FRESHWERKZ

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Background
The recent discovery of the link between the human microbiome and a host of chronic disorders is one of the most exciting scientific developments of this century. The discovery is so significant that the World Economic Forum considers Human Microbiome Therapeutics (HMT) to be one of the top 10 emerging technologies in 2014 (World Economic Forum, 2014).

Freshwerkz, a Singapore biotech company, is a first mover in the area of HMT (see website). The Company develops and markets HMT products which help to rebalance disrupted human gut microbiome and treat ailments such as type 2 diabetes, hyperlipidaemia, depression and anxiety, attention deficit hyperactivity disorder (ADHD), autism spectrum disorder, eczema, allergies, and cancer.

In February 2016, Dr Chia Boon Tat and Ms Lee Hwee Teng, founders of Freshwerkz Biotech based in Singapore, were wondering what they need to do to increase public awareness in order to boost sales of the three phytosynbiotics products developed and commercialised by the company.

Company history

The initial foray
The foray into HMT was spearheaded by two technopreneurs, Dr Chia and Mr Angelito Abaoag, in year 2000. Dr Chia is an engineer by training, having graduated from the Institute National Polytechnique de Grenoble in France. He has worked for several SGX-listed Temasek-linked companies and successfully built several businesses in the technology sector in the past 15 years. Mr Abaoag is an industrial microbiologist who graduated from the University of Los Banos, Philippines. He has worked in the microbial technology for nearly 15 years prior to coming to Singapore to start the venture with Dr Chia.

The two partners founded the microbial technology laboratory IMO Labs in Singapore. The Company makes use of microorganisms to develop solutions to counter low productivity problems encountered in the agriculture, aquaculture, and animal health industries. The scientific team from IMO Labs travelled widely in Asia, and discovered that many Asians were eating local traditional fermented foods to keep themselves healthy. The team painstakingly studied these foods and reconstructed the fermentation processes in the laboratory. After a decade of empirical development, IMO Labs developed phytosynbiotics which are effective formulations for treating metabolic, brain, and autoimmune disorders.

In 2008, the team received a grant from SPRING Singapore to develop industry-scale manufacturing processes for stabilising the formulations in the form of capsules. The team also commissioned a trial in a hospital in the Philippines with 166 diabetic patients. The trial showed that one of the phytosynbiotic formulation was as effective as insulin in lowering the blood glucose of diabetic patients. It also lowered their bad cholesterol, raised their good cholesterol, and restored their liver enzymes to normal levels.
In 2009, IMO Labs launched the phytosynbiotic formulation in Singapore. Although the products were effective, the commercial launch was unsuccessful because of the following reasons:

- People were skeptical that microbes can heal chronic ailments. The public awareness of human microbiome therapeutics at that point in time was very low.
- IMO Labs’s forte was in the agricultural sector, so the team lacked the knowledge and experience needed to develop effective marketing and branding strategies.
- IMO Labs underestimated the effort and cost needed for educating the target markets about microbiome therapeutics and for marketing the phytosynbiotics.

**The second wave**

Hwee Teng, a graduate from NTU School of Business, joined IMO Labs as chief financial officer from its very inception. Prior to IMO Labs, she worked in the telecommunications industry and started up her own retail shop reselling health supplements sourced from Australia, Europe, and the United States. She discontinued her health supplement business after several years when her profit margins were too thin to sustain a long-term business.

Because of her background in health supplements, Hwee Teng has always believed in the potential of plants to heal diseases. In 2013, she felt that it was the right time to make another attempt to commercialise phytosynbiotics. She left IMO Labs, formed Freshwerkz, and became an entrepreneur again. She reached an agreement with IMO Labs to commercialise its range of phytosynbiotic formulations worldwide. She also received support from Dr Chia to run her business Freshwerkz.

Hwee Teng is the only staff in Freshwerkz. She looks after the finance, promotion, customer service, and logistics while Dr Chia provides support for website marketing, technical marketing, and technical consultancy.

