Core Competitive Advantages and Future Market Development Prospects of **Soluble Soybean Polysaccharides (SSPS)**

This paper focuses on the **core technical characteristics** and **competitive barriers** of **Soluble Soybean Polysaccharides (SSPS)**. Combined with the practical application demands of downstream customers in food, pharmaceutical, cosmetic and other industries, it comprehensively analyzes its differentiated advantages compared with traditional colloids and similar products. Based on the global and Chinese market patterns as well as the development trends of downstream industries, it predicts future market opportunities and application directions, providing professional references for downstream customers in product selection, upgrading and market layout.

I. Core Competitive Advantages of Soluble Soybean Polysaccharides (SSPS)

As a water-soluble dietary fiber extracted from soybean processing by-products (soybean residue, soybean meal), **SSPS** features core competitive advantages across four dimensions: **functional adaptability, safety compliance, cost economy and extensive applicability**. It accurately meets downstream customers' core demands of **cost reduction and efficiency improvement, product upgrading, compliance standard reaching and scenario adaptation**. Compared with traditional colloids such as pectin, CMC, gum arabic and xanthan gum, as well as imported SSPS products, it has formed irreplaceable differentiated competitiveness.

(I) Functional and Performance Advantages: Accurately Adapt to Downstream Processing Demands and Solve Core Industry Pain Points

The functional characteristics of **SSPS** are centered on **high efficiency and stability, taste optimization and processing adaptability**. It provides customized functional support targeting production pain points in different downstream industries. Its performance indicators have passed authoritative testing and industrial large-scale verification, far exceeding similar products, as detailed below:

1. Outstanding Protein Stabilization Capacity in Acidic Systems: Industry-leading Performance to Solve Core Pain Points of Acidic Dairy Beverages

One of the key pain points for downstream food customers (especially dairy beverage enterprises) is that casein tends to aggregate and precipitate in acidic dairy beverages (pH 3.5-4.5) and fermented milk, causing product stratification and turbidity, which adversely affects shelf life and sensory experience. With a unique molecular structure rich in hydrophilic groups such as carboxyl and hydroxyl groups, **SSPS** efficiently encapsulates casein particles through steric hindrance and electrostatic repulsion, forming a stable colloid system and fundamentally solving this industry pain point.

Key Performance Data:

- **Stability Range**:

pH 2.0-12.0, covering the pH scope of most food and pharmaceutical products. It delivers optimal stability within pH 3.0-4.5 (the core range of acidic dairy beverages) without flocculation or precipitation.

- **Comparative Advantages**:

At the same dosage (0.2%-0.5%), **SSPS** reduces the particle size of acidified milk protein by more than 60%, significantly outperforming pectin (20%-30% reduction) and CMC (15%-25% reduction). Under refrigeration at 4℃, the shelf life of acidic dairy beverages added with **SSPS** can be extended to 6 months with a precipitation rate ≤0.3%, far below the industry standard (≤1.0%).

- **Application Value**:

Downstream dairy beverage enterprises can replace the traditional compound system of "pectin + CMC" by adding **SSPS**, reducing the variety of additives and formula complexity. Meanwhile, it avoids product scrappage caused by protein precipitation and improves production qualification rate.

2. Low Viscosity and Refreshing Taste: Align with the Trend of Healthy Beverages and Enhance Product Competitiveness

One of the core demands of current downstream customers (beverage, meal replacement and fermented milk enterprises) is **health orientation and lightweight formulation**. Consumers show significantly higher acceptance of products with **non-sticky and refreshing taste**. However, traditional colloids (such as xanthan gum and pectin) tend to produce heavy and sticky texture when the dosage exceeds 0.3%, impairing product taste experience.

The core strengths of **SSPS** in low viscosity are as follows:

- **Viscosity Performance**:

The viscosity of 10% **SSPS** aqueous solution at 25℃ is only 50-80 mPa·s, much lower than pectin (150-200 mPa·s) and xanthan gum (300-500 mPa·s) at the same concentration. It maintains a smooth flowing state without stickiness even at a dosage up to 0.8%.

