose Anhydrous, Dextrose Monohydrate, Liquid Sorbitol

Co Products- Germ, Gluten, Fiber, Enriched Fiber, Maize Steep Liquor

Value Added Products- Maize Flour, Baking Powder, Custard Powder, Icing Sugar

Source: Industry sources, Frost & Sullivan

2.15. Entry and Exit Barriers for Maize Starch Industry in India

Entry Barriers-

1. **Capital Investment**: Entering the maize-based speciality products and ingredient solutions market demands significant capital expenditure. The required machinery—elevators, destoners, blowers, tanks, dryers, and more—comes with substantial costs. Additionally, land acquisition, especially in prime industrial areas, can pose a challenge due to high prices and regulatory hurdles.
2. **Established Competition**: The industry is dominated by large, well-established players like GAEL, Sukhjit Starch, and Sanstar Limited., who have strong domestic and export markets. New entrants face intense competition, not only in terms of market share but also in gaining credibility and trust within the supply chains.
3. **B2B Market Dynamics**: The primary consumers of maize-based speciality products are well-established firms in industries such as Food & Beverage, Pharmaceuticals, Textiles, and Paper. These industries typically have long-standing relationships with their suppliers, making it difficult for new entrants to break into the market and build trust with key customers.

4. **Economies of Scale**: Achieving viable production volumes is crucial for profitability in this industry. A maize milling plant needs to operate at a capacity of 500-600 Tons per Day to be financially sustainable. New entrants must invest in large-scale production to achieve lower unit costs, or risk operating at a loss.
5. **Raw Material Availability**: Although maize is widely grown in India, the supply available for milling is limited due to its traditional use in animal feed and growing demand from ethanol producers. Securing high-quality maize at competitive prices may be challenging for new entrants, especially during peak demand periods.

These barriers make the maize starch industry highly competitive, requiring not only financial investment but also strong strategic planning to overcome market entry challenges.

Exit Barriers-

Investment in specialist equipment – Investment in specialised equipment makes it difficult to use it in other industries is typically a barrier to exiting the industry.

High fixed costs- High levels of dedicated fixed costs tend to be an impediment to leaving an industry.

2.16. Government Schemes for Maize in India

State /Central Govt Scheme	No of Schemes	Scheme Name	Description	Benefits	Beneficiary
Central Govt Central Govt	Scheme No 1	Interest Subvention Cost	All loans under this financing facility will have interest subvention of 3% per annum up to a limit of ₹ 2 crore. This subvention will be available for a maximum period of 7 years. In case of loans beyond ₹ 2 crore, then interest subvention will be limited up to ₹ 2 crore.		Micro and Small Enterprises
	Scheme No 2	Credit Guarantee Cost	Credit guarantee coverage will be available for eligible borrowers from this financing facility under Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) scheme for a loan up to ₹ 2 crore. The fee for this coverage will be paid by the Government. In case of FPOs the credit guarantee may be availed from the facility created under FPO promotion scheme of DA&FW and NABSanrakshan Trustee Company Private Limited. However, FPOs are also eligible for reimbursement of credit guarantee fee under AIF.		
	Scheme No 3	Administration Cost of PMU	Farmers Welfare Programme Implementation Society under DA&FW will provide PMU support to the scheme at the central level. With the financial assistance from DA&FW, each of the States/ UTs will set-up PMUs in their respective states for creation of awareness, identifying potential clusters, mobilization of applications, review of all the stakeholders, and providing all necessary handholding support under the scheme		
	Scheme No 4	National Food Security Mission (NFSM)	The Mission aims at increasing production of rice, wheat, pulses, coarse cereals (Maize and Barley) and Nutri-Cereals through area expansion and productivity enhancement in a sustainable manner in the identified districts of 28 States and 2 UTs (i.e., J&K and Ladakh).	Different initiatives	Start-ups, FPOs

State /Central Govt Scheme	No of Schemes	Scheme Name	Description	Benefits	Beneficiary
Central Govt	Scheme No 5	Modified Ethanol Interest Subvention Scheme (2025)	Provides interest subvention of 6% per annum or 50% of loan interest rate (whichever is lower) for 5 years (including 1-year moratorium) to help Cooperative Sugar Mills convert sugarcane-based ethanol plants into multi-feedstock units using maize and damaged food grains (DFG). Enables year-round ethanol production, boosting efficiency and financial viability.		Cooperative Sugar Mills
Bihar	Scheme No 1	National Agricultural Development Scheme-cultivation of sweet maize	State government has approved a sum of Rs 54.99 lakh to encourage the production and cultivation of sweet maize	Bihar Government offers subsidies to producers in the state for the purchase of seeds of a variety of crops. Farmers who are interested in obtaining this seed may submit an application through the Bihar State Seed Corporation Limited (BRBNL) portal.	Farmers
Bihar	Scheme No 2	Kharif Abhiyan 2024	The maize seed distribution programme is distributing maize seedlings in clusters of 25 acres during this campaign. The objective of sowing maize seedlings in 4493 clusters has been established. The State Seed Corporation (BRBN) is offering eight varieties of maize to producers. Maize cultivars that are more advanced are suitable for specific environmental conditions	Seed distribution	Farmers
Bihar	Scheme No 3	Bihar Industrial Investment Promotion Policy, 2016	**Priority sectors in the food processing sector**- Maize processing units with installed capacity of more than 100 TPD including units for manufacturing starch and cattle and/or poultry feed	State shall extend "Interest Subvention" to the eligible units on the term loan availed by the unit from a bank/ financial institution registered by RBI/SEBI. (b) Rate of interest for interest subvention will be 10% or actual rate of interest on term loan, whichever is lower. (c) The overall limit of this subvention for high priority sector will be 50% of the approved project cost. The upper limit of this subvention shall be Rs 20 crore	companies

State /Central Govt Scheme	No of Schemes	Scheme Name	Description	Benefits	Beneficiary
				All new units will be entitled to avail 100% reimbursement against the admitted SGST deposited in the account of the state government (excluding strictly any tax paid by them arising out of a purely trading business), for a period of 5 years from the date of commencement of commercial production. The SGST reimbursement shall be applicable only to the net tax payable, after adjustment of input tax credit against the output tax liability. This shall have a maximum limit of 100% of the approved project cost.	
Bihar	Scheme No 4	Bihar State Crop Assistance Scheme	To protect the crops of farmers cultivating in Bihar from natural calamities such as floods, drought, etc. Under this Bihar State Crop Assistance Scheme, if there is any damage to the farming of farmers due to any natural calamity, then they will be provided financial assistance by the Government of Bihar under the Bihar State Crop Assistance Scheme. In Bhadai - Maize crop is notified in all gram panchayats of a total of 534 of 38 districts of the state.	In case of a reduction in the actual yield rate by 20% as compared to the threshold yield rate, total assistance of Rs. 15,000 is estimated at the rate of Rs. 7,500 per hectare up to a maximum of two (02) hectares. In the event of more than a 20% reduction in the actual yield rate as compared to the threshold yield rate, total assistance of Rs. 20,000 is estimated at the rate of Rs. 10,000 per hectare up to a maximum of two (02) hectares.	Farmers
Tamil Nadu	-	Production of Certified Seeds of Maize	The scheme “Production of Certified Seeds of Maize” by the Agriculture-Farmers Welfare Department, Tamil Nadu, is designed to support maize	By offering a subsidy of ₹1,000/- per quintal, the scheme encourages farmers to produce certified maize seeds, ensuring a steady supply of high-quality seeds. Financial Assistance: ₹,1000/- per quintal.	Farmers

State /Central Govt Scheme	No of Schemes	Scheme Name	Description	Benefits	Beneficiary
			farmers in specific districts of Tamil Nadu.		

Source: Secondary research

3. Global and Indian Native Maize Starch and Co- Products Industry

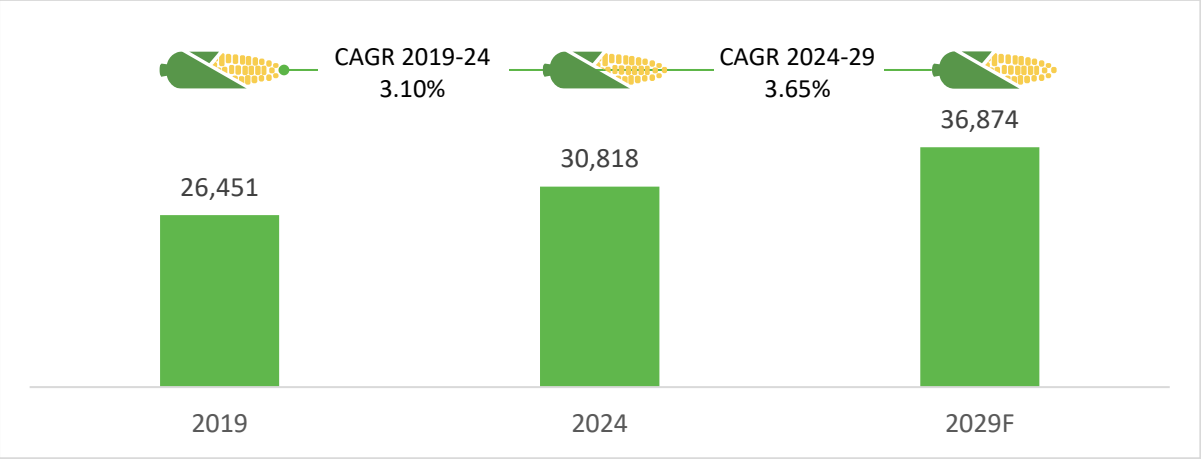
3.1. Global Native Maize Starch Market

The global Native Maize Starch market is projected to register a growth of CAGR 3.65 % during 2024-2029.

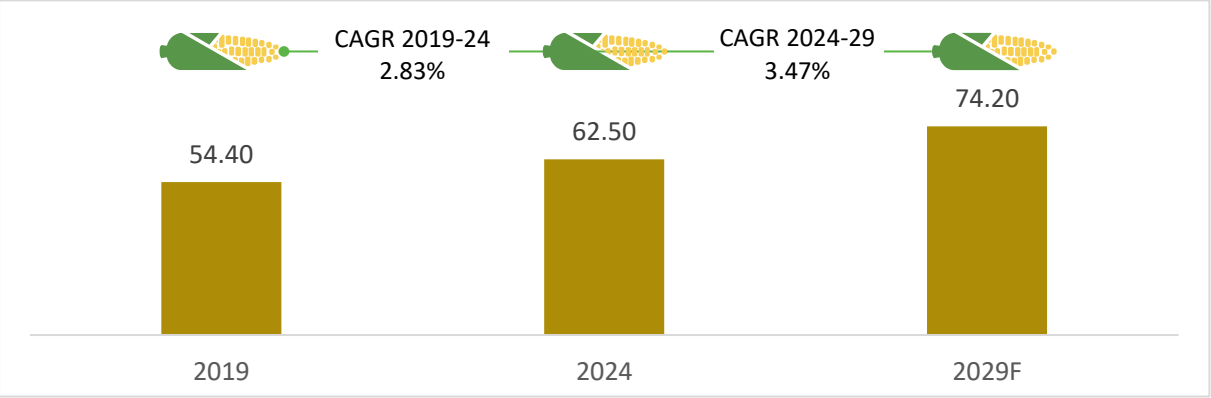
Currently the Global Native Maize Starch market was valued at USD 30,818 Million in 2024 and is expected to reach USD 36,874 Million by 2029. In volume terms, the Global Native Maize Starch market was 62.50 Million Tons in 2024. It is expected to reach 74.20 million tons in 2029.

The expansion of the Native Starch market is being driven by increased applications in processed foods and beverages, confectionery, paper, and pharmaceuticals industries. Increasing demand for Native Maize Starch in the food industry in the production of ready to eat food products, pudding, sauces, salad dressings and pies, has projected to support the market growth in coming years. Manufacturers of Native Maize Starch are coming up with customized multifunctional ingredient to meet customer needs. Native Maize Starch is available in various physical forms like coarse or fine powders, flakes, pearls, and larger particles but the powder form is majorly preferred across globe.

Exhibit 25: Global Native Maize Starch Market Size, USD Million



Source: Industry sources, Frost & SullivanExhibit 26: Global Native Maize Starch Market Size, Million Tons



Source: Industry sources, Frost & Sullivan

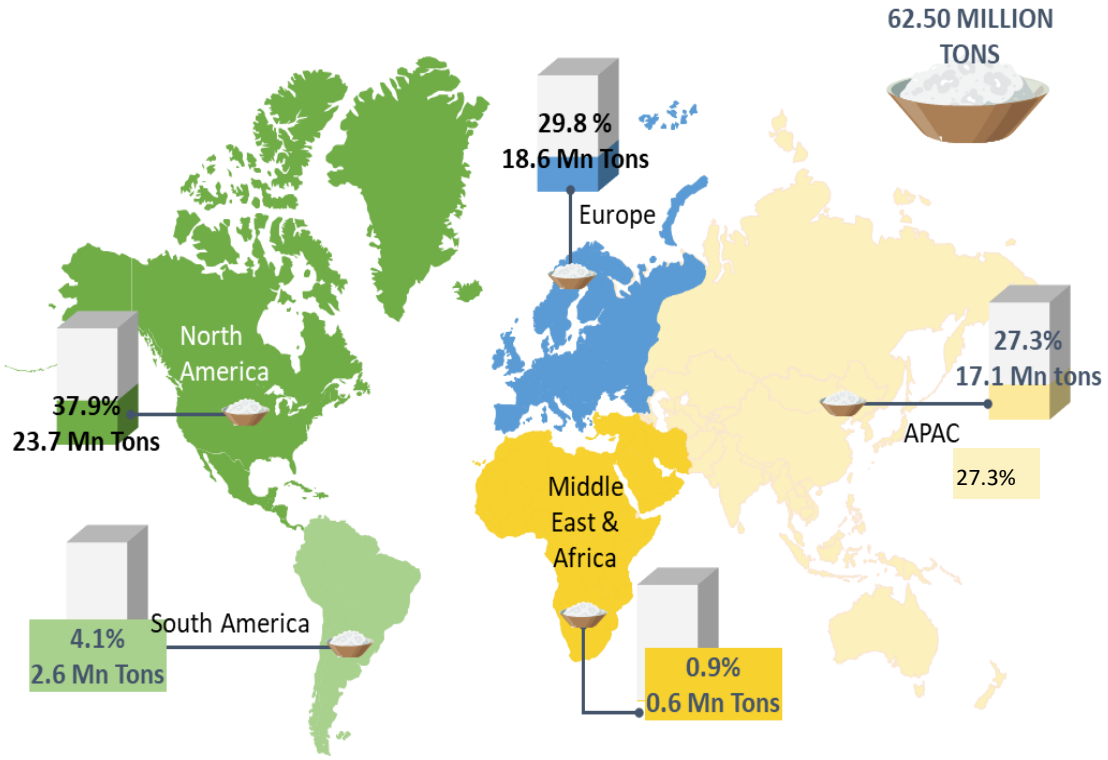
3.2. Geography-wise Breakup of the Global Native Maize Starch Industry

Currently North America is the largest market with 23.7 million tons of global Native Maize Starch consumption in 2024. It is expected to grow at a CAGR of 3.20% till 2029 with volumes reaching up to ~27.7 million tons by 2029 and is expected to continue holding the largest maize starch market share throughout the forecast period. As on 2024, USA is the largest producer of maize and its derivatives, globally, followed by European nations.

For 2024, Asia Pacific (APAC) region accounted for 27.3% of global native starch market i.e., 17.1 million tons. Furthermore, APAC region is projected to grow at CAGR of 3.77% to reach consumption of ~20.5 million tons of native maize starch by 2029. The growing population, accelerating urbanization, and changing lifestyles are driving an increase in the consumption of convenience foods and ready-to-eat (RTE) snacks. Additionally, the strong demand for bakery products is expected to be another key factor contributing to the global growth of the Native Starch market.

Middle East and Africa (MEA) market for Native Starch is expected to grow at a steady pace to reach consumption of ~ 0.82 million ton by 2029.

Exhibit 27: Global Native Maize Starch market size, By Geography, Million Tons,%, 2024

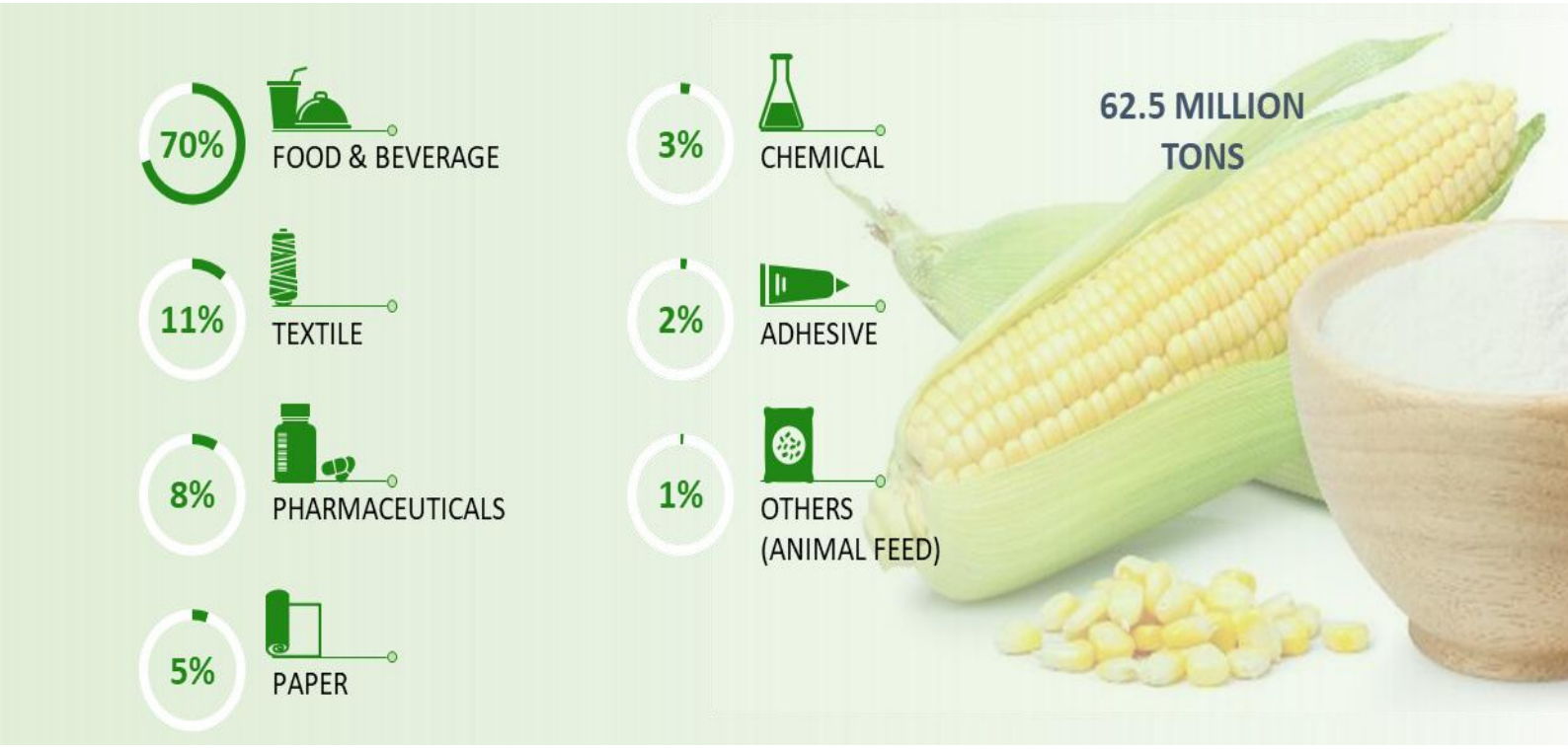


Source: Industry sources, Frost & Sullivan

3.3. Application-wise Breakup of the Global Native Maize Starch Industry

Maize being the biggest produced crop globally has given boost to its use for starch production and its demand in high animal feed industry as well. Maize starch industry is driven by growing application of Native Maize Starch in the food industry as it is widely used as thickener in food items like gravies, soups, and sauce along with coating for deep-fried food to give them a crispy texture, and in baked goods to provide them with moisture and fullness. Approximately 70% of native maize starch is used in food and beverage applications across the globe. It is followed by textile, pharmaceuticals, and paper applications. Maize starch is also used as a warp size to strengthen warp yarns and improve their resistance to abrasion during weaving in textile applications. It is also used for the finishing of fabrics, in printing, and as components in finishes for glazing sewing thread. It is used as flocculant and retention aid in paper making industry.

Exhibit 28: Global Native Maize Starch Market size, By Application, Million Tons, 2024



Source: Industry sources, Frost & Sullivan

3.4. Global Maize Starch Co- Products Market

Co- Products account for 30–35% of the total product yield, from Maize milling process. A wide variety of products are made from milled Maize starch Co- Products. Use of Co- Products in human food is very limited with refined maize oil used in some food applications. Germ, Gluten, Fiber and Maize Steep Liquor are the major co- products derived from maize milling process.

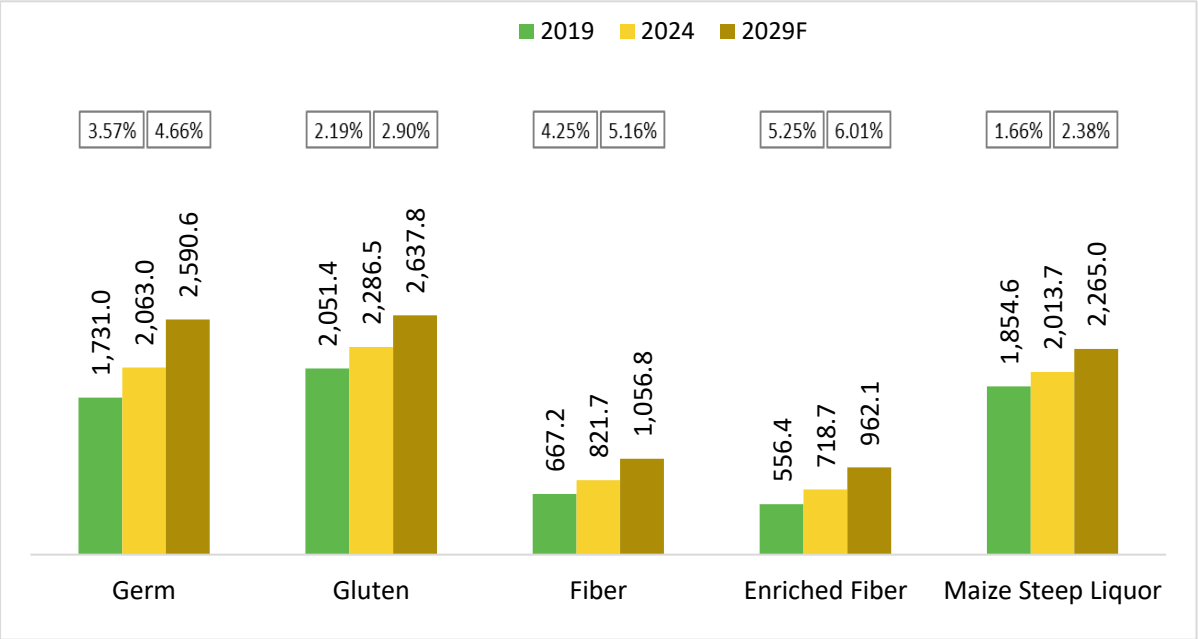
Steep soluble i.e., Maize Steep Liquor which is high protein ingredient is used as a nutrient-rich medium for antibiotic production (*e.g.,* Penicillin) and as a feed additive for livestock, aquaculture, and poultry. It is often used as a Maize Gluten feed constituent for cattle feeds or as a pellet binder.

Maize germ is used directly into feed for ruminants. Also, Maize germ yields oil which can be refined and used as Maize oil in salad dressings, margarines or simply can be used for cooking.

Maize Gluten makes for excellent feed for poultry, fish, and other animal feed to achieve good weight for these animals. Maize fiber is also used as poultry feed.

Currently in 2024, the Global Co- Products market accounted for USD 7,903.5 million with 27.9 million tons in volume. It is expected to reach USD 9,512.2 million by 2029 growing at CAGR of 3.77%.

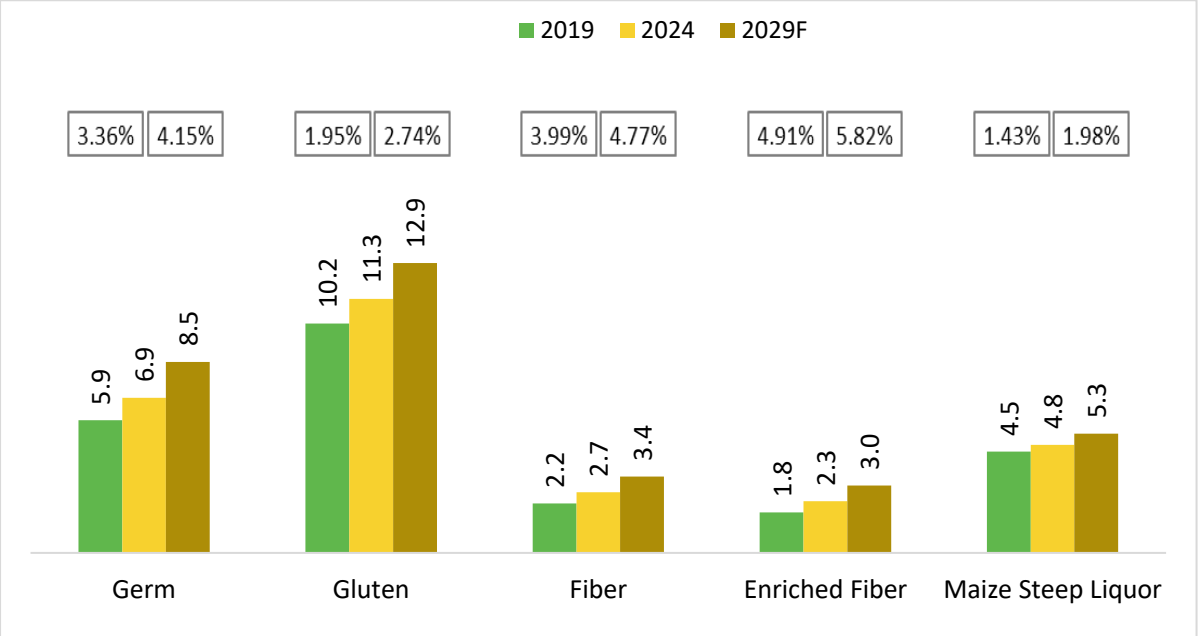
Exhibit 29: Global Maize Starch Co- Products Market Size, USD million



Note: CAGR mentioned in the left box is for 2019-2024 & the one in right box is for 2024-2029F

Source: Industry sources, Frost & Sullivan

Exhibit 30 : Global Maize Starch Co- Products Market Size, Million tons



Note: CAGR mentioned in the left box is for 2019-2024 & the one in right box is for 2024-2029F

Source: Industry sources, Frost & Sullivan

3.5. Global Market Drivers, Restraints, and Opportunities influencing the Native Maize Starch & Co products industry.

Opportunities & Drivers

- The major industry drivers for **native maize starch** are expanding use of native maize starch in various industries, such as food and beverage, pharmaceuticals, paper and packaging, textiles, adhesives, industrial applications, and cosmetics, improving living standard for consumers, increasing purchasing power and increasing demand for ready to cook food and packaged snacks.
- Investment by companies in R&D for customizable products in starch and derivatives is giving major boost to the industry. New range of products include neutral flavour and different colour of starches as per end use applications. Vanilla flavoured maize starch is being used for preparing beverage mixes.
- Companies are also offering fortified starches for various special food and baby food products. These fortified starches are used to control and reduce lifestyle disorders such as diabetes, osteoporosis, etc.
- The growing use of recycled paper is another factor giving boost to the industry as it requires more and more starch quantities to avoid deterioration of the quality of fibers during recycling.
- Rising trend of health-conscious consumers has led to growing demand for plant-based and premium quality starch solutions, fuelled by the improved living standards and the inflating disposable incomes.
- Rapidly growing poultry sector and its requirement for poultry feed has maintained good demand for co-products such as **gluten and fiber**.
- Multiple and versatile applications of maize starch in almost all the significant industries have become expedient to companies.
- Starch manufacturing companies are offering various products to enhance texture and appearances of food, confectionary, and bakery products.
- Nutraceutical and pharma industries are also using starch as flexible ingredient.
- By increasing horizons of starch applications and capitalizing on improving functionality of maize starch, manufactures can have abundant opportunities.

Restraints

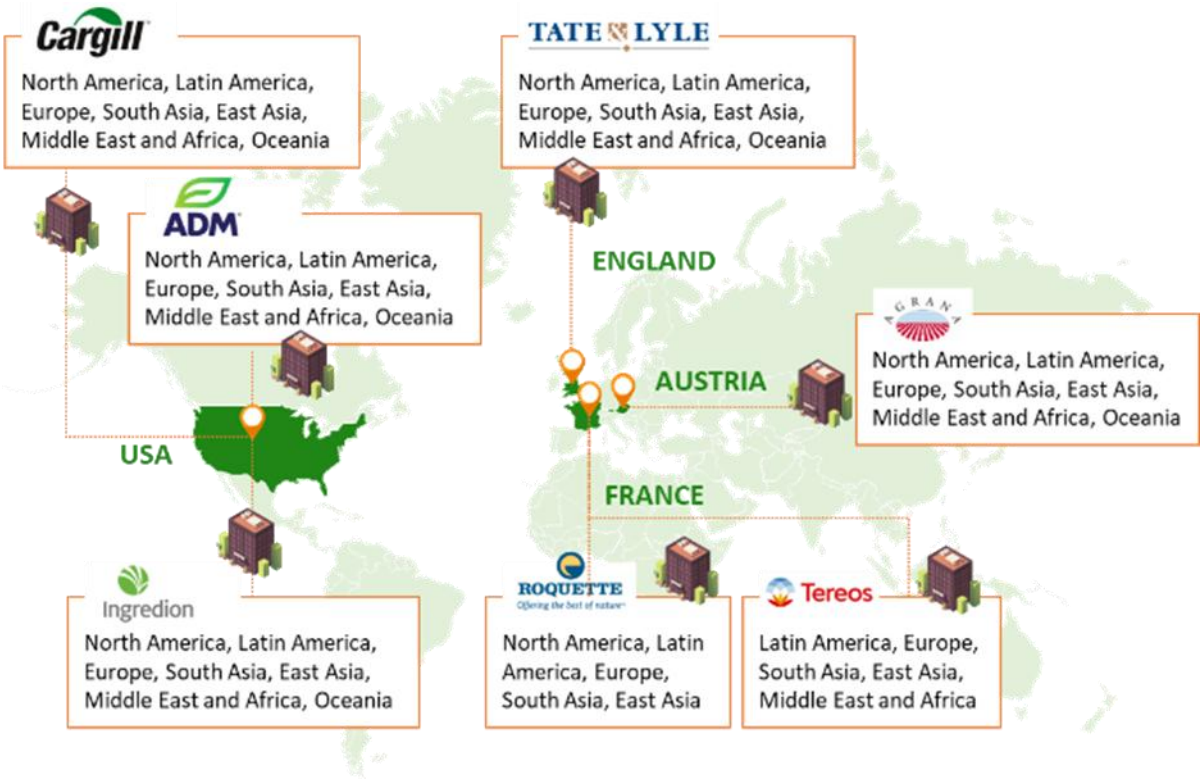
- Usage of other source derived starches such as potato starch, tapioca starch and rice starch might hamper the demand for maize starch.
- Concerns of health-conscious consumers for the NON- GMO maize starch can further dampen the growth of maize starch market.
  .
- Surging prices of maize

- Demand from other industries such as Biofuels and Animal feed might hinder growth of maize starch industry.