Manufacturing is outsourced to third-party pharmaceutical packaging companies with good-management-practice (GMP) facilities.

**Market analysis**

**Introduction to HMT**

The human gut microbiome is the aggregate of microorganisms in the human gut. There are as many microorganisms in the microbiome as cells in the body. In terms of genetic diversity, the microbiome outnumbers us by 100 to 1. The role of the microbiome is so important that many scientists have called it “The Forgotten Organ” or “The Second Brain”.

There are tremendous developments taking place in our understanding of the human microbiome has a big influence on our own health.

Diseases linked to dysbiosis include:
- Metabolic syndrome: type 2 diabetes, obesity, hyperlipidaemia, and hypertension
• Neurodevelopmental and neurodegenerative disorders: anxiety, depression, ADHD, Attention Deficit Disorder (ADD), Autism spectrum disorders, Alzheimer’s disease, dementia, and multiple sclerosis
• Autoimmune disorders: asthma, sinus, eczema, food allergies, and cancer
• Gastrointestinal disorders: irritable bowel disease, celiac disease, and colon cancer

Studies are also showing that rebalancing the imbalanced gut microbiome through ingestion of prebiotics and probiotics can help reverse diseases. It is exciting to know that microbiome therapeutics is poised to be one of the disruptive innovations which may transform medicine in the near future.

This new discovery reveals that many conditions and diseases have a root cause in an imbalanced gut microbiome. This new finding has spawned a host of new biotech start-ups in the area of microbiome analysis, diagnosis, and treatment, targeting a wide spectrum of diseases and conditions. Some of these start-ups include Seres Therapeutics, Microbiome Therapeutics, Enterome, Evelo Therapeutics, Evolve Biosystems, Second Genome, uBiome, etc.

Seres Therapeutics is by far the leader of the pack. Backed by Flagship Ventures, Mayo Clinic, and Nestle Health Science, Seres Therapeutics pulled off an IPO in mid-2015, grossing around USD 134 million to fund its work on drugs to modify the gut microbiome to treat recurrent clostridium difficile infections. It also landed USD 120 million upfront payment from Nestle Health Science for commercialisation rights to its future solutions for clostridium difficile infection and inflammatory bowel disease, in a pact which has potentially a deal value of up to USD 1.9 billion.

This new approach to treatment has also inspired a burgeoning economy built around the human microbiome. Self-help books, diet plans, microbiome-friendly foods and supplements, cosmetics and alternative medicine have become available for consumers to strike the right balance in their gut microbiomes and bring about better living.

In comparison to the United States and Europe, Asia is just waking up to the microbiome revolution. Apart from a handful of exceptions, Asia’s research institutes are slow to respond, and its venture capital industry is not developed. Start-ups are few in Asia.

**Market size**
Each Freshwerkz product competes in distinct and different market segments. We shall look at the market size specific to the product needs.

**Diabetes and metabolic syndrome**
The number of people suffering from diabetes is expected to grow from 171 million to 366 million by 2030 (Wild, Roglic, Green, Sicree, & King, 2004). The cost of diabetes is becoming unsustainable. Diabetes results in high healthcare costs, low labour productivity and decreased economic growth. Globally, healthcare expenditure for diabetes totalled USD 465 billion in 2011, equivalent to 11 per cent of total health spending. Without a widely-available investment for effective treatments that prevent diabetes-related complications, the
expenditure is predicted to rise to USD 595 billion by 2030 (International Diabetes Federation, n.d.). In 2012, the global diabetes market yielded USD 28.1 billion in sales in anti-diabetic medication. With the predicted increase in disease prevalence, global sales are expected to grow to USD 67.7 billion in 2022 (Gohil & Enhoffer, 2014).