- **Taste Advantages**:

When added to sugar-free beverages, plant-based drinks and meal replacement milkshakes, it endows products with a **smooth, refreshing and light** taste without masking the original flavor (fruit and vegetable flavor, milk flavor), perfectly fitting the current consumption trend of **light diet, low sugar and clean label**.

- **Processing Adaptability**: Its low viscosity ensures excellent fluidity in high-pressure homogenization, pumping and filling processes, reducing equipment energy consumption and improving production efficiency, especially suitable for automated continuous production lines.

3. Temperature, Salt and Shear Resistance: Adapt to Complex Processing Technologies and Reduce Production Risks

Production processes of downstream food and pharmaceutical enterprises often involve high-temperature sterilization, high-salt systems and strong shear treatment. Traditional colloids are prone to structural damage and functional attenuation (such as viscosity decline and stability deterioration) under such processes, leading to unstable product quality. Benefiting from its stable molecular structure, **SSPS** boasts strong processing adaptability and can adapt to various complex production processes, as follows:

- **Temperature Resistance**:

It withstands autoclave sterilization at 121℃ for 30 minutes without molecular degradation, with functional stability attenuation ≤5%. It is also compatible with pasteurization (85℃ for 15min) and UHT ultra-high temperature sterilization (135℃ for 5s), suitable for dairy beverages, canned food, pre-made dishes and other products requiring high-temperature sterilization.

- **Salt Resistance**:

No flocculation, stratification or obvious viscosity change in high-salt systems (NaCl concentration 0%-5%). It adapts to high-salt products such as meat products (ham, sausages), pickled food and sauces, solving the instability pain point of traditional colloids in high-salt environments.

- **Shear Resistance**:

Its molecular structure remains stable without degradation or sudden viscosity change under strong shear forces such as high-speed homogenization (rotating speed ≥3000r/min) and stirring. It meets the continuous production demands of large-scale manufacturing for beverages, dairy products and meat products, lowering product quality risks caused by processing procedures.

4. Multifunctional Composite Properties: Multi-purpose Ingredient to Reduce Formula Costs for Downstream Customers

SSPS integrates six core functions: emulsification, thickening, moisturizing, film-forming, starch retrogradation inhibition and nutritional fortification. Downstream customers can replace multiple additives (emulsifiers, thickeners, humectants) by using single **SSPS**, simplifying formulas and cutting procurement and formula R&D costs. The specific functions and application scenarios are as follows:

- **Emulsifying Function**:

It can replace synthetic emulsifiers such as sucrose ester and glyceryl monostearate to stabilize oil-in-water systems (dairy beverages, salad dressings, plant-based cream). Its emulsifying activity reaches 0.85-0.92, 1.5 times that of pectin and 1.3 times that of gum arabic, with excellent emulsifying stability and no stratification after 3 months of storage at room temperature.

- **Starch Retrogradation Inhibition Function**:

Adding 0.3%-0.8% to flour products (noodles, steamed buns, bread) and frozen food (frozen dumplings, glutinous rice balls) delays starch aging and prevents hardening and cracking of flour products. The cracking rate of frozen food is reduced by more than 80%, extending shelf life and improving taste.

- **Moisturizing and Film-forming Function**:

Added to baked goods (cakes, biscuits), it locks moisture and delays product aging and hardening, extending shelf life by more than 30%. It can be used to prepare edible packaging films with good oxygen barrier, moisture barrier and antibacterial properties, meeting downstream customers' demands for **green packaging and environmental upgrading**, replacing part of plastic packaging and easing environmental pressure.

- **Nutritional Fortification Function**:

The water-soluble dietary fiber content of **SSPS** is ≥80% (in accordance with GB 28050-2011). As a high-quality source of dietary fiber, it supports downstream products to achieve the health claim of **high dietary fiber**, catering to consumers' demands for intestinal health, sugar and fat control, and enhancing product added value.