3.6. Key Players in the Global Native Maize Starch and Co Products Industry

Some of the largest players in Global Maize Starch Industry are Ingredion Incorporated, Tate and Lyle Plc, Cargill, AGRANA, Roquette, Archer-Daniels Midland Company (ADM). These companies have invested in capacity expansion and research and development activities to offer new product variants for a growing market.

Other players operating in the Maize starch market are Bio-chem Technology Group Company Limited, Tereos Syral S.A.S, Associated British Foods plc, Gujarat Ambuja Exports Limited, Sukhjit Starch and Chemicals Limited, Kent Corporation, Grain Processing Corporation and MEFSCO (Middle East Food Solutions Company).



The global starch industry has seen many upheavals since Covid -19 pandemic. The rising demand for maize from poultry sector is driving the maize prices high.

Starch manufacturers faced issues due to supply chain disruptions and trade flow challenges across globe. Red Sea Crisis was majorly affected the trade. Mainly challenges were faced by manufacturers to procure raw material. Most of the companies were safeguarded due to the industry practice of holding 4-5 months of inventories in silos and warehouse. Despite that, manufacturers faced supply chain disruptions, cost escalations and delay in product deliveries.

3.7. Indian Native maize starch market

Maize Starch production in India is regionally fragmented with most of the production facilities are concentrated in Gujarat, Maharashtra and Karnataka owing to ease in procuring raw material. Some manufacturing facilities are in Madhya Pradesh, Uttarakhand, Uttar Pradesh, Andhra Pradesh, and Telangana. These manufacturers offer different grades of maize starch along with multiple derivatives according to capacity levels.

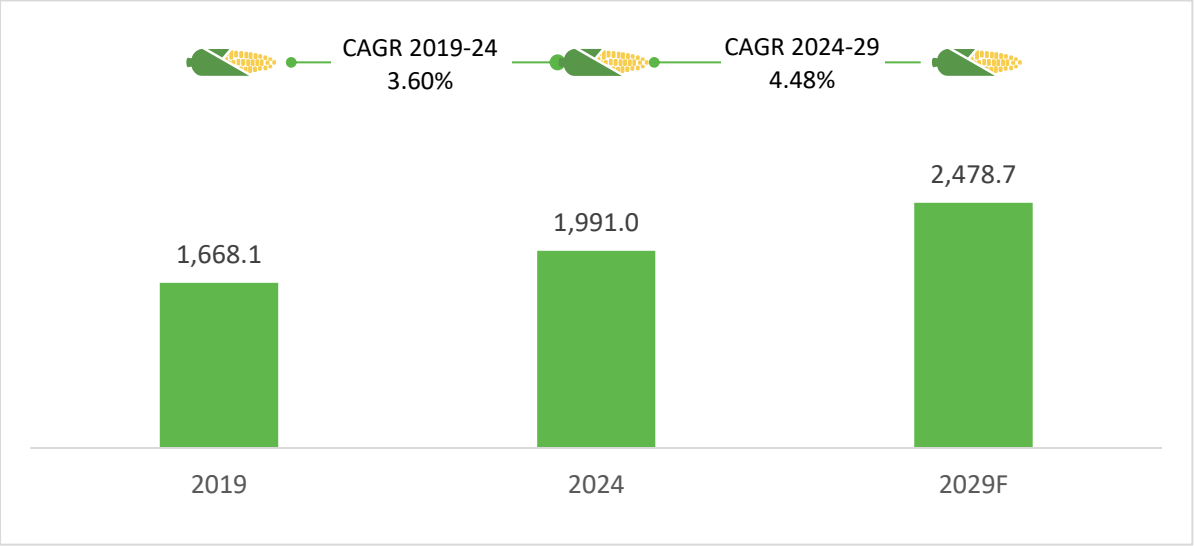
The Indian Maize Starch and Derivatives market scenario has seen significant reforms in the last few years and the Maize Starch industry outlook looks promising with many players investing in the expansion along with quality of starch and derivatives. In India, Maize Milling production capacities are predominantly used for processing Native Maize Starch followed by Liquid Glucose and other Derivatives.

Over the years, the Maize Starch market has grown significantly due to capacity additions as well as new plants with capacities coming up in recent past. Native maize starch market grew at CAGR of 3.6% from 2019 to 2024 to reach around USD 1,991 million in 2024.

Currently the industry is witnessing a burst in expansion activities, leading several projects to enhance/set up new capacities. According to industry experts, the capacity of milling has almost doubled in last 5-6 years, owing to increase in demand of starch in domestic and export market and availability of raw material in country.

India is the largest exporter of Native Maize Starch in world with ~17.4% Global share in 2023. It imports very negligible amount of Native Starch. The major export destinations of Native Starch are the Malaysia, Indonesia, Vietnam, Thailand, etc.

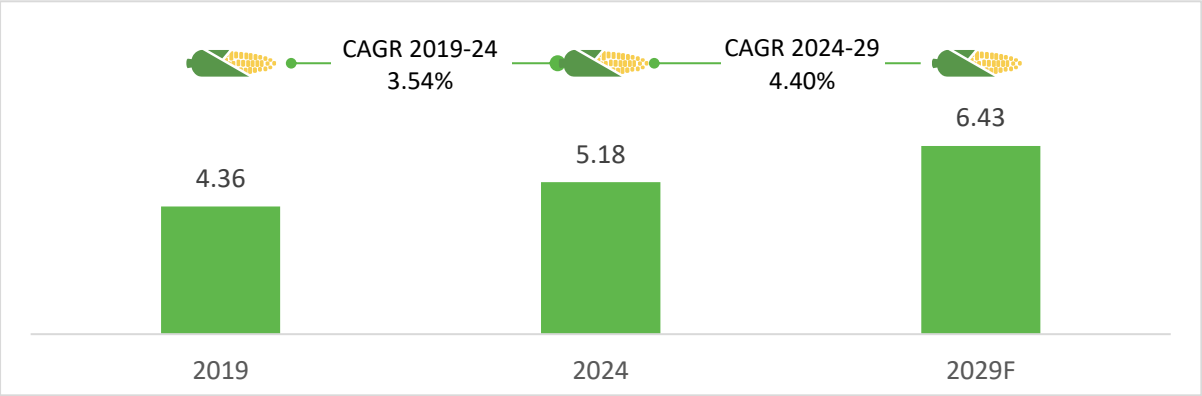
Exhibit 31: Indian Native Maize Starch Market Size, USD Millions



Source: Industry sources, Primary interactions, Frost & Sullivan

Companies in India are manufacturing Food, Pharma and Industrial Grade Maize Starch. All these grades are in odorless, white powder form and vary in terms of moisture content on small basis. Food and pharma grade moisture content varies between 10-11% whereas industrial grade can have moisture content up to 13%. The Pharma Grade – IP (Indian Pharmacopeia) Grade Starch is produced and packed under extremely hygienic conditions to make it suitable as IP grade. Also, license from FSSAI is required in case of exporting this Grade Starch.

Exhibit 32: Indian Native Maize Starch market size, Million Tons



Source: Industry sources, Primary interactions, Frost & Sullivan

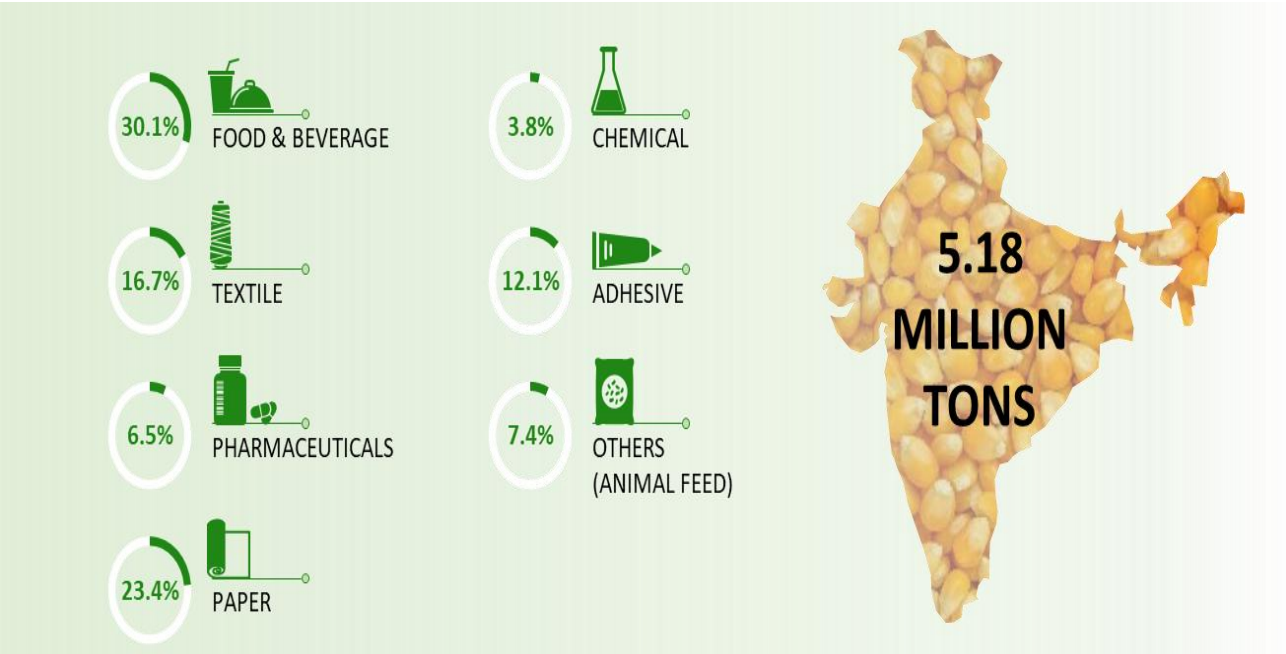
Key end users in terms of large FMCG companies include Mondelez, Parle Products, Nestle, Britannia Industries Limited, Priya Gold, ITC, Dabur, JK Paper Limited, Weikfield Foods, Arvind Limited, JCT Limited, Century Pulp & Paper to name a few.

3.8. Application wise Breakup of the Indian Native Starch Industry

The major End use Industries of starch and derivatives are Food & Beverage, Textile, Paper, Adhesive and Pharma sectors. Starch is used as a binder and filler for tablets and capsules, as well as to strengthen ice cream cones, give cloth weight, and increase the quality of paper for writing and printing. It is also used in oil extraction industries, manufacturing industries, animal feed industries, etc. The most promising of all the sectors is the high-value food processing and beverage industry where the demand for native maize starches is strong. Frozen food along with ready to eat foods products are the dominant segment in food along with increasing use of starch in noodles and soups preparations.

Food and Beverage contributed to approximately 30% share in consumption of native maize starch followed by Paper and Textile industries.

Exhibit 33: Indian Native Maize Starch market size, By application, Million Tons, 2024

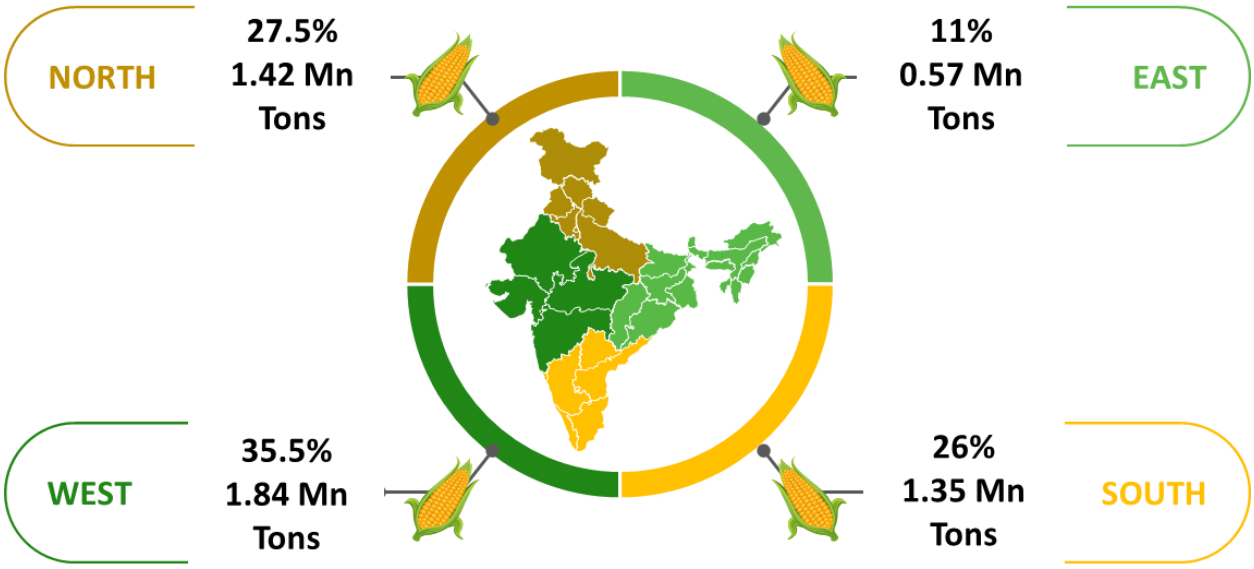


Source: Industry sources, Primary interactions, Frost & Sullivan

3.9. Geography-wise Breakup of the Indian Native Maize Starch Industry

Demand for native maize starch is high from West zone followed by South and North zones. Food and Beverage, Pharmaceutical and Textile industry in states of Gujarat and Maharashtra are the major end use industries driving the demand for starch in West zone.

Exhibit 34: Indian Native Maize Starch market size, By Geography, Million Tons, 2024



Source: Primary interactions, Frost & Sullivan

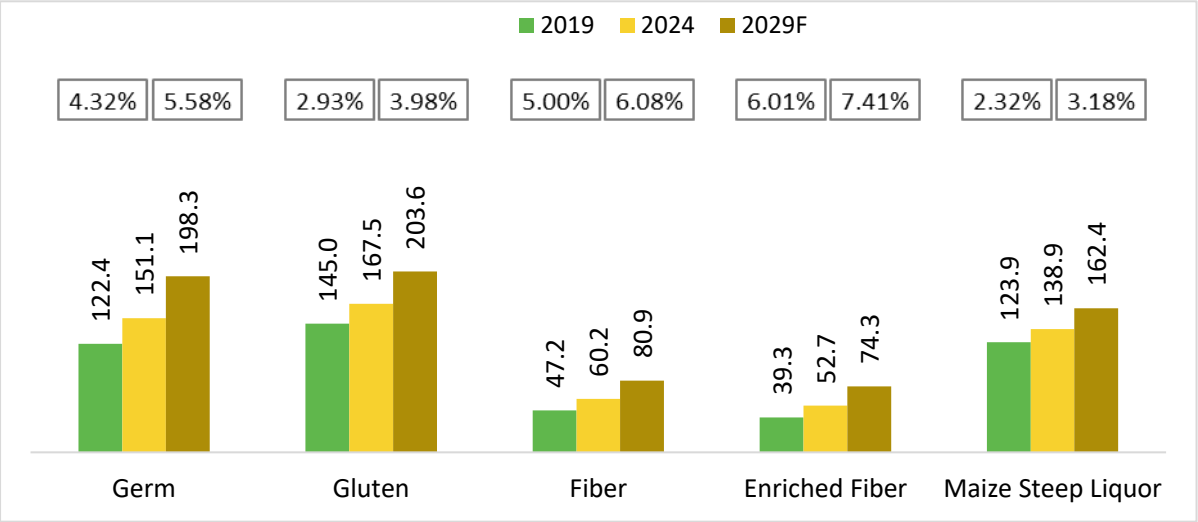
3.10. Indian Maize Starch Co- Products Market

Maize starch Co- Products market in India was around 1.31 million tons in 2024 which is valued up to USD 570 Million. Demand for products, especially Maize Gluten and Maize Fiber is increasing in India owing to growing Poultry industry. Animal Feed industry which uses Maize Gluten and Oil Cake has experienced a significant growth in the recent past. Maize Fiber is odourless yellow fibrous matter with maximum of 12% moisture content. Its main component is pericarp which consists of 10-13% protein, 33-42% hemicelluloses, 15-18% cellulose, 3-6% oil, 2-25% starch, and 1-2% other components, making it nutrient rich Co- Products of Maize Milling process. It is considered as an essential component to ensure safe, ample, and affordable animal proteins. When mixed in Animal Feed, it helps increasing the cattle's' milk yield. It is also used as feedstock for the Ethanol production. Enriched fiber is also produced by adding Maize Steep Liquor to dry fiber.

Maize Gluten is produced by centrifugation, filtering, and drying of the slurry obtained from the first and secondary phases of maize refining. It is used as an animal feed because of its high protein content. It is palatable, readily digested by ruminant animals and is one of the best sources of energy. Demand for dry maize gluten is increasing because it is more palatable and readily digested by animals. Companies such as Godrej Agrovet, Venky's, Avanti foods, IB group, Suguna foods, Altech biotechnology are the major end use consumers for maize fiber and gluten.

Maize Steep Liquor is high energy, high protein liquid made from the soluble parts of the maize kernel through a steeping process. It is widely used in feed additive for livestock specially for the ruminants. It is used as binding or pelleting agent in animal feeds. It is also very useful for the pharmaceutical, enzyme industry because of its high nutritional value (rich in Vitamins, Lactic acid, and Proteins). Many of the small maize milling players in India discard or use it as fuel. But high concentration of Maize Steep Liquor discarded might lead to exceeding the permissible limit for discharging effluent. Companies such as Gulshan Polyols Limited, Sayaji Maize Products are currently concentrating Maize Steep Liquor and selling it in 250kgs HDPE drums or tankers.

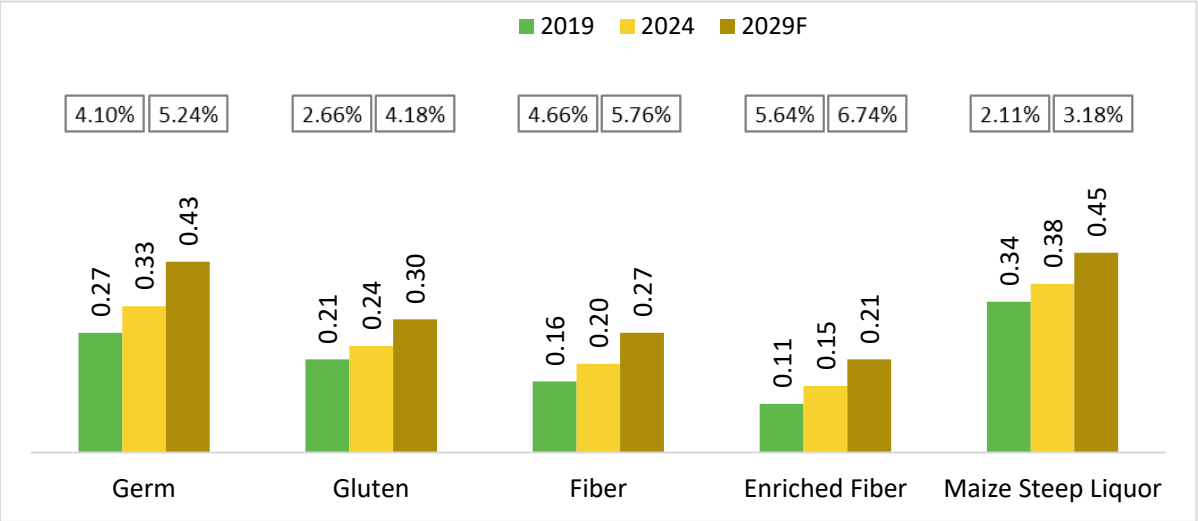
Exhibit 35: Indian Maize Starch Co products Market Size, USD million



Note: CAGR mentioned in the left box is for 2019-2024 & the one in right box is for 2024-2029F

Source: Industry sources, Primary interactions, Frost & Sullivan

Exhibit 36: Indian Maize Starch Co products Market Size, Million Tons



Note: CAGR mentioned in the left box is for 2019-2024 & the one in right box is for 2024-2029F

Source: Industry sources, Primary interactions, Frost & Sullivan

Rising demand for Maize oil has led to doubling of India's Maize oil production in last 4-5 years. Maize oil is a strong antioxidant and a good source of beneficial fats that helps in maintaining a healthy lifestyle. It also helps in reducing blood cholesterol levels as 60% of the fats are polyunsaturated, 25%–30% are monounsaturated, and 10%–15% are saturated. Additionally, the high concentration of polyunsaturated fatty acids helps to decrease high blood pressure. States like Maharashtra and Gujarat are the major consumers of maize oil in India. Oil refineries in Gujarat purchase germ form maize mills and further extract oil to sell it as refined maize oil. Major manufacturers of products such as snacks and sweets, which used soy oil earlier, are now using maize refined oil due to risings prices and limited supply of oilseed oil.

Maize milling companies sell these Co- Products directly to the end use consumers or to the traders. Trend in industry is towards directly selling these Co- Products to end consumer as these are not very high margin products.

Thus, the maize starch Co- Products market is expected to reach 1.65 million tons by 2029 growing at CAGR of 4.72% from 2024.

3.11. Market Drivers, Restraints, and Opportunities Influencing the growth of Indian Maize Starch Market

DRIVERS - OPPORTUNITIES

- Huge population base (1.42 Bn) in India with a relatively young demographic, accelerating urbanisation and nuclearization of families, rising disposable incomes, shifting consumption pattern towards health and convenience offers excellent opportunity for maize starch market.
- Change in Consumer behaviour with respect to habits & patterns of food consumption with rising focus on organic, gluten free food, ready to eat food is driving the maize starch industry in India. Packaged ready-to-eat food is the order of the day due to ready OTC availability which in turn boosts maize starch market.
- The rising demand for organic and clean-label products represents one of the primary drivers of the maize starch market.
- Focus on eco-friendly and readily bio-degradable packaging / products intended to replace single use plastics will spur the demand of starch & starch-based biopolymers.
- The growing consumer preference toward organic maize starch products that are free from chemical modifications is offering a favourable market outlook. Consumers consider chemical products as undesirable and want to consume products with healthy ingredients.
- Beverages & Pharmaceutical manufacturers are using Liquid Glucose, High Maltose Maize Syrup (HMCS), Sorbitol, Fructose, Dextrose and other derivatives which are derived from Maize Starch as sweetners.
- Additionally, because maize starch-based foam is compostable and has thermal insulation qualities, it is becoming more and more popular for shipping temperature-sensitive goods, which is opening attractive growth potential for industry players.
- Maize starch combined with polymers creates a super absorbent used in sanitary napkins, bandages, disposable diapers, and baby powders, and can also be used to remove water from fuels and to clean up pesticide spills.
- Abundant availability of maize in India coupled with promotion of exports of value-added products will further boost the maize starch industry.

RESTRAINTS

- Industry suffers from rising prices of raw material – maize which has increasing demand from animal feed and ethanol manufacturing companies.
- Post-harvest losses due to manual handling further led to losses and shortage in availability of maize for maize starch industry.

3.12. Key Players in the Indian Maize Starch Industry

Maize Processing industry in India used to be highly labour intensive. Consolidation of industry, technological advancement and labour migration has decreased labour intensity. Currently, Maize processing industry is running at high-capacity utilization of 85-90% with competitors trying to achieve maximum efficiency owing to increasing demand. The credit duration, which pre covid ranged from 30-45 days has now been extended to 45-90 days in case of some end users of maize starch & derivatives product. This has an impact on the cash flow since the maize millers also need to stock raw materials—maize—for the plant to run efficiently.

Industry is dominated by large players who have large capital to set-up modern plant and machinery like Gujarat Ambuja Exports Limited (GAEL), Roquette, Sukhjit Starch and Chemicals Limited, Bluecraft Agro Private Limited and medium sized players like Sayaji Maize Products, Gulshan Polyols Limited, Sahayadri Starch & Industries Private Limited, Regaal Resources Limited, Paramesu Biotech Limited etc.

3.13. Regulatory Landscape, Incentives, and Subsidies in India

- Following are the specifications of maize starch: -

Parameters	Limit
Moisture (% by mass), Not more than	12.5
Total ash (% on dry basis), Not more than	0.5
Ash insoluble in dilute HCl, % on dry basis, not more than	0.1
Alcoholic acidity 90 percent alcohol	Shall be equivalent to not more than 2.0 ml. N. NaOH per 100 g. of dried substance
Starch content (% on dry basis), Not less than	98
pH	4.5-7.0
Sulphur Dioxide (ppm), Not more than	70
Uric Acid, mg/kg, not more than	100

Source: FSSAI

- According to FSSAI, Modified Maize starch may be used in confectionery, flavours, dairy products (where use of emulsifier/stabiliser is allowed per regulations) glazes, icings, gravies, sauces, soups, coatings up to a maximum concentration of 0.5 per cent by weight.
- Modified food starches may be used in snacks, frozen potato products, baked foods, and salad dressing/mayonnaise, up to a maximum concentration of 5 per cent by weight.
- Acid treated starch may be used in sugar confectionery on GMP basis.
- To mitigate the hazardous pollutants, an Effluent Treatment Plant (ETP) is made mandatory for maize processing industry by the Government of India. The treated water can be utilised for agricultural purposes within the permitted BOD (Biochemical oxygen demand) level of 30 PPM (Parts per million). Financial support in the form of capital subsidy is also available from Ministry of Environment and Forests, Government of India for the purpose.
- In some products, the statutory permissible limit of usage of starch is still very low in India compared to the permissible limits in other American and European countries. Government may consider and thereby make necessary amendments in the permissible limits.
- While agricultural policy changes and shifting barriers to trade are often perceived to be factors of change in the business, they tend to be of secondary importance since they are often an attempt to protect local interests from the pressures in supply/demand that is brought about by these differences in growth patterns.
- In Mid-2016, Food Safety and Standards Authority of India(FSSAI) changed the legislation for the use of Modified Starches in Food. As per the new legislation, the dosage of Modified Starches in processed foods can be GMP (Good Manufacturing Practice) instead of the earlier dosage limit of 0.5 percent. This Modified Starch regulation revision will not only result in an increase in the dosage of the ingredient in current applications but pave way for new applications, which in turn is expected to affect the Indian starch demand positively.

Bihar Industrial Investment Promotion Policy, 2016

Priority sectors in the food processing sector- Maize processing units with installed capacity of more than 100 TPD including units for manufacturing starch and cattle and/or poultry feed

State shall extend “Interest Subvention” to the eligible units on the term loan availed by the unit from a scheduled nationalized bank/ financial institution registered by RBI/SEBI. (b) Rate of interest for interest subvention will be 10% or actual rate of interest on term loan, whichever is lower. (c) The overall limit of this subvention for high priority sector will be 50% of the approved project cost. The 55 upper limit of this subvention shall be Rs 20 crore All new units will be entitled to avail 100% reimbursement against the admitted SGST deposited in the account of the state government (excluding strictly any tax paid by them arising out of a purely trading business), for a period of 5 years from the date of commencement of commercial production. The SGST reimbursement shall be applicable only to the net tax payable, after adjustment of input tax credit against the output tax liability. This shall have a maximum limit of 100% of the approved project cost. This policy was further amended in 2020 and extended till 2025 to make it more investor friendly.

The **Bihar Logistics Policy of 2023** aims to take ahead the vision and objectives of the state’s Industrial Investment Promotion Policy 2016 (BIIPP 2016) and further provides strategic direction for the development of the warehousing and logistics sector in the state over the next 5 years. The objectives of this policy include but are not limited to promoting private investment in setting up logistics facilities, upgrading and improving existing warehousing, enhancing warehousing capacity. Taking cue from the Government of India’s definition of logistics units considered as logistics infrastructure, this policy shall incentivize Multimodal Logistics Park, Logistics Parks and Logistics Units.

- Logistics Units include Container Freight Station (CFS) and Inland Container Depot (ICD), Warehousing facility and Cold Chain with various requirements to qualify for the same. Recognizing the need for additional incentives to improve prospects for Logistics Units the policy offers the following incentive:
  Capital Investment Subsidy which will be applicable after completion of Logistics Units as per DPR as follows:
  - First Installment: 50% of the eligible amount after 12 months or 50% of the project completion as per DPR whichever is earlier.
  - Second Installment: 30% of the eligible amount after 24 months or 80% of the project completion as per DPR whichever is earlier.
  - Third Installment: 20% of the eligible amount after 36 months or 100% of the project completion as per DPR whichever is earlier.

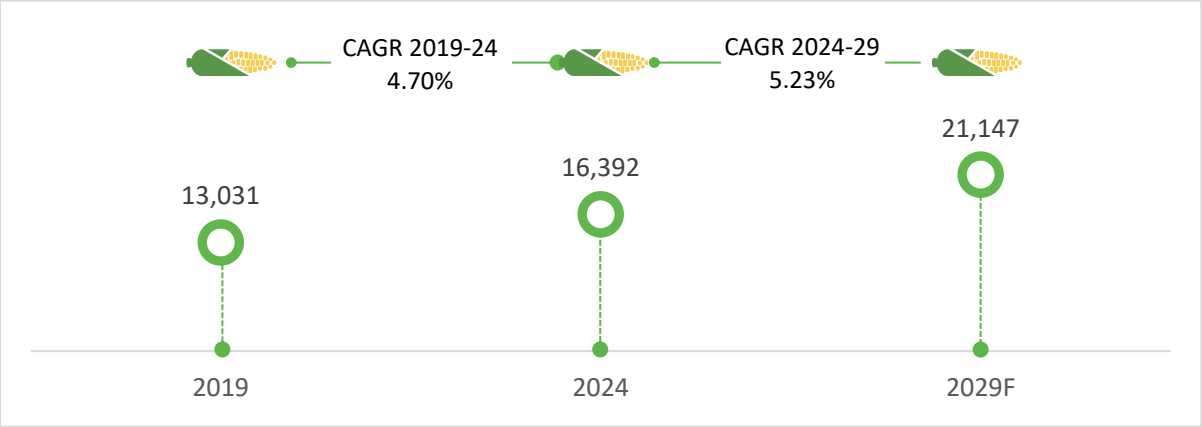
4. Global & Indian Modified Starch Industry

4.1. Global Modified Maize Starch Market

The Global Modified Starch market size was valued at USD 16,392 million in 2024 and is anticipated to expand at a CAGR of 5.23% from 2024 to 2029. The demand for processed and convenience foods is being driven by an expanding global population. Modified starch is a crucial and useful ingredient found in manufacturing ready-to-eat food products. The growth of Modified starch is anticipated due to rising consumer demand for processed foods, paper, textile and chemicals industry over the coming years.

