Designing Future-Fit Food

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Key messages

- Our health and planet are paying the price for the current food system, which threatens food security through accelerated climate change.
- We can innovate ourselves out of our situation by designing foods that aim to provide a nutritionally complete diet and minimize environmental impact.
- Through Future-Fit Crops and nutritionally rich diets, we can counter the significant burdens of the current food system and contribute to healthier people, a healthier planet and a healthier economy.

"The global food system is becoming increasingly streamlined and has failed to provide global food and nutrition security"

Living in the Nutritional Paradox

The global food system is becoming increasingly streamlined in the pursuit of economies of scale, to the point that 75 percent of the world's calories come from only 12 crops and five animals.[1] This streamlining has failed to provide global food and nutrition security. We denote this failure as the Nutritional Paradox, and characterize it through four distinct burdens caused by the way the food system currently works: hunger, obesity, micronutrient deficiencies and the destruction of our planet.

1) **Hunger, stunting and wasting:** The world already produces enough food to feed 10 billion people,[2] more than required for the population today, yet paradoxically many still go to bed hungry. According to the Food and Agriculture Organization of the United Nations (FAO), globally 821 million consume insufficient calories.[3]

2) **Overweight and obesity:** Hunger paradoxically coexists with overweight and obesity, in the same country, and often even in the same household. As high-calorie, unhealthy diets are becoming more prevalent, body mass is increasing across the world; the World Health Organization (WHO) estimates that 2.1 billion adults are already overweight or obese[4] (**Figure 1**).

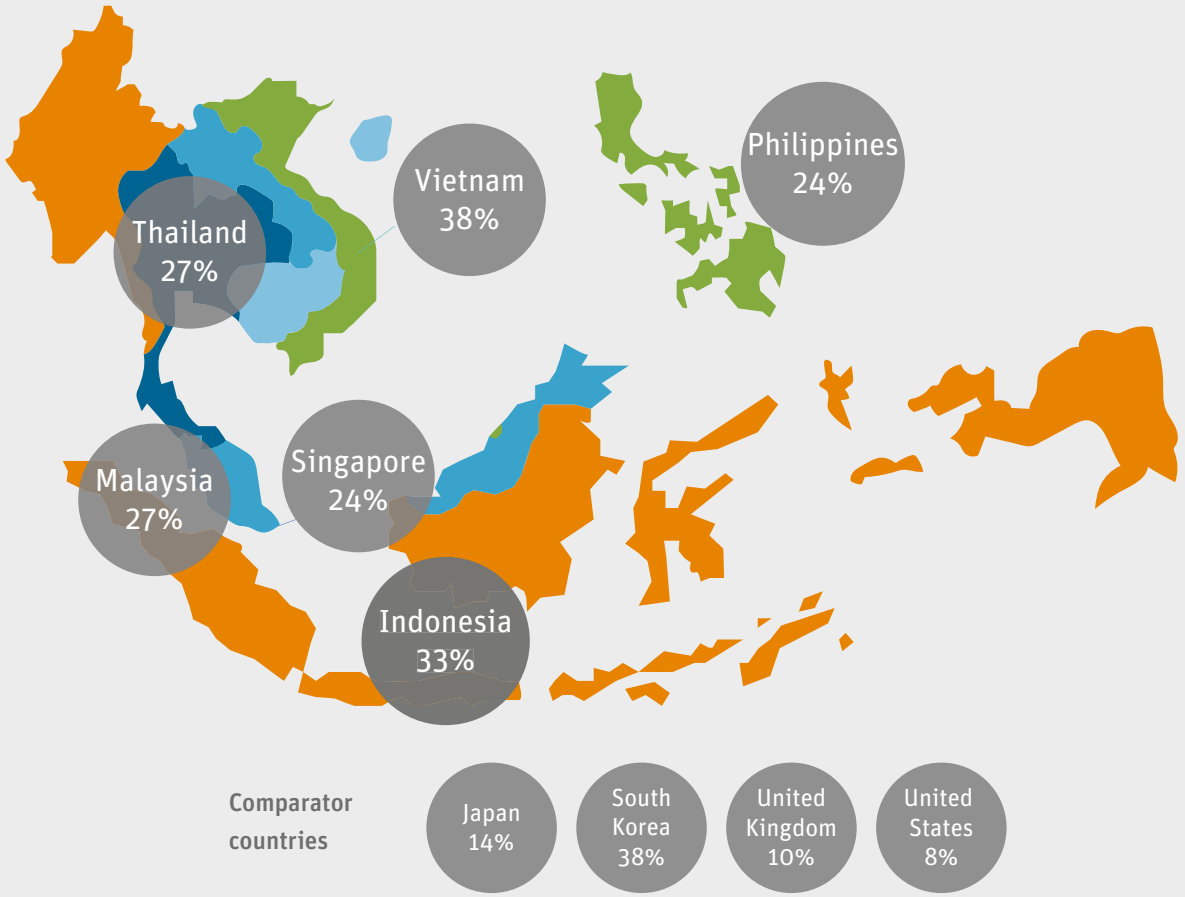
3) **Micronutrient deficiencies:** The FAO estimates that some 486 million people remain undernourished in Asia and the Pacific.[6] Paradoxically, even overweight and obese people eating large amounts of food can, and do, suffer from micronutrient deficiencies.[7–9] The reason for this is that many of the foods we eat today are calorie-rich and nutrient-poor, because of our heavy reliance on only a dozen crops.