(II) Raw Material and Safety Advantages: Align with Clean Label Trend and Reduce Customers' Compliance Risks

Downstream customers (especially food and pharmaceutical enterprises) have increasingly stringent requirements on the **naturalness, safety and compliance** of raw materials. Clean label, clean formula and non-GMO have become the core direction of product upgrading. The advantages of **SSPS** in raw materials and safety perfectly match downstream customers' compliance demands, as detailed below:

1. Natural Plant-derived Source, High-value Utilization of By-products, Stable Raw Material Supply and Controllable Cost

Made from soybean processing by-products (soybean residue, soybean meal), **SSPS** is a green raw material realizing **waste recycling**, in line with national circular economy policies. It also features stable raw material supply and controllable cost, providing long-term raw material guarantee for downstream customers:

- **Raw Material Supply**:

China ranks first globally in soybean processing, with annual soybean residue output exceeding 28 million tons and soybean meal output over 90 million tons. Abundant raw material resources meet the large-scale production demand of **SSPS**, eliminating raw material shortage concerns for downstream customers.

- **Cost Advantages**:

Compared with pectin (extracted from citrus peel and apple pomace with high raw material costs) and gum arabic (high import dependence and severe price fluctuation), **SSPS** adopts industrial by-products as raw materials, cutting raw material costs by 40%-50% and helping downstream customers reduce procurement expenses.

- **Green Attributes**:

Derived from natural plants without synthetic chemical ingredients, it can be labeled as **Soluble Soybean Polysaccharides** or **Dietary Fiber**, conforming to the clean label trend and helping downstream products build a brand image of **natural, healthy and clean formula**.

2. Comprehensive Safety Certifications Without Usage Limitations to Reduce Customers' Compliance Risks

SSPS has obtained safety certifications from multiple global authoritative institutions with **no dosage limitations**, complying with compliance requirements in different regions worldwide. Downstream customers can safely apply it to various products without compliance concerns:

- **Authoritative Certifications**:

It has been certified by CAC (Codex Alimentarius Commission), FDA (U.S. Food and Drug Administration), JECFA (Joint FAO/WHO Expert Committee on Food Additives) and GB 2760-2014 (China Food Additive Usage Standard). It has **unrestricted ADI (Acceptable Daily Intake)** and is classified as **GRAS (Generally Recognized As Safe)**.

- **Safety Characteristics**:

Non-GMO, allergen-free (soybean protein content ≤0.1%, far below national allergen limit standard) and free of chemical residues (produced by physical extraction and enzymatic hydrolysis without organic solvent addition). It is suitable for all groups including infants, pregnant women and people with allergies.

- **Compliance Adaptability**:

It can be widely applied in food, pharmaceutical, cosmetic, feed and other fields without additional special compliance qualifications, reducing downstream customers' compliance costs and R&D cycle.

(III) Technical and Cost Advantages: Domestic Technological Breakthrough, Far Higher Cost Performance Than Imports to Help Customers Cut Costs and Improve Efficiency

Previously, the global SSPS market was mainly monopolized by international giants such as Fuji Oil Japan, ADM and Cargill. Imported products feature high prices and long delivery cycles, increasing production costs and supply chain risks for downstream customers. In recent years, domestic enterprises have broken through core technologies to realize domestic production of SSPS, forming significant advantages in quality, cost and delivery cycle, accurately meeting downstream customers' demands for **cost reduction, efficiency improvement and stable supply chain**.

1. Independent Core Technology, International-level Quality and Customized Adaptation to Downstream Demands

Leading domestic enterprises (Jingjing Biology, Huahui Biology, Juyuan Biology) have made breakthroughs in three core technologies: **enzymatic hydrolysis-membrane separation coupling technology, precise molecular weight control technology and high-purity purification technology**. Product quality reaches the international advanced level, and customized products can be provided according to specific downstream application demands:

- **Quality Indicators**:

Product purity has been upgraded from the traditional 85% to 93%-98% with uniform molecular weight distribution (10000-50000 Da). Its solubility (completely dissolved within 30min at 25℃), stability and functional properties are equivalent to Fuji Oil Japan's SOYAFIBE series, with partial indicators (acid stability, shear resistance) superior to imported products.

- **Customized Services**:

Customized **SSPS** products with different molecular weights and functional focuses (low-viscosity type, high-emulsifying type, high-purity type) can be developed for specific application scenarios such as acidic dairy beverages, baking and pharmaceutical carriers, helping customers optimize formulas and enhance product competitiveness.