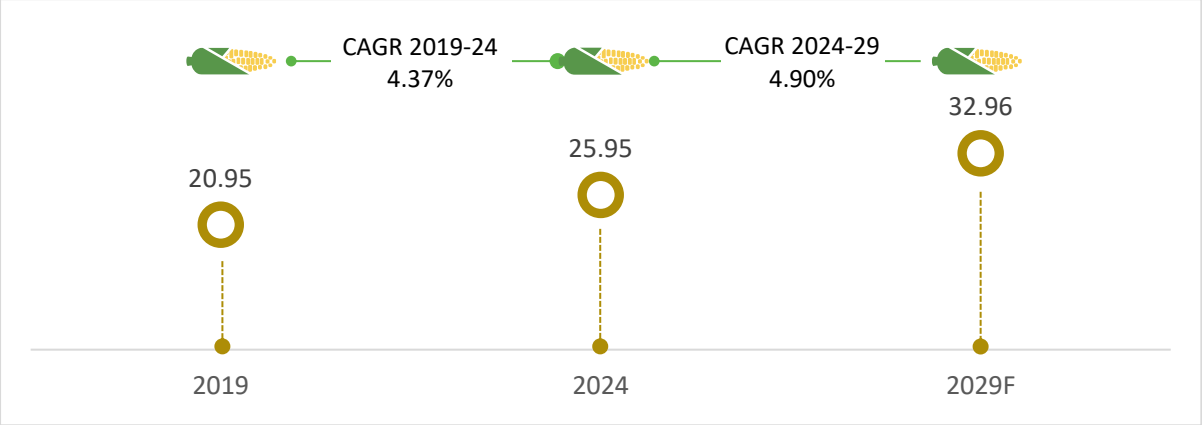
Along with ready to eat products (RTE), Modified Starch is utilized in a wide range of industries, including Pharmaceuticals, Paper, Cosmetics, Personal care, and Textiles due to its varied technical properties. The personal care and Cosmetics industries use Modified Starch as a versatile additive. Manufacturers are investing in technology and research for use of Organic Ingredients like Modified Starch, as the demand for natural products has grown over the past few years, which is expected to fuel product demand in the coming years.

Exhibit 37: Global Modified Maize Starch market size, USD Millions



Source: Industry sources, Frost & Sullivan

Exhibit 38: Global Modified Maize Starch Market size, Million Tons



Source: Industry sources, Frost & Sullivan

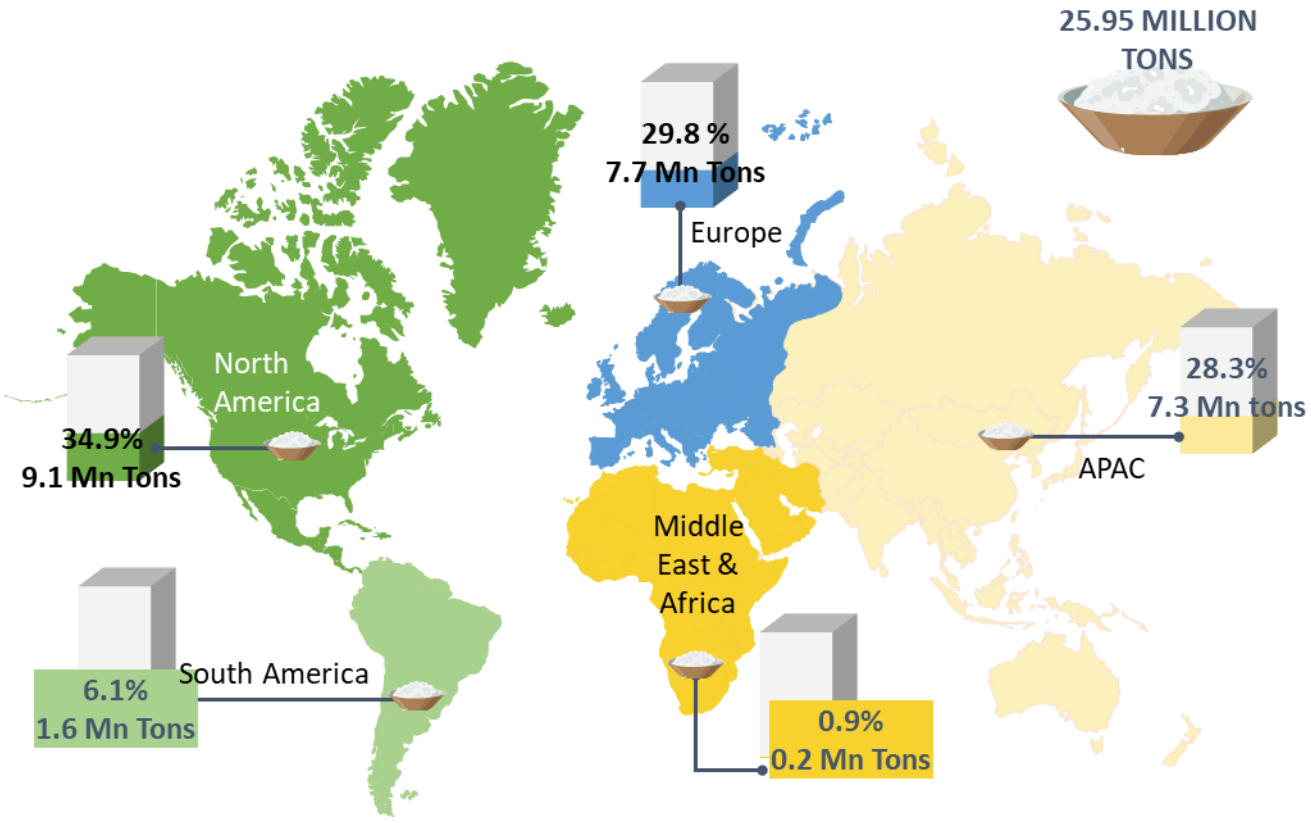
4.2. Geography-wise Breakup of the Global Modified Maize Starch Industry

Convenience and ready to eat foods are mainly prevalent in North America and Europe due to fast paced lifestyle. Rise in working population with hectic and isolated lifestyles is resulting in little time for home cooking. Globalization and the resulting lifestyle changes have resulted in an increase in the consumption of convenience foods and ready to eat in various countries around the world, especially in Asia's expanding markets, thereby increasing the demand for modified starch.

North America holds majority share in global modified starch market in 2024, accounting for more than 35% of the total consumption share. Rising consumer awareness especially in the USA., which is one of the largest producers of maize starch and maize globally will further boost the market. Furthermore, diverse applications of modified starch products, as well as innovation and new product development are propelling the market growth.

Asia Pacific market is growing at good pace owing to shift in lifestyle, increased per capita consumption and growing population. Also, Asian markets have lenient regulations when it comes to health claims for modified starch. In terms of health claims for modified starch, European markets have the strictest regulations. Distributors and manufacturers face production and distribution challenges because of these stringent laws and regulations, which are expected to hinder market growth.

Exhibit 39: Global Modified Maize Starch market size, By Geography, Million Tons, 2024



Source: Industry sources, Frost & Sullivan

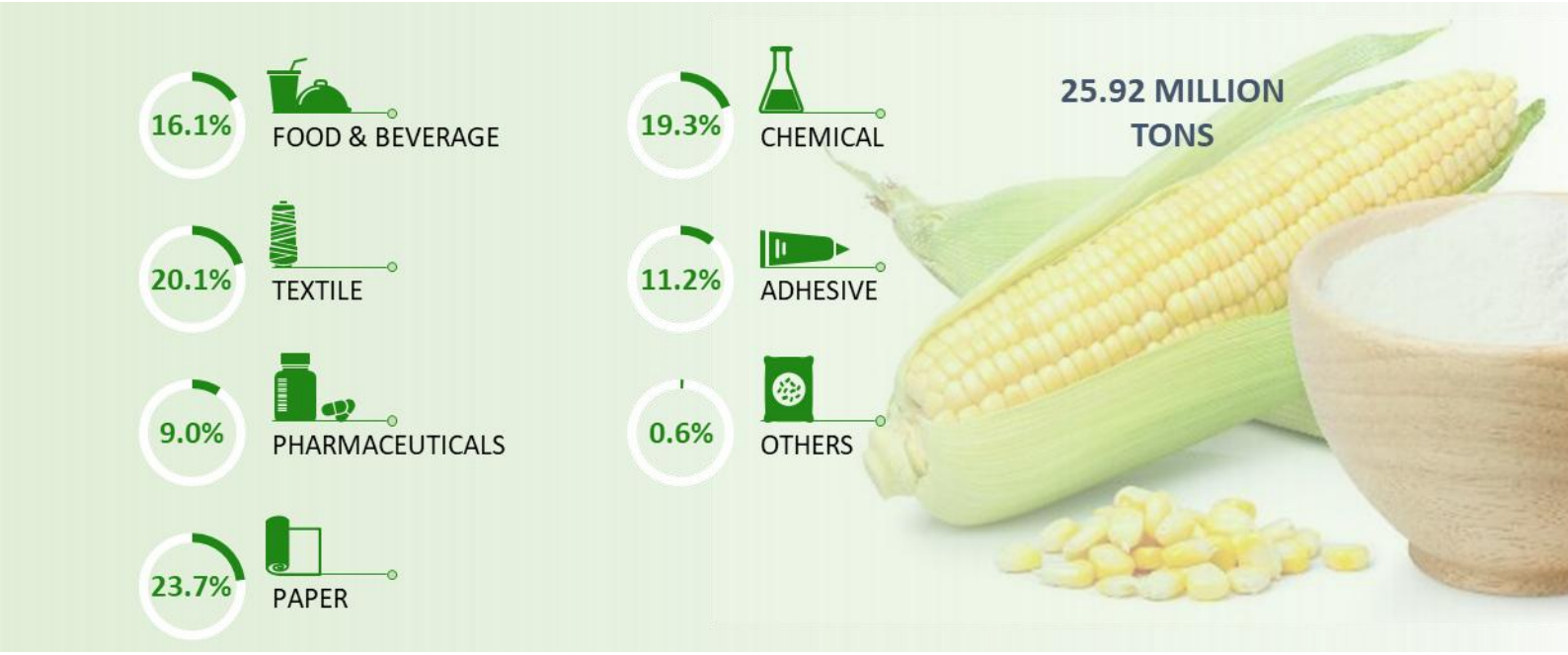
4.3. Application wise breakup of the Global Modified Maize Starch Industry

The Global Modified Starch market is largely dominated by Paper, Textile and Chemical industries. Paper industries as End use Industry accounts for highest revenue share of almost around 23.7% and is predicted to remain stable in terms of revenue share and volume during the forecasted period. Modified starch is used in large volumes in the papermaking process. It aids in the production of paper by providing functional characteristics and acting as a processing aid for paper and pulp industry. The Paper mills use Starches derived from a variety of sources, including Waxy Maize,

Regular Maize, Tapioca, Wheat, and Potato. Starch is also used as a binder in paper coating, improving the firmness and whiteness of the paper, thereby improving the printing characteristics.

Food and Beverage industry ranked as the fourth-largest consumer of modified starch by volume in 2024, accounting for 16.1% of its total global consumption. Modified starches are excellent flavour carriers and therefore have usage in ready to drink mixes globally. In addition to that it also adds a slight amount of viscosity for a silky texture in coffee, slushies, smoothies, and other beverages within the beverage segment. For the ready meal segment for pasta, soup, and mayonnaise, it enhances the quality of such products in the baking industry. It is also very beneficial for emulsifying end-use products in a variety of industries, particularly those containing flavoured oils.

Exhibit 40: Global Modified Maize Starch Market size, By Application, Million Tons, 2024



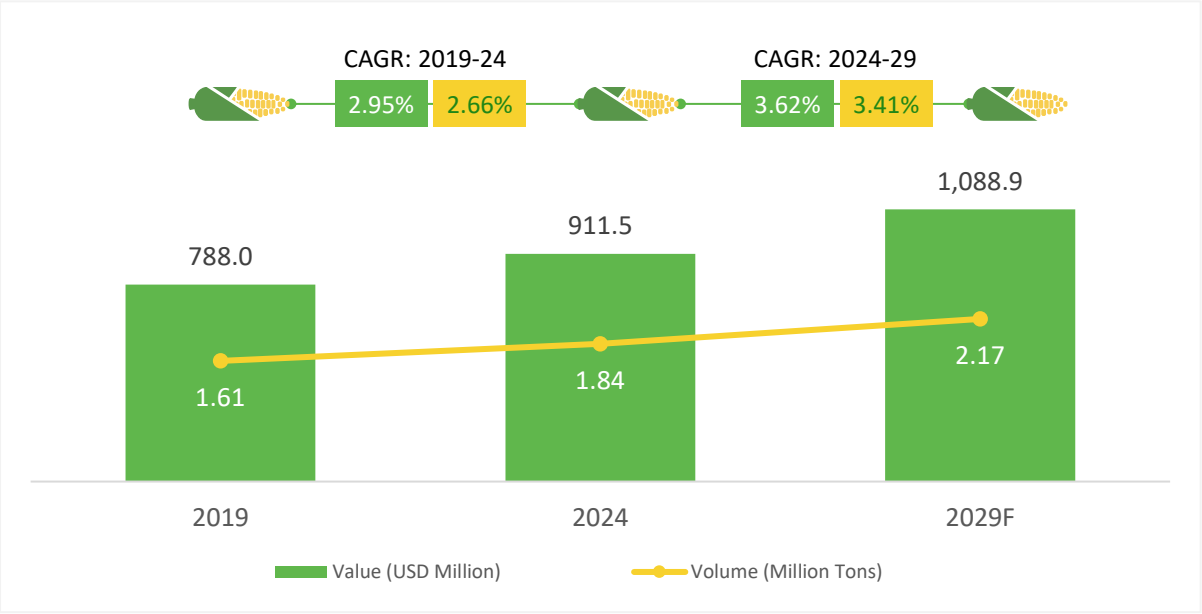
Source: Industry sources, Frost & Sullivan

4.4. Segmentation of Global Modified Starches and Value-Added Products

A. Dextrin

The Global Dextrin market was valued at USD 1,744 million in 2024 and is expected to grow at CAGR of 3.72% to reach USD 2,093 million in 2029. Dextrin's are primarily made in two categories i.e., Yellow Dextrin, and white dextrin. These are mainly available in dried powdered form, which makes it easy for handling and transportation. Yellow dextrin accounted for ~52.25% of dextrin market with 1.8 million Tons in volume in 2024. It is majorly used as a thickener, adhesive and glazing agent in the food industry, and as a binder in paper and cardboard manufacturing. It also has applications in pharmaceutical industry, where it is used for tablet coating and as a stabilizer in emulsions. It is also used in the manufacture of paints, adhesives, coatings, and inks. High quality papers such as magazine covers, brochures & catalogues production use yellow dextrin not only as an aesthetic ingredient but also to provide support for glossy pages thereby enhancing the print quality. The mining industry uses yellow dextrin as foam control agents to improve the efficiency of ore separation processes and, in the textile industry, yellow dextrin is used as blanket adhesives when screen-printing fabrics.

Exhibit 41: Global Yellow Dextrin Market Size - Value and Volume

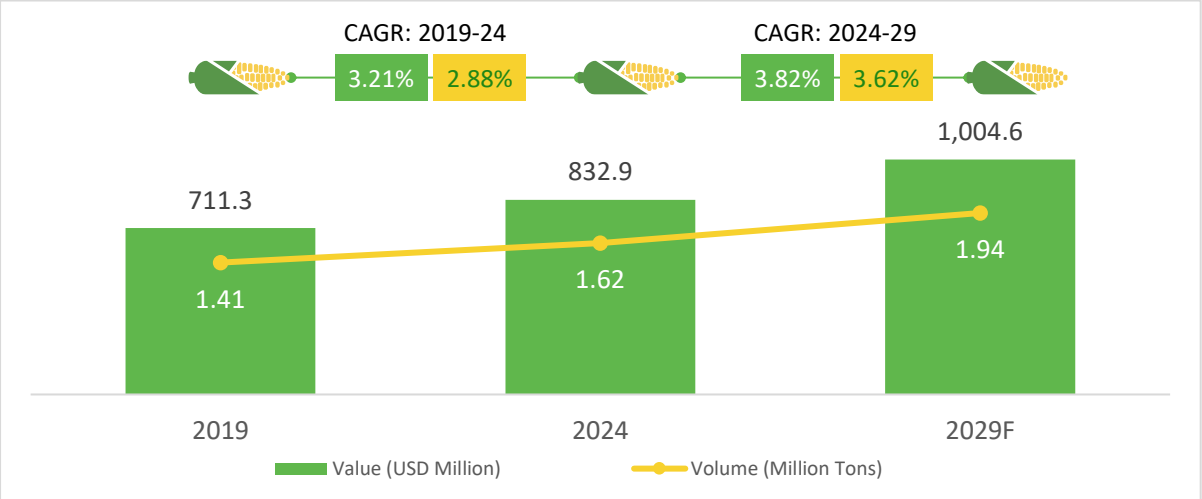


Source: Industry sources, Frost & Sullivan

The Yellow Dextrin market is projected to grow at a CAGR of 3.41% from 2024 to 2029 with volumes reaching to 2.17 million tons in 2029 from 1.84 million tons in 2024. The growth in Yellow Dextrin market is fuelled by increasing demand for food-grade and industrial-grade yellow dextrin from applications such as envelope adhesive, paper application.

White Dextrin is used extensively in making adhesives for paper converting. It is mostly employed with starches and ingredients such as alkaline materials, borax, fillers, latices, resins, salts, and defoamers. The Global market for White Dextrin was valued at USD 832.9 Million in 2024 and it is projected to reach USD 1,004.6 million by 2029, expanding at a CAGR of 3.82% during the forecast period.

Exhibit 429: Global White Dextrin market size - Value and Volume



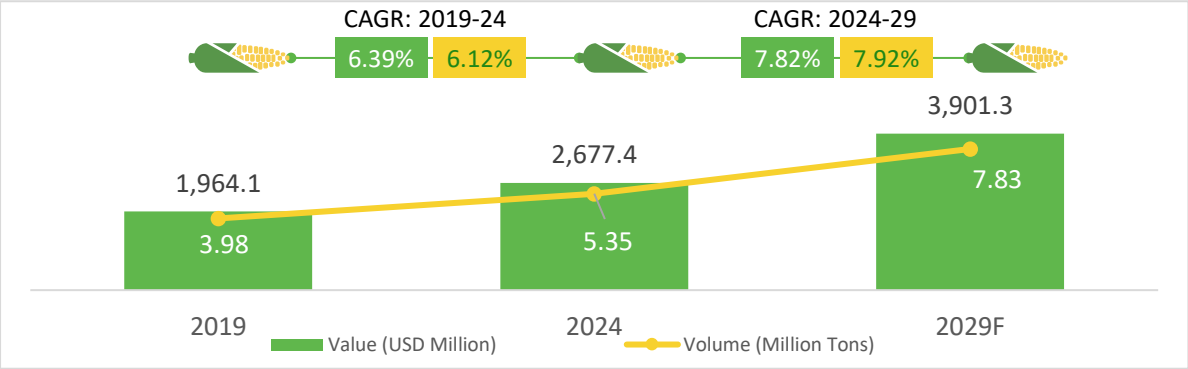
Source: Industry sources, Frost & Sullivan

White dextrin is especially useful in paper sizing when thin viscosities are required. White dextrin also has its applications as dough improvers in baking of breads and rolls. They area also added to increase the crispness of batters for breading fish and poultry. Some of the key players in the Yellow and White Dextrin market are Agrana, Tate & Lyle, Cargill, Sunar group, and Roquette.

B. Maize Flour: -

The Maize Flour market will likely grow at a CAGR of 7.82% in value term between 2024 and 2029 owing to growth in bakery industry, ready to eat products and increasing demand from developing markets. The size of the market in 2024 was USD 2,677.4 million and is forecasted to reach USD 3,901.3 million by 2029.

Exhibit 43: Global Maize Flour market size - Value and Volume



Source: Industry sources, Frost & Sullivan

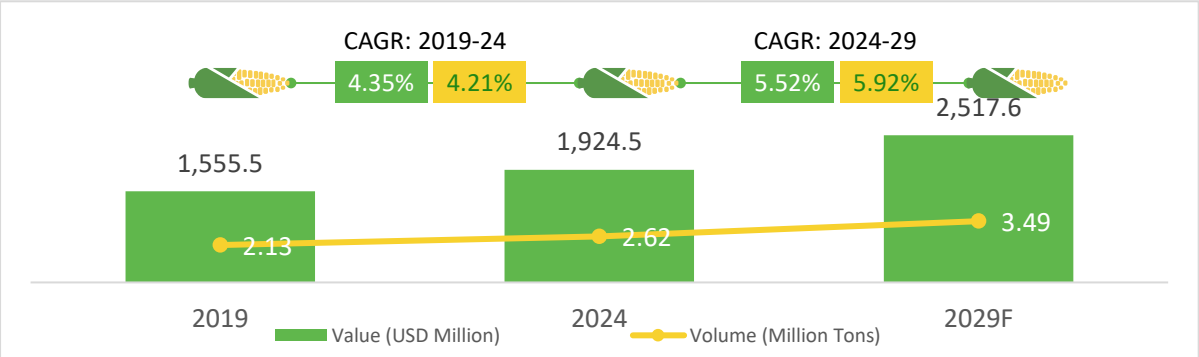
The market for maize flour is highly unorganised in Asian countries whereas North America and Europe's market is dominated by players like Cargill, Bunge, and ADM. Many retailers and supermarkets sell their products under private labelling which increases the profitability as these products are priced lower than the branded products. The key players in maize flour global market include Andersons Food, Archer Daniels Midland, Cargill, Bunge, Grain Millers, Gruma, North Dakota Mill, Limagrain, Associated British Foods Plc, Bob's Red Mill, and Empresas Polar Inc.

C. Baking Powder:

The Global Baking Powder market was valued at USD 1,924.5 in 2024 and is projected to grow at a CAGR of 5.52% from 2024 to 2029. Increasing demand for bakery products, especially in developing countries is fuelling the demand for baking powder. Cakes, breads, tarts, pastries, and biscuits has become very popular in many developing countries as well, leading to demand of baking powder.

Baking powder can be segmented based on – phosphorus, anhydrous phosphorus, sodium aluminium sulphate phosphate, tartrate, aluminium free and phosphate free. The phosphate-based segment is projected to dominate the baking powder market owing to its high leavening power and good volume stability.

Exhibit 44: Global Baking Powder Market Size- Value and Volume



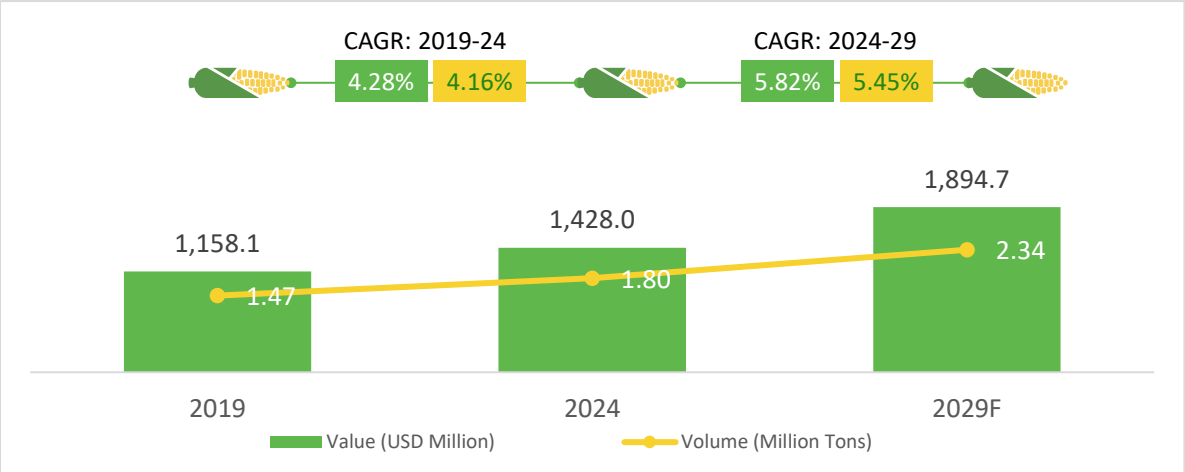
Source: Industry sources, Frost & Sullivan

Some of the key players in baking powder market are Nestle, Britannia, Associated British Foods Plc, Corbion, Cargill, ADM, DSM, British Bakels and Muntons.

D. Custard Powder: -

Global custard powder market was valued at USD 1,428 million in 2024 and is expected to grow at CAGR 5.82% till 2029.Variety of types and flavours such as baked custard, stirred custard, refrigerated custard, Ultra Heat-Treated custard, rose flavour, vanilla flavour, pista flavour, chocolate flavour are available in market.

Exhibit 45: Global Custard Powder market size- Value and Volume



Source: Industry sources, Frost & Sullivan

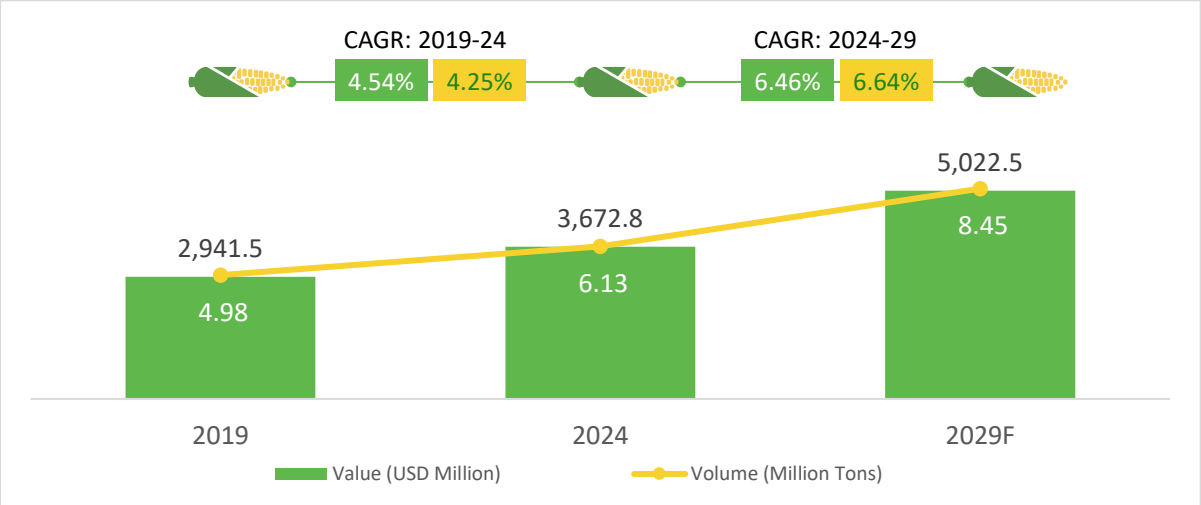
Swiss Bake, GD Foods, Premier Foods, Kraft Foods, Pillsbury, Goodman Fielder ITN Food Corporation, Well and Good Pty Limited, Unilever Food Solutions are some of the key players in custard powder industry.

E. Icing Sugar:

Icing sugar is mainly used for preparing icings and frostings on desserts, sweets and baked items. It is also known as confectioners' sugar is made by milling granulated sugar into a powdered state. Its fine nature makes it suitable for bakery and confectionary applications.

The global icing sugar market was valued at USD 3,672 million in 2024 and expected to grow at CAGR 4.25% between 2024-2029.

Exhibit 46: Global Icing Sugar Market Size- Value and Volume



Source: Industry sources, Frost & Sullivan

Need of fine texture in food, increasing demand for confectionary on account of growing population growth will cushion the growth of the icing sugar market. Major players in global icing sugar industry are Associated British Foods Plc, Sudzuker group, Tate Lyle Plc, Thai Flours, Indiana Sugars, NZ sugar company.

4.5. Key Player in Global Modified Maize Starch Industry

Globally, the Modified Starch Market is moderately fragmented, with some of the major players in the market include Archer Daniels Midland Company, Agrana, Emsland-Starle GmbH, Cargill.Inc., Global Bio-Chem Technology Group Company Limited, and others. Key players in the market enter strategic partnerships, M&A, and Joint Ventures, and focus on R&D to launch innovative products to cater to the changing preferences of consumers across the world.

Some of the prominent players in the Global Modified Starch market include:

Sr No	Company Name	Sr No	Company Name
1	Emsland-Stärke GmbH	9	Sanwa Starch
2	Nihon Shokuhin Kako	10	Japan Corn Starch
3	Global Bio-Chem Technology Group Company Limited	11	China Essence Group Limited
4	Ingredion Incorporated	12	PT Budi Starch & Sweetener Tbk
5	Roquette	13	Tate & Lyle PLC
6	ADM	14	ULRICK&SHORT
7	Agrana	15	Nouryon
8	Cargill	16	Samyang Genex Corp

4.6. Indian Modified Maize Starch Market

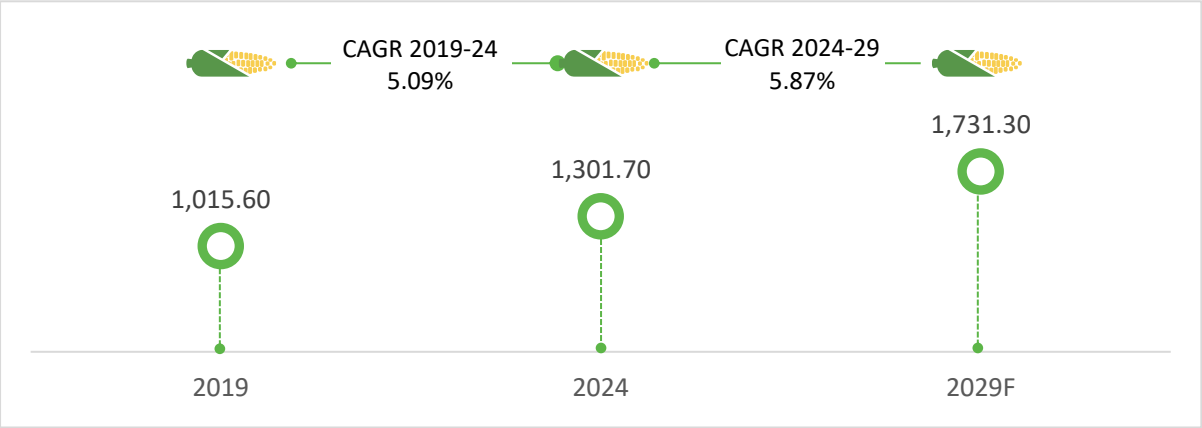
The modified starch market in India is expected to grow at a compound annual growth rate (CAGR) of 5.87% between 2024 and 2029. The market is being driven by the growing use of modified starches, which provide better functional qualities such higher stability, improved texture, and longer shelf life.

The growing food and beverage sector and the rising demand for convenience foods are the main drivers of the modified starch market's strong growth in India. The demand for processed and ready-to-eat meals has been rising due to changing consumer habits, rising disposable incomes, urbanisation and a large population base with a relatively young demographic. One essential ingredient in these foods is modified starch, which improves texture, stability, and shelf life. Modified starch has been increasingly popular as a flexible and useful solution as a result of the rising demand for natural and clean-label products brought on by consumers' increased awareness of health-conscious purchasing decisions. The market's growth has also been aided by the growing pharmaceutical industry, as modified starch is used in tablet binding, encapsulation, and medication compositions.

In volume terms, the Indian market was around 2.44 million tons in 2024 and is expected to grow at CAGR 5.54% from 2024-29.