Neurodevelopmental disorders
ADHD is a behavioural disorder that affects 1 in 20 children in the United States (Faraone, Sergeant, Gillberg, & Biederman, 2003). Global prevalence of autism spectrum disorders is estimated to be 62 in 10,000 people (Elsabbagh, et al., 2012). The global market for anxiety disorder and depression drugs is expected to rise to USD 18.2 billion in 2020 (Block, 2015). The global market for ADHD drugs is worth USD 12.9 billion in 2015 and is expected to grow to USD 17.5 billion in 2020 (Whelan, 2015).

Neurogenerative disorders
Neurogenerative disorders or dementia is a term used to describe brain disorders that affect memory, thinking, behaviour, and emotion. The disorder places enormous strain on healthcare systems, caregivers, and dehumanises the patients. The worldwide costs of dementia are estimated at USD 818 billion (Alzheimer’s Disease International, n.d.). According to a World Health Organisation (2006) study, Alzheimer’s disease, Parkinson’s disease and other dementias affect 37.3 million people or 5.3 per cent of the population worldwide in 2015. The prevalence is expected to rise to 51.3 million or 6.5 per cent of the population worldwide in 2030. According to a representative from research and consulting firm GlobalData, the Alzheimer’s disease treatment market is expected to exceed USD 13 billion by 2023, driven mainly by new therapies addressing the underlying cause of the disorder (cited in Pharma Exe, 2015).

Autoimmune disorders
Autoimmune diseases are a group of more than 80 chronic inflammatory illnesses that collectively affect five per cent to eight per cent of the worldwide population (DiscovHer, n.d.). According to GBI Research, the autoimmune disorders therapeutics market for rheumatoid arthritis, multiple sclerosis, psoriasis, inflammatory bowel disease (including Crohn’s Disease and ulcerative colitis) and systemic lupus erythematosus is expected to reach USD 61.4 billion in 2017 (PR Newswire, 2012).

Need for probiotic supplements
According to Research and Markets (2015), worldwide demand for probiotic foods, beverages, and supplements is rising. The global market size reached nearly USD 23.1 billion in 2012 and is expected to reach USD 36.7 million in 2018 with a compound annual growth rate (CAGR) of 6.2 per cent over this period (BCC Research, 2014). This increase is due to sustained clinical research and growing awareness of the role of microorganisms in promoting good health. Female consumers, in particular, are influencing family buying decisions for probiotics because they tend to gravitate towards supplements that help in maintaining immunity, energy, bone health, mental functions, and ensuring quality sleep (Globe Newswire, 2015).
Technology and products

Description of technology
In the new school of thought of microbiome therapeutics, diseases are caused by dysbiosis, a condition of imbalance of the microbial ecology in the gut. The imbalance may be brought about by aging, genetic disposition, overconsumption of processed foods, overuse of antibiotics, or exposure to environmental pollutants. The imbalance allows harmful microbes to proliferate, eventually causing a leaky gut syndrome, a condition where toxins, live bacteria, and undigested food particles leak into the blood stream. Our immune system then reacts to eliminate these foreign bodies. In the process of defending our body, our immune system triggers chronic low-grade inflammation which gradually spreads into our tissues and brain, shifting the body into a diseased state.

Fortunately, studies on animals and humans have shown that the diseased condition can be reversed by rebalancing the gut microbiome and re-establishing a healthy gut microbiome. This is exactly what phytosynbiotic technology is all about. The technology consists of selecting combinations of plants with known healing properties for specific ailments, and fermenting them using a proprietary process to amplify their healing power. The end product of fermentation is phytosynbiotics which, as shown in Figure 1, is a combination of beneficial microbial communities (probiotics), complex sugars and fibers (prebiotics), and plant nutrients with very high bio-availability (phyto).

Figure 1: The constituents of photosynbiotics

Fermentation significantly enhances the efficacy of healing properties by extracting hard-to-absorb nutrients from the raw plants, hence making them readily available and easily absorbed by the body. At the same time, this special process ensures that the active enzymes are kept intact, whereas other industrial processing or extraction processes usually destroy them.