- **Technical Support**:

Domestic enterprises have professional R&D teams to provide technical support for downstream customers including formula debugging, process optimization and problem-solving solutions, accelerating product launch and reducing R&D and trial-and-error costs.

2. Remarkable Cost Performance Advantage with Comprehensive Application Cost Reduced by Over 25%

Domestic **SSPS** boasts prominent advantages in price, dosage and delivery cycle, enabling downstream customers to significantly cut comprehensive application costs and improve profitability:

- **Price Advantage**:

The market price of domestic **SSPS** is about 80-120 RMB/kg, 30%-40% lower than imported products (120-180 RMB/kg), directly reducing downstream raw material procurement costs.

- **Dosage Advantage**:

Domestic **SSPS** delivers higher functional efficiency with a dosage of only 0.1%-0.5%, much lower than traditional colloids (pectin 0.5%-1.0%, CMC 0.3%-0.8%), further cutting raw material consumption costs.

- **Comprehensive Cost**:

Verified by practical downstream applications, replacing imported products or traditional colloids with domestic **SSPS** reduces comprehensive application costs (raw material cost + formula cost + processing cost) by over 25%, greatly improving customers' profitability.

- **Supply Advantage**:

Domestic **SSPS** has sufficient production capacity (annual output of leading enterprises exceeds 10,000 tons) and a short delivery cycle (7-15 days), avoiding supply chain risks caused by long delivery cycles (30-60 days) and severe price fluctuations of imported products and ensuring continuous downstream production.

(IV) Application Scenario Advantages: Full-industry Coverage, Adapt to Emerging Downstream Tracks and Expand Customers' Product Boundaries

Leveraging its multifunctional properties, **SSPS** is widely used in food, pharmaceutical, cosmetic, feed and other fields, covering both traditional mature tracks and emerging growth tracks. It helps downstream customers expand product boundaries and seize market growth opportunities. The specific application scenarios and customer values are as follows:

1. Food Industry (Core Application Scenario, Accounting for Over 75%)

The food industry is the core application market of **SSPS**, covering traditional and emerging food tracks and accurately meeting product upgrading demands of food enterprises:

- **Dairy Products**:

Applied in acidic dairy beverages, fermented milk, plant-based milk (soy milk, oat milk), cheese and milk drinks to solve pain points of protein stabilization, taste optimization and nutritional fortification, supporting product upgrading towards low sugar, low fat and high fiber.

- **Flour and Frozen Food**:

Used in noodles, steamed buns, bread, frozen dumplings, glutinous rice balls and pre-made dishes to delay starch retrogradation, prevent hardening and cracking, extend shelf life and improve taste and quality.

- **Beverage Industry**:

Applied in sugar-free drinks, fruit and vegetable juices, meal replacement milkshakes and probiotic drinks to deliver a refreshing taste and achieve dietary fiber fortification, aligning with healthy consumption trends.

- **Baking and Snack Food**:

Added to cakes, biscuits, pastries and candies for moisturizing and anti-aging effects, improving taste and shelf life while enabling clean label upgrading.

- **Meat Products and Sauces**:

Used in ham, sausages, condiments and salad dressings for emulsification, thickening and system stabilization, enhancing product texture and taste and extending shelf life.

2. Pharmaceutical Industry (High-value-added Scenario with the Fastest Growth Rate)

With the development of the pharmaceutical industry, **SSPS**, as a natural bio-based material with good biocompatibility and safety, has seen rapid application expansion in pharmaceuticals, providing high-value-added raw materials for downstream pharmaceutical enterprises:

- **Drug Carrier**:

Used as microcapsule embedding material for encapsulation of probiotics, vitamins and traditional Chinese medicine extracts to improve drug stability, realize sustained and controlled release delivery and reduce drug irritation.

- **Medical Dressing**:

Can be made into absorbable medical dressings with excellent moisturizing, antibacterial and hemostatic properties to meet wound healing demands, replacing traditional non-absorbable dressings and reducing secondary injury.

- **Pharmaceutical Excipient**:

Serves as a thickener, stabilizer and binder for tablets, capsules and oral liquids to improve formulation stability and taste, conforming to the development trend of **natural pharmaceutical excipients**.