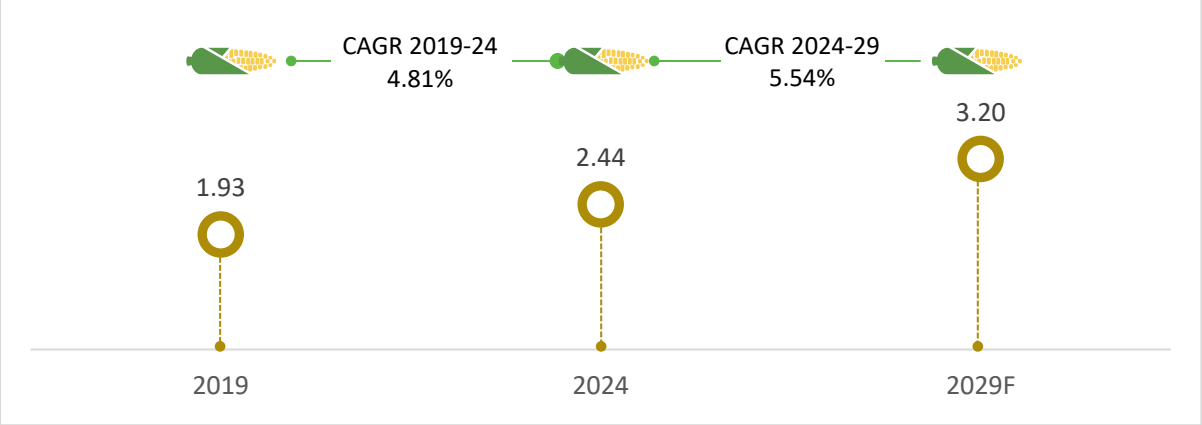
The recent change in regulation of Modified Starch i.e., dosage in processed foods can be considered under GMP (Good Manufacturing Practice) by the producer instead of the earlier dosage limit of 0.5% has not only increased the dosage of the ingredient in current applications but also paved the way for new applications, which has positively affected Indian starch demand in recent years.

Exhibit 47: Indian Modified Maize Starch Market size, USD millions



Source: Industry sources, Frost & Sullivan

Exhibit 48: Indian Modified Maize Starch market size, Million Tons



Source: Industry sources, Frost & Sullivan

4.7. Application wise Breakup of the Indian Modified Maize Starch Industry

Modified Starch is majorly used in Paper industry, Textile industry and Food and beverage industry. The demand for modified starches in different food and beverage segments is expected to grow rapidly in coming years.

Indian modified maize starch industry in 2024 was valued at USD 1,310 Million. Food & Beverage segment accounted for 10.1% in modified starch market in 2024. Sauce, salad dressings, and spreads are key applications in food sector for modified starch, accounting for more than 35-40% of modified starch demand and are expected to fuel demand of specifically modified starches. Next emerging segment is bakery and snacks. Modified starch is used to provide the desired hardness to cookies and impart texture and stability for bars. Thus, the demand for modified starch in snack preparation has been significantly growing.

Also, other key food applications for Modified Starch are processed meat, spice mix, etc. Other sectors such as dairy, confectionery, food service, noodles, RTE, and beverages are using modified starches for its various applications.

Exhibit 49: Indian Modified Maize Starch Market size, By Application, Million Tons, 2024

Source: Industry sources, Frost & Sullivan

Modified Maize starch is also widely used in the paper industry which give good quality final product along with efficiency in production. They are used in different stages of manufacturing such as wet end, spraying, surface sizing, etc. In 2024, paper industry accounted for 55.8% of modified starch consumption.

Usage of oxidized maize starch- type of modified starch is increasing in pharmaceutical and nutraceutical industry. It is well known as a disintegrant filler and binder in dosage forms. It is used in a variety of dosage forms including swallowable tablets, hard capsules, blends, granules, and pellets premix.

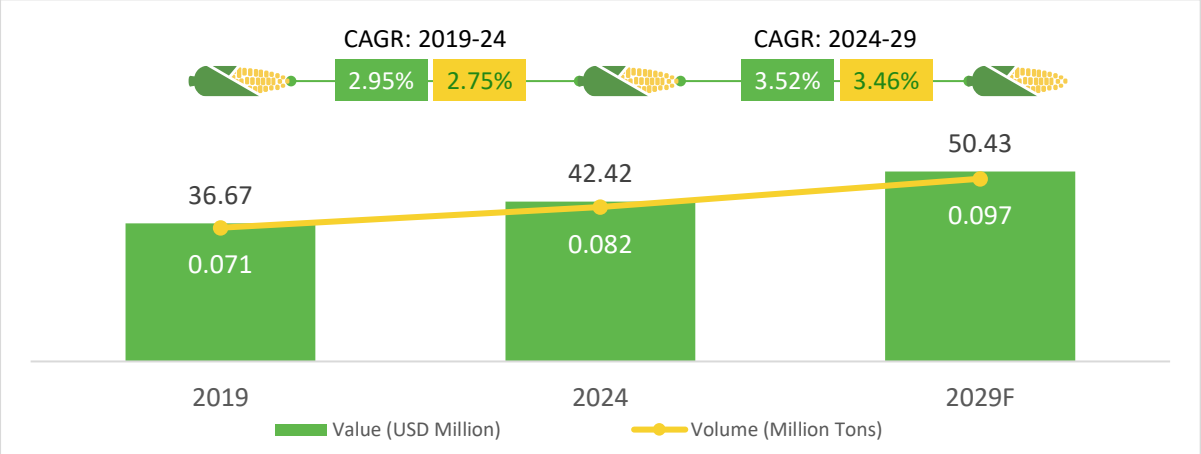
4.8. Segmentation of Indian Modified Starched and Value-Added Products

A. Dextrin

Yellow dextrin is highly sticky and hygroscopic, with a low viscosity and is used as a core binder in the foundry. Yellow dextrin is entirely soluble in water and aids in boosting dry strength. Additionally, it is a thickening for printing, a binder for paints, and an ingredient in water-soluble glues.

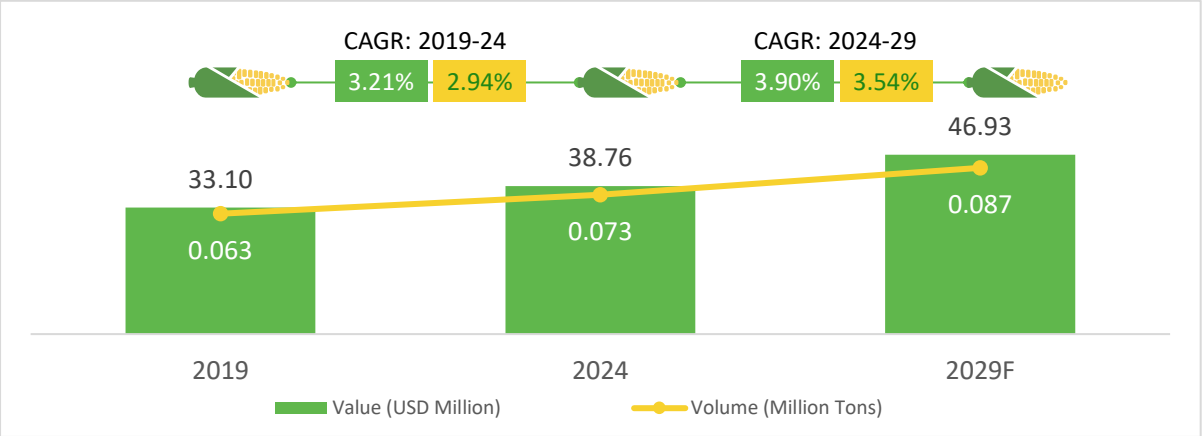
The market for yellow dextrin is growing at CAGR of 3.5% is expected to reach USD 50.4 million in 2029.

Exhibit 50: Indian Yellow Dextrin market size - Value and Volume



Source: Industry sources, Frost & Sullivan

Exhibit 51: Indian White Dextrin market size - Value and Volume



Source: Industry sources, Frost & Sullivan

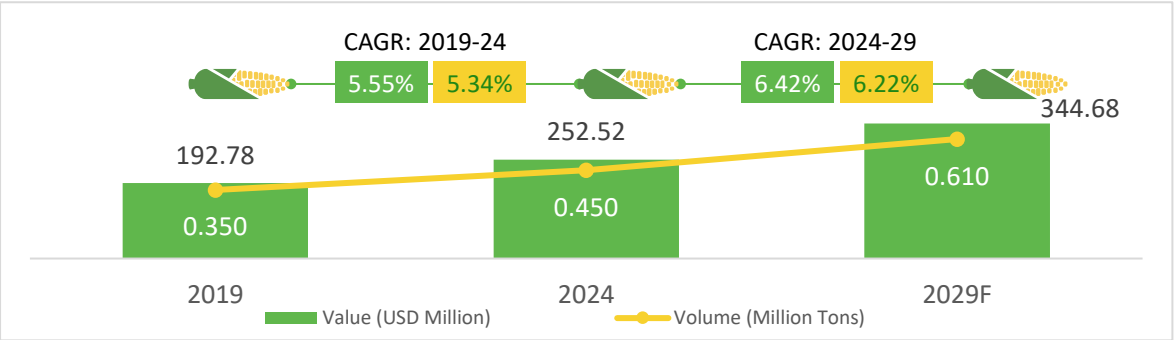
Linear and branched are two types of White dextrin. White dextrin is mostly used in the paperboard industry, to improve the stiffness and strength of cardboard. White dextrin products have significant advantages over existing synthetic resins due to their higher solid content and excellent binding capabilities.

The Indian market for white dextrin powder is valued at USD 38.8 million in 2024 and expected to reach USD 46.9 million in 2029, with a CAGR of 3.90%. Growth in white dextrin can be attributed to its demand in foundries, pharmaceutical companies, food and confectioneries companies, construction chemicals, paint industry and leather chemicals. Some of the key players in the yellow and white dextrin market in India are Universal Star Chem Allied Limited, Sahyadri Starch and Industries Private Limited, Gujarat Ambuja Exports Limited and Paramesu Biotech Limited. Regaal Resources Limited also manufactured quality-based dextrin. The packaging for dextrin is done in HDPE bags with liner of LDPE in 25 and 50 kg SKUs.

B. Oxidised Starch

The market for oxidized starch is anticipated to expand at a CAGR of 6.42% till 2029. The industry is projected to reach around USD 344.7 million by 2029 up from USD 252.5 million in 2024. The chain length of oxidized starch is shorter than that of native starch which helps in providing range of viscosity and fluidity to suit the requirement of paper processing in the application of surface sizing. It helps in improving oil absorbency quality of paper and imparts smoothness to paper. It is also used as coating in industries including food, pharmaceuticals, textiles & construction. Oxidized starch is also used as stabilizers in milk and ice-cream dessert, pudding and dessert . In confection and confectionary industry as organization and structure creators for preparation of deserts, fillings, soufflé and jellies.

Exhibit 52: Indian Oxidised Starch market size - Value and Volume



Source: Industry sources, Frost & Sullivan

Customization in viscosity of the oxidized starch is possible as per the end application. It is available in 50 Kg. HDPE bags with inner liner. However, special packing like Jumbo bags or Paper bags with 25 Kg SKU is also arranged as required.

C. Cationic Starch

A growing number of industrial sectors, including textile, paper, chemicals, agricultural, construction engineering, and healthcare, are using Cationic starch as a result of research and development in technologies.

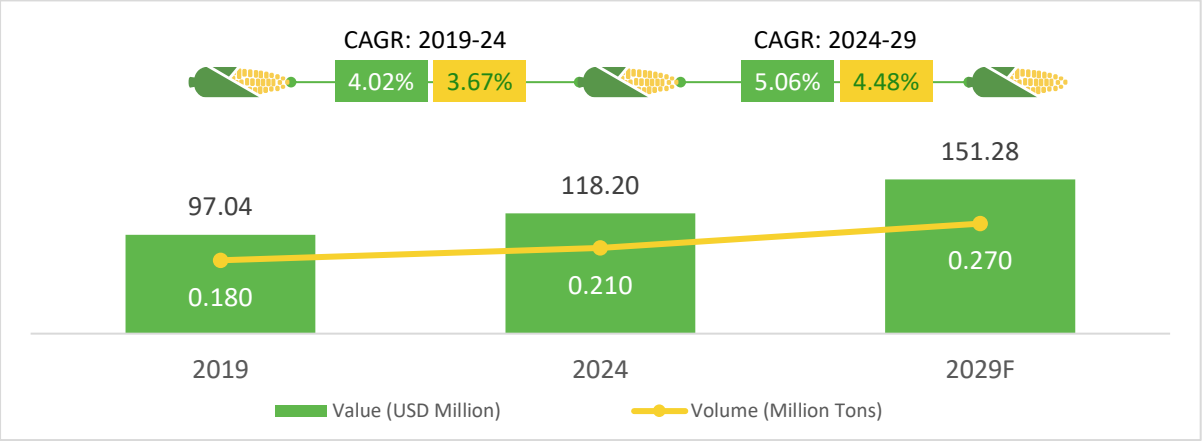
Cationic starches is mostly preferred as wet-end starches. The negatively charged cellulose fiber and fillers readily draw the positively charged cationic starches. This strengthens the bonds between the fibers and the filler. Quaternary ammonium type cationic starch and tertiary amino type cationic starch are the two types of cationic starch that are commercially accessible. While tertiary amino starch is cationic solely in the acidic range, quaternary ammonium starch is cationic throughout the pH spectrum.

The Indian cationic starch market was valued at USD 118.2 million in 2024 and is expected to grow at CAGR of 5.06% to reach USD 151.3 million in 2029. Indian manufacturers are providing cationic starch, which is fine, white, odourless, dry powder with less than 12% moisture content in 50 kg SKU packed in HDPE bags with inner liner or Jumbo bags as per client's requirement.

Cationic starches are effective for improving physical properties of paper as bursting and tensile strength, elongation, fold endurance, and pick resistance. They are often used in manufacturing high grade printing papers, fine writing papers, light weight papers such as bread wraps and glassine.

Cationic starch also has applications in detergent soaps & powder, paint & emulsion, wall putty and disposable diapers industry.

Exhibit 53: Indian Cationic Starch market size - Value and Volume



Source: Industry sources, Frost & Sullivan

D. Pregel Starch

The market for pregelatinized starch is valued at USD 290.8 million in 2024 and is expected to grow at CAGR of 5.92% till 2029. Pregelatinized starch is a dried and boiled carbohydrate which is then made into powder or flakes. It is utilized in food and beverage items like soups, drinks, baby food, and baked goods and is very easily absorbed. Since these starches decompose naturally, there is no environmental risk. Additionally, pregelatinized starch is regarded as a non-GMO component.

Pregel's starch ability to enhance the sensory and textural qualities of product is driving the market's growth, because this cross-linked starch influences the product's baking qualities in a variety of applications, including pharmaceuticals, food and beverage, personal care, and textiles. It is an

important ingredient in the production of tablets. When making tablets, these starches serve as a binding or dilution agent. The market is expanding as a result of an aging population and rising medication need. Pregelatinized starch is experiencing rapid expansion in the market because to its various features, including but not limited to self-lubricating, high shear wet granulation, and utilization as a disintegrating agent.

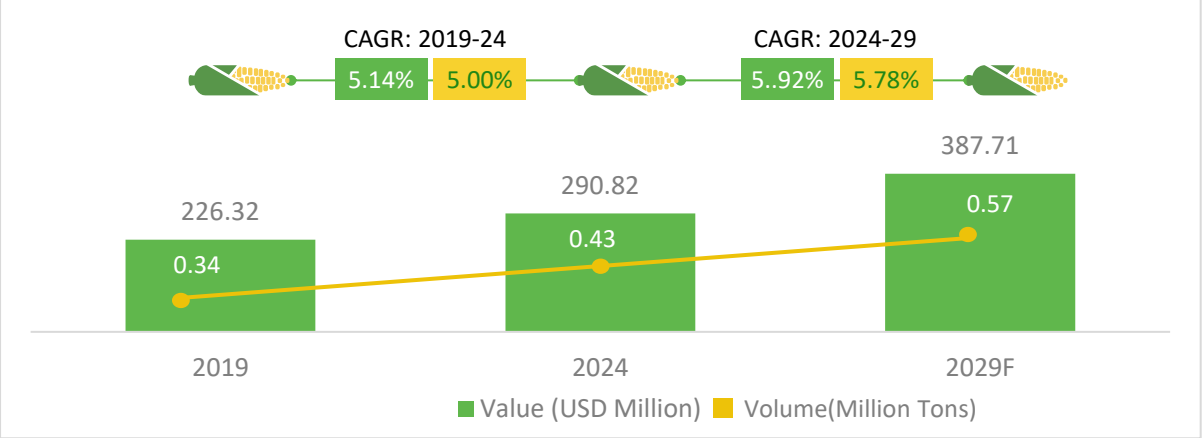
Pregelatinized starch has its applications in dairy products, beverages including less sugar variants, confectionery, cold mixes such as fruit and cream fillings, glazes, frostings and icing for bakery products and snacks, instant foods, soups, sauces, dressings.

There are also other industrial and pharmaceutical applications for pregelatinized starches. Pharmaceutical grade pregelatinized starch is widely used as a binding and disintegrating agent for tablets, pills and granules, also used as filler for capsules.

It is used as a binder for briquettes in coal, foundry, incense stick and mosquito coil industry. It is also used as a fluid loss control additive in oil well drilling industries. Pregelatinized maize starch is also widely utilized in the fish feeding industry as a binding agent or expanding agent.

Indian manufacturers produce pregelatinized maize starch in range of lower to high viscosity and is available in 25 or 50 Kg SKU in printed or plain HDPE, PP bag, Multiply Paper Bag or Paper & PP Combined bag.

Exhibit 54: Indian Pregel Starch market size - Value and Volume



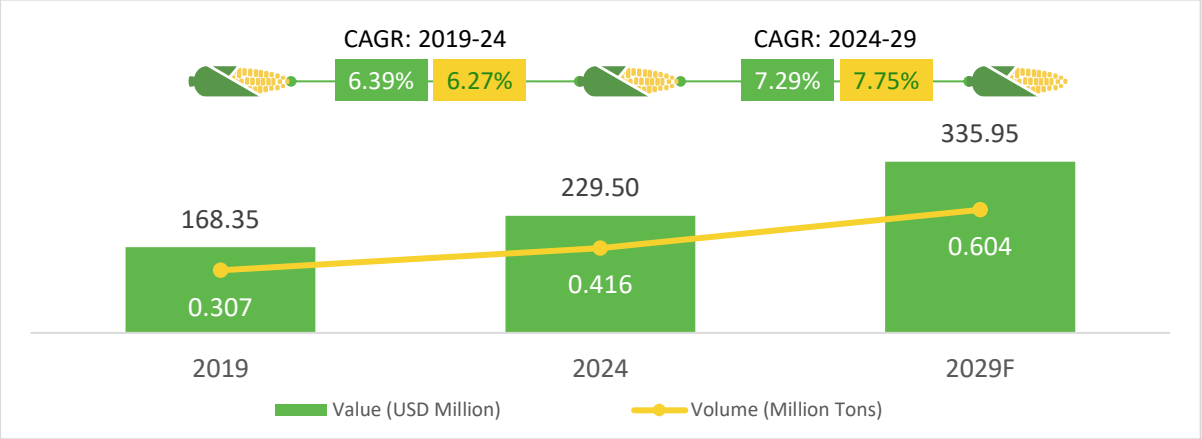
Source: Industry sources, Frost & Sullivan

E. Maize Flour

The Indian Maize flour market size is expected to be valued at USD 336 million in 2029 from USD 229.5 million in 2024. Increasing demand for ready-to-eat products, noodles, pasta, chips, nachos, bakery products, soups and similar products is creating incremental opportunities for maize flour producers. The overall demand for maize flour is projected to grow at a CAGR of 7.29% between 2024 and 2029.

Maize Flour is dusted on vegetables, paneer or chicken before deep frying to achieve perfect crispiness, especially while cooking desi-Chinese meals. It is also used in Indian households to thicken the gravies, soups and add crispiness to fried food products.

Exhibit 55: Indian Maize Flour market size - Value and Volume



Source: Industry sources, Frost & Sullivan

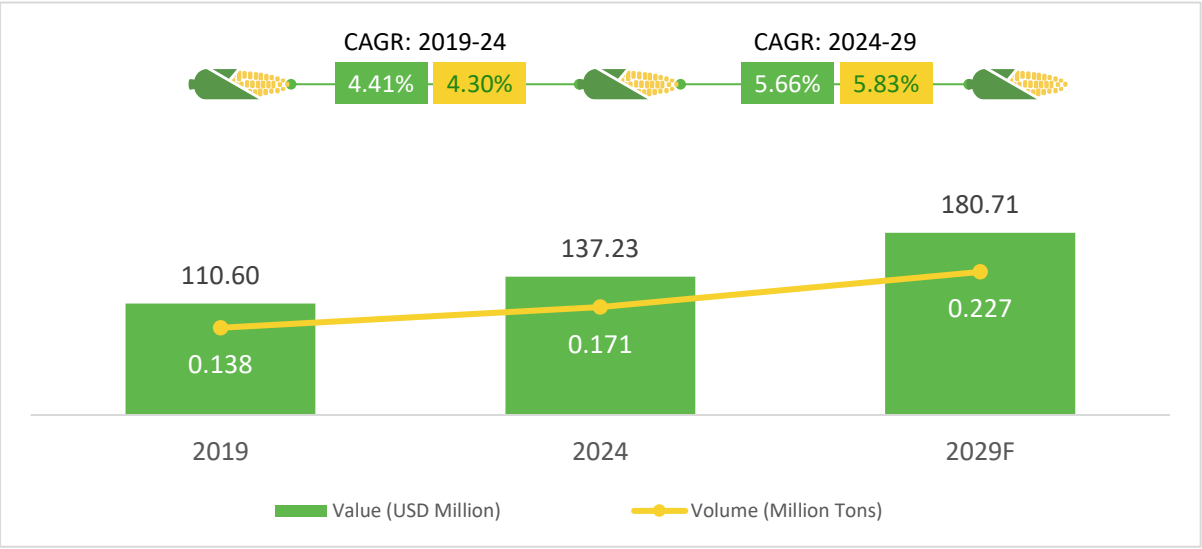
Indian maize flour market is highly fragmented and unorganised with existence of many private labelling players as well. On an average, price for maize flour in Indian retail market ranges from Rs 28-40 for 100-200 gms of packet with shelf life of 18-24 months. Bulk purchasers buy maize flour at Rs 22-35 per kilogram. Some of the key brand available in retail market are Top, Brown & Polson, Blue Bird Foods Private Limited, Weikfield, Ruchi, Aahar, Dr RBL, SFT, Mr Kool, Mojan Impex, Khushi and so on.

Many players such as Burly Field, Organic Tattva, Natureland, Radha Govind have also started offering organic- 100% natural maize flour.

F. Baking Powder

Baking powder market in India is valued at USD 137.2 million in 2024 with expected growth of 5.66% till 2029. In the production of bakery goods such bread, tarts, pies, pastries, biscuits, and cakes, baking powder is a crucial ingredient. A good quality baking powder is necessary for improved baked goods in terms of flavor, color, and texture. Because of this, the market has seen continuous demand over the past few years. The widespread use of baking powder in the food processing sector has persisted even as customers' preferences for healthier food have increased. As a result, the market for baking powder has historically been remarkably stable.

Exhibit 56: Indian Baking Powder market size - Value and Volume



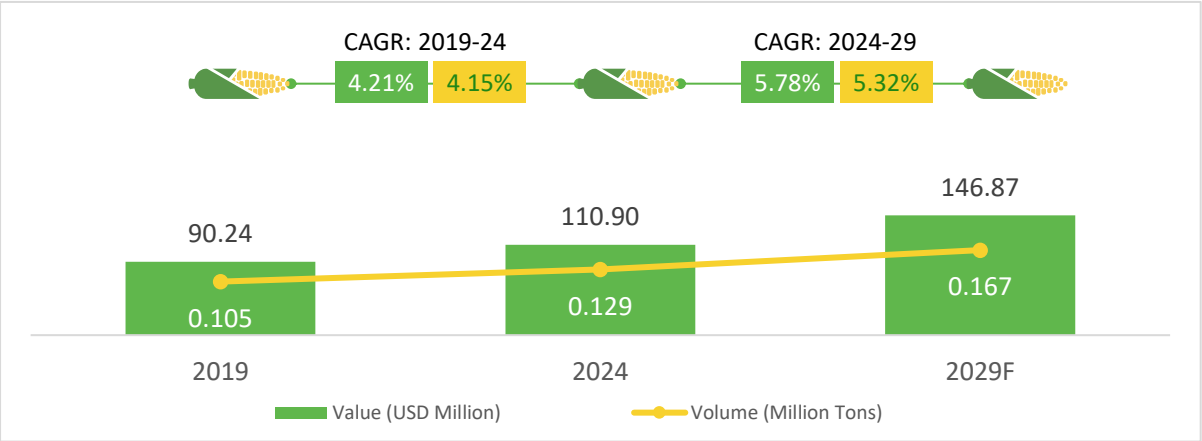
Source: Industry sources, Frost & Sullivan

Blue Bird Foods (India) Private Limited, Amrut International, Swiss Bake Ingredients Private Limited, Ajanta Food company, RB Foods, Urban Platter, Weikfield, Indiana, and Mr. Kool are some of the manufacturers of baking powder in India.

G. Custard Powder

The Indian custard powder market witnessed a growth from USD 90.2 million to USD 110.9 million from 2019 to 2024. With a CAGR of 5.78%, this market is estimated to reach USD 146.9 million in 2029.

Exhibit 57: Indian Custard Powder market size - Value and Volume



Source: Industry sources, Frost & Sullivan

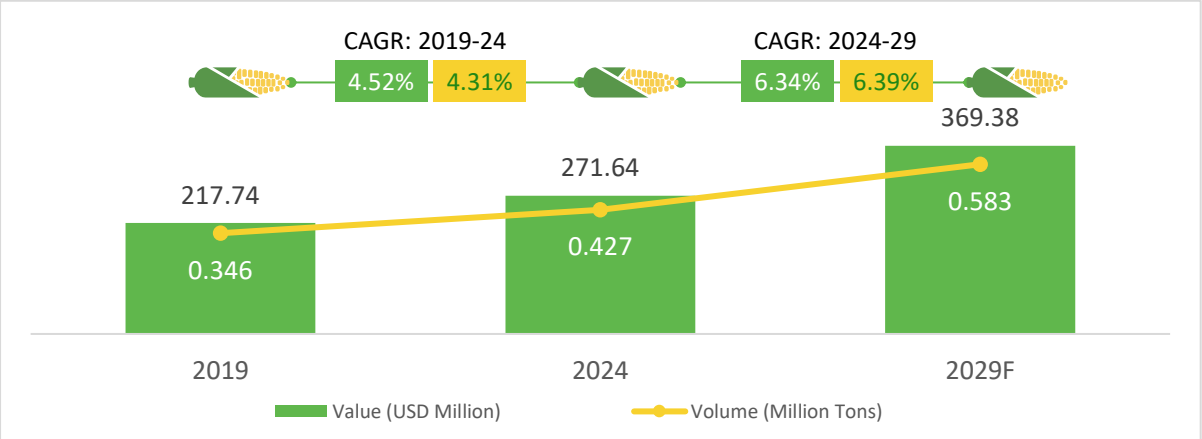
With increasing globalization, people have developed taste for food from western countries and are ready to try new products which will help further penetration of custard powder in Indian markets. Some of the company's manufacturing custard powder are Weikfield, Pillsbury, Kraft Foods, GD Foods, Premier Foods, ITN Food Corporation, Well and Good Pty Limited, Unilever Food and General Mills Inc.

H. Icing Sugar

Icing sugar is majorly used by commercial bakeries, confectionary manufacturers, and beverage producers. Icing sugar's fine texture makes it perfect for dusting over cakes, pies, and pastries to sweeten and add a lovely decorative touch.

Indian market for icing sugar was valued at USD 271.6 million and is expected to grow at CAGR of 6.34% till 2029.

Exhibit 58: Indian Icing Sugar market size - Value and Volume



Source: Industry sources, Frost & Sullivan

AB Sugar Company, Simbhaoli Sugars Limited., Crusty International, Dhampur Speciality Sugar Limited, Blue Bird Foods India Private Limited., SBEC Sugar Limited, USHA International Limited (Mawana), Weikfield Products Co. (I) Private Limited, and Amrut International are some of the key players in icing sugar industry.

4.9. Growth Drivers, Opportunities & Restraints of Indian Modified Starches Industry

Growth Driver & Opportunities-

- Growing demand for convenience food and processed food on account of the rising trend of on-the-go food and changing lifestyles.
- Multiple functional properties offered by modified starch make them suitable to be used in different industries. Noval applications like biomaterials, bio polymers, bioethanol mock meats also boost the demand for starch.
- Increasing use of starches in the textile industry for applications like sizing which helps in improving strength, smoothness and weaving efficiency. According to IBEF (Indian Brand Equity Foundation), the market for Indian textiles and apparel is projected to grow at a 10% CAGR to reach US$ 350 billion by 2030, with exports expected to reach US$100 billion.
- Use of modified starch in personal care and cosmetics industry is also rising.
- Modified starches are used as disintegrants, binders, and controlled-release agents in pharmaceutical formulations. The market is driven by increasing population and rising healthcare expenditure especially for preventive healthcare.