4) **Planet destruction:** To cope with growing demand, the food industry directly and indirectly destroys the ecosystem that provides us with a stable food supply. Every second, one football pitch of forest is converted into agricultural land, yet we depend on forest for climate stability and preventing soil erosion.[10]

The world's population is projected to reach 9.8 billion by 2050,[11] and there is increasing awareness that the global food system needs radical change in order to feed the world diets that are both nutritious and sustainable.[4] Environment and nutrition experts are increasing pressure on the food industry to change its practices. Future food product development will need to disrupt the status quo and innovate us out of our current situation. This article explores how food product development must go hand in hand with consumer behavior and planet-friendly agricultural practices in order to achieve the goal of improving the health of the people, planet and economy.

"Future food product development will need to disrupt the status quo and innovate us out of our current situation"

FIGURE 1: Increase in the number of obese people (%) from 2010 to 2014



Data from the Tackling Obesity in ASEAN: Prevalence, Impact, and Guidance on Interventions report[5]

Food design for crop diversity

One solution to assist with resolving the burden of hunger, stunting and wasting is to encourage and help introduce crop diversity in the agri-food system. This is a complex and challenging matter, involving multiple stakeholders with different interests. We advocate creating strategic partnerships with organizations that have the courage to take the risks that are intrinsic in incorporating new ingredients, adopting more environmentally sustainable practices and working towards achieving economies of scale for highly nutritious products.

The food industry has the opportunity to help create new markets for alternative crops and to provide alternative means of income for smallholder farmers, especially those whose land is degraded, and in turn to positively impact the communities around them. To put this in perspective, an estimated 450 million farmers are currently cultivating < 2 hectares of land – yet together they support a population of around 2 billion people.[12]

> "We envision a holistic system from which farmers, industry and consumers will all benefit"

We envision a holistic system from which farmers, industry and consumers will all benefit. This should start with the selection of nutrient-rich crops that are resilient to climate changes and can be grown economically on marginalized or degraded land – for example, bambara groundnut, moringa and lupin.

The next step is to scale up plant breeding programs and implement agricultural systems relating to these crops to ensure that high yields can be obtained under local climate conditions. The availability of the resulting crop seeds and the transfer of know-how to local farmers will assist them with transitioning away from existing staple crops. The final step is to develop processing technologies that incorporate these crops into the food system and result in products that consumers can buy.

TABLE 1: Comparison of the nutritional composition of NamZ high-protein noodles and market comparators

	NamZ high-protein noodles (per 100 g)	Benchmark averages* (per 100 g)	Content of our noodles compared with the average instant noodle on the market
Energy	433 kcal (1,818 kJ)	466 kcal (1,957 kJ)	7% fewer calories
Fat (g)	8.9	18.0	51% less fat
Carbohydrate (g)	64.7	66.0	
Dietary fiber (g)	3.3	1.8	83% more fiber
Protein (g)	23.6	10.0	136% more protein
Sodium (mg)	443	396	

*Benchmark averages were calculated by averaging the nutritional information of two readily available, off-the-shelf instant noodle products (values correct at the time of printing)