Probiotics consist of live lactic acid bacteria that boost the overall presence of beneficial bacteria that counter the effects of harmful bacteria in the gut. This eventually leads to better gut health and a stronger immune system. Prebiotics are plant fibres that cannot be digested by the human body. They nourish the good bacteria (bifidobacteria and lactobacilli) already present in the colon which in turn produces substances needed to keep the body healthy.

To date, the technology has not been patented but kept as a trade secret.
**Products**

After a brief period of market testing, Freshwerkz chose to commercialise three phytosynbiotic formulations. Derivatives of vegetable origins and packed in bottles of 60 capsules, the three products are Provie G, Living Logic+ and Living Genesis. A brief description of the products is given below.

- **ProVie G (PVG)**
  It contains fermented bitter gourd and moringa which are known for the active bio-compound polypeptide-P (also known as plant insulin) and their ability to support healthy levels of glucose and cholesterol.

  PVG has been scientifically tested in a hospital on 166 patient volunteers. Results show that PVG is as effective as insulin in lowering blood glucose levels of diabetic patients to normal levels within one month. It is also effective in lowering levels of bad cholesterol while significantly increasing levels of good cholesterol. It also restores liver activity and enzymes to normal levels. In contrast, anti-diabetic medication causes liver activity and enzyme levels to rise.

  Over time, PVG has become Freshwerkz’s best-selling product.

- **Living Logic+ (LVL+)**
  This contains fermented rhodiola, cistanche, and almond.

  Rhodiola is associated with physical and mental health benefits including mood-boosting and emotional-stabilising properties, positive response to stress and anxiety, and support for neurological function, anti-aging, and brain health.

  Cistanche is known to strengthen blood flow, increase energy level, enhance cognitive abilities, and increase important antioxidants in the body to neutralise free radicals while almonds are packed with antioxidants and vitamins to enhance mental clarity.

  A study involving 30 university students taking LVL+ two weeks before sitting for their examinations showed that more than two-thirds of respondents became more alert, had higher concentration levels, focused better at work, slept better, and experienced a lower degree of stress. There is also anecdotal evidence that LVL+ helps to reverse certain symptoms in autistic and hyperactive children.

- **Living Genesis (LVG)**
  This contains fermented broccoli, celery, kelp, and shiitake. These plants, known for their antioxidant, anti-inflammatory, and detoxification properties, are beneficial for regeneration and recovery (The World’s Healthiest Foods, 2016). Anecdotal evidence shows that LVG has been helpful for alleviating allergies such as eczema and sinus infection. It also shows that cancer patients undergoing chemotherapy and radiotherapy tend to recover much faster after taking LVG.
**Unique selling point**

Freshwerkz products are condition-specific because different combinations of healing plants and probiotics allow for specific targeting of ailments.

The phytosynbiotic technology allows the live probiotics to survive the acidity of the stomach and arrive intact in the intestines where they can do their work.

The phytosynbiotic technology is fast acting. The person can reap the benefits of better gastrointestinal health within one week and experience improvement in the specific condition within one month.

**Customers**

Each Freshwerkz product is designed to cater to a specific market segment.

PVG is targeted at pre-diabetic, type 2 diabetic, and hyperlipidaemic patients who are seeking to improve their metabolic health.

LVL+ is mainly consumed by two groups of people. The first group consists of working adults and students who use the product as a nootropic to increase mental alertness and concentration while working under stress. The second group consists of special-needs children and demented senior citizens who use the product as a psychobiotic for alleviating depression and anxiety.

LVG is used by people who are suffering from cancer or allergy to boost immunity and reduce inflammation.

**Competitors**

As Freshwerkz products are present in different and distinct market segments, the Company encounters different competitors in each of the market segments.

PVG competes in the market with products which lower glucose and bad cholesterol levels in the body. The main competitors are the big pharmaceutical companies with their anti-diabetic medication such as metformin and insulin. Vitamin and herbal products for glucose control are also in the market. Competition may come from products derived from glucose-reducing foods such as bitter gourd.