Restraints-

- **Raw Material availability** i.e., Maize has become a crucial commodity in India with growing demand from ethanol and Animal feed industries.
- **The lack of adequate infrastructure and capacity** to dry maize to the optimal level of 14% moisture is causing significant wastage and losses for farmers. According to industry sources, there is a shortage of farm-level infrastructure, such as maize dryers, and quality storage facilities, which leads to the degradation of maize quality. Inadequate drying contributes to post-harvest losses. A 2022 NABCONS study found that post-harvest losses for cereals range from 3.89% to 5.92% at various stages, including harvesting, collection, grading, drying, packaging, transportation, and storage. According to the U.S. Grains Council, maize stored long-term should have a moisture content below 14%. This lack of infrastructure not only results in post-harvest losses but also drives up the cost of maize, which is a key raw material for the maize-based speciality product industry.
- **Price Volatility and Shortages:** The production and availability of maize can be impacted by changes in agricultural yields, weather patterns, which could result in price volatility and shortages.
- **Legal restriction related to the use of modified starches in the country:** Government regulations in India are limiting the usage of starch in products in India compared to the permissible limits in other American and European countries

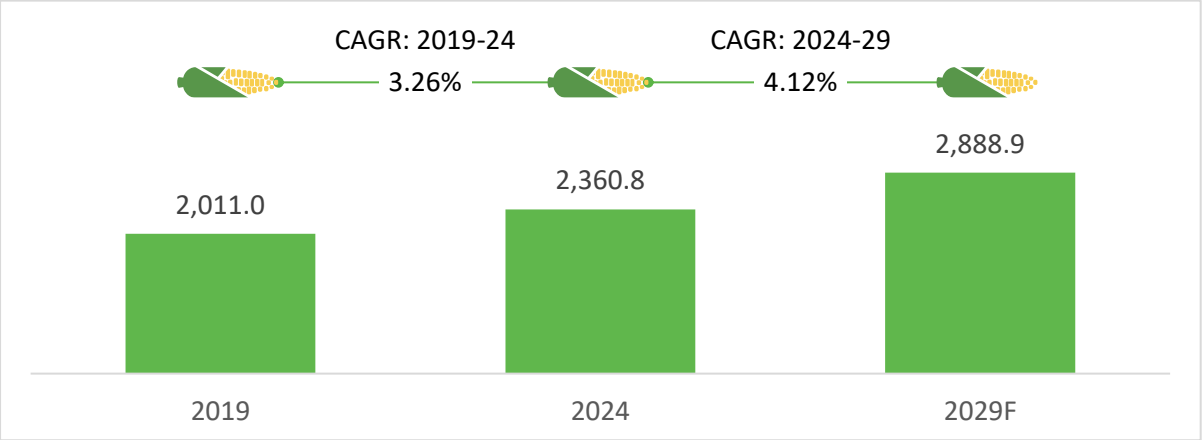
5. Global & Indian Native Starch Based Derivatives Products Industry

5.1. Global Native Starch Based Derivatives Products Industry

I. Global Glucose market

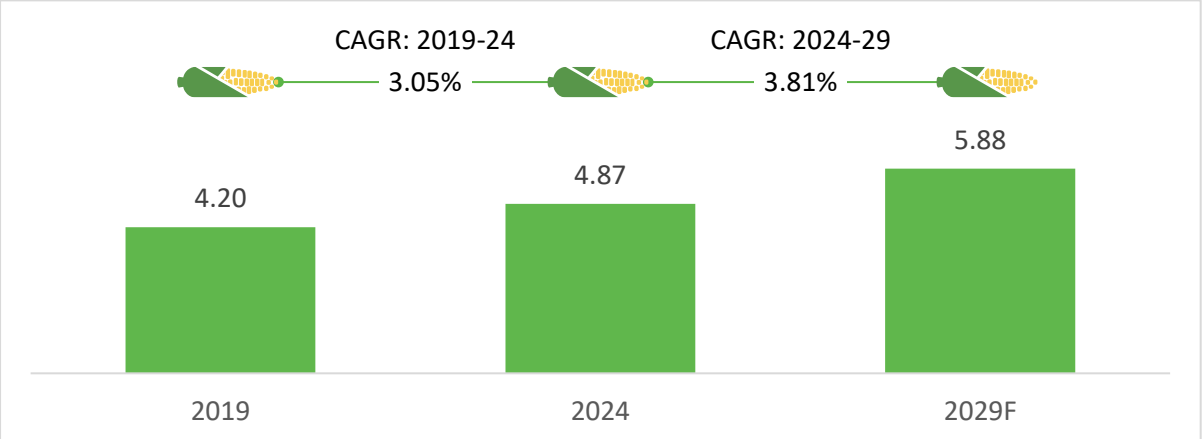
The global glucose market size is was valued at USD 2,360.8 million in 2024 and is expected to expand at CAGR of 4.12% from 2024 to 2029. The increasing demand for soft drinks, confectionery and bakery products in the food and beverages sector is fuelling the growth of this market. Apart from food and beverage, glucose has high demand across pharmaceutical industry. It is used as flavour enhancer, adjuncts, texture enhancer, humectants, stabilizer, preservative, and coating and bulking agent. Crystallization of sugar molecules is prevented by glucose.

Exhibit 59: Global Glucose market size, USD Millions



Source: Industry sources, Frost & Sullivan

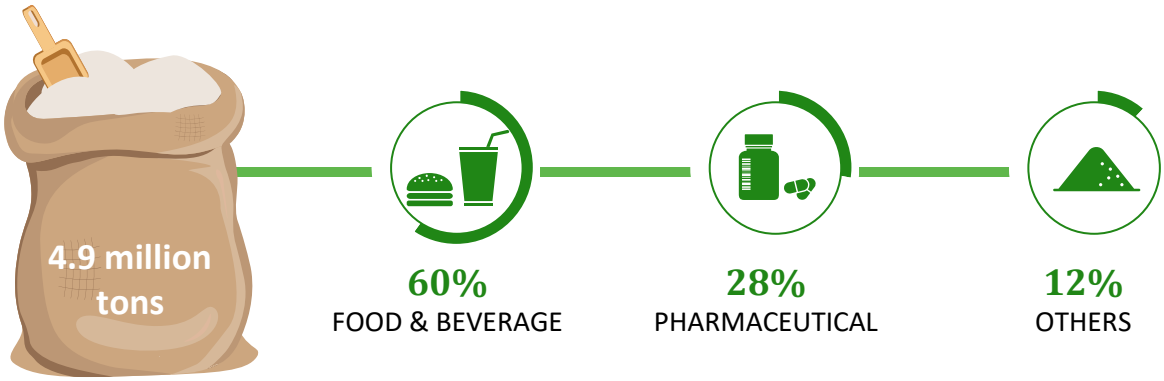
Exhibit 60: Global Glucose market size, Million Tons



Source: Industry sources, Frost & Sullivan

It is also used as a humectant in personal care products. It helps bind moisture to skin, adds flavor to facial cleansers and lip balms, and is also a part of many prebiotics that help reinforce skin's microbiome.

Exhibit 61: Global Liquid Glucose market size, By application, 2024



Source: Industry sources, Frost & Sullivan

II. Global Maltodextrin market

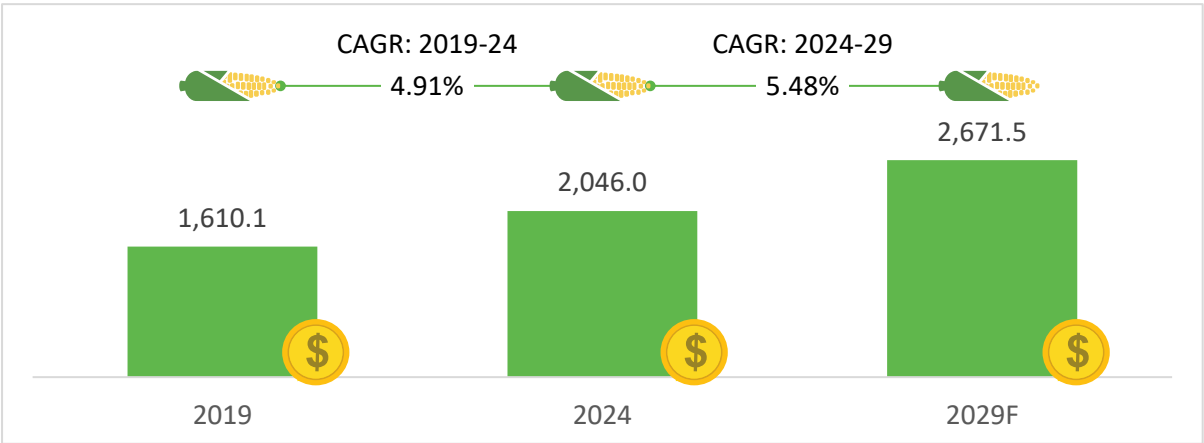
The global market for maltodextrin is valued at USD 2,046 million in 2024 and is expected to grow at CAGR 5.48 % on account of increasing demand from food industry. Companies provide customised maltodextrin powder based on variations in Dextrose equivalent (DE) values.

Maltodextrin is natural food ingredient, which is type of carbohydrate. It undergoes intense processing to form white powder, which is easily digestible, being absorbed as rapidly as glucose and is either moderately sweet or almost flavourless.

It also has applications in pharmaceutical and supplements industry where it is majorly used as diluents. It is also used as tablet Binder, Coating Agent, and Viscosity- Increasing Agent.

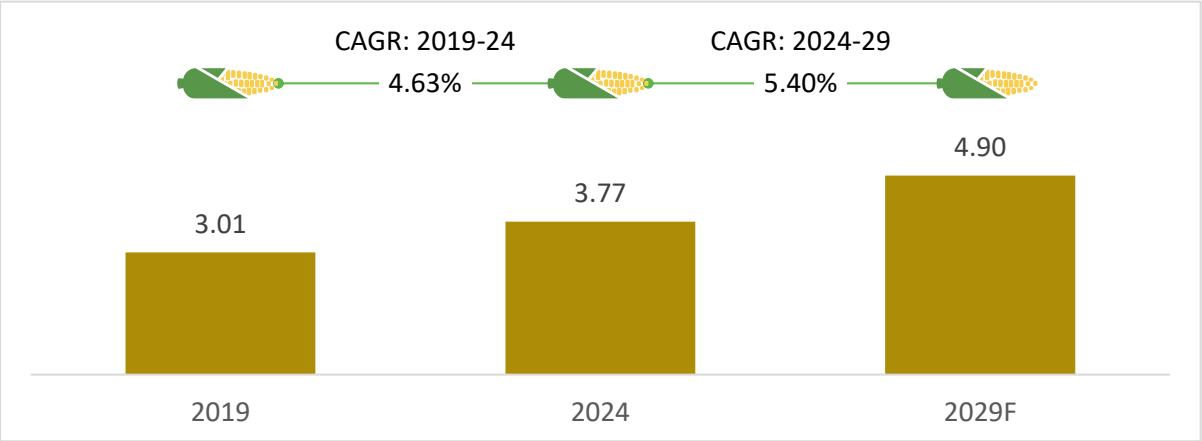
3 to 9 Low DE Maltodextrins	**9 to 16** Medium Maltodextrin	**17 to 20** Standard Maltodextrin

Exhibit 62: Global Maltodextrin market size, USD Millions



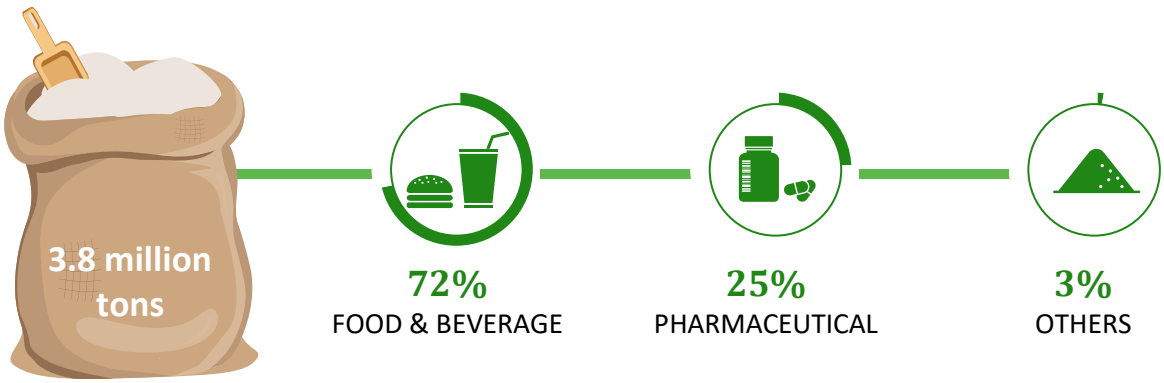
Source: Industry sources, Frost & Sullivan

Exhibit 63: Global Maltodextrin market size, Million Tons



Source: Industry sources, Frost & Sullivan

Exhibit 64: Global Maltodextrin market size, By application, 2024



Source: Industry sources, Frost & Sullivan

Maltodextrin is majorly used in Food & Beverage industry for applications such as infant baby foods, instant food products, dairy products, confectionary, soups, and salad dressings. It is extensively used as a stabilizer, thickener, and filling agent. In 2024, F&B applications account for ~72% i.e., 2.7 million tons. It is followed by pharmaceutical applications where it is used as diluents in single unit dosage preparations such as sachets. It can also be used in textile and household necessities industries.

Some of the key players in maltodextrin industry are Cargill, Archer Daniels Midland Company, Ingredion Incorporated, Roquette, Tereos, Tate & Lyle, Agrana, Tate & Lyle, AGRANA, Matsutani Chemical Industry Company Limited, and Global Sweeteners Holdings Limited.

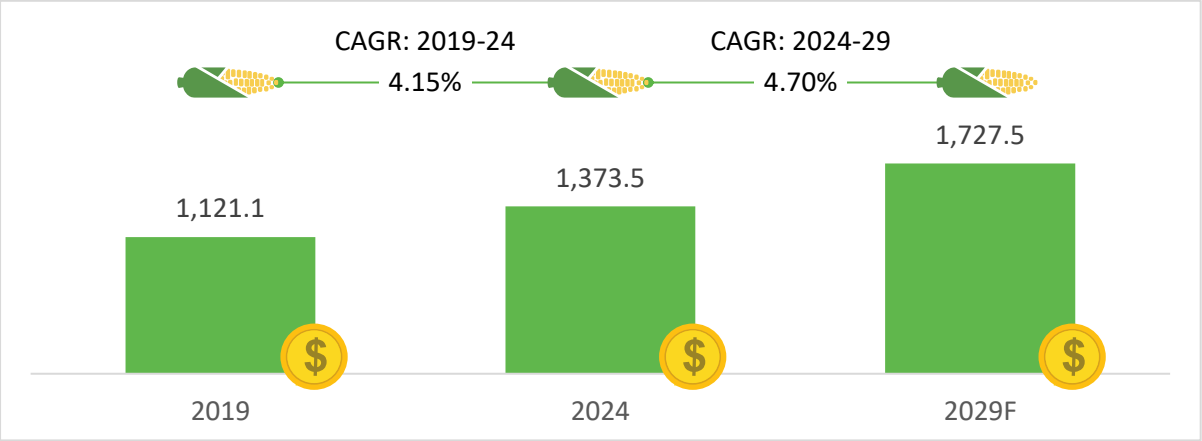
III. Global Dextrose Monohydrate & Dextrose Anhydrous markets

The global dextrose monohydrate market was valued at USD 1,373.5 million and is forecasted to expand at a CAGR of 4.70% to reach valuation of USD 1,727.5 million by 2029.

In order to make food products more appealing, manufacturers of beverages, confectionary, and bakery goods are focusing on natural ways to keep their portfolios fresh for a longer amount of time. Dextrose made from natural ingredients plays a crucial part in the preservation process as it does

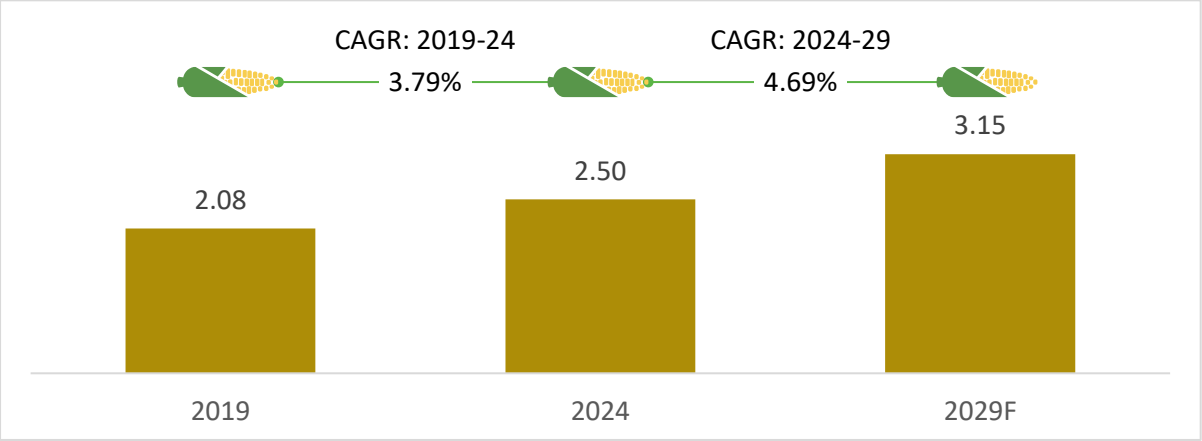
not hydrolyse in the same way as sucrose does, allowing many food products to have a longer shelf life. Dextrose has a caloric value of 4 Kcal/g which produces a rapid glycaemic response. It provides an immediate source of energy for the organs, muscles, and brain.

Exhibit 65: Global Dextrose Monohydrate market size, USD Million



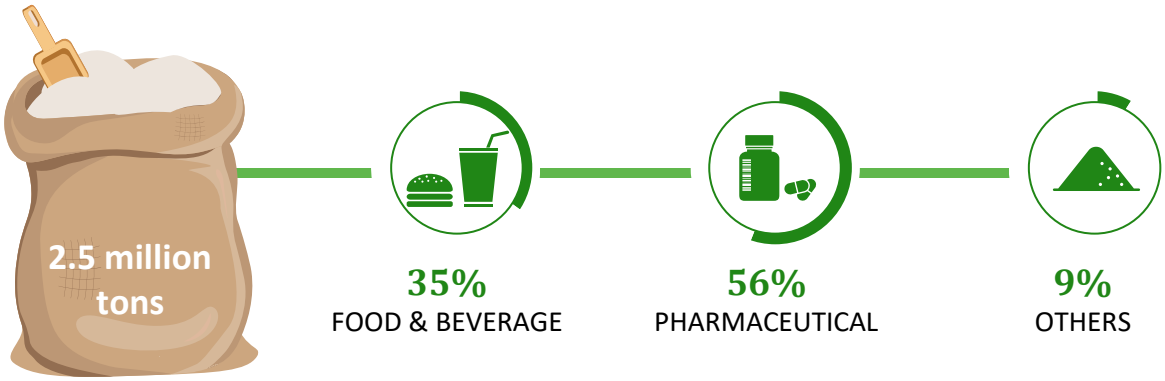
Source: Industry sources, Frost & Sullivan

Exhibit 66: Global Dextrose Monohydrate market size, Million Tons



Source: Industry sources, Frost & Sullivan

Exhibit 67: Global Dextrose Monohydrate market size, By application, 2024

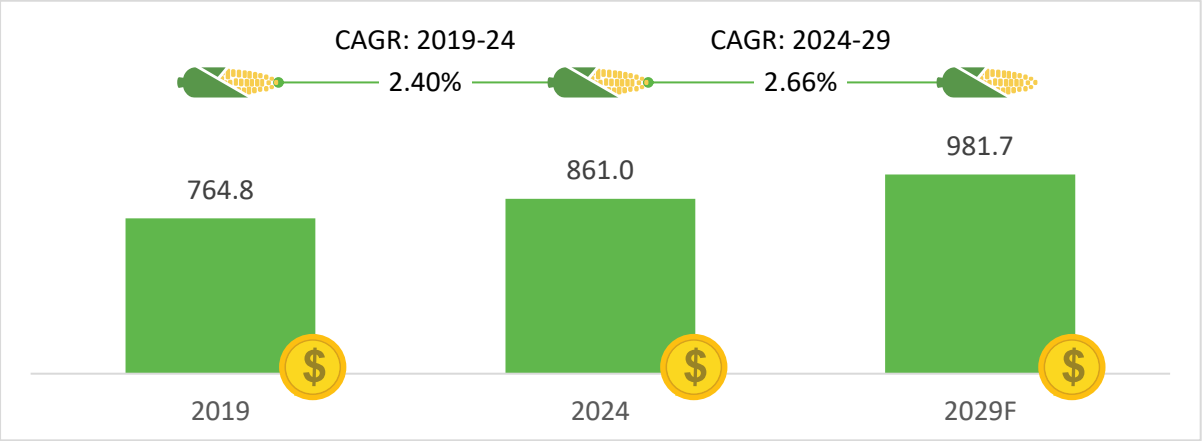


Source: Industry sources, Frost & Sullivan

Dextrose monohydrate is widely used in confectionery, beverages, biscuits, bakery products, gum, creams and frozen dairy products alcoholic beverages, jarred and canned foods for better taste and quality. By 2024, around ~ 35% i.e., 0.9 million tons is used in Food & Beverages industry. In pharmaceutical industry it has applications in production of energy powders and drinks which are used as supplementary fluid for patients suffering low blood sugar. It is also used as energy food by convalescing patient and athletics. In 2024, pharma applications accounted for ~56%. Other applications include cattle & poultry feed.

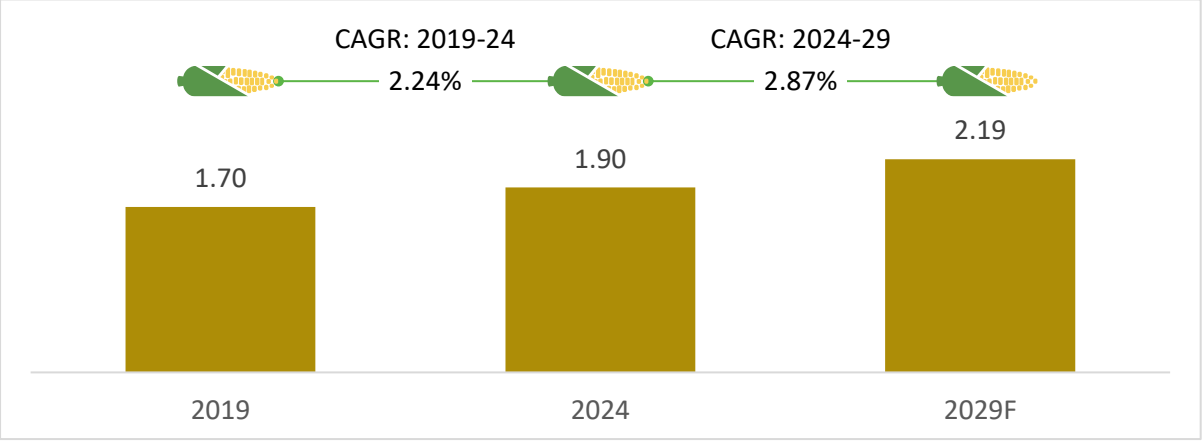
The global dextrose anhydrous market is valued at USD 861 in 2024 and is expected to reach value of USD 981.7 million by 2029.

Exhibit 68: Global Dextrose Anhydrous market size, USD million



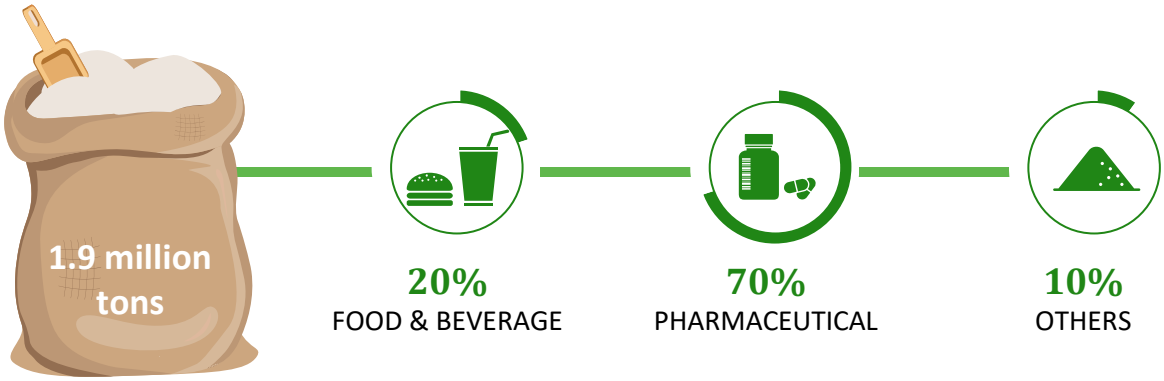
Source: Industry sources, Frost & Sullivan

Exhibit 69: Global Dextrose Anhydrous market size, million tons



Source: Industry sources, Frost & Sullivan

Exhibit 70: Global Dextrose Anhydrous market size, By application, 2024



Source: Industry sources, Frost & Sullivan

Dextrose Anhydrous is majorly used in nutrition supplement and as sweetener in food & beverage industry. It is also used in infant formula to improve nutrition value. Apart from food, it is also used in pharmaceutical industry as antioxidant and fermentation substrate in production of various vitamins, amino acids and other organic products. It is also used in chewable and swallowable tablets, effervescent tablets and medicated confectionaries.

It is used as buffering agent in veterinary medicine and animal feed industry.

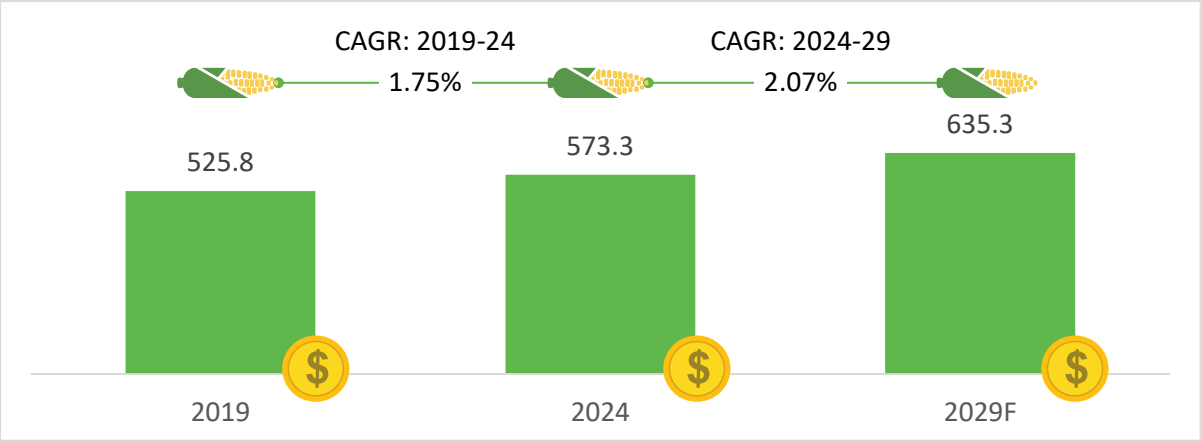
Archer Daniels Midland Company, Cargill, Tate & Lyle, Roquette, Tereos, Sanofi Ingredients, Belgosuc, Penta Manufacturing Company, Global Sweeteners Holdings Limited and Foodchem International Corporation are among the key players.

IV. Global Liquid Sorbitol market

Sorbitol is produced by the catalytic hydrogenation of D-glucose and is available as aqueous solutions. It is low caloric bulk sweetener which provides a variety of functional properties in confectionery, bakery and personal care industry. Its non-reactivity and compatibility with active ingredients make it a perfect carrier in pharmaceutical formulations to improve taste, body and mouthfeel.

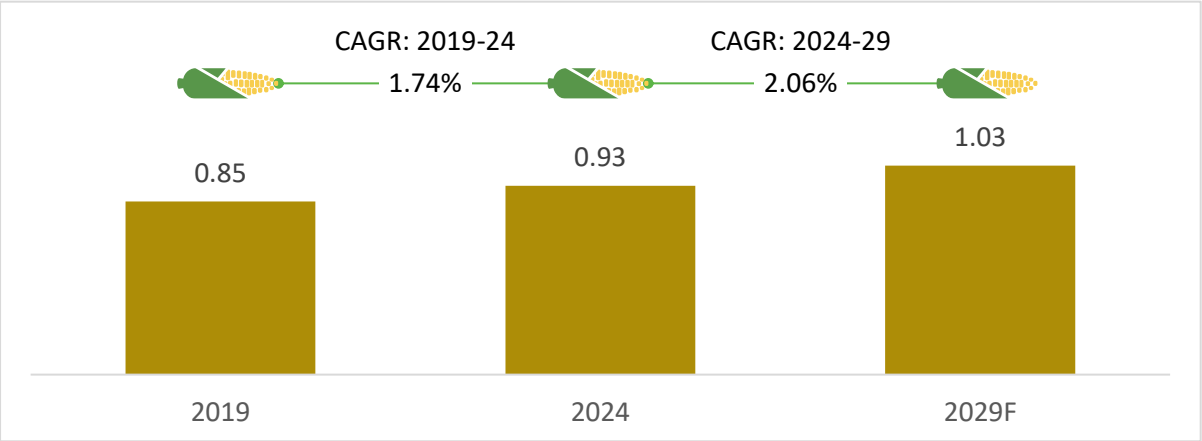
The global liquid sorbitol market is estimated to reach USD 635.3 million in 2029 from USD 573.3 million in 2024. Sorbitol wide use as humectant, taste masking agent, non-cariogenic sweetening agent and anti-crystallizing agent is driving the market growth. Sorbitol also has wide applications in cosmetics, toothpaste, personal care and pharmaceuticals.

Exhibit 71: Global Sorbitol market size, USD million



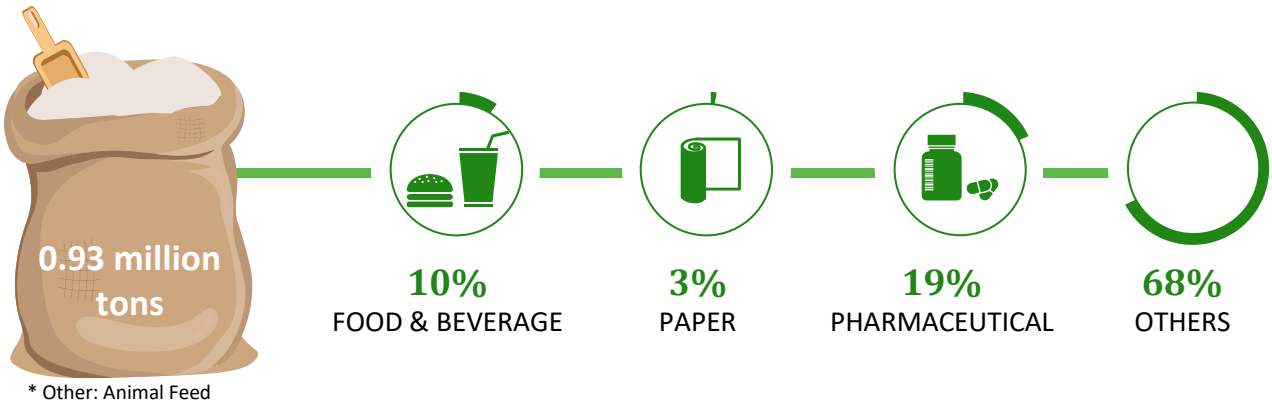
Source: Industry sources, Frost & Sullivan

Exhibit 72: Global Sorbitol market size, Million Tons



Source: Industry sources, Frost & Sullivan

Exhibit 73: Global Liquid Sorbitol market size, By application, 2024



* Other: Animal Feed

Source: Industry sources, Frost & Sullivan

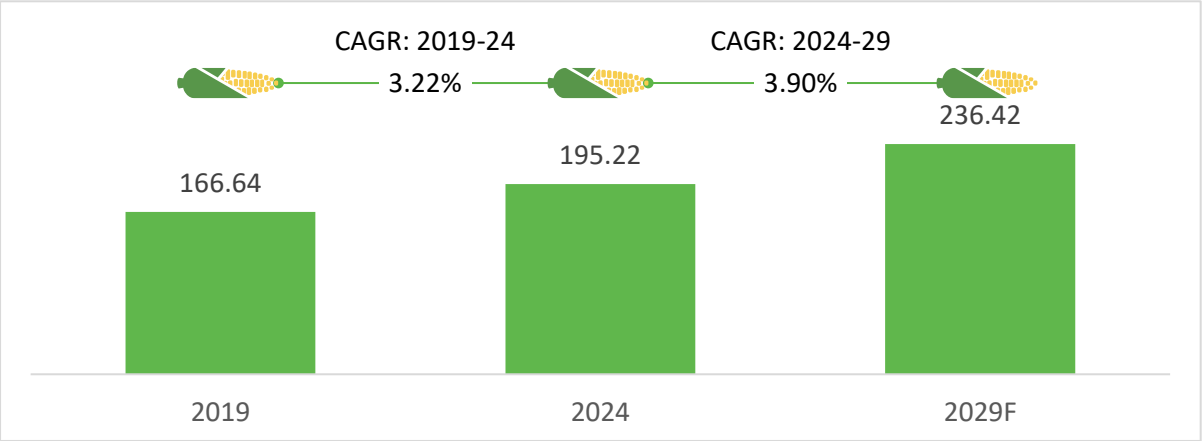
Sorbitol is used in animal feed to complement the feed of animals raised in an intensive manner. It is also used as bulking agent which helps to add volume and texture. Roquette, Cargill, Ingredion, ADM, Tereos, Merck group, Ecogreen Oleochemicals Pte, Gulshan Polyols Limited are some of the major players in sorbitol market.

