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The spirulina strategy

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This is an adapted version of the SMU Case, "Navigating an Eternal Ocean: EnerGaia's Emergent Strategy in the Market for Spirulina" written by Research Fellow Ryan Merrill and Assistant Professor Simon Schillebeeckx. To see the full case, please click on the following link: <https://cmp.smu.edu.sg/case/3986>

EnerGaia began life trying to address nutrition issues in the developing world. The prospect of profit is testing its founder to balance both or choose one over the other

Spirulina, a form of edible algae, has been harvested around Lake Chad from as early as the 9th century and is thought to have been a food source for the Aztecs as recently as the 16th century. At 60 percent protein content by dry weight, it yields 20 times more protein per unit than soybeans and 200 times more than beef. It also uses less water per kilo of protein than other crops, at 25 percent of soy, 17 percent of corn and just two percent of beef.

Saumil Shah saw the potential of spirulina in addressing future protein demand as global population is projected to reach 8.6 billion in 2030 and 9.8 billion in 2050.

"By 2050, global food supplies need to increase by between 60 percent and 100 percent," elaborates Saumil, who started biotech EnerGaia to grow spirulina. "The only way to do this sustainably is through technology; there is simply not enough land and resources to do it in the 'business as usual' fashion. And as income increases, people tend to demand more protein.

"The average person in the developed world consumes three times more protein than someone in the developing world. I thought as an environmentalist, using bioreactors to grow algae for protein would be a very interesting thing to bring to Asia."

BLOOMING ALGAE

Spirulina is traditionally grown in open ponds, which is inexpensive but prone to airborne contamination and is hard to scale. The alternative was to produce the algae in closed photobioreactors in a laboratory at a much higher cost, resulting in purer forms of spirulina that fetch a premium in the market.

"In terms of cost, this gap was not 2-3X, or even 10X, but rather closer to 100X," Saumil reveals. "So, we set out to engineer a system of modular bioreactors that could achieve capex levels closer to the open raceway with added advantages of scalability, versatility, and partial automation. The EnerGaia system emerged in the middle, with moderate capex, a nice ability to scale, and many of the benefits of quality and purity from the high end – and without the massive cost."

Saumil's solution: a farm on the rooftop of the Novotel Hotel in Bangkok where 100 tanks were installed to produce spirulina at scale. The team mastered production techniques through 2013, shuttling nutrients and fresh spirulina back and forth the hotel and their R&D facility in the city outskirts. The end product was then sold to local health food stores and retail consumers under the retail brand, Skyline Spirulina.

While successful, the tanks – called "bioreactors" – needed a "renewal" every three months whereby the water had to be replaced to remove contamination before starting a fresh algae colony in a brand new "ocean". Given the lack of access to fresh water in rural farms in developing countries, a system where the water never needs replacing – an "Eternal Ocean" – would go a long way towards EnerGaia's goal of feeding, serving, and empowering poor communities.

While his team was still working on the Eternal Ocean, Saumil was busy developing sales channels outside of Thailand. By 2017, he had secured a co-production relationship with a large French grocer, E. Leclerc, and also a research collaboration to develop protocols for growing rooftop spirulina in the colder climates of Europe.

The potential for profit was immense: organic spirulina powder retailed at over US\$300 per kilo. Touted as a super food that stimulates the immune system and even reduces the toxic effects of radiation, its natural blue hue is a source of natural food colouring. Various reports have projected the global market for spirulina to increase at CAGR of at least seven percent to reach some US\$240 million by 2022.

PROFIT FOR THE POOR? PROFIT OR THE POOR?

Meanwhile, contacts in France and Germany reported skyrocketing demand and much higher prices for organic spirulina that met strict EU organic certification guidelines. In Germany, a major nutraceutical company, Baron Munik, had approached EnerGaia's management team with a compelling offer. If EnerGaia could supply organic spirulina to Baron Munik, the company would purchase the full volume of EnerGaia's production – now expanded to 1,100 tanks – at a premium market price

Simultaneously, ACE Milano, an Italian venture led by two brothers, wanted to start farming spirulina in Phuket, Thailand. The Italians proposed a joint venture to produce dry powder for the mid-price tablet market in the EU and had rented low-cost agricultural land, where EnerGaia would occupy set up capital goods (bioreactors) and staff it with laboratory expertise. ACE Milano would buy an expensive pill-press, dry the spirulina into powder, make tablets, and export them directly to Europe.

While Saumil was excited by the opportunity after years of hard work to grow EnerGaia, he found himself choosing between two seemingly mutually exclusive options. On one hand, EnerGaia was making inroads in transferring technology and financial solutions to poor communities in India and Bangladesh, thereby fulfilling its founder's dream of supporting small farmers and communities with viable livelihoods and better nutrition.

On the other hand, Saumil continued to feel the firm's future could be best secured through the pursuit of a real scientific breakthrough in the Eternal Ocean model, or in achieving farm-scale organics, which would enable it to flourish as a dedicated R&D company with sustained cash flows from licensing technologies to a rapidly growing global marketplace.

Should the company focus on its social role or attempt to combine profit and people motives? And how should he direct the energies of his science team? Should they continue their pursuit of an Eternal Ocean breakthrough that would empower geographic scaling of the EnerGaia solution across rural landscapes? Or pivot their efforts to pioneer farm-scale organics and compete to supply high-priced spirulina, and/or the technology to produce it at scale, to a rapidly growing European and even global marketplace?

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