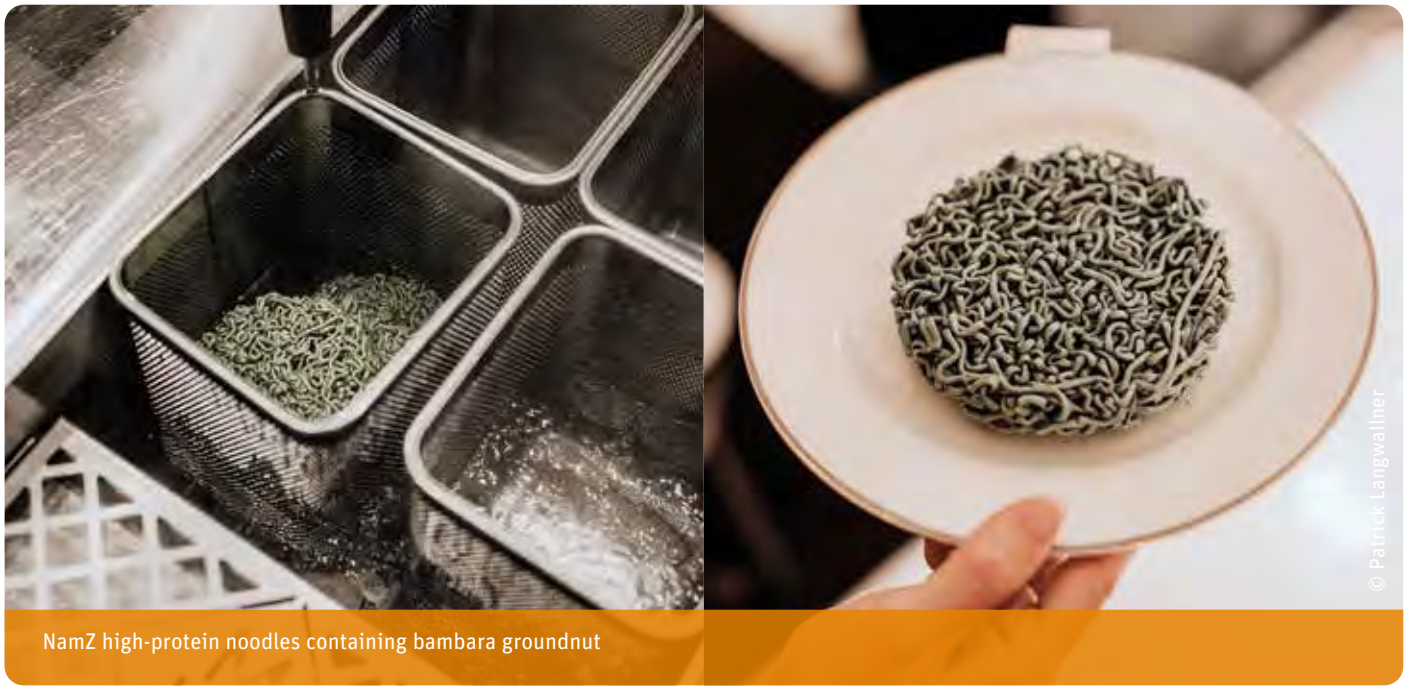
In our effort to redesign an Asian comfort food, the instant noodle, we were able to incorporate a crop – for example, bambara groundnut – that was foreign to the processing industry by creating cost-effective technologies and processes. Taking care not to refine out the existing nutrients, we were able to create a high-protein noodle that tastes and smells exactly like fried instant noodles (Table 1). In support of smallholder farmers, we established a supply network of bambara groundnut in Ghana, West Africa.

"No matter how healthy it is, if it doesn't taste good, I won't eat it"