3. Cosmetics and Cross-border Fields (Emerging Scenarios with Huge Potential)

The moisturizing, antibacterial and film-forming properties of **SSPS** drive its rapid application growth in cross-border fields including cosmetics, pet food and edible packaging, opening up new growth space for downstream customers:

- **Cosmetics**: Used as humectant and thickener in toner, lotion and cream to lock skin moisture and relieve dryness, with high safety suitable for sensitive skin products.
- **Pet Food**: Applied in pet dry food, wet food and snacks for moisturizing and taste improvement, while supplementing dietary fiber to promote pet intestinal health, fitting the upgrading trend of **natural and healthy pet food**.
- **Edible Packaging and Biodegradable Materials**: Used to prepare edible packaging films and biodegradable films to replace plastic packaging, meeting downstream customers' demands for **environmental protection and green development** and complying with the national dual-carbon policy.

II. Future Market Development Prospects of Soluble Soybean Polysaccharides (SSPS) (For Downstream Customers and Target Markets)

Combined with the global and Chinese market patterns, downstream industry development trends, policy orientation and technological upgrading direction, the SSPS market will maintain steady and rapid growth in the next 5-10 years with continuous market scale expansion and expanding application scenarios. Meanwhile, the market competition pattern will be further optimized, with domestic products dominating the market and providing higher-quality and cost-effective products and services for downstream customers. Below is the market reference for downstream customers from five dimensions: market scale, driving factors, competition pattern, development trends and customer opportunities.

(I) Market Scale: Steady Global Growth, China as the Core Growth Engine and Continuous Release of Downstream Demand

With the upgrading and development of downstream food, pharmaceutical, cosmetic and other industries, market demand for **SSPS** keeps expanding, achieving rapid growth in both global and Chinese market scale. Benefiting from domestic substitution advantages and downstream industrial cluster strengths, China has become the core growth engine of the global SSPS market, with specific data as follows:

1. Global Market Scale

According to data from third-party market research institution Grand View Research, the global SSPS market size reached approximately 222 million US dollars in 2025, with a compound annual growth rate (CAGR) of 8.02% from 2026 to 2032. The global market scale is expected to exceed 380 million US dollars by 2032. The Asia-Pacific region (China, Southeast Asia) is the fastest-growing region worldwide, contributing over 60% of global market increment. The European and American markets focus on high-end applications (pharmaceuticals, high-end food) with steady market growth and a growth rate of about 6%-7%.

2. China Market Scale

As the world's largest soybean processing country and food industry country, China's SSPS market growth rate far exceeds the global average. Data from the China Food Additives and Ingredients Association shows that China's SSPS market size exceeded 1.2 billion RMB in 2023, with a CAGR of 22.7% from 2018 to 2023. It is projected to surpass 3 billion RMB by 2030, accounting for over 45% of the global market share and making China the world's largest producer and consumer of SSPS.

3. Downstream Demand Distribution (2023 Data)

In China's downstream demand structure, the food industry accounts for 75.3% (dairy products 38.2%, flour and frozen food 21.5%, beverages 15.6%), the pharmaceutical

industry 12.7%, and cosmetics and other fields 12.0%. In the future, demand growth in the pharmaceutical and cosmetic industries will continue to rise, with the pharmaceutical sector expected to account for over 25% by 2030 and become a core growth pole of the SSPS market.

(II) Driving Factors: Four Core Forces Fueling Sustained SSPS Market Growth and Benefiting Downstream Customers

Future growth of the SSPS market is mainly driven by four core factors: **health consumption upgrading, downstream industry iteration, technology and cost optimization, policy and industrial coordination**. These factors will continuously release downstream demand and create more opportunities for product upgrading and market expansion for downstream customers.

1. Health Consumption Upgrading: Promote SSPS Replacement of Traditional Additives with Explosive Demand Growth

With the improvement of residents' health awareness, **clean label, natural ingredients and functional nutrition** have become the core development trend of food, cosmetic and pharmaceutical products, directly driving the demand growth of **SSPS**:

- **Clean Label Trend**:

Consumers have growing demand for products with **clean formula, natural ingredients and transparent labeling**. As a natural plant-derived ingredient, **SSPS** can replace synthetic emulsifiers and thickeners to fit the clean label trend. Downstream food and cosmetic enterprises will gradually increase the application proportion of **SSPS** to enhance product competitiveness.

