



# An Emerging Market for Microalgae-Based Omega-3: Maximizing Algae Production and its Key Market Drivers



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Omega-3 is a type of nutritional lipid with historical negative associations with cardiovascular or other chronic diseases due to its oil or fat content. However, consumer awareness of the health benefits of Omega-3 has come a long way in recent years, especially in the Asia-Pacific (APAC) region. The most common ingredients of Omega-3 include EPA, DHA, and ALA, with two that can be sourced from microalgae oil—DHA and EPA. The market for microalgae-based Omega-3 was valued at about \$641 million in 2019, highlighting its potential. It also has an optimistic outlook with a healthy 12.04% CAGR, beating the market for plant-sourced Omega-3 (CAGR of 8.51% and 2019 value of \$568 million).

Typical end-use applications of Omega-3 include dietary supplements, infant nutrition, food, beverages, cosmetics, and personal care products. The market segment for microalgae oil includes a higher price point at \$60 on average per kg in 2019 compared to other Omega-3 products sourced from plant, seed, or nut oil, which average around \$2.78 per kg. In the coming years, the price point for microalgae-based Omega-3 should decline and stabilize as more efficient production methods come to fruition, coupled with increasing competitors and manufacturers in the market. APAC countries such as China, South Korea, and Vietnam have increased microalgae-based Omega-3 production, leading to an overall decrease in pricing.



Besides, Japan is prone to natural disasters, such as earthquakes and floods. Hence, it is essential for the country to build a robust digital infrastructure and adopt a resilient cybersecurity practices. It will help the nation to overcome such catastrophes and ensure the success of the SDGs, particularly numbers nine, 11, and 16.

## Maximizing Production for Microalgae-based Omega-3

Sourcing microalgae oil for Omega-3 is an emerging market popularized for being sustainable, safe, and vegan-friendly. Compared to fish oil, algal oil has many advantages, such as less odor, a consistent composition leading to easier algae biomass pr, and a lack of cholesterol and contaminants.

Microalgae are grown in a saline laboratory and involve five key stages in their production process: fermentation, biomass filtration/centrifugation, drying of the biomass, microalgae oil extraction, and further purification. During microalgae oil extraction, algal cells are disrupted. If the cell walls are ruptured, the algal concentrate can be exposed to oxidation, leading to an odorous by-product that humans cannot ingest. To maximize production stability, efficiency, and yield, innovative technology that enhances the safe disruption of the algal cells for extraction, decreases by-product waste, and maximizes feedstock utility (sugarcane molasses, for example) during the initial fermentation stage must be created. For dietary supplements in pill form, encapsulation technology is also key to protecting the Omega-3 isolate from unwanted moisture or contaminants.

Compared to Omega-3 products sourced from krill or fish oil, the production of microalgae-based Omega-3 is more sustainable and leads to increased fish development and harvests. Harvesting microalgae commercially can be accomplished in a stable and well-controlled laboratory setting, limiting uncontrollable factors. Recent technology development in algal-based oil has increased efforts to create a more sustainable and durable method of providing necessary Omega-3 ingredients for aquaculture harvesting.

BASF SE, a German chemicals company with production plants across the Americas, Europe, Asia, and Australia, partnered with Cargill to produce Latitude™ Technology. This innovative technology highlights an industry movement toward sourcing alternatives to fish oil that are instead algae-based. Canola oil is infused with algal oil and other plant matter rich in all three Omega-3 ingredients (i.e., EPA, DHA, and DPA). Latitude™ Technology promotes the growth of quality fish by replacing or blending with fish oil in aquaculture feed production. Not only can algal-based technology benefit the fish industry, but it can also be used in direct applications of Omega-3-infused food and dietary supplements. Recent technology advancements by the New Zealand Institute of Plant and Food Research Ltd. in detecting Omega-3 concentrates in supplement pills without destroying them (and almost instantaneously) have been patented.

## Breaking Down Key Trends and Highlighting Country Cases

Key drivers in the algae market in the APAC region include rising consumer awareness of the health benefits of Omega-3, increased consumer focus and preference for healthier and mindful living, and growing demand for quality infant development formulas. Need for fish-based Omega-3 has had the highest market value compared to other ingredient sources such as plants, seeds, or krill oil. However, concerns about a depleting marine population and the sustainability of aquaculture farming for fish harvesting have led to increased manufacturing of algae-based Omega-3. These short-term trends will likely impact the market in the next three to four years. General macro-level trends such as rising disposable incomes and quality of life in the APAC region are also affecting the market. Lastly, specific APAC country trends have already begun to impact the decisions of value chain holders, from targeting specific health benefits during product formulation on the manufacturer side to wholesale retailers adapting to changing consumer preferences.



## The Case for India: High Demand for Omega-3 in Infant Nutrition

Concerns about India's lower life expectancy than most competing developing countries in the APAC region, such as China, Japan and Australia, have been partially attributed to a deficiency in Omega-3 EPA and DHA nutrients. This had led to Indian health officials establishing a reference for daily intake for locals, thus increasing awareness and demand for daily supplements for adults and fortified infant nutrition. The health benefits of Omega-3 EPA in infant brain development are expected to increase sales of infant nutrition formulas. Coupled with factors such as rising population rates and increased disposable income for Indians, the infant nutrition market for India is the fastest growing after China's booming market.

More than half of the Omega-3 market in India is sourced from fish, and algae-sourced products are the next biggest source. With a depleting source of marine life and an increasing vegetarian and vegan population, algal Omega-3 is quickly becoming a popular alternative to fish oil Omega-3 and is more sustainable in its production. Beyond the rise of product development in infant nutrition, the Omega-3 market for India also has other opportunities in end-use products such as pet food, animal feed, and dietary supplements.

## The Case for Japan: Omega-3 for an Aging Population

In Japan, changing demographics that emphasize a high geriatric population with at least a quarter of its total population aged 65 years or older have led to an increase in the intake of Omega-3 in the daily lifestyles of Japan's elder generation. The key to harnessing this growing Japanese market for Omega-3 (especially rich in DHA and EPA) is producing more consumer-friendly products that are transparent in sourcing quality ingredients that emphasize health, wellness, and sustainability.

Research efforts at the university level, such as Japan's Hosei University and Teikyo Heisei University, have focused on developing quality and effective Omega-3 EPA and DHA. Support from the government in promoting dietary supplements as healthy alternatives for nutrition intake has increased Japanese consumers' awareness of the health benefits of Omega-3. Algal oil sourcing has increasingly become a factor in infant nutrition, as seen in India. In fish production, Japan has established its presence in the APAC region as a leading fish oil producer. However, with the adverse effects of the COVID-19 pandemic on the industry, many fish harvesting facilities have been on strict lockdown and have reduced harvest yields after the Japanese government declared a state of emergency. Demand for fish-based Omega-3 has been steady in the Japanese market, but production limits and growing consumer awareness of microalgae Omega-3 make algal-based Omega-3 an emerging competing product.



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