5.2. Indian Native Starch Based Derivatives Products Industry

I. Indian Glucose market

The Indian market for liquid glucose is valued at USD 195.2 million in 2024 and is expected to grow at rate of 3.90% till 2029 to reach valuation of USD 236.4 million. Owing to its ease in production and good returns, native maize starch manufactures expand their milling capacities to produce liquid glucose. Liquid glucose is also the highest in demand derivative because of its application in almost all the food and beverage products.

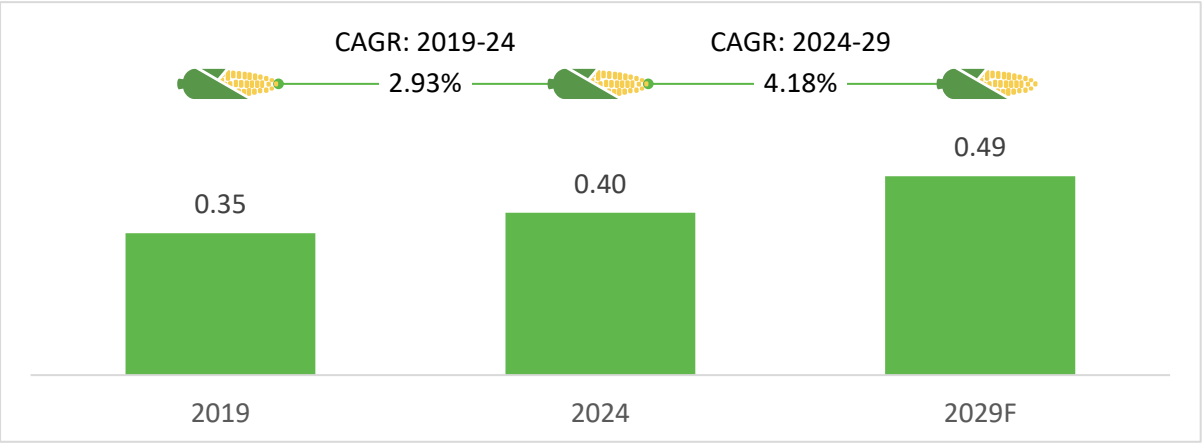
Exhibit 74: Indian Glucose market size, USD Millions



Source: Industry sources, Frost & Sullivan

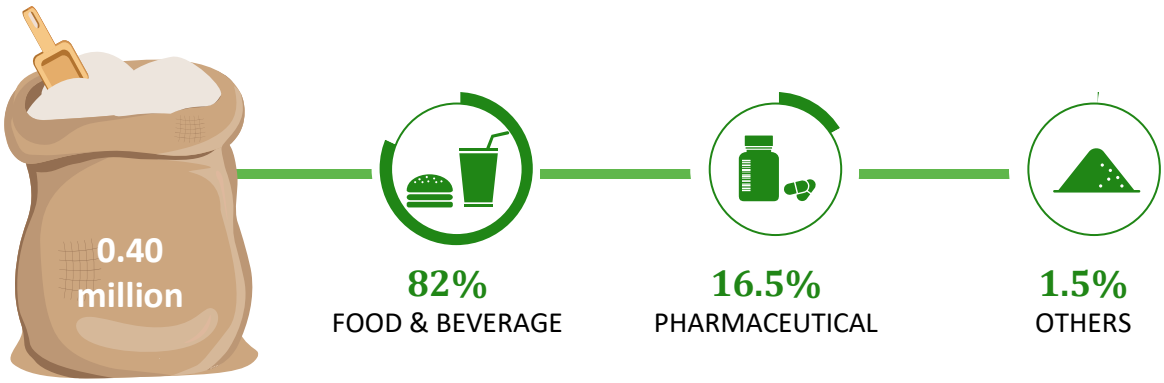
Liquid Glucose is a clear, colourless, viscous solution, making it compatible with the physical properties desired in the end products. Properties of liquid glucose such as flavour, freezing point depression and osmotic pressure are directly related to dextrose equivalent (DE) whereas foam stabilization, cohesiveness, bodying characteristics, and prevention of sugar crystallization are inversely proportional to the increasing DE.

Exhibit 75: Indian Glucose market size, Million Tons



Source: Industry sources, Frost & Sullivan

Exhibit 76: Indian Glucose market size, By application, 2024

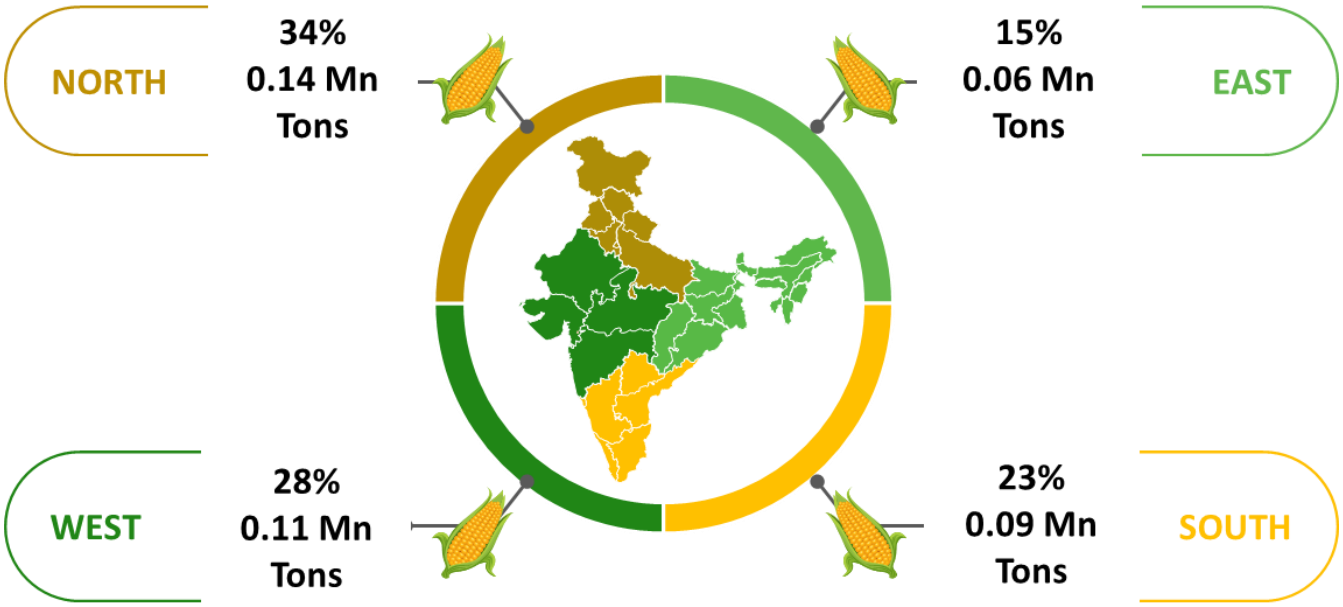


Source: Industry sources, Frost & Sullivan

Liquid glucose is extensively used in manufacture of flavoured candies and chocolates. It is used in the preparation of glucose biscuits. Liquid Glucose also helps to keep products soft and fresh and acts as

a preservative which makes it suitable for using in Jams, jellies, chewing gums and canned fruits. It is also used as a base for preparing artificial honey.
Liquid Glucose is also used in pharmaceutical industry particularly in cough syrup and vitamin-based tonics. It is also used as a granulating agent for tablet coating. Liquid glucose also has it use in curing and imparting flavour in tobacco. Liquid Glucose is added to shoe polish to prevent which helps avoid caking and gives better shine. It is also used in tanning to get softer texture and enhance weight.
Another interesting usage of glucose syrup is in creating fake blood for films and television as it is cheap and easy to obtain.

Exhibit 77: Indian Glucose market size, By geography, 2024



Source: Industry sources, Frost & Sullivan

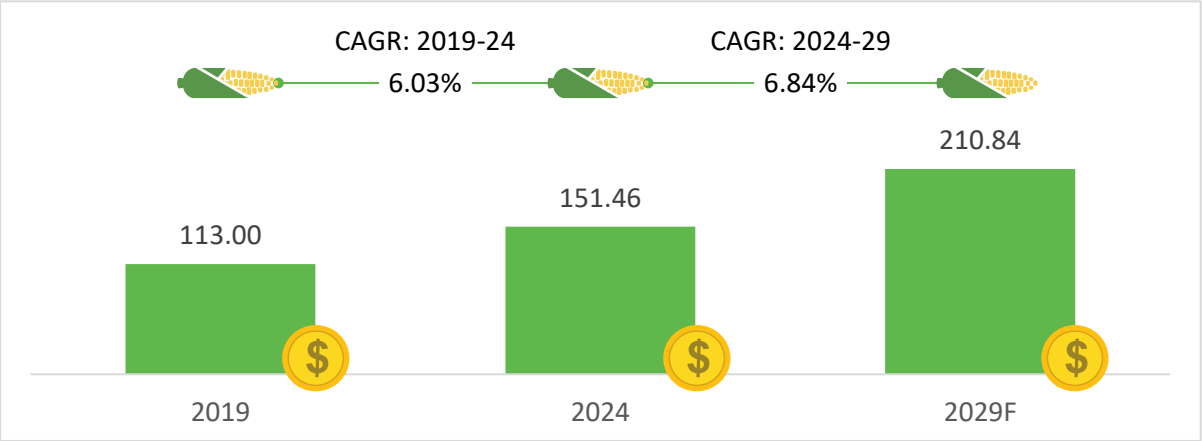
Indian manufacturers offer, liquid glucose of various DE (Dextrose Equivalent) as per varied end uses and client requirement. Sulphur free glucose is manufactured for specific customer. Glucose syrup is packed in HDPE barrels (300-500 kg), Intermediate Bulk containers and ISO tanks.

II. Indian Maltodextrin market

Maltodextrin is a complex carbohydrate, yet due to its high Glycaemic Index, it is absorbed by the body quickly, much like Dextrose. It delivers a quick boost in energy and raises blood sugar levels in body which helps in swiftly replenishing glycogen levels. Maltodextrin is used as sugar replacement to reduce the sweetness of beverages, thickening, stabilizers, and bulking agents in foods. Maltodextrins is used in spray drying, carriers for noncaloric sweeteners, vitamins and spices which are all in powder form.

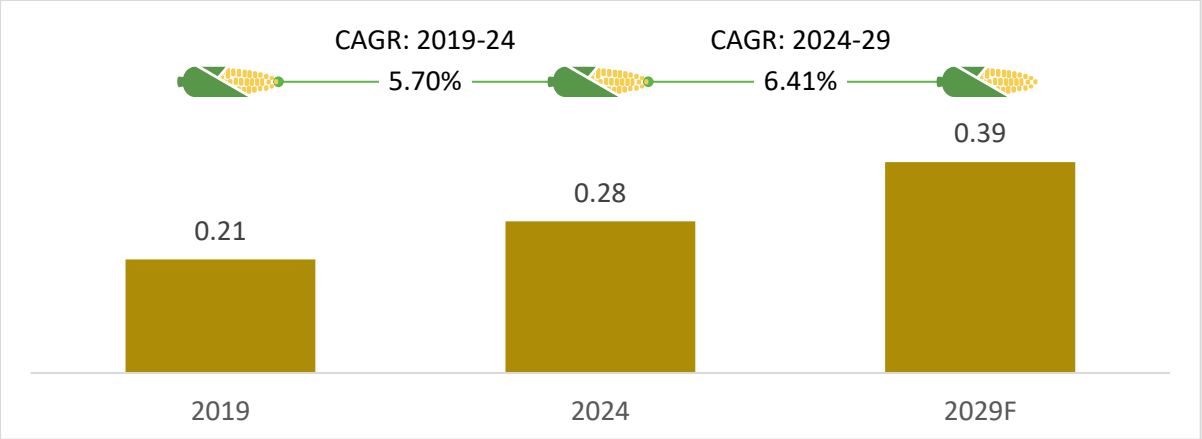
Maltodextrin market in India was valued at USD 151.5 million in 2024 and is expected to reach USD 210.8 million at growth rate of 6.84% by 2029. Major players in maltodextrin market in India are Blue Ocean Biotech Private Limited, Bluecraft Agro Private Limited, Cargill, Gujarat Ambuja Exports Limited, Gulshan Polyols Limited, Roquette, Sahyadri Starch, ShreeGluco Biotech and Sukhjit Starch and Chemicals Limited.

Exhibit 78: Indian Maltodextrin market size, USD Millions



Source: Industry sources, Frost & Sullivan

Exhibit 79: Indian Maltodextrin market size, Million Tons



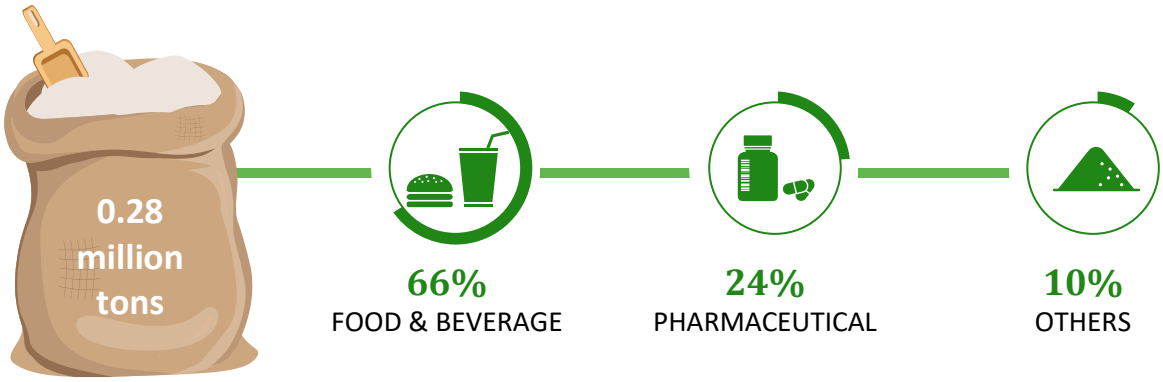
Source: Industry sources, Frost & Sullivan

Maltodextrin is offered in following variants:

10 to 16 Low DE Maltodextrins	**16 to 24** Medium Maltodextrin	**24 to 30** Standard Maltodextrin

Approximately 60-65% of production is undertaken for regular maltodextrin followed by low DE maltodextrin. Low DE maltodextrin used in India is imported. Other maltodextrin demand is mostly filled by Indian producers. It is available in 25- 50 Kg HDPE bags with the inner liner of LDPE & 25 kg Kraft Multiply Paper Bags.

Exhibit 80: Indian Maltodextrin market size, By application, 2024



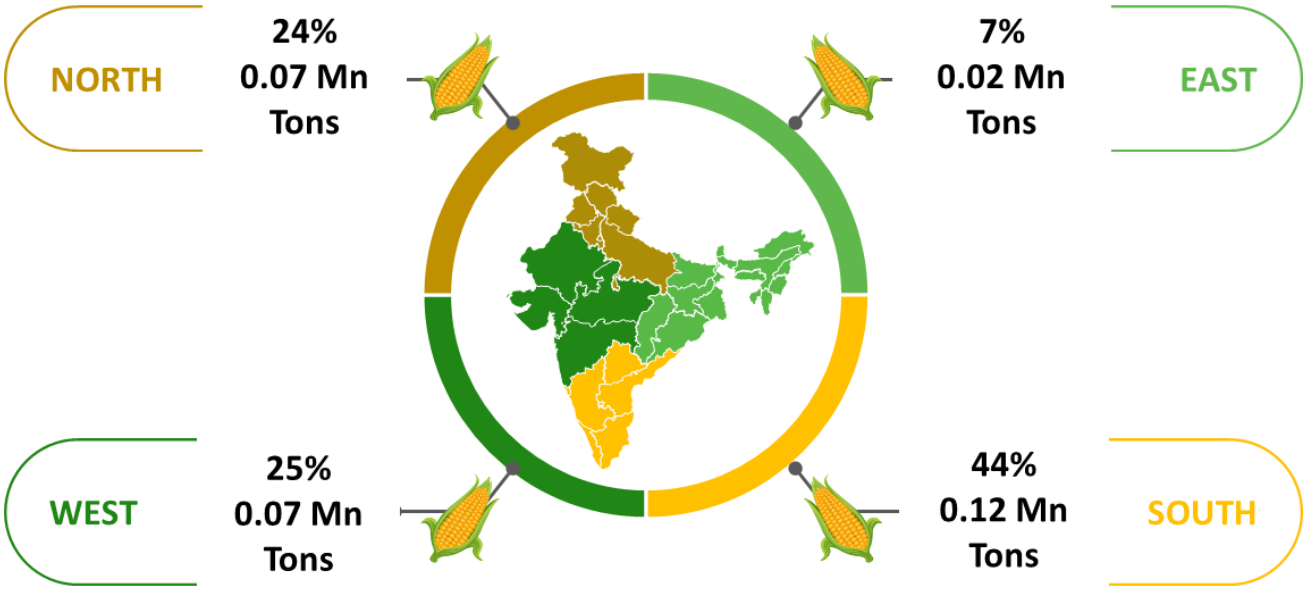
Source: Industry sources, Frost & Sullivan

Maltodextrin is majorly used in nutraceuticals, dairy, snacks, bakery products, and the flavour industry. One of the oldest uses of maltodextrin powder is certainly in infant formulas, which is merely one part of a larger category of nutritious fluids. Maltodextrin is used in infant food to provide carbohydrates in drink which do not have milk or lactose (usually soy protein based).

Maltodextrin is also used as bulking agents and serve mainly as a carbohydrate component in dry mix products, including dry beverage mixes, cookie mixes, puddings, frosting, soups, frozen desserts, cake, artificially sweetened cocoas, tea, coffee and so on.

Maltodextrin is also used for tabletting as direct tablet excipient. It is used as fat replacer for ice-creams, salad dressings and desserts. It is used for oil well drilling fluids and other industrial application as well. Zydus, Nestle, Danone, P&G and Wockhardt are the key end users of maltodextrin in India.

Exhibit 81: Indian Maltodextrin market size, By Geography, 2024



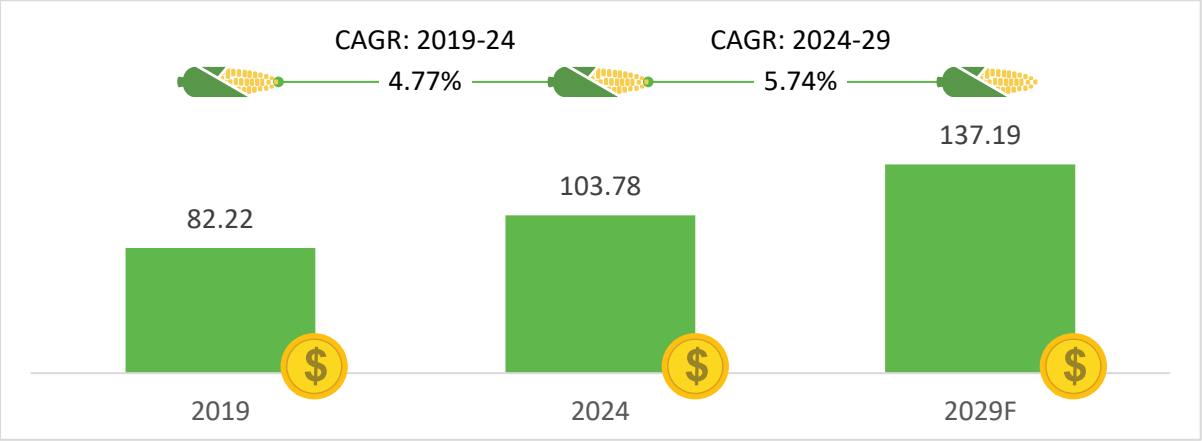
Source: Primary interactions, Frost & Sullivan

III. Indian Dextrose market

Dextrose Monohydrate is moderate in sweetness which is 65-70% sweet as sucrose. It is freely soluble in water at room temperature and also in boiling alcohol. It has a greater depression of

freezing point than that of cane sugar which helps in a smoother and creamier texture of frozen food products.

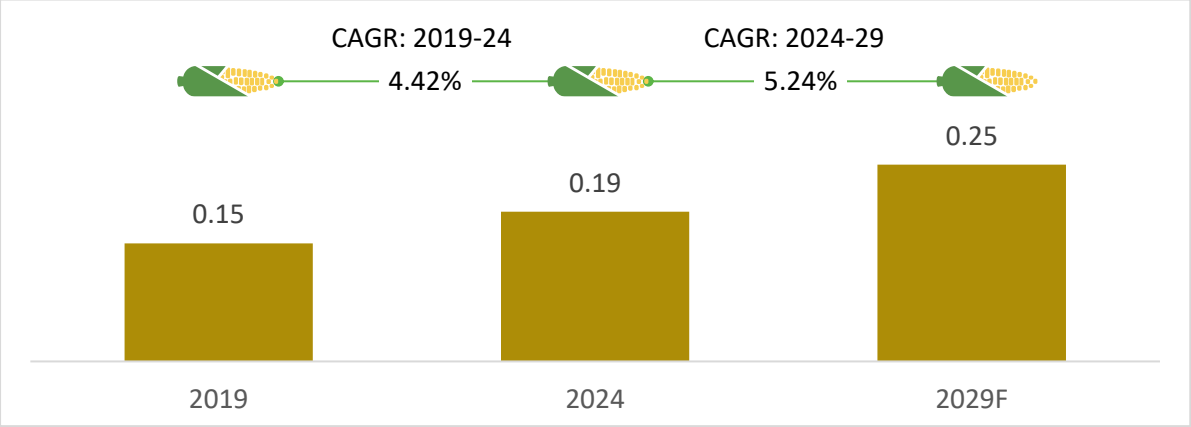
Exhibit 82: Indian Dextrose Monohydrate market size, USD Millions



Source: Industry sources, Frost & Sullivan

Indian Dextrose monohydrate market was valued at USD 103.78 million in 2024 and is expected to grow at a CAGR 5.74% till 2029.

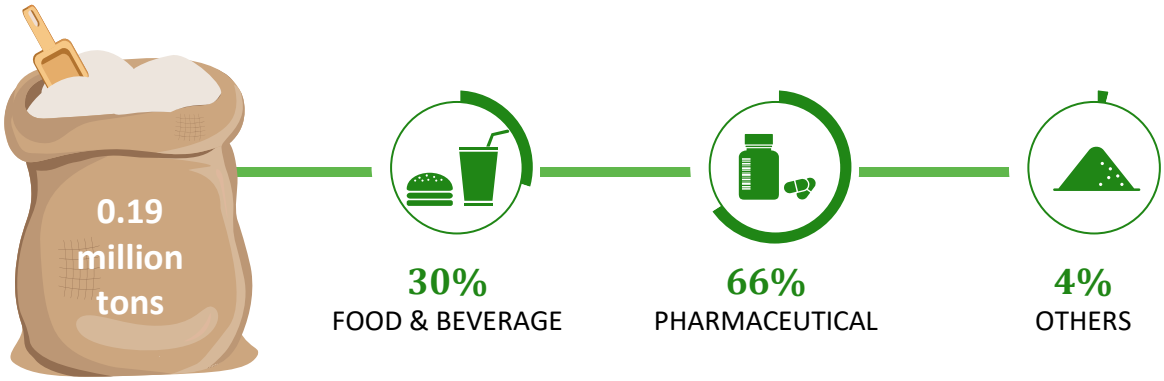
Exhibit 83: Indian Dextrose Monohydrate market size, Million tons



Source: Industry sources, Frost & Sullivan

Major players in dextrose monohydrate market are Cargill, Bluecraft Agro Private Limited, Gujarat Ambuja Exports Limited, Sayaji Maize Products, Roquette and Sukhjit Starch and Chemicals Limited. Dextrose monohydrate is available in packing of 25-50 Kg HDPE bags with the inner liner of LDPE which is heat sealed.

Exhibit 84: Indian Dextrose monohydrate market size, By application, 2024



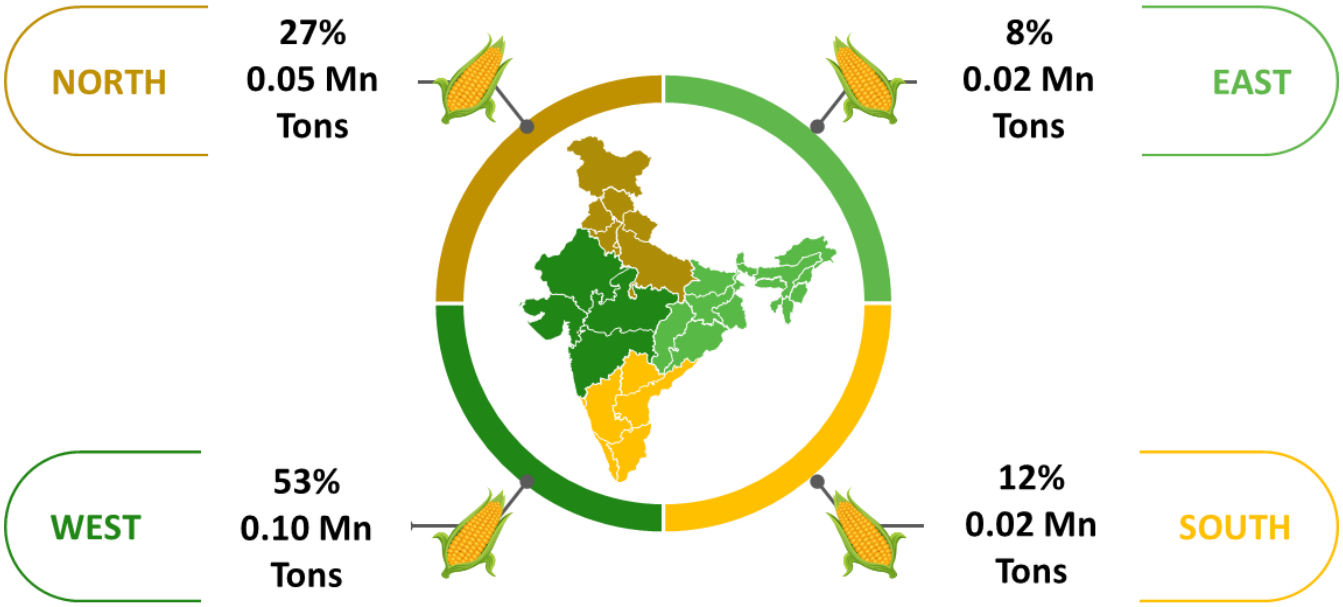
Source: Primary interactions, Frost & Sullivan

Strong demand from Food and beverage industry is fuelling the growth of market. It is used in bakery products such as breads and buns to supply fermentable carbohydrates for raising the products. In biscuits, it is used as sucrose replacement for cream fillings and fondants as it gives smooth texture to product. Dextrose monohydrate is used extensively in confectionaries for sweetening and coating, chewing gum and bubble gum. It helps to improve gloss and colour in gums. It also imparts whip ability and sweetness in nougat and marshmallow applications. It is also used in frozen desserts to control ice crystal formation.

Dextrose monohydrate is also used in canned fruits and vegetables for controlling preserving and sweet properties. It is also used for its high fermenting and low-calorie ability in alcoholic beverages.

In industrial applications, dextrose monohydrate is used to provide flow control and wrapping prevention in adhesives. It is used as a plasticizer in various resin formulations. It also serves as feedstock for chemical or microbiological oxidation to gluconic acid. Some of other uses of dextrose monohydrate are - metal treatment, leather manufacturing, and dye applications.

Exhibit 85: Indian Dextrose monohydrate market size, By geography, 2024

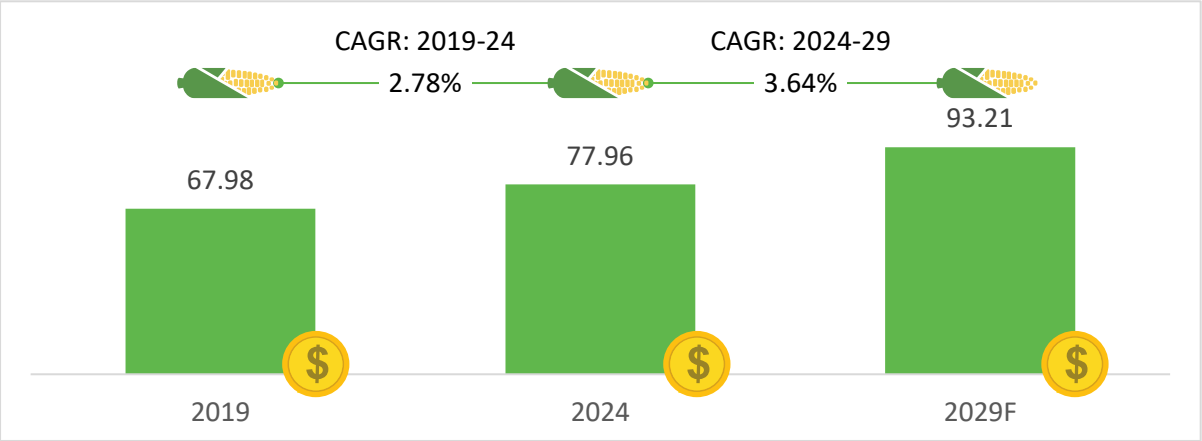


Source: Primary interactions, Frost & Sullivan

Dextrose anhydrous is also known as Maize sugar anhydrous or Anhydrous sugar. It is purified and crystallized D-glucose which is directly absorbed into blood. It is colourless, odourless white powder which has a glycaemic index close to 100%. It is less sweet than cane sugar, soluble in water and partially soluble in alcohol.

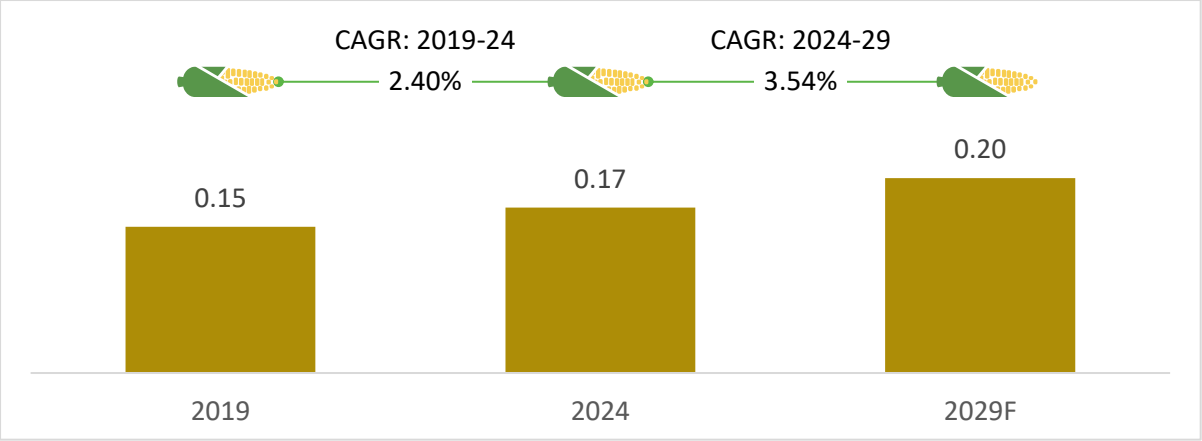
The Indian Dextrose Anhydrous market was valued at valued at USD 78 million in 2024 and is expected to grow at 3.64% to reach USD 93.2 million by 2029.

