

New Developments in Soy Value Added Products

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Outline

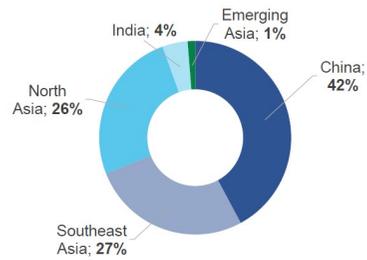
- Health products
- Meat Analogues
- Dairy analogues
- Sports Nutrition
- Food Ingredients
- Traditional Snacks
- Animal Nutrition products
- Soy Protein and Sustainability
- Conclusion



Soy protein innovation and opportunities in Asia

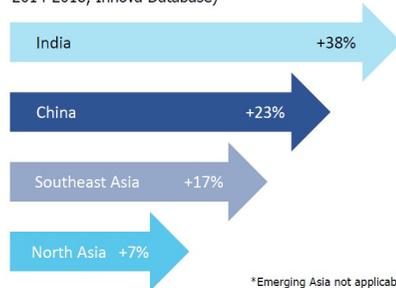
China leads for soy protein use in new F&B

Percentage of new food & beverage product launches tracked with soy protein ingredients by geographic market (Asia, 2014-2018, Innova Database)



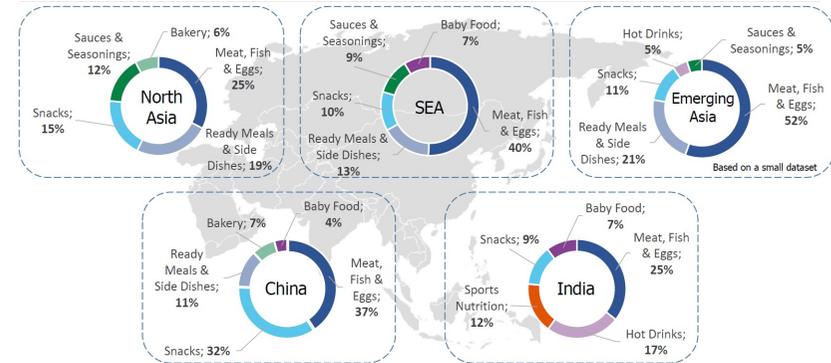
But India, Southeast Asia are also growth hubs

CAGR for new food & beverage product launches tracked with soy protein ingredients by geographic market (Asia, 2014-2018, Innova Database)



Note North Asia: Hong Kong, Japan, South Korea, and Taiwan
 Southeast Asia: Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam
 Emerging Asia: Bangladesh, Myanmar, Nepal, and Sri Lanka

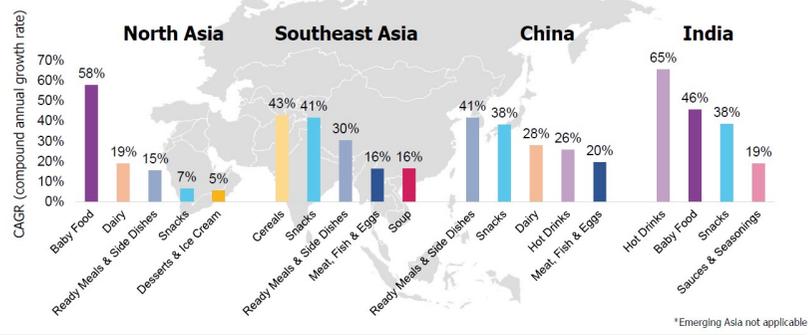
Established key segments for soy proteins across Asian markets



Note North Asia: Hong Kong, Japan, South Korea, and Taiwan
 Southeast Asia (SEA): Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam
 Emerging Asia: Bangladesh, Myanmar, Nepal, and Sri Lanka
 Percentage is share of launches tracked with soy proteins by category per geographic market (2014-2018), Innova Database

Potential for incremental use of soy proteins in additional categories

Fastest growing categories tracked with soy protein ingredients by geographic market (CAGR, 2014-2018)



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Protein Status in India

- Prevalence of protein deficiency is very high in India
 - More than 90% vegetarians and 85% non vegetarians
 - GAP in availability of pulses and milk
 - Leading to growth and development problems
- Protein quality deficiency
 - Cereals contribute more than 70% protein
 - Cereals have relatively low digestibility and quality
- Globally protein demand will increase by 70% by 2050
 - Indian requirement will be even higher



