Business Review

Global Patterns of Starch Demand in Food

2017 - 2022

Focus on Americas, Europe, China, India, ASEAN, Middle East (Saudi Arabia, UAE), RoW (overview)

INTRODUCTION

For nearly half a century, native and modified starches have seen sustained growth in both food and non-food. Food use of starch is a complex scenario, considering the number of options that food manufacturers have now been provided by starch suppliers. Native starches are a plain vanilla structural element of food matrices, with modified starches having specific functionalities. In the USA hydroxypropyl waxy starch (etherified) is more popular whereas acetylated waxy starch (esterified) is more popular in Europe. This leads to some visible price differences between the two main regions. In addition, the current trend of reducing E numbers has led to the demand for "natural" and "clean label" starches, of the type represented by the *Novation* range from Ingredion, for example. Many starch manufacturers have seized this trend. India has liberalized the use of modified starches to GMP, where it was earlier restricted to less than 0.5% dosage. The pivot of global production and demand has remained with China. Structural overcapacity in China, combined with a slight cooling of demand has caused problems for producers, but for users it is a different story.

For users, this is an interesting period, as prices have remained on decade-long lows. Despite rapidly increasing demand in emerging countries, prices have remained stable. Processors of starch have responded by increasing production of technical starches, both physically and chemically modified for specialty applications.

Thailand is a traditional tapioca powerhouse, Europe with potato, and China and the USA with maize are competing for ever increasing compartmentalized applications.

Giract has been tracking this market for several decades and is revisiting the demand for starch and derivatives after a gap of nearly 6 years since its last study in 2011. In the interim, the most recent starch supply study was published in 2015.

OBJECTIVES

The overall objective is to provide a global picture of demand for native and modified starches in food applications. This can be broken down into the following sub-objectives:

- To estimate current demand for native and selected modified starches across food sectors and by key country/region
- To describe the structure of the key end-product sectors in each key country/region
- To understand demand dynamics in specific sectors/regions through discussions with major players in both supply and demand
- To identify native and modified starch production by key producer/country
- To estimate availability by country taking into account production and trade patterns
- To estimate global patterns in the demand for native and modified starches in food applications based on in-depth research across major countries/regions
- To provide forecasts for native and selected modified starches by key sectors/regions

PRODUCTS

Native starches (various sources), Esterified and etherified starches (cross-bonded or not), Other modified starches (thinned/enzymatically modified, dextrinised, pregelatinized, spray dried)

MARKETS

Global demand, with focus on Europe (EU28, Switzerland, Norway), N. America (USA, Canada, Mexico), Other America (Brazil, other LATAM as an overview), China, India, ASEAN (Thailand, Indonesia, Other ASEAN as an overview), Middle-East (Saudi Arabia, UAE), RoW as an overview

SECTORS

Bakery, Dairy, Processed meat, Soups & Noodles, Snacks, Confectionery, Ready meals/RTE/RTC, Other food

TIMESCALE

2017 – 2022

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REPORT

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1.2. OBJECTIVES

The overall objective is to provide a global picture of demand for native and modified starches in food applications, implying the following sub-objectives:

- To estimate current demand for native and selected modified starches across food sectors and by key country/region
- To describe key end-product sector structure in each key country/ region
- To understand demand dynamics in specific sectors/regions through discussions with major players in both supply and demand
- To identify native and modified starch production by key country
- To estimate availability by country taking into account production and trade
- To estimate global patterns in the demand for native and modified starches in food applications based on in-depth research across major countries/regions
- To provide forecasts for native and selected modified starches by key sectors/regions

1.3. PRODUCTS

Starch products considered in this report are:

- Native starches (various sources)
- Esterified and etherified starches (cross-bonded or not)
- Other modified starches (thinned/enzymatically modified, dextrinised, pregelatinized, spray dried)

1.4. MARKETS

Global demand, with focus on:

- Europe (EU28, Switzerland, Norway)
- N. America (USA, Canada, Mexico)
- Other America (Brazil, Other LATAM as an overview)
- China
- India
- ASEAN (Indonesia, Thailand, Vietnam, Other ASEAN as an overview)
- Middle East (Saudi Arabia, UAE)
- RoW as an overview

1.5. SECTORS

- Bakery
- Confectionery
- Dairy
- Processed meat
- Snacks
- Soups & Sauces
- Noodles
- Ready meals/RTE/RTC
- Other food