- **Dietary Fiber Demand**:

Dietary fiber intake is generally insufficient globally. The average daily intake of Chinese residents is only 15g, far below the recommended value (25-30g). Dietary fiber fortification has become an important direction for product upgrading. As a high-quality water-soluble dietary fiber, **SSPS** is widely used in various products with an annual demand growth rate exceeding 15%.

- **Functional Trend**:

Demands for sugar control, fat control, intestinal health and anti-aging drive the expansion of functional food, functional cosmetics and functional pharmaceutical products. Integrating stabilization, nutrition and moisturizing functions, **SSPS** perfectly meets the upgrading demands of these products and becomes a core ingredient.

2. Downstream Industry Iteration: Expansion of Core Application Fields Driving Rigid Demand Growth for SSPS

The core downstream fields of **SSPS** (food, pharmaceuticals, cosmetics) are in a rapid iteration and upgrading stage. Industrial expansion directly drives rigid demand growth

for **SSPS**, creating more application scenarios for downstream customers:

- **Food Industry**:

Categories including acidic dairy beverages, plant-based drinks, frozen food, pre-made dishes and sugar-free beverages achieve an annual growth rate of 8%-12%. As core application scenarios of **SSPS**, these categories will continuously drive market demand. Meanwhile, the expansion of emerging categories such as non-fried instant noodles, fresh wet rice noodles and functional meal replacements further broadens the application boundary of **SSPS**.

- **Pharmaceutical Industry**:

Rapid development in biopharmaceuticals, modernization of traditional Chinese medicine and medical dressings has increased demand for natural, safe and biocompatible excipients. As a high-quality pharmaceutical excipient, **SSPS** will gradually replace traditional chemical excipients with a demand growth rate of 18%-20%.

- **Cosmetic Industry**:

Natural cosmetics, sensitive skin cosmetics and anti-aging cosmetics have become market hotspots. The moisturizing, antibacterial and mild properties of **SSPS** meet product demands with rising application proportion and a demand growth rate of 16%-18%.

3. Technology and Cost Optimization: Domestic Technological Breakthrough Improves SSPS Cost Performance and Reduces Downstream Customer Costs

Domestic enterprises continue to increase R&D investment to promote technological upgrading and cost optimization of **SSPS**, further enhancing product cost performance, lowering downstream application costs and boosting market penetration:

- **Technological Upgrading**:

Breakthroughs in targeted enzymatic hydrolysis and modification technologies (acetylation, carboxymethylation) enable the development of high-emulsifying, high-temperature-resistant, high-purity and pharmaceutical-grade dedicated **SSPS** products to meet high-end demands in different downstream fields. Improved extraction efficiency raises raw material utilization rate from 60% to over 85%, further cutting production costs.

- **Cost Optimization**:

Driven by large-scale production and technological upgrading, the unit production cost of domestic **SSPS** will decrease by 15%-20% with further price reduction. Continuous dosage optimization will lower comprehensive application costs steadily, encouraging downstream customers (especially small and medium-sized enterprises) to increase the application proportion of **SSPS**.

4. Policy and Industrial Coordination: Policy Support + Industrial Cluster Ensuring Healthy Market Development

National policy support and coordinated industrial development underpin the sustained growth of the SSPS market and provide a more stable supply chain environment for downstream customers:

- **Policy Support**:

The state has issued policies such as the *14th Five-Year Plan for Advancing Agricultural and Rural Modernization* and the *Action Plan for High-value Utilization of Agricultural Processing By-products* to promote the high-value utilization of soybean processing by-products (soybean residue, soybean meal). As a core high-value product, **SSPS** receives strong policy support. Meanwhile, RCEP tariff reduction policies boost the export growth of domestic **SSPS**, with China's SSPS export volume increasing by 41% year-on-year in 2023 and expanding global market share continuously.

- **Industrial Coordination**:

China boasts prominent cluster effects in soybean processing, food industry and pharmaceutical industry. In-depth cooperation between **SSPS** manufacturers and downstream customers has formed an integrated industrial chain of **raw material-production-application**, enabling rapid response to customized downstream demands and reducing customers' R&D and supply chain costs.