Health Products

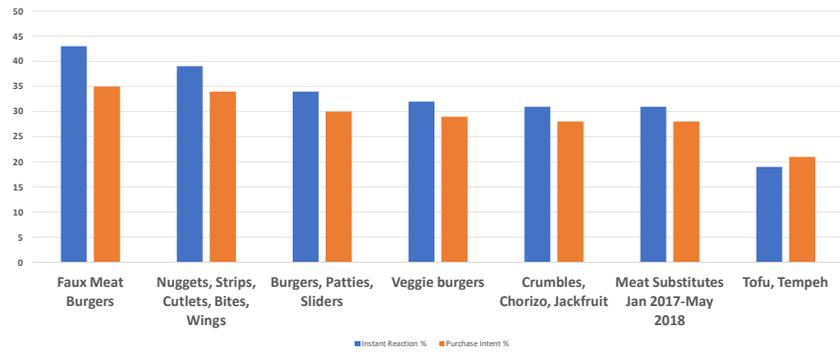
- Disease specific products
 - Heart health
 - Diabetic
 - Bone health
 - Women's health
 - Child nutrition
- Bioactive peptides
 - Bioactive peptides may be present in independent entities or encrypted in the native protein.
 - Act as regulatory compounds with hormone like activities and have number of health benefits
 - Antimicrobial
 - Antihypertensive
 - Cholesterol-Lowering
 - Anti-type 2 diabetes mellitus
 - Immunomodulatory
 - Antioxidation
 - Lunacin, a food derived peptide with anticancer bioactivity



Meat Analogues

- Growing trend across the globe
 - Meat alternatives are perceived as significantly more healthy, more unique, more environmentally friendly and more natural than conventional meat products
- Challenges
 - Meat alternatives must work to improve their tasty and indulgent image as they score significantly lower than meat products on the high impact purchase intent drivers "tasty" and "indulgent".

US: meat substitutes by format, instant reaction and purchase intent, Jan 2017-May 2018



Beyond Meat, Gets Spicy, Fresh & Frozen



High Protein Reconstituted Rice

- Rice kernel reconstructed from broken rice using extrusion technology
- Improve nutritional composition
 - Protein, Vitamins, Minerals
- Adding value to low cost by-products
- High Protein Rice
 - Improvement in quantity and quality
- Low Glycemic Rice
 - Reconstituted rice has lower glycemic Index (GI) than regular rice
 - Better management of blood glucose
 - Lower insulin levels in the blood
 - Reduces overweight

Diabetes in India

- Indians and South Asians have high risk of diabetes
- India is home to the world's largest number of diabetics (~73 mil.)
- India will have more than 80 mil diabetics by 2030
- Nearly 90% of these individuals have type 2 diabetes
- There may be more undiagnosed cases

Market Potential for Low Glycemic RCR

	2020	2021	2022	2023	2024	2025	2026
Diabetics in Indian (million)	75.00	77.78	80.65	83.64	86.73	89.94	93.27
Rice eating population (65%)*	48.75	50.55	52.42	54.36	56.38	58.46	60.62
Targeted diabetic population	1.00%	3.00%	7.00%	12.00%	19.00%	25.00%	30.00%
Target diabetic population for RCR	0.49	1.52	3.67	6.52	10.71	14.62	18.19
Rice consumption MT/day (200 gm/cap)	98	303	734	1,305	2,142	2,923	3,637
LG RCR consumption MT/day (100 gm/ cap)	49	152	367	652	1,071	1,462	1,819
LG RCR consumption TMT/year	17.7	55.3	133.9	238.1	390.9	533.5	663.8
SPC/SPI @ 5% inclusion MT/Year	890	2,768	6,697	11,906	19,548	26,673	33,192

Soy milk and Dairy Analogues

- Is a aqueous extract of soybeans
- Closely resembles dairy milk in appearance & composition
- Has highest amount of protein, Iron, Unsaturated fatty acids & Niacin
- Excellent alternate for lactose intolerants
 - High incidence (40%)
 - Very high incidence of lactose malabsorption (27-70%)*
 - Inability to digest lactose
 - Due to deficiency of lactase
- It is considered as a healthy food as, it is cholesterol free and has phytochemicals
- Is the easiest way to add soy to the diets



Why Soy Dairy Analogues - Economics

- **Health Benefits**
 - Heart health, Cancer, Osteoporosis, Diabetes, Cholesterol free
- **Economic Benefits**
 - Low production cost compared to dairy products
 - One kg soybean
 - 7-8 lit of milk /flavored milk
 - 1.40 kg tofu
 - 7-8 lit curd /yogurt
 - Ideal project for unemployed youth
 - No formal education required

Soy Yogurt

- Good quality acceptable yogurt can be made with soymilk
 - Salt, sugar
- Can be made the same way as dairy yogurt
- Soy-based yogurt and cultured milks are growing world over



PROBIOTIC SOY MILKS

Ice Cream & Frozen Dessert

- Low fat and cholesterol free
- Healthy alternate to ice cream
- Very economical
- Excellent acceptability
- Economic Benefits
 - Soy Protein is one of the cheapest sources of protein
 - Production cost of soymilk is almost 40% less than dairy milk
 - Vegetable fat, one of the main ingredients, is economical than dairy fat
 - Higher overrun
- Marketability
 - High protein ice cream possible
 - Cholesterol free ice cream
 - Healthy ice cream – positive perception
 - Increased awareness for health foods



Soy-Cream Cheese

- Place a clean muslin in a colander.
- Place the colander in a bowl that is large enough to hold it.
- Add the soy yogurt to the lined colander and wrap the towel over the top to cover (or use a plate).
- Leave this to drain for about 5 hours in the refrigerator. (If you want a thicker consistency, leave it longer).
- Store your finished cream cheese in a resealable container in the fridge.