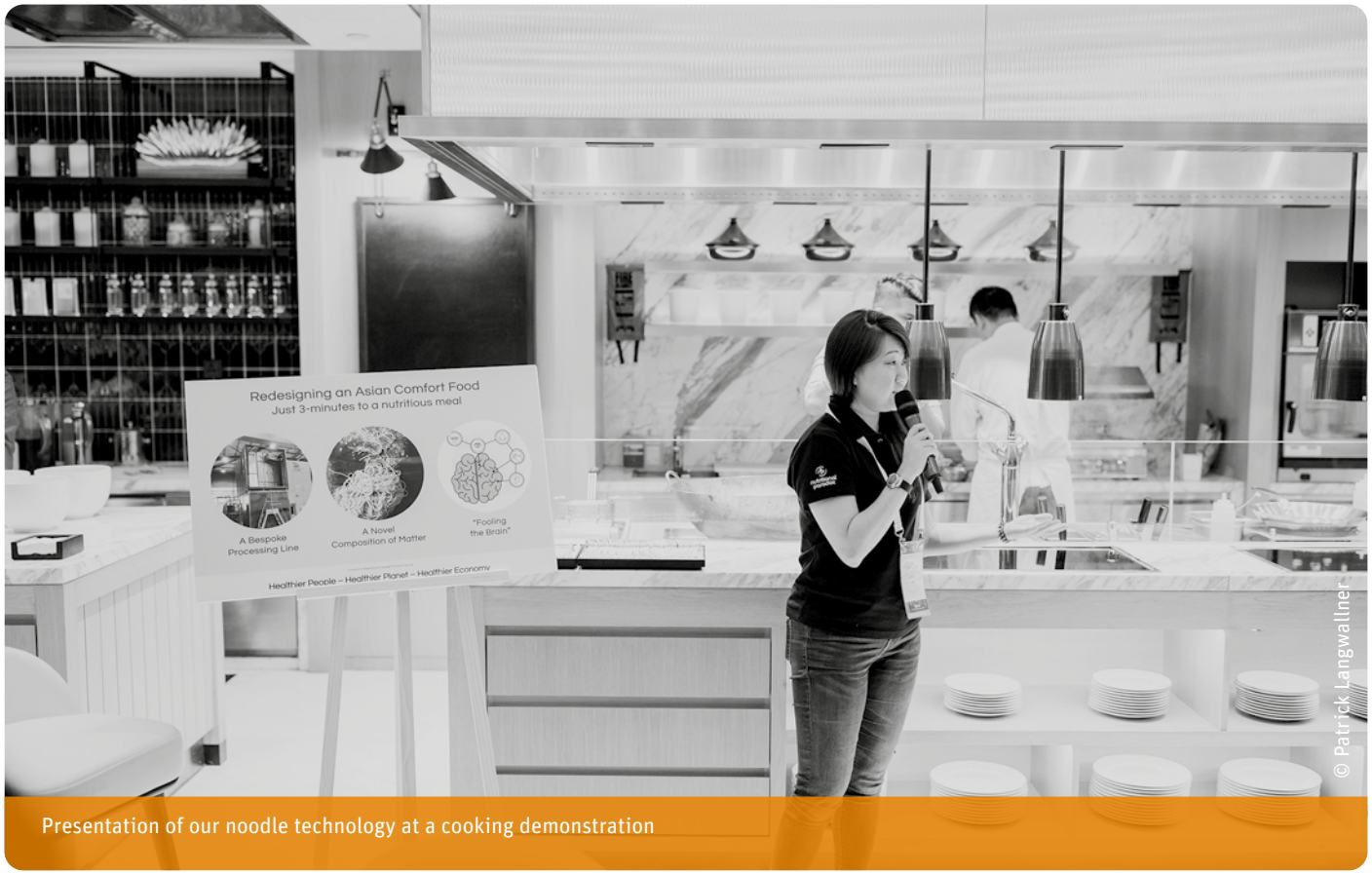
Solving obesity through taste preferences

Taste, price and convenience are the key drivers in consumer food-related purchasing choices. In relation to our product development, taste is our key concern. In our recent consumer interviews, one participant remarked, "No matter how healthy it is, if it doesn't taste good, I won't eat it." We examined where taste preferences come from, with the aim of designing novel food products that suit the tastes of the modern consumer.

The foundations for our taste and food preferences are formed from the very beginning of life. Amniotic fluid and mother's milk will both take on flavors from the mother's diet, which will affect a baby's taste preferences as it progresses to solid foods.[13] According to studies of eating behavior, unfamiliar foods are often refused by children eight to 15 times before being finally accepted by them.[14] Children often prefer sweet and salty tastes, and



NamZ high-protein noodles containing bambara groundnut



Presentation of our noodle technology at a cooking demonstration

they shun sour and bitter tastes – a reaction that can be traced back to an evolutionary adaptation to avoid new and possibly dangerous or poisonous foods.[15] Taste can therefore be considered a learnt behavior. When creating new foods or recreating existing foods for consumers, particularly in the case of children, taste preferences and variance from their existing diet need to be taken into account.

In our consumer study to find an alternative for a favorite Indonesian condiment, a sweet soy sauce that is used in classic Indonesian dishes, we found co-creating taste between generations was part of the family bonding process. Younger members of the family are often prone to experimentation as well as being health-conscious and environmentally aware, whereas older members stick strictly to the way 'it has always been done' or 'how your father likes it.' As one of the participants in the study mentioned, "When I modernize my family's traditional dishes, I may make some changes but unless it tastes like the original, my parents will not eat it."

