

S. K. Patil and Associates

Global Modified Starch Products, Derivatives & Markets – A Strategic Review - 2012



By: S K Patil & Associates, Inc.

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Global Modified Starch Products & Carbohydrates Functional Foods, Derivatives & Markets – A Strategic Review

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ABSTRACT & SAMPLE PAGES

Abstract

This report has comprehensive information on various modified starches, market segments along with review of modified starches manufactured worldwide. There is also information on the modified starch manufacturers in the US, their market share along with the prices. Report provides details of modifications, applications and markets worldwide. We have provided critical data on the modified starches by applications and market segments. Modified starch and other derivatives are key drivers of profitability of major starch players engaged in modified starches. Description of the capabilities of each US manufactures along with their position in the market is very useful. Global list of modified starch manufacturers is also provided.

For 2011 we estimate the total utilization of dried starch in the world was ~71 million tons (USDA, EU Commission). We previously estimated this would reach 70 million tons by 2010, China and some of the emerging markets added most to the growth. China had the biggest growth with ~ 19 million tons (including ethanol) production in 2011 with growth of 7 % over 2010. The US , EU and Japan has lower growth of ~2%/year, EU at ~2%, and Japan at 1-2% Going forward the growth in China and India will slow down to 6-7 %; the rest of the world grows at 2-4%. Most of the 4 % growth came from ethanol from the wet milling operations. We estimate that total starch production from major starch crops will be 81.3 million tons by 2015.

Value added modified starch derivatives remains very attractive area due to high margins and numerous food and industrial applications. There are excellent opportunities to grow this business because of the growth in health, nutritional and functional needs of the changing consumer appetite as we move forward in the global economies. This is a comprehensive report with lot of data and insights in to modified starch products, market segments and future developments and how one can position in the changing global markets. Detail analysis of modified starches in food and industrial sectors provide in depth insights into the use and potential for modified starches.

Carbohydrate economy is moving forward with the pace of new knowledge and technologies developing at a great momentum. Besides the bio-fuel and bio-ethanol story; there are several developments underway using the biotechnology that will introduce new technologies and products that will potentially change the landscape for modified starches. Most notable are natural high phosphate starch that can potential replace chemical modifications especially starting with paper and other industrial application then in foods. National Starch, leading modified starches has introduced new line of natural starches to replace chemically modified starches. New hybrids via biotechnology will further enhance natural starches to be utilized to meet consumer demands. Corn with amylase and other enzymes in the grain that can be activated to improve processing economics of the way we process carbohydrates or to create new carbohydrates with novel properties are moving forward.

Modified starches are utilized in hundreds or even thousands of food, industrial, biofuels, bioplastic applications. Unmodified starches have limited usage due to its inherent weakness of hydration, swelling and structural organization. To enhance viscosity, texture, stability among many desired functional properties desired for many food and industrial applications, starch and their derivatives are

modified by chemical, physical and biotechnology means. . 2009 has been a difficult year for all industries and Modified Starches were not an exception to this. Starch industry has posted a good comeback.

Report covers major food and industrial market segments with focus on food sector. Global markets food and industrial markets are much diversified and there is further fragmentation within each market sectors. This is also complicated by the fact of food and industrial preferences that are regional and the industrial practices, products preferences by consumer require that these products are tailored to fulfill the functional needs. As the recession in the US ends, the EU recession is ongoing with several complex causes well publicized. Opportunities in the US, Asia, South America and Africa remain strong. Growth of starch processing industry going forward remain very bright in view of strong growth of developing economies and rising population with higher incomes and demands on many food and industrial products. 2011 has seen growth of modified starches in many segments. In the US the capacities remain tight due to growth of ethanol and several sweeteners from corn wet milling. In general, starch industry has posted a good comeback.

This is a focused report provides current situation, products, markets and future of modified starches for foods and industrial sectors. We also provide our insights and strategic manufacturing and market positioning perspectives for the manufacturers of these products and potential future developments. There are also many details; specific insights and starch derivatives market segment data not found elsewhere. New chapter on future trends, research and selected patents on modified starches worldwide offers excellent review of activities in global arena..