1.6. TIMESCALE

Current: 2017
Forecast: 2022

1.7. GLOSSARY/EXCHANGE RATES

Glossary

bio	'000 000 000, billion
kg	kilogram
kt	'000 tons
ktpa	'000 tons per annum
mio	'000 000, million
p.a.	per annum
tons	'000 kilograms
tpa	tons per annum
tpd	tons per day

"Corn" and "maize" have been used interchangeably to denote the same product

Exchange rates (May 2018)

EUR 1 =	USA:	USD	1.20	China:	CNY	7.80
	Canada:	CAD	1.52	India:	INR	80.62
	UK:	GBP	0.88	Indonesia:	IDR	16012
	Thailand:	THB	38.04	Vietnam	VND	27.10
	Brazil:	BRL	4.31	Nigeria	NGN	656
	South Africa	ZAR	15.90	Algeria	DZD	137.73
	Egypt	EGP	21.25	Saudi Arabia	SAR	4.48
	United Arab Emirates	AED	4.39	Russia	RUB	73.89

Note: Totals in tables may not add up exactly due to rounding off of individual numbers

1.8. LIST OF NATIVE AND MODIFIED STARCHES

The following starch types were proposed during end-user interviews. In some instances, interviewees were prepared to respond to the awareness/use of each starch type, or only a partial list. In other instances, interviewees were only prepared to talk about starches which they used or knew very well. Their responses are indicated in each interview.

Native Starch maize, tapioca, wheat, potato, rice, other)	
Dextrins	
Acid-treated starch	
Alkaline-treated starch	
Bleached starch	
Oxidized starch	E1404
Starches, enzyme-treated/Enzyme treated starch	
Monostarch phosphate	E1410
Distarch glycerol	
Distarch phosphate	E1412
Phosphated distarch phosphate	E1413
Acetylated distarch phosphate	E1414
Starch acetate/Acetylated starch, mono starch acetate	E1420
Acetylated distarch adipate	E1422
Acetylated distarch glycerol	
Hydroxypropyl starch	E1440
Hydroxypropyl distarch phosphate	E1442
Hydroxypropyl distarch glycerol	
Starch sodium octenyl succinate	E1450
Acetylated oxidized starch	E1451
Pregelatinized starch	
Resistant starch	
Cook up starches	
Clean label starches	

2. EXECUTIVE SUMMARY

2.1. GLOBAL SUPPLY OF STARCHES

Global Production of Food and Non-Food Grade Starches,-2017 kt

	Native Tapioca	Native Maize	Native potato	Native wheat	Other native(Rice)	Total Native	Total Modified	Total starch
North America								
China								
Europe								
Thailand								
Brazil								
India								
Indonesia								
Vietnam								
KSA								
UAE								
ROW								
Total								

Source: Giract, based on interviews and database

Note: the supply estimates do not include the volume of starches which are further processed into derivatives and only include native and modified starches which are sold directly in the market

2.2. AVAILABILITY

Starches are used essentially in the non-food industry; applications include paper, corrugated board, textiles, construction, etc. Of the global demand for starches, only around xx% of starches are used in food applications.

Food and Non Food Starch Demand by Region, 2017

Region	Total Starch demand (kt)	Food demand (kt)	Food demand (%)	Non Food demand (%)
N. America				
Europe				
China				
Thailand				
Indonesia				
India				
Brazil				
Vietnam				
United Arab Emirates				
Saudi Arabia				
Other Europe (incl. Russia)				
Other America				
Other Middle East-Africa				
Other Asia-Pacific				
Rest of World				
Total				

Source: Giract, based on interviews

Demand for starch in food applications is highest in Brazil, North America and Europe. With the exception of Brazil, demand for starch in non-food applications is greater. The main starch sectors - paper, textiles and construction - have been shifting from developed regions such as Europe and North America to developing regions, taking with them associated environmental concerns linked to these industries.

Starch usage in food can also be seen as an indicator of the economic growth of a region. With the growth of the processed food sector, the demand for starch (and particularly modified starch) in foods has also grown.

Food Demand for Native and Modified Starch by Region, 2017

Region	Native Starch (kt)	Modified Starch (kt)	Native %	Modified %
N. America				
Europe				
China				
Thailand				
Indonesia				
India				
Brazil				
Vietnam				
United Arab Emirates				
Saudi Arabia				
Other Europe (incl. Russia)				
Other America				
Other Middle East-Africa				
Other Asia-Pacific				
ROW				
Total				

Source: Giract, based on interviews

Use of native starch in food is higher than that of modified starch in developing countries due to its lower cost. Developed regions such as Europe and North America use larger proportions of modified starches, as these are largely required in sophisticated processed foods, which require the superior functionality characteristics of modified starches during processing.