To introduce new food products that offer new or alternative flavors via a healthier choice of ingredients and processing choices, we look to the young and to soon-to-be caregivers as the force of change. Appealing to their sense of self-empowerment and willingness to experiment is crucial if buying habits are to be changed, but at the same time it is important not to stray too far from the traditional. Two examples we chose to develop are Asian family favorites: *kecap manis*, the Indonesian sweet soy sauce, and the Asian comfort food, instant noodles.

A delicate balance between 'new and better' and 'old and familiar' must be upheld in order to win hearts and minds of the young and old alike.

> "A delicate balance between 'new and better' and 'old and familiar' must be upheld in order to win hearts and minds"

Nutritionally conscious consumers

The majority of the population of the urban world live in 'obesogenic environments' – defined as environments where convenient access to inexpensive, rich, tasty, energy-dense, micronutrient-deficient and fiber-poor foods makes it difficult to buy and eat healthier, often higher-priced, foods. Rapid economic growth, as experienced in parts of Asia during recent decades, does not necessarily go together with better food choices. As seen in China, with rising incomes, the consumption of Western-style convenience food has increased[16] in contrast with that

TABLE 2: Sample nutrition information panel for prepackaged food in China[19]

项目 Items	每 100 克 (g) 或 100 毫升 (ml) 或每份 per 100 g/100 ml or per serving	营养素参考值% NRV%
能量 **Energy**	千焦 (kJ)	%
蛋白质 **Protein**	克 (g)	%
脂肪 **Fat**	克 (g)	%
碳水化合物 **Carbohydrate**	克 (g)	%
钠 **Sodium**	毫克 (mg)	%

Recreated from National Food Safety Standards translations

of healthier options. In Malaysia, the GDP per capita increased from US$7,101 in 1980 to US$23,267 in 2015, and this rise in income fueled increased food consumption, particularly of processed foods.[5]

While consumer awareness of nutrition has come a long way in recent years, it is interesting to note that, according to Nielsen's recent Global Ingredient and Dining-Out Report,[17] Asian consumers primarily define healthy food by the absence of undesirable ingredients. The four top ingredients cited by Asia-Pacific respondents as necessary to avoid were artificial preservatives, artificial flavors, artificial colors, and antibiotics or hormones used in animal products.

Conducted in Beijing in 2016, a cross-sectional survey with 380 participants from four suburban communities and 308 urban-dwelling supermarket shoppers highlights the difference between awareness of an undesired ingredient, in this case salt, and the translation of that awareness into an understanding of the information on packaging. The study found that 91.3 percent of the 688 participants were aware of the harmfulness of excessive salt intake,[18] but only half of the participants (52.3 percent) were able to connect salt with the term 'sodium' as listed on the mandatory nutrition information label. Extremely few participants (5.5 percent) reported that they understood the meaning of Percentage of Nutrient Reference Values (NRV%). Furthermore, when purchasing prepackaged foods, only 12.6 percent reported that they frequently or often read or checked the sodium label when purchasing[18] (**Table 2**).

Another factor is the consumer understanding of terms used in product promotion. Take the term 'superfood,' for example. In a recent consumer interview we conducted, one participant based her whole concept of healthy eating around avocados. As long as she ate at least one avocado – her 'superfood' – every day, she felt she had made healthy choices. However, from a nutrient diversity perspective, this participant's diet is far from ideal.

Designing communications that effectively communicate the nutritional quality within the brief moment when the purchasing decision is made will broaden consumer awareness, and every effort the food industry makes towards education and transparency will help. From a food product development point of view, we want to assist consumers with achieving nutritionally complete diets. Our goal is to create a full range of food products that will allow a consumer to choose anything from the range and feel confident that it is beneficial for their nutrient intake, knowing at the same time that their purchase has also had a positive impact on the environment.

Will you join us in changing the world one meal at a time?

Planet-friendly decisions creating a healthier population

To sustainably alleviate the quadruple burden of the Nutritional Paradox means creating change at every stage and every level of the food system. It is a mammoth task, and given its complexity, various stakeholders from the government, science, business and civil society will need to lead in partnership, creating actionable steps on both the national and global level.

Companies like ours will continue to believe in innovation and in creating products such as our proprietary instant noodle technology that take into account both the population's and the planet's health while adding economic value.

We will continue to work on changing the world, one meal at a time.

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