LVL+ is a product in the brain supplement market. Competition comes from nootropic products such as caffeine, gingko supplements, and energy drinks, as well as psychobiotic products such as fish oil supplements. This product competes in the antioxidant, cell protection, anti-aging, and immunity supplement markets.
Marketing strategy and mixes
Freshwerkz has submitted product information to the Health Sciences Authority (HSA), the regulator of health products in Singapore. The authority has given approval for the products to be sold as health supplements in Singapore.

Place
The three products are sold through a network of 20 independent health stores located in different parts of Singapore. These stores are usually privately owned and managed by the business owners themselves. They sell a variety of other health supplements and organic food. The products are also sold through Freshwerkz’s own website which offers e-commerce and m-commerce interfaces for the computer and mobile phone respectively.

Freshwerkz is constantly on the lookout for distributors in overseas markets. Recently, a distributor in Hong Kong has been appointed and is already listing the products in the Watsons’ chain of drug stores there.

One hurdle to selling these products overseas is excessive bureaucracy in product registration. Registration regulations vary from country to country, and the requirements may range from simple to onerous.

Price
Freshwerkz enforces a recommended selling price of SGD 60 per bottle throughout its network of shops and website.

Promotion
In Singapore, the products are promoted through various media including:
- Print advertisements: Chinese language newspaper and health magazines
- Radio advertisements: popular Chinese language radio channels
- Television advertisements: popular free-to-air English and Chinese language channels
- Social media: Google AdWords and Facebook advertisements
- Exhibitions: Health fairs and conferences to showcase and promote products

Business problem and decision time
Freshwerkz has reached a crossroad. Although it has first-mover advantage over other products in the market, it is established in a small country in Asia. This implies that it cannot compete with European and US start-ups which enjoy biotech funding from large pharmaceutical companies and food corporations. It is estimated that Freshwerkz may only have a two-year lead. Moreover, many of these biotech companies are developing therapeutics that will compete with supplements currently sold by Freshwerkz.

As competition is fast catching on, what marketing strategies should Freshwerkz adopt to expand the pool of consumers and to exploit the full commercial potential of the products?
End-of-Case Questions

**Question 1**
What are the benefits of human microbiome therapeutics?

**Question 2**
Why are most people sceptical about microbiome therapeutics?

**Question 3**
What changes would you recommend in the marketing mix adopted by Freshwerkz to increase its sales volume?

**Question 4**
What are your recommendations for Freshwerkz to exploit the full commercial potential of its products? What are the limitations of your recommendations?
References


About Nanyang Technopreneurship Case Centre

With funding from both the National Research Foundation of Singapore and Nanyang Technological University, the Nanyang Technopreneurship Case Centre (NTCC) was one of the initiatives of the Nanyang Technopreneurship Centre (NTC) to enhance the quality of entrepreneurship education through the case pedagogy. These are part of NTC’s efforts to foster, promote and nurture enterprising mind-sets, skills and knowledge in entrepreneurship education.

There is a plethora of business cases but a general paucity of cases highlighting the specific problems faced by technopreneurs in growing their ventures. NTCC adds value to Technopreneurship education by developing a pool of cases on technology-based local and international enterprises. Through the cases, NTCC hopes to share the experiences, success stories and challenges faced by entrepreneurs/intrapreneurs in growing their organisations and how they overcome their problems to sustain growth.

The theme of this first compendium is “innovation through technology”. It features Singapore-based and global companies confronting issues and challenges due to technological shifts in the industry and changing market and competitive dynamics; when introducing new products in the marketplace; and in using technology to drive organizational change.

Online versions of these cases are available for complimentary downloads at [www.ntc.ntu.edu.sg/ntcc](http://www.ntc.ntu.edu.sg/ntcc).

Teaching notes are also available to faculty members for use as reference, reading and/or teaching materials in various academic and professional programs. For further information, please contact Ms. Denise Lee (deniseleecw@ntu.edu.sg) and Mr. Wu Chong Chuan (wucc@ntu.edu.sg).

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