Sakharam K Patil, Ph. D. S. K. Patil & Associates

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III. STARCH A BRIEF REVIEW OF STARCH CHEMISTRY

A. Starch extraction process a brief review

Sources of starch are; maize, potato, wheat and tapioca have starch as a major component (Table 1). Processes of extracting this major component starch vary depending on the source. Most of these differences are in the front end of the plant where milling, grinding, separation steps are dependent on the nature of source, remaining downstream process are very similar. There are many publications that describe this in detail. (Reference in section X)

a. Modified starch review

1. Why Use Starch?
2. Why modify starch

V. REVIEW OF FUNCTIONS AND APPLICATIONS

A. Functions of unmodified and modified starches in foods a brief review

Functionality is the key to marketing starches in the wide range of food applications. No other ingredient provides texture to as many foods as starch does. Whether it is a soup, stew, gravy, pie filling, sauce or custard, starch provides a consistent shelf-stable product that consumers rely upon. Almost unlimited attributes and functional properties of starches are required by the food industry (Table 9).

Table 1: Functional properties of starches in Foods

VI. GLOBAL & US MARKETS OVERVIEW

A. Global market situation and size

In this section we provide a collection of data on total starch and modified starch products globally with emphasis on the United States. The tables and figures describe the basis of information and the assumptions that outline our rationale. Some of these are estimates based on our past knowledge and experience in this industry. The conclusions should be drawn with some degree of caution. Most of these estimates are close to reality with some variation depending on the products, market segment and the regions. Co-products such as corn gluten feed, corn gluten meal (60% protein) and corn oil constitute a very significant portion of corn as a variable cost of raw material for unmodified, modified starches, sweeteners and other industry products. More detail analysis of the impact of co-products is presented in our main report published earlier. Use of corn for usage for food and industrial applications has risen at a very fast pace since 2006, growing almost at 20 % compound annual rate (Figure 12) mostly due to starch ethanol from CWM (corn wet milling) industry. In the US ethanol from CWM in 2012 is at 14 billion gallons using almost 40 % of 1.8 billion bushels of total corn usage by CWM.

a. Modified starch

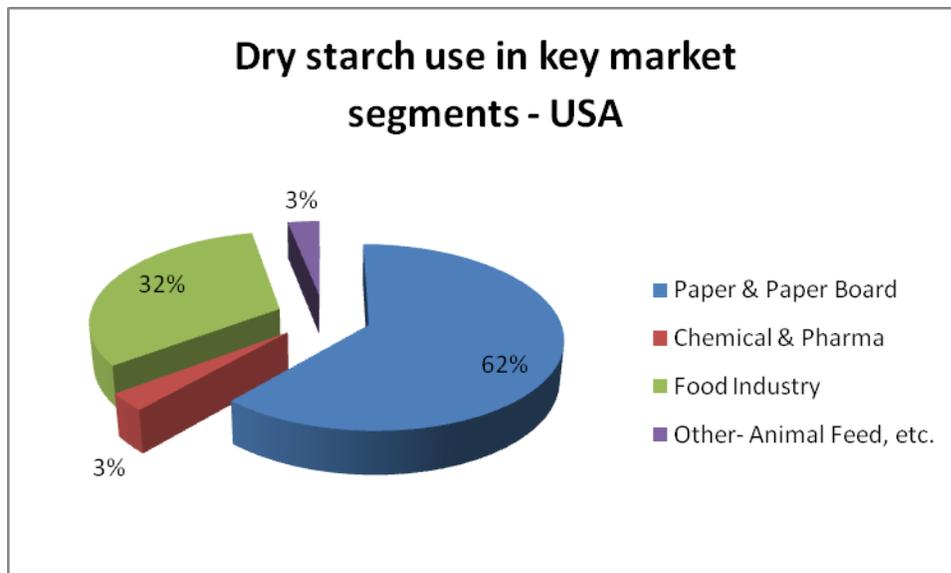
This area is recently becoming active with margin improvement enhancing the profitability in view of multitude of applications and functions in many food and non-food segments. Recent growth of global developing economies and the demands of processed, convenience foods of populations with rising income and the two income families. This has created very attractive opportunities for starch and carbohydrate ingredient that are essential as bulking agents and functional nutritional demands of food and industrial segments.

Table 9 US un-modified and modified starch market structure and opportunities. Source: Private

Market Information	Comments
Overall Size	Total Food and Industrial market in the US is 6.9 billion lbs – 5.6 billion lbs. for Industrial and ~1.4 billion lbs. for food. 20% of this market can be replaced by other substitutes such as tapioca or improved new products.

b. Starch utilization

In this section we provide a collection of data on total starch and modified starch products globally with emphasis on the United States. The tables and figures describe the basis of information and the assumptions that outline our rationale. Some of these are estimates based on our past knowledge and experience in this industry.



US players market share

Figure 24 below shows market share of all starches (Food & Industrial) by key players. This reflects combined market share for CPI/National, now INGREDION. Figure 26 is food modified starch market share.