Sports Nutrition products

- Promotes Lean Body Mass/Muscle Mass
 - Soy Protein Can Enhance Muscle Mass Synthesis
 - Soy Protein Can Increase Lean Mass
- Better digestion/absorption
 - Soy protein is digested at a different rate compared to whey protein and casein, which may help prolong the delivery of amino acids to muscles
- Good Amino Acids profile
 - The BCAAs are critical for several reasons
 - Glutamine helps maintain cell hydration and may attenuate the decrease in blood pH.
 - Arginine may enhance blood vessel function and may help maintain a strong immune system.
 - Soy protein contains 30% more glutamine and 300% more arginine than whey.
- Antioxidant Properties
 - Improves antioxidant status
 - Raises plasma antioxidant capacity
- Soy with whey and casein will promote performance
 - more recent work has shown that intact high-quality proteins such as whey, casein, or soy are effectively used for the maintenance, repair, and synthesis of skeletal muscle proteins in response to training



Processed Food Ingredients

- Replacement of Expensive Ingredients
 - Whole Egg
 - Eggs can be fully or partially replaced using lecithinated defatted soy flour
 - Studies at AIB demonstrated about 25% reduction in raw material cost
 - Skim Milk Powder (SMP)
 - Defatted soy flour (60%) and sweet dry whey (40%) can replace SMP
 - Egg White
 - Enzyme treated soy isolate can replace egg white
 - Can whip to as much as twice the volume of egg whites but will not set when heated.
 - 75% replacement of egg albumen can yield similar product
 - Oil
 - Reduction of oil absorption in fried products
 - Traditional snacks
 - Instant noodles
- Increased functionality
 - Fermentation
 - Enzyme hydrolysis

Protein and Cereal Bars

- Consumer demand for on-the-go nutrition has seen the explosion of the snack bar market in recent years.
- Whether it's a cereal, energy or sports bar, today's ever increasing challenge is to create "good-for-you products" that deliver great taste and natural health benefits.
- Soy protein plays a very important role in providing ingredients for these products.
- Protein isolates and cereal flours can be extruded to make protein crisps to provide texture, taste and nutrition delivery to these products.



Traditional Snacks

- Increasing interest in health foods
- Healthy traditional snacks
 - Bhujia, murukku
 - Extruded
 - High protein, low fat
- Soy nuts
 - Far less expensive than traditional nuts
- Soy nuts can be found in a variety of flavors, including chocolate-covered.
- High in protein and isoflavones, soy nuts are similar in texture and flavor to peanuts.

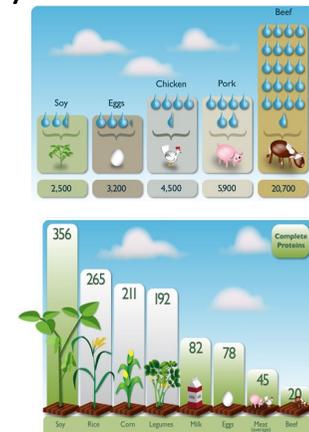


Animal Nutrition Products

- Today, animal nutrition cannot be imagined without the use of soy products such as PSC
- Can be used in
 - Calf feed
 - Swine/pigs feeds
 - Pet foods
- In aquaculture, substitute fish meal
 - Enzyme treated SPC
- Poultry Nutrition products
 - Fermented Soybean meal

Soybean and Sustainability

- Soybean is highly sustainable protein crop for protein and oil
- Rich source of protein and oil
 - Excellent nutritional and health benefits
- Highly resistant for adverse environmental conditions
- Perfect solution for the mankind with decreasing natural resources like water and land



Conclusion

- Soy protein ingredients have been leading plant based protein applications in food and beverage industry.
- Great opportunities for plant based products esp. meat alternatives
- Consumers tend to be more health oriented paving the way for healthful innovations. Soy protein fits very well in this category.
- But innovation is also moving in more of an indulgent direction.
- Innovation is focusing on functionality, indulgence, and new hybrid products.
- Functional ingredients continue to grow in the processed food industry.
- Excellent opportunities for dairy analogues.
- Scope for modified protein products in animal nutrition.
- Soy protein is the solution for growing protein demand.

**Thank You
for
Your Attention**