2.3. GLOBAL STARCH DEMAND IN FOOD – 2017

Global Starch Demand in Food by Sector, 2017 kt

	Bakery & Cereals	Confectionery	Dairy	Processed Meat	Snacks	Soups & Sauces	Noodles	Ready Meals	Other food	Total
Native tapioca										
Native maize										
Native potato										
Native wheat										
Other Native										
Esterified										
Etherified										
Thinned/enzymatically modified										
Pregelatinized										
Dextrinised										
Clean label										
Oxidised										
Resistant										
Total										

Note: The above table excludes ROW volumes, thus will show a difference with global demand
Source: Giract, based on Interviews and analysis

Global Starch Demand in Foods by Region,- 2017 kt

	N. America	China	Europe	Thailand	Brazil	India	Indonesia	Vietnam	KSA	UAE	Total
Native tapioca starch											
Native maize starch											
Native potato starch											
Native wheat starch											
Other Native											
Esterified starch											
Etherified starch											
Thinned/enzymatically modified											
Pregelatinized											
Dextrinised											
Clean label											
Oxidised											
Resistant											
Total											

Note: The above table excludes ROW volumes, thus will show a difference with global demand
Source: Giract, based on Interviews and analysis

North America, China and Europe are the major consumers of starch in food applications.

2.3.1. PRICES

Starch	Price USD/kg
Native tapioca starch	
Native maize starch	
Native potato starch	
Native wheat starch	
Other Native	
Esterified starch	
Etherified starch	
Thinned/enzymatically modified	
Pregelatinized	
Spray dried	
Dextrinised	
Clean label	
Oxidised	
Resistant	

Source: Giract based on interviews

2.4. INTRODUCTION

2.5. LEGISLATION

2.6. DEMAND SECTORS

2.6.1. BAKERY

Bakery, North America

	2012	2017	2022	CAGR%	CAGR%
	kt	kt	kt	2012-17	2017-22
Bread					
Biscuits					
Pastry					
Breakfast cereals					
Total					

Source: Giract - Canadean, Trade Data, End-user Interviews

Market Shares of Key Players, Bakery, N. America

Company	Market share (%)
Grupo Bimbo	
McKee Foods Corporation	
Mondelez	
Kellogg's	
Flowers Foods	
General Mills	
PepsiCo	
Campbell's Soup Company	
Post Holdings	
Artisanal/Others	
Total	

Source: Giract - Retail Analysis, Trade data

Starch Demand in Bakery, N. America

Starch	2017 tons	2022 tons	CAGR % 2017-2022
Native tapioca starch			
Native maize starch			
Native potato starch			
Native wheat starch			
Other Native			
Total Native Starch			
Esterified starch			
Etherified starch			
Thinned/enzymatically modified			
Pregelatinized			
Dextrinised			
Clean label			
Oxidised			
Resistant			
Total Modified Starch			
Total Starch			

Source: Giract - Industry Analysis, Trade Data, End-user Interviews

Examples of Bakery Products Containing Starches Identified During Retail Analysis

Product	Brand	Manufacturer	Starch Used
Udi's Gluten-free White Sandwich Bread	Udi	Boulder Brands	Tapioca starch, Tapioca Maltodextrin, Tapioca Syrup, Modified Food Starch
Gluten-free Seeds & Grains Bread	Little Northern Bakehouse	Little Northern Bakehouse	Modified Tapioca Starch, Potato Starch, Corn Starch
Wild Blueberry Smash Muffins	Abe's Muffins	Abe's Muffins	Non-GMO Corn Starch
Bagels, Everything	Canyon Bakehouse	Canyon Bakehouse	Potato Starch
Gluten-free Bagels, Plain, Frozen			
Soft-Baked Celebration Cookies			
Strawberry Bread			
All Natural Cinnamon Raisin Bread			
Italian Bread			
Butter Top Wheat Bread			
Tapioca Loaf			
Bread - Original Hawaiian Sweet Sliced			
Rocky Mountain Sourdough Bread			
Naan Garlic			
Naan Original All Natural			
Flatbread Original Gluten-free			
Greek Lifestyle Flatbread			
100% Whole Grain Bread			
Double Fiber Wheat Bread			
100% Whole Wheat Deli Flat			
100% Whole Wheat Bread			
Delightful Multi-Grain Bread			
Soft and Smooth Whole Grain White Bread			