(III) Competition Pattern: Rise of Domestic Brands and Tier Differentiation Expanding Downstream Customers' Options

Breakthroughs in domestic SSPS technology have triggered major changes in the global competition pattern, evolving from **international giant monopoly** to **domestic dominance supplemented by international brands**. Obvious market tier differentiation expands downstream customers' choices while delivering higher-quality products and services.

1. Global Market Tier (2023)

- **First Tier**:

Fuji Oil Japan, ADM and Cargill lead in technology, focusing on the high-end market (pharmaceutical grade, high-end food grade) with premium product prices. They account for about 35% of the global market share, mainly serving large global food and pharmaceutical enterprises.

- **Second Tier**:

Leading Chinese enterprises including Weibo Food, Jingjing Biology, Huahui Biology and Juyuan Biology deliver international-level product quality with remarkable cost performance advantages. They target the mid-to-high-end market while covering China's low-to-mid-end market, holding about 45% of the global market share. They mainly

serve domestic food, pharmaceutical and cosmetic enterprises and export products to Southeast Asia, Europe and other regions.

- **Third Tier**:

Regional small and medium-sized manufacturers (domestic and international) feature low production capacity, weak technology and unstable quality, focusing on the low-end market with low product prices. They account for about 20% of the global market share and are gradually integrated by leading enterprises.

2. Core Competition in China Market

- **Rising Domestic Substitution Rate**:

China's SSPS domestic substitution rate has increased from 45% in 2015 to 80% in 2023, completing import substitution. Downstream customers can prioritize domestic products to reduce procurement costs and supply chain risks.

- **Advantages of Leading Enterprises**:

Leading domestic enterprises (Jingjing, Huahui) have an annual output of over 10,000 tons with all-round strengths in technology, quality, cost and delivery cycle. The CR5 (market share of the top 5 enterprises) exceeds 60%, ensuring stable product supply and professional technical support for downstream customers.

- **Competition Focus Shift**:

Future competition in China's market will shift from **price competition** to **quality competition and customized service competition**. Leading enterprises will further increase R&D investment to enhance product added value and provide customized solutions for downstream customers, while small and medium-sized manufacturers will be gradually eliminated.

(IV) Development Trends: High-end Technology, Diversified Application and Value Upgrading to Boost Downstream Customers' Product Innovation

The SSPS market will present three major development trends: **high-end technology, diversified application and value upgrading**, creating more product innovation opportunities for downstream customers, enhancing product competitiveness and expanding market space.

1. High-end Technology: Customized and High-value-added Products Become Mainstream

- **Precise Molecular Weight Control**:

Develop dedicated products including low-viscosity Type A (molecular weight 10000-20000 Da), medium-viscosity Type B (20000-30000 Da) and high-viscosity Type C (30000-50000 Da) to adapt to different downstream scenarios (low-viscosity for beverages, high-viscosity for pharmaceutical carriers).

- **Functional Modification Upgrading**:

Optimize emulsification, heat resistance, film-forming and sustained-release properties of **SSPS** through acetylation, carboxymethylation and phosphorylation modification technologies, developing high-emulsifying, high-temperature-resistant and high-purity pharmaceutical-grade products to meet downstream high-end demands.

- **Breakthrough in Pharmaceutical-grade Products**:

Focus on developing high-purity (≥95%), low-endotoxin and structurally uniform pharmaceutical-grade **SSPS** for drug carriers, targeted delivery and medical dressings, enhancing product added value and supporting product upgrading of downstream pharmaceutical customers.

2. Diversified Application: Rapid Expansion of Emerging Scenarios to Broaden Downstream Customers' Boundaries

- **Food Industry**: Emerging scenarios such as pet food, functional beverages, plant meat and edible packaging will grow rapidly, expected to account for over 30% of SSPS demand by 2030 and open up new growth space for downstream food customers.
- **Pharmaceutical Industry**: Applications in microcapsule embedding, sustained and controlled release preparations, wound dressings and tissue engineering materials will continue to expand. The pharmaceutical sector is expected to account for 31% of SSPS demand by 2030, becoming one of the core application fields and driving product innovation for downstream pharmaceutical customers.
- **Cross-border Fields**: Applications in cosmetic humectants, feed additives, biodegradable materials and environmental coatings will be gradually implemented. New scenarios will contribute over 30% of market increment, creating more cross-border innovation opportunities for downstream customers.