Exhibit 86: Indian Dextrose anhydrous market size, USD Million



Source: Industry sources, Frost & Sullivan

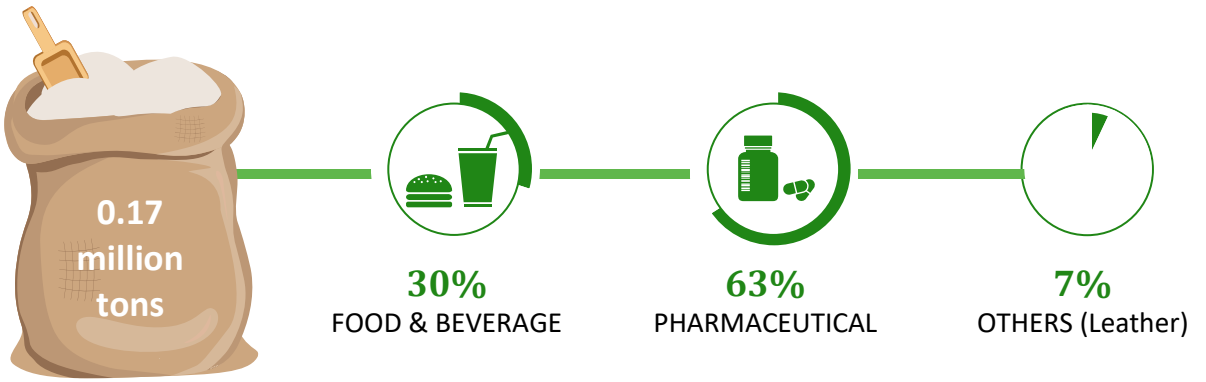
Exhibit 87: Indian Dextrose anhydrous market size, Million tons



Source: Industry sources, Frost & Sullivan

Sukhjit Starch and Chemicals Limited, Gujarat Ambuja Exports Limited, Sayaji Maize Products and Tirupathi Starch & Chemical Limited are some of the major producers of Dextrose Anhydrous. They offer the product in 25-50 Kg HDPE bags with the inner liner of LDPE as well as 25 kg Kraft Multiply Paper Bags.

Exhibit 88: Indian Dextrose anhydrous market size, By application, 2024

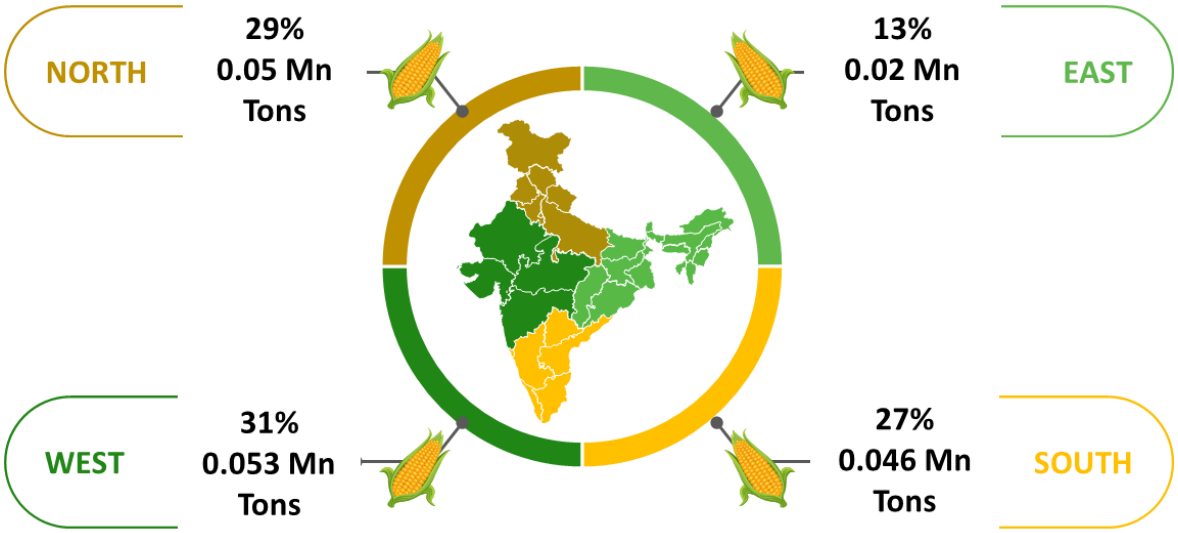


Source: Industry sources, Frost & Sullivan

Dextrose Anhydrous can be used in a wide variety of industries including pharmaceutical, food and beverage products and animal feed. In food industries, dextrose anhydrous can be used as sweetener in candies, gums, baked goods, ice-creams, frozen yogurts, canned foods, cured meats etc. It is also used in energy drinks, low calorie beer products to reduce source of calories.

Dextrose Anhydrous has major application in pharmaceutical industry. It is used for oral ingestion for enhancing nutrition in patients. It is also widely used in human infusion and injection. It is also used as fillers, diluents & binders for tablets, capsules, and sachets. Another application of dextrose anhydrous is in formulation of Skin care products, bath products, cleansing products, eye makeup, and hair care products in Cosmetic industry

Exhibit 89: Indian Dextrose anhydrous market size, By geography, 2024

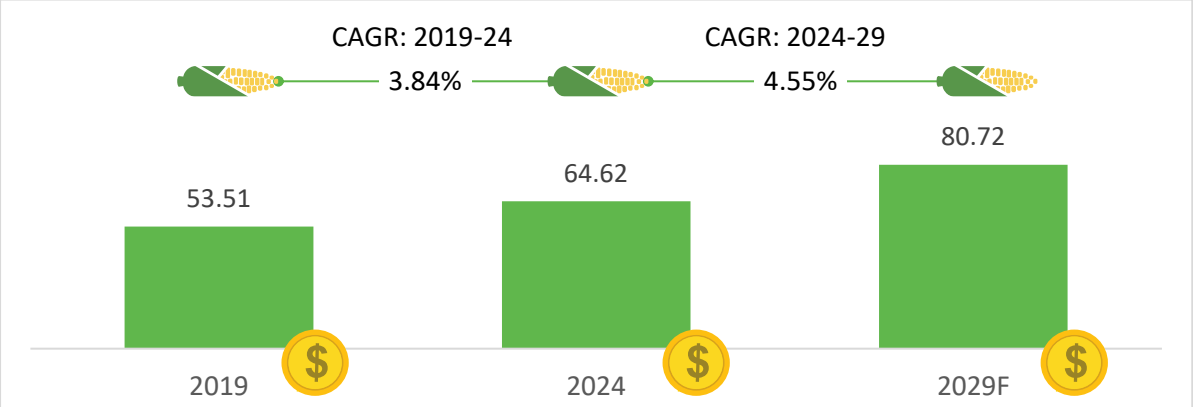


Source: Primary interactions, Frost & Sullivan

IV. Indian Sorbitol market

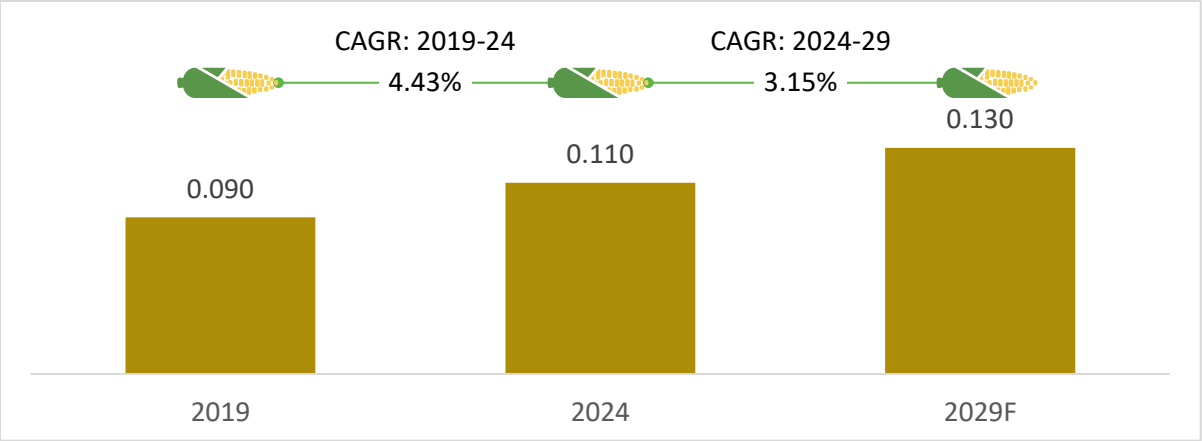
The Indian sorbitol market was valued at USD 64.6 million in 2024 and is expected to grow at 4.55% to reach USD 80.7 million by 2029. Sorbitol's features such as its plasticity, viscosity, moisture retention and its chelating property makes it suitable ingredient for applications ranging from food to personal care products. It is also used as bulking, cooling and texturizing agent, low calorie sweetener, humectant and stabilizer.

Exhibit 90: Indian Sorbitol market size, USD Million



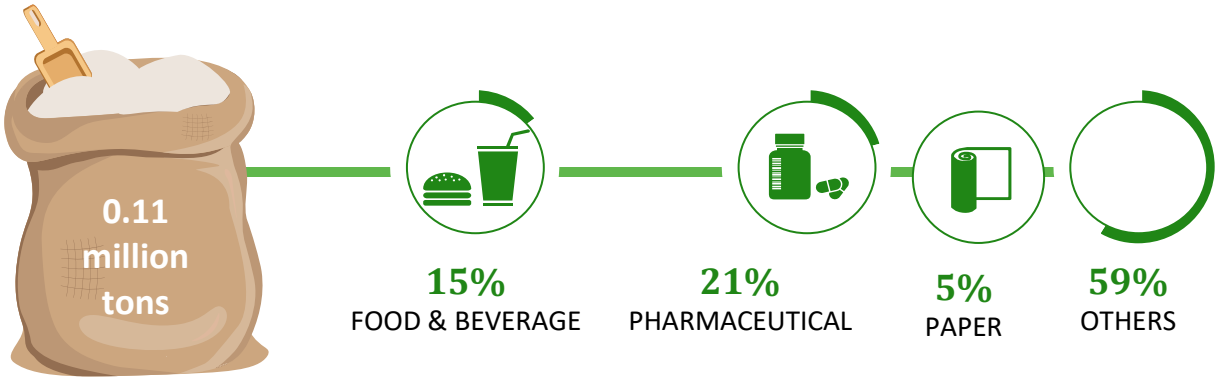
Source: Industry sources, Frost & Sullivan

Exhibit 91: Indian Sorbitol market size, Million tons



Source: Industry sources, Frost & Sullivan

Exhibit 92: Indian Liquid Sorbitol market size, By application, 2024



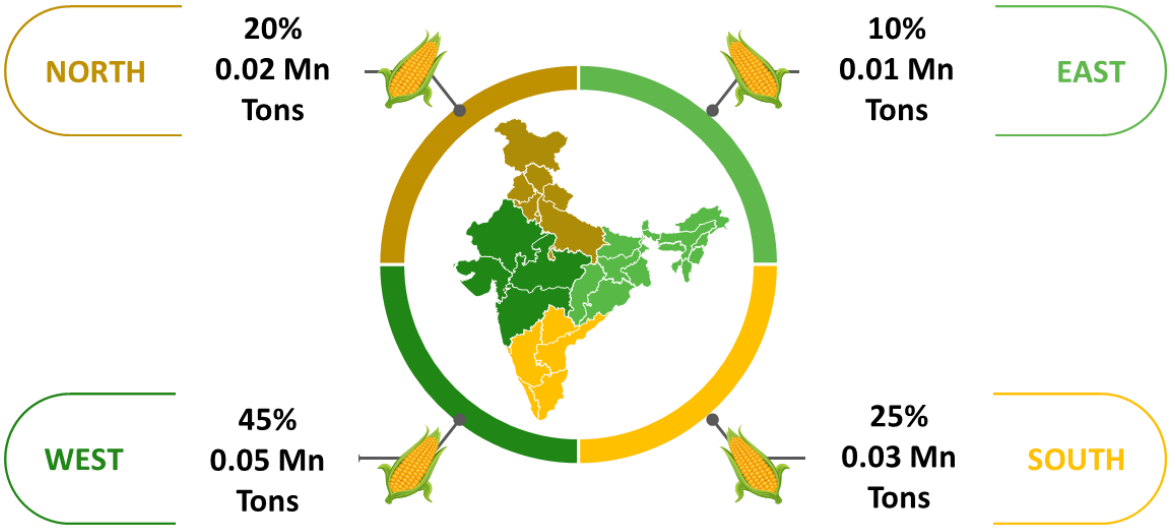
* Others include Animal Feed, FMCG, Cosmetics

Source: Industry sources, Frost & Sullivan

Sorbitol is used in cosmetics and all the oral care products which include toothpaste, mouthwash, ointments, creams, lotions, shampoo and shaving creams. Companies such as Unilever, Patanjali, Wipro, and Colgate are the major end use consumers for sorbitol. It is also used in papers, explosives, tobacco, and mortar & concrete industry to some extent.

Candies, pastries, low or no sugar chocolates, chewing gums, ice-creams, jams, energy drinks, cakes and enzymes also have sorbitol as its ingredient. Soft gel capsules, suspensions and liquid syrups also use sorbitol. Sorbitol is used in Industrial applications for alkyd Resins, Melamine & Phenolic Resins, Polyether Polyols for Rigid Polyurethane Foams, Vitamin 'C' and Sorbitol (D-Glucitol) Esters.

Exhibit 93: Indian Liquid Sorbitol market size, By geography, 2024



Source: Primary interactions, Frost & Sullivan

Major players in sorbitol market in India are companies such as Gujarat Ambuja Exports Limited, Gulshan Polyols Limited, Bluecraft Agro Private Limited, Kasyap Sweeteners Limited, and Sukhjit Starch and Chemicals Limited. Some companies also produce sorbitol in crystalline and non-crystalline grade which have same appearance – clear, colourless, syrupy liquid but vary in D-glucitol content, i.e., 72% to 92% in non-crystalline grades and 92% to 100% in crystalline grade.

Indian is also an exporter of sorbitol, and it is exported in 270- 300 Kgs HM HDPE drums, Flexitank and IBC tankers. 300 kg HM HDPE barrels, 1 MT IBC and in ISO Tanks for domestic supplies.

6. Competitive Landscape

6.1. Indian Maize milling industry- Competitive landscape

Indian Maize starch market is expected to reach a volume of 9.62 million tons by 2029 and is expected to grow at a CAGR of 4.77 % during 2024-2029. The major drivers for growth in the sector includes abundant availability of the raw material in India (domestic production of 42.28 Million Tons in 2024-25, and end use industries including food and beverage, pharmaceutical, animal feed, textile, and paper industries with the Food & Beverage category being the largest end use industry.

The Indian maize starch market has expanded significantly in the last decade due to rapid industrialization, growing population, relatively young demographic, urbanisation and rising disposable incomes. The supply and demand of maize from different end use industries has a significant impact on the Indian maize processing business. The consumption of maize is expected to exceed its supply due to its growing usage in the manufacturing of ethanol. India's push to increase the ethanol content in gasoline 20% by 2025-26 has driven up the demand for maize-based ethanol. According to India's Department of Agriculture, maize prices are expected to increase in the near future. The growth of the maize processing sector in India is largely driven by the growing demand for maize for industrial purposes. Concurrently, the cost of downstream products like maize starch & its derivative products is also rising. Long-term investment in a maize processing facility is profitable when the manufacturers target domestic as well as export market. In addition, presence of processing facility near the cultivation belts in India will be added advantage for the manufacturer.

Maize starch industry is highly competitive, with large number of players in organized (20-25 players) as well as unorganized sector. Medium to Large players is present in starch, derivatives, and other value-added segments.

Indian maize starch manufacturing companies are currently investing in state of the art manufacturing facilities and charting out expansion plans to cater domestic as well as global demand. Maize milling plants of Regaal Resources Limited (1), Cargill (1), Gujarat Ambuja Exports Limited (2) and Roquette (3) have zero liquid discharge, wherein the plant discharges no liquid effluent into surface waters, in effect eliminating the environmental pollution associated with treatment and making it more ESG friendly.

Exhibit 94: Major Indian Players in Indian Maize Milling industry

Indian Maize Starch producing companies	Bluecraft Agro Private Limited	Gujarat Ambuja Export Limited	Gulshan Polyols Limited *	Regaal Resources Limited	Roquette*	Sukhjit Starch and Chemicals Limited	Sanstar Limited	Paramesu Biotech
Year of Establishment	2016	1991	1981	2016	2010	1943	2005	2011
Plant location	Andhra Pradesh (1), Telangana (1), Haryana (1)	Gujarat (1), Maharashtra (1), Karnataka (1), Uttarakhand (1), West Bengal (1)	UP (1), Gujarat (1)	Bihar (1)	Karnataka (1), Gujarat (1), Uttara-khand (1)	Punjab (1), Telangana (1), WB (1), Himachal Pradesh (1)	Gujarat (1), Maharashtra (1)	Andhra Pradesh (1)
Installed Maize milling Capacities (TPD)	1,675	4,000***	600*	750	2,720*	1,600	1,100**	800
Capacity Utilization, %	78% (FY24)	90% (FY24, FY23, FY22)	Not Available for last 3 fiscal years	99.74% (FY25) 94.70% (FY24) 96.59% (FY23)	Not Available for last 3 fiscal years	80% (FY 23) 80%(FY 22)	86.2% (FY24), 87.9% (FY23), 78.2% (FY22)	93.09% (FY 24) 94.58% (FY 23) 91.76% (FY 22)

Indian Maize Starch producing companies	Bluecraft Agro Private Limited	Gujarat Ambuja Export Limited	Gulshan Polyols Limited *	Regaal Resources Limited	Roquette*	Sukhjit Starch and Chemicals Limited	Sanstar Limited	Paramesu Biotech
Product Mix	Native Starch, Modified Starch, Sorbitol, Maltodextrin, Coproducts	Maize Starch, Liquid Glucose, Dextrose Monohydrate, Dextrose Anhydrous, Sorbitol, Maltodextrin, Dextrin	Maize Starch, Liquid Glucose, Sorbitol, Fructose syrup	Starch, Dextrins, Maize Flour, Icing Sugar, Baking Powder, Custard Powder, Co products	Maize starch, Liquid and powdered glucose, Modified starches, Glucose D, Dextrose Monohydrate, Maltodextrin, High Maltose Maize syrup, and Dextrose syrup	Maize Starch, Liquid Glucose, Dextrose Monohydrate, Dextrose Anhydrous, Sorbitol, Maltodextrin, High Maltose Maize Syrup	Starch, Dextrin, high maltose maize syrup, dextrose monohydrate, maltodextrin, sorbitol, and co-products.	Starch, Maltodextrin, Liquid Glucose, Dextrin's, Pre-gelatinized starch, Thin Boiled Starch, Cationic Starch, Oxidized Starch, Spray Starch, Co products
No of employees	500+	2590+	526	469	NA	1250+	271+	366
QUALITY CERTIFICATIONS	Good Manufacturing practice, HACCP, FSSAI	Halal India, BRC Food Certification, FSSC 22000, GMP+, Kosher check, Sedex, Non- GMO Standards, Majelis Ulama-Indonesia	ISO 9001:2015, ISO22000, BRC Global, Standard OHSAS 18001,Halal India	ISO 9001:2015, ISO 14001:2015, ISO 22000:2018, ISO 45001:2018, FSSAI, Halal India, LEI, IEM, One Star Export House	NA	FSSC 22000, Certification (SGS), ISO 9001: 2015, Halal India, Food safety system Certification (SGS), ISO 9001: 2015, Halal India	ISO 9001:2015, HACCP and FSSAI certifications a	ISO 9001:2015, ISO 14000:2015, ISO 22000:2018, ISO 45001:2018, FSSAI, HALAL, Kosher certificate for -High Maltose Corn Syrup, Maize starch powder, Liquid Glucose, Maltodextrin Powder, White Dextrin, Halal Indonesia, Certification of compliance -Good Manufacturing Practice by Quality verification registrar-Registration No : DAAS-PAL-000229
Expansion plans		Plan to increase capacity by 2000 TPD un the next two years		The company is planning is to reach 1,650 TPD		The company has been focused on expanding this capacity, with a recent increase from 1,600 TPD to 2,000 TPD		Company plans to establish a new facility in Madhya Pradesh with maize milling capacities of 1200 TPD

*Data provided for capacity is given on the basis of credit rating reports and discussions with industry stakeholders.
Based on press release of Care Edge Ratings
**Expected to reach 2,100 MT by July 2025 (D._CRR_Sanstar_Limited.pdf)
***Expected to reach 6,000 MT by next 2 years (202501130152_Gujarat_Ambuja_Exports_Limited.pdf)

Source: Company Websites and Secondary sources

Exhibit 95: Key Players in Indian Maize Starch Industry

Indian Maize Starch producing companies	Installed Maize milling Capacities, TPD	% Market Share
Gujarat Ambuja Exports Limited	4,000	20.50%
Roquette *	2,720	13.94%
Sukhjit Starch and Chemicals Limited	1,600	8.20%
Bluecraft Agro Private Limited	1,675	8.58%
Sanstar Limited	1,100	5.64%
Sayaji Maize Products	1,000	5.12%
Cargill*	800	4.10%
Paramesu Biotech Limited	800	4.10%
Regaal Resources Limited	750	3.84%
Universal Starch- Chem Allied Limited	750	3.84%
Gulshan Polyols Limited*	600	3.07%
ShreeGluco Biotech*	600	3.07%
Sahyadri Starch & Industries Private Limited	600	3.07%
Kasyap Sweeteners Limited*	420	2.15%
Rajaram Maize Products Private Limited*	300	1.54%
Everest Starch Private Limited*	300	1.54%
Santosh Limited	300	1.54%
Others	1,200	6.15%

** These companies have not published the capacities, and the data provided is given on the basis of credit rating reports and discussions with industry stakeholders.*

Source: Company Annual Reports, Secondary sources, Frost & Sullivan

Overview of financial performance of key players

Exhibit 96: Key Financial Indicators of Indian Maize based Speciality Products and Ingredient Solutions Players

Parameters	Revenue, INR Mn			Revenue CAGR
Company name/ Year	2023	2024	2025	2023-2025
Gujarat Ambuja Exports Limited (Maize Processing revenue)	49,089.90	49,267.00	46,125.80	-3.07%
Gulshan Polyols Limited (Starch revenues)	11,797.30	13,779.76	20,196.77	30.84%
Sanstar Limited	12,050.67	10,672.71	9,534.23	-11.05%
Sukhjit Starch & Chemicals Limited- Revenue from Starch & Derivative	14,465.72	13,753.45	14,979.50	1.76%

Parameters	Revenue, INR Mn			Revenue CAGR
Company name/ Year	2023	2024	2025	2023-2025
Tirupati Starch & Chemicals Limited	3,642.15	3,061.15	3,862.25	2.98%
Universal Starch-chem Allied Limited	5,157.57	5,271.32	4,908.91	-2.44%
Regaal Resources Limited	4,879.55	6,000.23	9,151.61	36.95%

Source: Annual Reports, Money control, Frost & Sullivan research

Exhibit 97: Key Financial Indicators of Indian Maize Based Speciality Products & Ingredient Solutions Players

Parameters	PAT (INR Mn)			PAT Margin (%)		
Company name/ Year	2023	2024	2025	2023	2024	2025
Gujarat Ambuja Exports Limited	3,301.00	3,458.70	2,492.50	6.62%	6.82%	5.31%
Gulshan Polyols Limited	451.82	177.58	246.66	3.81%	1.28%	1.22%
Sanstar Limited	418.05	667.67	437.98	3.46%	6.17%	4.51%
Sukhjit Starch & Chemicals Limited	633.61	499.58	399.50	4.37%	3.61%	2.65%
Tirupati Starch & Chemicals Limited	65.69	21.95	5.52	1.80%	0.72%	0.14%
Universal Starch-chem Allied Limited	59.02	69.85	32.12	1.14%	1.32%	0.65%
Regaal Resources Limited	167.58	221.42	476.68	3.43%	3.68%	5.19%

Source: Annual Reports, Money control, Frost & Sullivan Research

Exhibit 98: Key Financial Indicators of Indian Maize Based Speciality Products and Ingredient Solutions Players

Parameters	EBITDA			EBITDA Margin (%)		
Company name/ Year	2023	2024	2025	2023	2024	2025
Gujarat Ambuja Exports Limited	4,750.40	4,423.70	4,009.70	9.68%	8.98%	8.69%
Gulshan Polyols Limited	879.98	580.77	953.56	7.46%	4.21%	4.72%
Sanstar Limited	724.47	981.41	559.76	6.01%	9.20%	5.87%
Sukhjit Starch & Chemicals Limited	1,470.90	1,280.22	1,116.90	10.17%	9.31%	7.46%
Tirupati Starch & Chemicals Limited	210.23	206.12	69.26	5.77%	6.73%	1.79%
Universal Starch-chem Allied Limited	174.01	201.15	183.60	3.37%	3.82%	3.74%
Regaal Resources Limited	406.73	563.65	1,127.90	8.34%	9.39%	12.32%

Source: Annual Reports, Money control, Frost & Sullivan Research

Exhibit 99: Key Financial Indicators of Indian Maize Based Speciality Products and Ingredient Solutions Players

Parameters	Debt/Equity		
Company name/ Year	2023	2024	2025
Gujarat Ambuja Exports Limited	0.09	0.07	0.07
Gulshan Polyols Limited	0.43	0.59	0.64
Sanstar Limited	0.60	0.50	0.04
Sukhjit Starch & Chemicals Limited	0.69	0.65	0.52
Tirupati Starch & Chemicals Limited	1.95	2.86	2.23
Universal Starch-chem Allied Limited	1.11	0.93	0.94
Regaal Resources Limited	1.68	2.65	2.08

Source: Annual Reports, Money control, Frost & Sullivan Research

Financial parameters for peers till March 31, 2025

Key Performance Indicators	Regaal Resources Limited	Sanstar Limited	Gujarat Ambuja Exports Limited	Gulshan Polyols Limited	Sukhjit Starch and Chemicals Limited	Tirupati Starch & Chemicals Ltd.	Universal Starch Chem Allied Limited
Revenue from Operations, INR Mn	9,151.61	9,534.23	46,125.80	20,196.77	14,979.50	3,862.25	4,908.91
PAT, INR Mn	476.68	437.98	2,492.50	246.66	399.50	5.52	32.12
PAT Margin (%)	5.19%	4.51%	5.31%	1.22%	2.65%	0.14%	0.65%
EBITDA	1,127.90	559.76	4,009.70	953.56	1,116.90	69.26	183.60
EBITDA Margin	12.32%	5.87%	8.69%	4.72%	7.46%	1.79%	3.74%
Debt/Equity Ratio	2.08	0.04	0.07	0.64	0.52	2.23	0.94

Source: Annual Reports, Money control, Frost & Sullivan research

Critical Success factors for Maize Milling Industry

a) Robust Financials

Having strong financials from the ongoing operations is must for being successful in maize starch industry. This comes with strong customer base and quality driven diversified product portfolio.

Gujarat Ambuja Exports Limited's (GAEL) EBITDA margin was 8.69% in FY 2025.

Regaal Resources Limited is the 2nd largest maize processor in Eastern Indian with its state-of-the-art starch manufacturing facility. Regaal Resources Limited is amongst the top 10 largest maize milling companies in terms of crushing capacity in India with a total installed crushing capacity of 750 TPD. It is first & only plant in Bihar. Company engaged in manufacturing of Starch, Dextrins, Gluten, Germ and Fiber & Value-Added Products- baking powder, custard powder, maize flour, and icing sugar. Their products cater to wide range of end use industries. The Company has reported INR 9,151.61 million in FY25 from INR 4,879.55 million in FY23. With revenue growing at a CAGR of 36.95% between Fiscal 2023 and Fiscal 2025, Regaal is one of the fastest growing (among the identified peers in report) maize-based speciality products manufacturers in India.

b) Strong Future growth backed by Capacity Expansion and Addition of Derivatives

Maize milling industry in India is undergoing capacity expansion owing to high domestic as well as international demand.
GAEL is expanding its maize processing capacity by 2,000 TPD in the next two years. Players including Paramesu Biotech has also planned to expand their capacities

Regaal Resources Limited is also diversifying its product portfolio by adding products such as Maltodextrin powder, Liquid glucose, DMH (Dextrose Monohydrate) & DAH (Dextrose Anhydrous) in the product pipeline

Regaal Resources Limited has value added products including Baking Powder, Custard Powder, Maize Flour, and Icing Sugar in its product portfolio. Company is also exploring new opportunities vertical and horizontal integration. Also, Regaal Resources Limited is working on improving buying and selling efficiency by procuring maize directly from farmers and selling its products directly to the companies bypassing traders.

c) Experienced Promoters with a Team of Industry Veterans

Maize Starch industry is thriving currently based on Experienced Promoters with capable technical team that is driving the Organised players to continue their growth trajectory.

Promoter Dr CK Jain of Gulshan Polyols have close to four decades experience in maize milling industry. Kasyap Family of Kashyap Sweetener's is in maize milling business since 1986 giving company leverage of experience. Promoter of Rajaram Maize Products - Gupta Family is in business from 1966. The market position of Sukhjit Starch and Chemicals Limited is supported by extensive industry experience of key promoters, Sardana family, and the company's vintage in the industry.

Regaal Resources Limited's promoters, Mr Anil Kishorepuria and Mr Karan Kishorepuria combined have close to three decades of experience in the manufacturing, retail, real estate, and trading industry giving them the understanding of market dynamics. Also, this has helped them to establish working relationships with suppliers and customers. Managing Director, Mr Anil Kishorepuria has 25+ years of experience in manufacturing, real estate, retail and trading industry and has been instrumental in setting up the first & only maize milling unit in Bihar. Regaal Resources Limited have a competent and resourceful team which comprises of Mr Karan Kishorepuria- Director, Saikat Chatterjee - Chief Financial Officer and Rohan Kishorepuria - Vice President, Sales. Regaal Resources Limited had set up its Starch Manufacturing plant in 2017 and the Commercial Production commenced in September 2018. But because of Promoters' business acumen they were able to do quickly ramp up the plant operations.

d) Proximity to Raw Material Catchment and First Mover Advantage

Entire business for Maize milling is based on efficient procurement of maize in terms of price and quality. Availability of maize is a challenge, as maize has other uses such as Ethanol production and Animal Feed. As maize is a seasonal crop, it needs to be stocked to ensure continuous supply to maize milling units for entire year. Located in close proximity to maize growing regions would help companies to procure maize more efficiently. Companies can also buy directly from farmers thereby saving on the commissions given to middlemen.

GAEL has strong in-house purchase and procurement system. Raw material price fluctuations are mitigated through timely procurements which is in commensurate with Export orders of the company. Company has strategically located plant in Gujarat, Uttarakhand, Karnataka, Maharashtra and West Bengal which are in close proximity to maize growing clusters.