Product	Brand	Manufacturer	Starch Used
Old Tyme 100% Whole Wheat			
7 Ancient Grains Whole Grain Bread			
Great Seed Whole Gain & 7 Seed Bread			
Italian Breadsticks			
Enriched Dinner Rolls - Brown 'N Serve - 12			
100% Whole Wheat Hot Dog Rolls			
Dessert Shells			
Baked French Apple Pies			
Chocolate Chip Cookies			
Cookies - Holiday Sprinkled			
Singles Chocolate Chip Cookies Original Recipe			
Brownies			
Cinnamon Snaps - Gluten-free			
Dessert Shop - Chocolate Brownie			
Apple Puffs			
Cheese Danish Twist			
Danish Twist - Raspberry			
Cinnamon Rolls With Raisins			
Cinnamon Swirl Buns			
Hot Cross Buns			

Product	Brand	Manufacturer	Starch Used
Donuts Assorted With Frosted			
Donuts Classic Chocolate Lovers Variety Pack			
Donuts Devil's Food Crumb Donuts			
Donuts Pop'ems Rich Frosted Donut Holes			
Donuts Softees Plain Family Pack			
Singles Donuts Frosted			
Singles Pop'ems Coconut Crunch Donuts			
Donuts - Plain			
Donuts - Softee Assorted w/Frosted			
Super Softee Donuts			
Assorted Donuts			
Crunch Mini Donuts			
Glazed Vanilla Donut Holes			
Powdered Sugar Mini Donuts			
Pie - Lemon			
Eclairs			
Guava Cheese Puffs			
Singles Danish - Raspberry			
Singles Jumbo Glazed Honey Bun			
Singles Jumbo Iced Honey Bun			

Product	Brand	Manufacturer	Starch Used
90 Calorie Bar Lemon Bar Value Pack			
Glazed Mini Cherry Pies			
Glazed Mini Apple Pies			
Banana Marshmallow Pies - 8 ct			
Big Pack Cosmic Brownies - 12 ct			
Big Pack Honey Buns-9 ct			
Cosmic Brownie			
Devil Cremes			
Devil Squares			
Fudge Brownies with English Walnuts - 6 pk			
Honey Bun			

Source: Giract, based on retail analysis

2.6.2. CONFECTIONERY

2.6.3. DAIRY

2.6.4. PROCESSED MEAT

2.6.5. SNACKS
2.6.6. SOUPS AND SAUCES
2.6.7. NOODLES
2.6.8. READY MEALS
2.6.9. OTHER FOOD
2.7. STARCH DEMAND OVERVIEW
2.7.1. STARCH DEMAND OVERVIEW-2017

tons

	Bakery & Cereals	Confectionery	Dairy	Processed Meat	Snacks	Soups & Sauces	Noodles	Ready Meals	Other food	Total
Native tapioca starch										
Native maize starch										
Native potato starch										
Native wheat starch										
Native rice starch										
Esterified starch										
Etherified starch										
Thinned/enzymatically modified										
Pregelatinized										
Dextrinised										
Clean label										
Oxidised										
Resistant										
Total										

Source: Giract, based on industry analysis, trade data, interviews

2.7.2. STARCH FORECAST DEMAND OVERVIEW -2022

tons

	Bakery & Cereals	Confectionery	Dairy	Processed Meat	Snacks	Soups & Sauces	Noodles	Ready Meals	Other food	Total
Native tapioca starch										
Native maize starch										
Native potato starch										
Native wheat starch										
Native rice starch										
Esterified starch										
Etherified starch										
Thinned/enzymatically modified										
Pregelatinized										
Dextrinised										
Clean label										
Oxidised										
Resistant										
Total										

Source: Giract, based on industry analysis, trade data, interviews

2.8. END USERS

2.8.1. END-USER PERCEPTIONS

Company	Key comments
Andre Prost	• Previously, used tapioca starch for texture and emulsification • Replaced tapioca starch with guar gum because product appeared unnaturally white, and emulsification not retained during storage
Bake'n Joy	• Corn starch and modified corn starch used for texture, bulking, and shelf life extension • Native starch used as clean-label ingredient • No plans to change starch ingredient usage
Canyon Bakehouse	• It uses potato starch and tapioca starch • Corn starch is not used as there is increasing anti-GMO sentiment in North America • Wheat starch is not used due to gluten intolerance • Consumer research suggests that customers do not read product labels closely • However, Canyon Bakehouse believes that there is a growing group of knowledgeable, health aware shoppers who scrutinise product labels carefully
Colorcon	•
Denali Ingredients	•
George's Inc.	•
Hanover Foods	•
Hato Potrero Farm	•
Imuraya USA	•
JM Smucker	•
Nestlé PTC Bakersfield (Dreyer's)	•
The Wright Group	•
Wise Foods	•