3. Value Position Upgrading: Transformation From "Additive" to "Functional Nutritional Ingredient + Green Bio-based Material"

The value positioning of **SSPS** will be gradually upgraded beyond the single role of **food additive**, transforming into a dual positioning of **functional nutritional ingredient + green bio-based material**, delivering higher-value-added product support for downstream customers:

- **Functional Nutritional Ingredient**:

Strengthen the nutritional functions of **SSPS** in dietary fiber supplementation, intestinal health regulation, blood sugar control and anti-aging, helping downstream customers develop functional products and enhance added value.

- **Green Bio-based Material**:

Leveraging its biodegradable, natural and safe characteristics, its applications in edible packaging, biodegradable materials and environmental protection fields will continue to expand, supporting downstream customers' **green and low-carbon upgrading** and complying with the national dual-carbon policy.

(V) Opportunities and Countermeasure Suggestions for Downstream Customers

With the rapid development of the SSPS market, downstream customers (food, pharmaceutical, cosmetic enterprises) will face abundant opportunities while needing to respond to market changes and optimize product layout and selection strategies, as detailed below:

1. Core Opportunities

- **Cost Advantage Opportunity**:

The continuous improvement of domestic **SSPS** cost performance helps customers reduce comprehensive application costs and improve profitability, especially supporting product upgrading for small and medium-sized enterprises.

- **Product Innovation Opportunity**:

The multifunctional properties and expanding application scenarios of **SSPS** enable customers to develop new products (high-fiber sugar-free beverages, natural moisturizing cosmetics, sustained-release drugs) and expand market space.

- **Compliance and Brand Opportunity**:

The natural, safe and compliant attributes of **SSPS** help customers build a clean-label, natural and healthy product image, enhance brand competitiveness and align with market consumption trends.

2. Countermeasure Suggestions

- **Optimize Selection Strategy**:

Prioritize products from leading domestic enterprises with balanced quality, price, delivery cycle and technical support. Select customized **SSPS** products according to personal product demands to optimize formulas and improve product performance.

- **Strengthen Application Innovation**:

Leverage the multifunctional characteristics of **SSPS** to expand application scenarios and develop new product categories, seizing growth opportunities in emerging tracks such as plant-based products, pet food and pharmaceutical excipients.

- **Deepen Supply Chain Cooperation**:

Establish long-term cooperative relationships with **SSPS** manufacturers. Rely on enterprise technical support to optimize production processes, reduce trial-and-error costs and accelerate product launch. Lock raw material prices to mitigate supply chain risks.

III. Conclusion

With six core competitive advantages — **outstanding acidic stability, low viscosity and refreshing taste, temperature/salt/shear resistance, natural safety and compliance, high cost performance and wide application scenarios** — **Soluble Soybean Polysaccharides (SSPS)** accurately meets the core demands of downstream customers in food, pharmaceutical, cosmetic and other industries, emerging as one of the most promising green functional ingredients and bio-based materials.

Driven by four core forces including health consumption upgrading, downstream industry iteration, technology and cost optimization and policy support, the global SSPS market will maintain steady growth at around 8% in the next 5-10 years, while China's growth rate will exceed 15%. China's market scale will surpass 3 billion RMB by 2030, accounting for over 45% of the global share. The market competition pattern will show a trend of **domestic dominance supplemented by international brands**, with high-end technology, diversified application and value upgrading as the core development directions.

For downstream customers, **SSPS** is not only a high-quality ingredient to reduce costs and improve product quality, but also an important support for product innovation, market space expansion and brand competitiveness enhancement. It is recommended that downstream customers seize market opportunities, optimize selection strategies, strengthen cooperation with leading SSPS enterprises, and rely on the functional advantages and technical support of **SSPS** to realize product upgrading and market expansion, jointly promoting the high-quality development of the SSPS industry.