Figure 1: Market shares of starches (Food & Industrial) by US players 2012

c. Potential changes and market drivers

The size of company, economy of scale and good capability to balance between commodity and specialty supply chain and operating practices allows good efficiencies and management of operating margins.

- Commodity base in given operation allows effective fixed cost dilution and supply chain infrastructure allows competitive positioning and cost efficient offering to large and small to mid size customers
- Superior logistic, supply chain and infrastructure management
- Ability to exploit commodity product mix e.g. HFCS, ethanol and dry starch depending on the market situation, demands and margins.
- Product mix of specialties and semi specialties product mix of diversified product lines and differentiation

Modified starch data by segment: Volume, value, margins and functions for segments

Tables 22 to 29 provide a detailed analysis of modified starches in food and certain major industrial sub-segments with volumes (lbs), functions, players, barrier to entry and margins. This data is in-depth presentation of estimates of 2010/2011 for global and US market segments. We have compiled these values and updated yearly based on the public and private information. The private estimates are developed based on experience and discussions with key industry people.

These values are a good indication of the usage and size of modified starch market.

The information is provided in tables for global estimates followed by next table of same market segments for the USA. The market size value, margins and unmet needs are listed in each table. Certain segment information will vary based on the regional food preferences, supply chain, commodity prices in the global and the US.

Tables 16 to 26 provide detail analysis of modified starches in food and certain major industrial sub-segments with volumes (lbs), functions, players, barrier to entry and margins. There can be a 10-15% margin of error in these estimates for 2007/08. We have compiled these values and updated yearly based on the public and private information.

Table 16 Certain key industrial modified starches, does not include all modifications, USA 2009

By Market Segments Industrial – 2011, Mainly Regular (Dent) Corn 85%				
Application/Segments	Products by Modification	Volumes (mm lbs)	Prices Est. (avg. \$/cwt)	
Building Material	TB, HE Starches	180	28	

Table 17 Modified Starch Bakery Segment Global (US 35%, EU 35%, Asia/ROW 30%) Waxy-30%, Wheat - 30%, Potato - Tapioca - 20%. 2009 estimates Starch Function in Blue

Segment	Market Size in Mm lbs	Market size Mm \$	GPM* %	Growth** % Vol. & \$	Unmet needs	Prod. Fragmentation	Barrier To Entry For Starch	Players Suppliers	Geography Food Manufacturer s
	Bakery -Total (Starch Function: Moist. Control Shelf stability Visc. Clarity, Taste, texture Gelatinization T)	240	60- 65	35-50	3	High fiber, low Cal, shelf stability, microwave Quality, Texture, control moist migration	Very high	Low to high Benefit And cost driven	National, Cargill, Staley/ Amylum, Roquette Avebe, CPI Other

XI. SELECTED STARCH RESEARCH/TECHNOLOGY PUBLICATIONS AND PATENTS

In this chapter valuable material presented based on our on-going research of developments in modified starches and derivatives. Also reported are the recent patent activities in process,

products and applications technologies. This valuable information is presented as a guide to current research and technology interests.

XII. SUMMARY

This report is a review of starch products, modified starches and functional ingredients from starches with emphasis on modified starch products. High margin specialty modified starch portfolio brings higher margins especially in today's environment where co-products prices have eroded due to large supplies, effect of ethanol production. Co-products traditionally contributed significantly to the lowering of corn costs. The modified starch market is fragmented and influenced by the consumer food segment needs and the trends. This is further complicated by multiple functional and texture contribution desired by current trends of health, nutrition, obesity, convenience and other demographic changes. In the next phase we provide more details on the issue of obesity and the satiety (bulking) effects of ingredients. This is expected to allow continuation of the eating habits such as snacking, "on the go" foods and also meet the balanced nutritional needs. This is further complicated by multiple functional and texture contribution desired by current trends of health, nutrition, obesity, convenience and other demographic changes

Report provides excellent detail analysis of food and industrial market segments and distribution of how the utilization remains dynamic depending on consumer and processing industry segments. There is more information to clearly understand the total picture of modified starch derivatives markets and the industry domain. Value added opportunities of modified starches and their multiple derivatives along with the contribution of biotechnology remain very bright going forward

Our main report ***"Strategic Review of Corn Starch Industry & Markets - Starch, Sweeteners, Bioprocessing & Co-Products Final August 2012"*** provides a very detailed analysis of a total industrial perspective of how this business operate, its products, costs, markets, etc. We have recently published three reports; Dextrins, Physically Modified Starch and Cold Water Swelling Starches to enhance our participation in the changing starch derivatives demands. Our reports are listed at www.skpatilassociates.com. Please call us to receive a special discount

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