2.8.1.1 NESTLÉ PTC BAKERSFIELD (DREYER'S)

5929 College Ave.
Oakland, CA 94618
USA
Tel: +1 661 398 3408
www.dreyers.com

Relevant products

Ice cream

Company background

- Dreyer's was founded in 1928 as Edy's Grand Ice Cream
- The company is based in Oakland, California
- Nestlé acquired Dreyer's for USD 3.2 bio in 2002
- The company operates the two largest ice cream manufacturing facilities in the USA
- It has 9000 employees, and annual revenue of USD 2.2 bio
- Dreyer's 3 best-selling brands — Haagen Dazs, Edy's Choice and Edy's slowchurned — control 21% of the North American ice cream market

Awareness and usage of starch

Starch	E-number	Aware-ness	Starch used by company	Desired function	Dosage (%)	Indicative Volume of starch used (tons)
Native tapioca		Yes	Yes	Texture, bulking	1-3%	
Dextrins		Yes	Yes	Bulking, fibre	1%	
Acid-treated starch		Yes				
Alkaline-treated starch		Yes				
Bleached starch		Yes				
Oxidized starch	E1404	Yes				
Starches, enzyme-treated/Enzyme treated starch		Yes				
Monostarch phosphate	E1410	Yes				
Distarch glycerol		Yes				
Distarch phosphate	E1412	Yes				
Phosphated distarch phosphate	E1413	Yes				
Acetylated distarch phosphate	E1414	Yes				
Starch acetate/Acetylated starch, mono starch acetate	E1420	Yes				
Acetylated distarch adipate	E1422	Yes				
Acetylated distarch glycerol		Yes				
Hydroxypropyl starch	E1440	Yes				
Hydroxypropyl distarch phosphate	E1442	Yes				
Hydroxypropyl distarch glycerol		Yes				
Starch sodium octenyl succinate	E1450	Yes				
Acetylated oxidized starch	E1451	Yes				

Starch	E-number	Aware-ness	Starch used by company	Desired function	Dosage (%)	Indicative Volume of starch used (tons)
Pregelatinized starch		Yes				
Cook up starches		Yes				
Clean label starches		Yes				

Note: The respondent was not prepared to identify each modified starch individually, but was knowledgeable on the range available

- Dreyer's uses starch for bulking and texture
- Native tapioca starch is preferred due to its clean taste and mouthfeel
- Native potato has a similar functionality, and may be used in many applications. However, it has a larger particle size than tapioca starch, and can produce in gritty mouthfeel
- There is currently not a big push to adopt modified starches as degradation by processing, cooking, or freeze-thaw cycles is not an issue
- Polydextrose was used as a thickener and fibre until recently. It has poor consumer perception due to its chemical-sounding
- Gums are avoided in formulations for the same reason
- Resistant maltodextrin is also used as a texturiser and fibre in many of Nestlé's economy brands due to its cost-effectiveness
- Soluble corn fibre (Promitor) is the key ingredient used for fibre purposes, as it also provides adequate bulking functionality
- Resistant starch is used as a fat replacer, commonly in fat and sugar-reduced product lines
- There is also no significant pressure to adopt clean-label functional starches as native starches preform have the required functionalities, and are considered clean-label, as they are not modified
- Clean-label starches are those that do not carry an E number. Additionally, they must also be non-GM, and ideally organic
- Modified starches are becoming less popular amongst consumers, and product reformulators try to remove them from ingredient lists. This is because consumers do not necessarily make the distinction between a chemically-modified ingredient, and a genetically modified ingredient
- The key considerations for ingredient selection, in order of importance, are:
- Regulation and legislative concerns
- Processability/functionality

- Consumer perception, such as Non-GMO status/organic etc.
- Reformulation only happens if there is a huge cost associated with an existing product regarding a claim, or if the brand is repositioned. In these cases the company will look at a new ingredient. However, generally branded products will not be reformulated
- Dreyer's/Nestlé has a broad portfolio of starch ingredients, and there is not the requirement for innovation or new ingredients in this area