Maize milling facilities for Sukhjit Starch and Chemical products are strategically located across North, South and East regions of India which are in proximity to source the key raw material. Further, different weather conditions in stated regions allow steady procurement of maize throughout the year at competitive prices, providing additional edge to company.

Regaal Resources Limited 's maize milling unit is strategically located in Kishanganj, Bihar which is maize growing belt of the region thus ensuring good supply of the key raw material to the company. The company also benefits from lower raw material procurement costs by directly purchasing maize from farmers thereby eliminating middlemen (wholesale traders). Regaal Resources Limited also procures maize from the Gulabbagh 'mandi', one of India's largest maize markets. Gulabbagh 'mandi' is in Purnia district of Bihar and is located a distance of 110 km from Regaal Resources Limited's manufacturing facility. Thus, logistics cost is also reduced, and company has access to abundant quantities of high-quality maize at competitive prices.

Company also procures a significant percentage of maize from wholesale traders and agri-distribution companies thus diversifying source of maize ensuring that company is not overly dependent on any one source and we are able to negotiate the best available rates.

It is also the closest located unit in north-eastern states, giving a geographical edge over others in the market. Regaal's Manufacturing Facility is also strategically located 21 Km from the Bengal border which is also a key area for maize cultivation and 209 Km from Assam border.

Regaal Resources Limited is the only company to have maize milling plant located in Bihar and thus it reaps benefit of increased customer loyalty within north-eastern belt. It also receives 100% Interest subsidy (up to 20Cr) and interest capping of 10**%** on every subsequent expansion and 100% exemption on State GST by Bihar government. Also, Bihar's labour rate is one of the lowest in country.

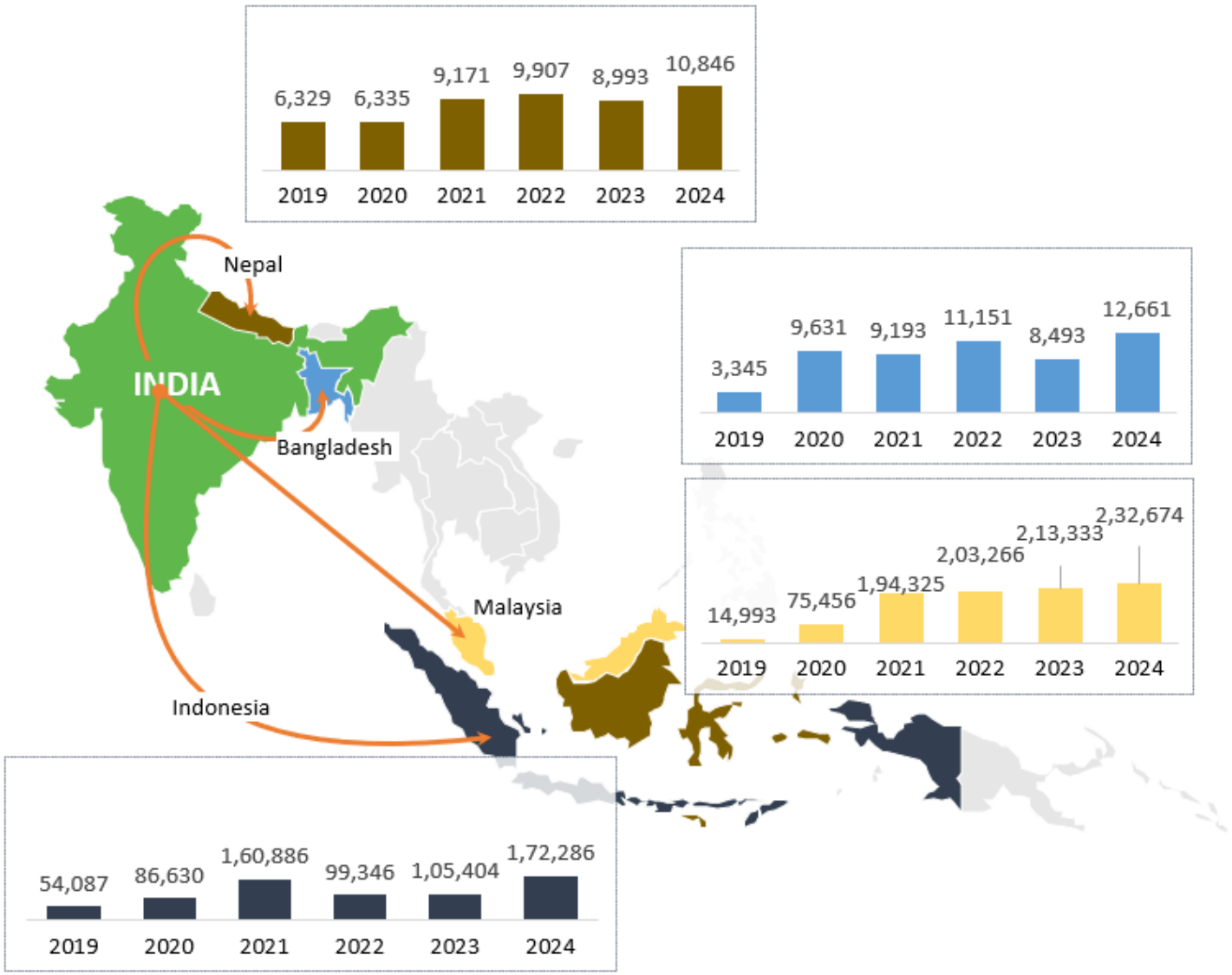
At present Gujarat Ambuja Exports Limited has largest maize milling capacity ~1,200 TPD setup in Malda, West Bengal which got operational from April 2023. Regaal Resources Limited is the second largest player in east region with maize milling capacity of ~750 TPD and amongst the top 10 largest maize milling companies in terms of capacity in India. Sukhjit Starch and Chemicals Limited has the third largest capacities (~450 TPD) in eastern zone.

e) Proximity to Major Maize Starch Importing Countries

Proximity to Export destinations and ports is added advantage to maize starch and derivatives producing companies as it saves transportation cost to company. GAEL has strategic advantage as its plants are close to ports which aid in exporting.

Regaal Resources Limited's plant in Bihar is in close proximity to countries like Nepal and Bangladesh which are the major importers for starch. Maize milling plant of Regaal Resources Limited is 235 kms from Bangladesh border, & only 24 kms from Nepal border (Kakarbhitta).

Exhibit 98 (a): Maize Starch Exported by India, Metric Tons, CY

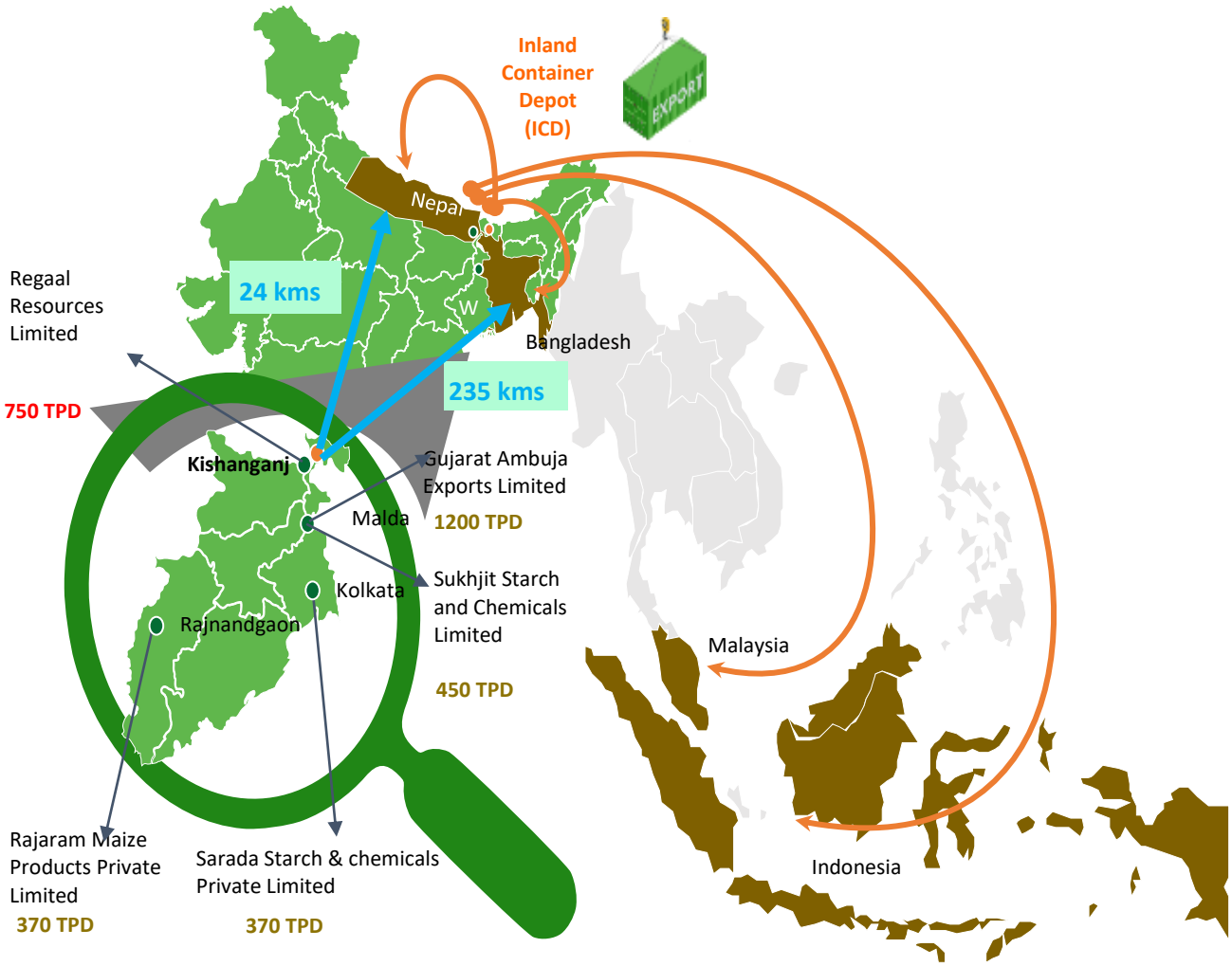


Note: HS code 110812

Source: Trademap, Frost & Sullivan

Companies in the East zone will also reap the benefits of the newly developed Inland Container Depot (ICD) developed in Siliguri, which is a first of its kind facility for domestic and international cargo movement in the region. This ICD is only 45-50 kms from Regaal Resources Limited's plant location which will help exports to Nepal and Bhutan.

Exhibit 98 (b): Proximity of East India plants to starch importing nations



Source: Trademap, Frost & Sullivan

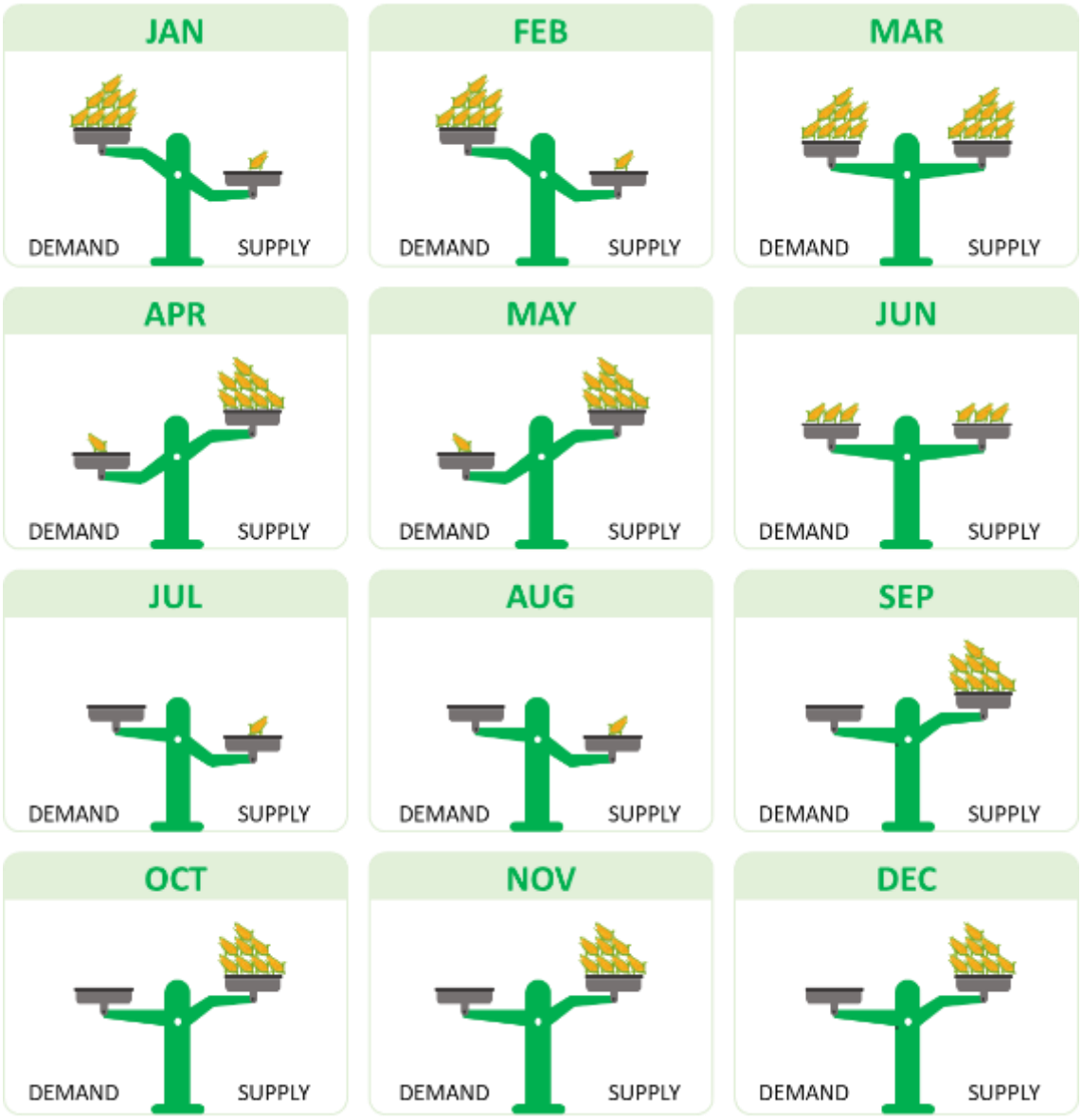
7. Raw Material Assessment

7.1. Raw Material- Maize

Maize is one of the major cereal crops grown in India. Production has increased at CAGR 7.2% from 2019 to 2025. Rising domestic demand for industrial usage and poultry feed may outstrip the domestic maize cultivation in the near future.

Maize is crucial to India's agribusiness value chain. Along with its importance as a foodgrain, maize is also important for biofuel as well as animal feed industry. Due to demand from multiple end industries, supply- demand dynamics plays a major role. The sowing and harvesting seasons have a significant impact on supply and demand for maize. During the months of March to May and September to December, maize harvesting in India is at its peak and purchase of maize usually takes place during such months for stocking purposes.

Exhibit 99: Seasonality of Mazie Demand and Supply



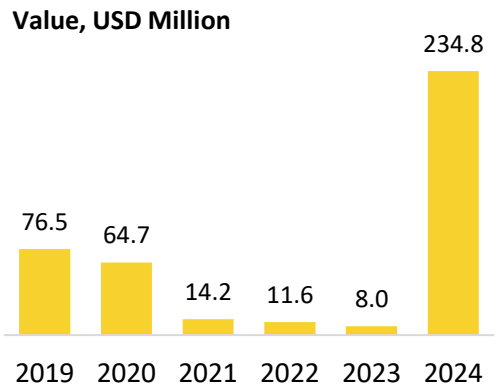
Source: Analysis based on GAIN Report "India Grain and Feed Annual "

Feed mills and Poultry farms often hold stock for 30 to 60 days, depending on their mill capacities, financial stability, and receivables cycle. Maize starch millers stock maize for 3- 5 months. Purchase

of maize usually happens during peak arrival season at low prices for stocking purposes. The inventory is maintained to tide over the peak price months, and buying for regular requirement continues in parallel. Trading companies normally enter into forward trade agreements with consumers (mills, poultry farms) and purchase the grain during peak arrival season. These holding patterns, along with the seasonality of planting and harvesting, have a significant impact on the supply-demand dynamics of maize.
Furthermore, maize prices are volatile, which leaves the manufacturer for Maize Starch with limited pricing power in maize-based commodity products like starch powder.

Due to rising consumer demand and limited domestic supply, India is likely to continue importing smaller quantities of food grade maize for the food processing industry.

Exhibit 100 (a): Maize Import, India, CY 2019 – CY 2024



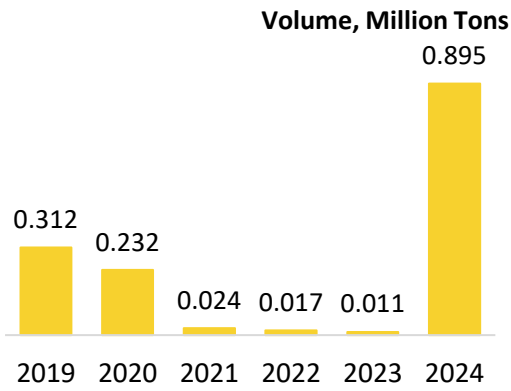
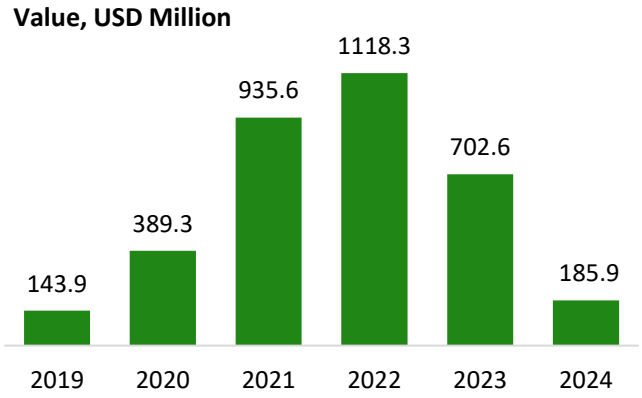
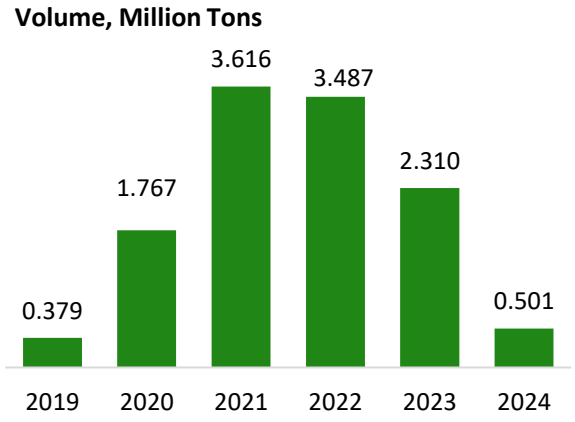
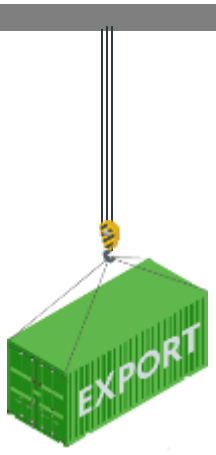


Exhibit 100 (b) : Maize Export, India, CY 2019 – CY 2024

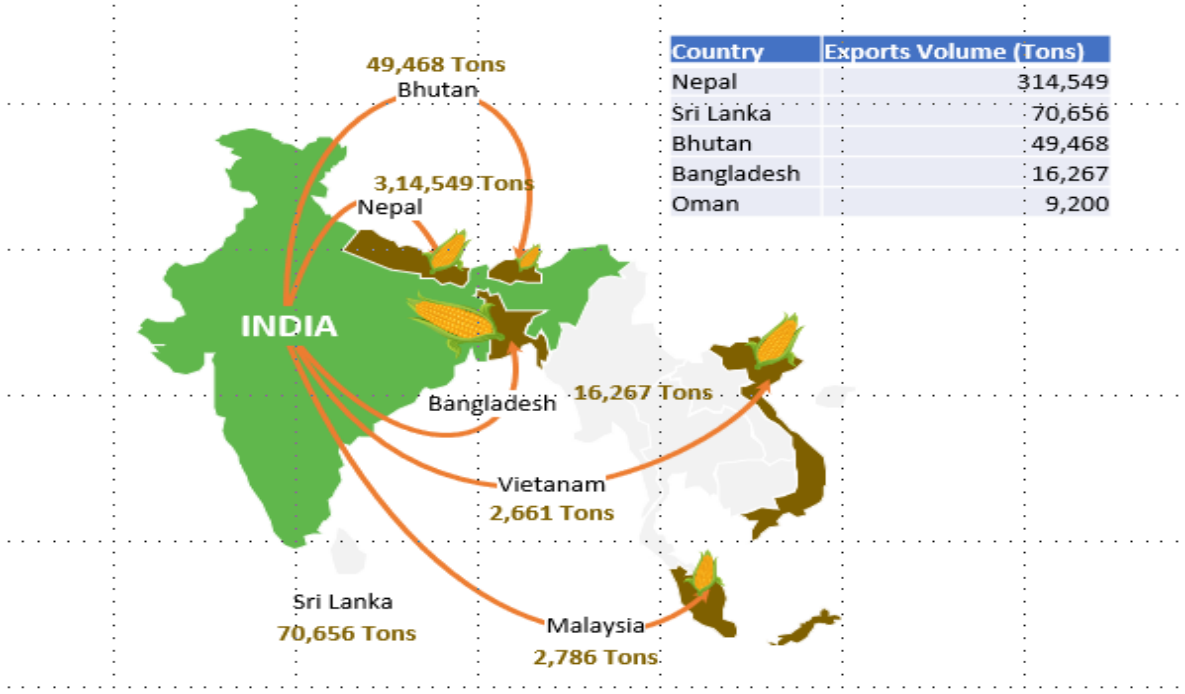






Source – Trademap, Frost & Sullivan Analysis

Exhibit 101: India's Export Partners for Maize, 2024



Country	Exports Volume (Tons)
Nepal	314,549
Sri Lanka	70,656
Bhutan	49,468
Bangladesh	16,267
Oman	9,200

Note: HS code: 1005

Source: Trademap; Frost & Sullivan

Nutritional Value and Quality of maize - Maize quality standards and specifications are important because they safeguard safety, nutritional value, and the worth of maize in the market. The general appearance of maize serves as a gauge of its quality. If some of the grains are compromised by insects or rodents, are stained, mouldy, fractured, or contaminated by non-grain material of either organic or inorganic origin, the quality of the crop declines.

Exhibit 102: Nutritional importance of maize

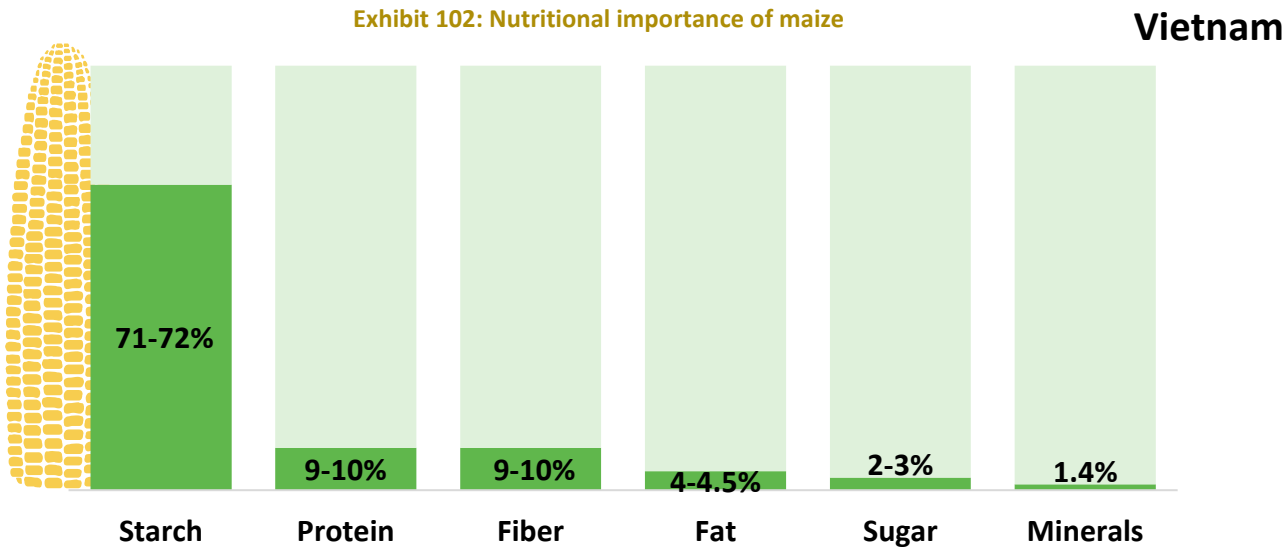


Exhibit 103: Quality Paramerts for maize

Quality Parameter: Warehouse	
Moisture	12-14%, rejected above -16%
Foreign Matter	2-2.5%, rejected above 2.5%
Fungus	0-1%, rejected above - 2%
Live Insect	Reject if seen
Weevield	Reject if seen

The starch in most maize hybrids is composed of about 70–80% amylopectin and 20–30% amylose. Understanding the hardness and texture of maize is crucial for commercial milling processes as starch is the most prevalent component in maize. Maize kernel contains roughly 65-75% starch (dry basis). In addition to providing energy, starch acts as a source of sugar for the developing germ during germination. Maize can be prepared in a variety of ways for use as an energy source for animals (including humans), including cracking or milling it before cooking it into a variety of food dishes.

Starch in Maize has amylopectin up to 75% as its major component. It varies between 70% and 80% in normal maize, but a genetic variation in the starch synthesis can have starch composed of 100% amylopectin, sometimes called waxy maize. Another 25% of starch is made of amylose.

Currently Indian Maize millers are facing challenge of procuring good quality maize at competitive price. One aspect of this is export of good quality maize and other is trader's urgency to procure maize from farmers which may lead to negligence in post-harvest activities particularly drying.

Also, the boost given by the Government for Ethanol production may lead to further challenges in procuring Maize for Starch manufacturing.

7.2. Fuel and other consumables used in Maize processing industry

Coal is used as primary source of fuel for maize milling plants. It is traditionally purchased from traders. According to industry sources, 1 MT of Indian coal can generate 4-4.5 MT of steam whereas 1 MT of imported coal generates 5-6 MT of steam. Prices for high calorific value coal ranged between Rs 8-15/kg. Low calorific value is priced at Rs 3.7- 7/ kg.

As an alternative to coal, use of husk is also increasing in Maize milling plants. It is one of the most abundant and affordable renewable sources for producing starch and derivatives. According to industry sources, 1 MT of husk would produce 3-3.5 MT of steam. There are various husks available in market – Soya husk, Groundnut husk, Rice husk, and Mustard husk. Husk prices normally range from Rs 3-10/kg. Rice husk costs range between Rs 6-10/Kg. Rice husk is preferred as fuel because of its abundant availability, and it contains up to 30-50% of organic carbon which has high calorific value of 13-16 MJ per kg. Rice husk is purchased from miller or traders with the moisture content of 13-15%. Husk can be used after size reduction in the form of pellets and briquettes. Companies are shifting towards green energy, and the use of husk has been increasing as it is environmentally friendly and cost-effective.

8. Profile of Regaal Resources Limited

Based in India, Regaal Resources Limited is engaged in the business of manufacturing of maize based speciality products which includes native maize starch, modified starch, value added products, and co-products such as maize germ, maize fiber, enriched fiber, maize gluten, and Maize Steep Liquor.

Company's Chairman & Managing Director– Mr. Anil Kishorepuria is a second-generation entrepreneur with 25+ years of experience in the manufacturing, real estate, retail and trading industry.

The Company was founded in 2016, and production started in 2018. Since then, it has grown rapidly, increasing its capacity from 180 TPD to over 750 TPD of crushing per day. The company has continuously improved and upgraded the manufacturing plant and enhanced and streamlined wet milling processes which is also reflected in high levels of capacity utilization.

The Company is one of the largest manufacturers of maize based specialty products in India in terms of crushing capacity with a total installed crushing capacity of 750 TPD. The Company is the second largest manufacturers of maize based specialty products in Eastern India with maize milling capacity of ~750 TPD.

The company has strategically situated manufacturing facility encompassing 54.03 acres in Kishanganj, Bihar, one of India's major hubs for maize cultivation, and has its headquarters is in Kolkata, West Bengal.

Products manufactured by Regaal Resources Limited are used in the paper, pharmaceutical, food, textile, animal feed, and many other industries. The company, which holds ISO certification, aims to provide the highest quality products to consumers both domestically and internationally.

Regaal Resources Limited's main products include- Native Maize Starch, Modified starch- White Dextrin & Yellow Dextrin, Maize flour, Baking Powder, Custard Powder, Icing Sugar, maize germ, maize fiber, enriched fiber, maize gluten, and Maize Steep Liquor. Native Starch is the underlying ingredient of Regaal's Speciality products & ingredient solutions. The Company's Speciality products and ingredients solutions add taste, texture, nutrients and increased functionality to:

(a) Foods as ingredients, thickening agents, stabilizers, sweeteners, emulsifiers and additives (in bakery products), confectionery, pastas, soups, ketchups, sauces, creams, deserts amongst others)

(b) Animal nutrition products as nutritional ingredients

(c) Paper industry to improve bonding strength of paper and paperboards; and

(d) Other Industrial Products as disintegrants, excipients, supplements, coating agents, binders, smoothing & flattering agents, finishing agents, among others.

The organization has been named as "Great Place to Work" and consistently strives to give each team member access to the greatest resources and chances for both professional and personal development.

The Company believes that sustainability is a very important factor for any business, especially those that are to be future proof. Company's manufacturing facility is one of the few maize wet milling facilities in India with a Zero Liquid Discharge (ZLD) Unit upholding sustainability measures in the maize wet milling industry. This leads to environmental protection as ZLD systems prevent liquid waste from contaminating water sources, which helps maintain the balance of ecosystems. ZLD system also recycles water reducing the need to acquire water from local sources. ZLD systems also lead to reducing of environmental impact of industries. In an effort to be more sustainable, the company recycles as much water as it can with its own Effluent Treatment facility (ETP), Zero Liquid Discharge (ZLD) unit, and Reverse Osmosis (RO) facility.

Company is self-reliant in terms of power as they are producing their own captive power using a boiler and turbine. Company's manufacturing facility possesses a significant and valuable resource—an abundance of groundwater as they are located 5.2 Km from the Mechi River. The Company also usually uses renewable energy sources, such as rice husk, for the majority of the year. Regaal's manufacturing facility is located near National Highway 327E & is very well connected, with Bagdogra airport at 35.7 Km and Thakurganj Railway Station at 9.6 Km from the facility.

The Company has built 4 silos each with a total storage capacity of 10,000 metric tons i.e. an aggregate of 40,000 MT. Additionally, Company also has a 138,747 square feet raw material warehouses which is capable of storing 25,000 tons of maize which along with storage silos enables company to store an aggregate of 65,000 MT of maize

Company infuses steeping water with certain chemical additives (Sulphur bicarbonate) in the place of the traditional Sulphur dioxide which reduces steeping time.

The company has an Air Handling Unit (AHU) for food-grade starches and an automated packing unit with weatherproof loading docks. The Company's products are packaged in barrels, drums, PP, and FIBC.

SWOT Analysis