ASHOKA INNOVATORS FOR THE PUBLIC

Introducing the Nutrient Value Chain

Based on trends among system-changing social entrepreneurs, we foresee a future of commerce, public policy and community action that improves people's health, food and agricultural systems, and natural environments in parallel; not just alongside each other, but because of each other.

The practical basis for this vision is the emergence of the Nutrient Value Chain as it threads through societies and economies worldwide.

In essence, we see indications that by focusing on full spectrum nutrition, as elaborated below, important factors align both scientifically and economically between human health, food systems, agriculture, and the environment. This focus provides a straightforward but powerful trigger to more complex, positive dynamics in local and regional economies.

Several emerging forces highlight this unique opportunity: new understanding of how full nutrition (in contrast to just the more common set of macro-nutrients) affects the drivers of peoples' physical and mental wellbeing; parallel insights about manageable chemical, physical and biological characteristics of agricultural soils and plants that affect nutritional "bioavailability" in people, and new economic models for fostering those characteristics; new technologies with potential to measure full nutritional outcomes (not just discrete nutrient inputs) for the first time, in people, foods, plants and soils; the evolution of highly portable technologies, fast-moving social networks, and underlying information systems that can put diagnostic and rapid learning tools in the hands of vast numbers of people worldwide; an upswing in business models rooted in the health, agricultural and environmental benefits of this full nutrition premise; and more broadly, mounting pressure for new frameworks that stimulate continuous and widespread innovation against global threats of disease, hunger and environmental crisis.

With these forces in play, bolstered by the personal relevance of food to every person on the planet, the emerging Nutrient Value Chain comes clearly into view. At large and small scale, in both rural and in urban settings, it offers concrete basis for communications and commerce both within and across the traditional health, food, agriculture and environmental sectors. It reflects micro- and macro-economics that, like the evolving science of full nutrition, aren't constrained by traditional boundaries between those sectors. And it reveals potential for a healthy cycle of demand and supply between communities that succeed in nourishing themselves (physically, economically and culturally) and factors helping drive wellbeing of people and ecosystems elsewhere.

We believe that investment in this new understanding, and particularly in the platform of information and infrastructure upon which it stands, will stimulate private, public and citizen sector innovation across many of the world's geographies and economies.

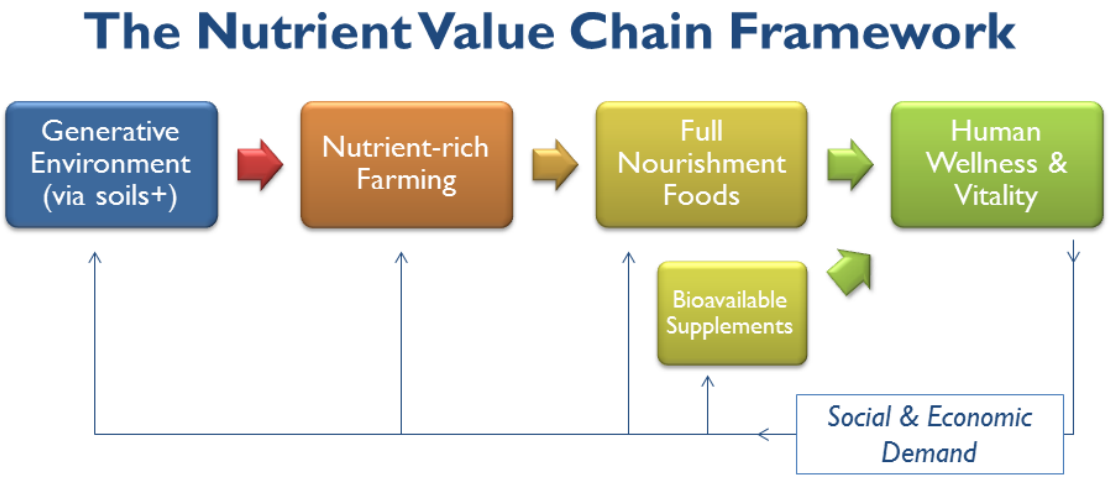
Three New Value Propositions

In its simplest form we are suggesting three things, informed by our work with leading social entrepreneurs (the Ashoka Fellows) across five continents. The Appendix to this note introduces many of these innovators, and some of them are referenced herein to provide examples and illustrate our team members. Over the past twelve months we've focused on validating and further developing these propositions with a growing cohort of scientific and business experts.

Value Proposition #1: Driving demand and innovation across traditional sectors

The wellness benefits of full spectrum nutrition, when understood clearly (which they are not today, but can be soon), will drive new demand and accountability for performance outcomes (not just nutrient inputs) to health and wellness providers, food processors and distributors, farmers and land managers. This is true across geographic, economic and social contexts. This new demand will likely be voiced by many consumers, governments, citizen-sector organizations and philanthropists.

The newfound premium on full nutrition should stimulate fundamentally healthy business practices and innovation between the segments of the value chain, as we are seeing emerge today among some of the world's leading social entrepreneurs.



We see this now, for example, via the spread of the *Intelligent Nutrition* food marketing label in Belgium and France that accounts for scientific factors all along the Nutrient Value Chain (ref. Genevieve Moreau); in the combined economic, food security and environmental conservation successes of the *Its Wild!* line of food products in Zambia, which is produced by a collective of more than 100,000 smallholder farmers who are paid a premium for adhering to certain agricultural and environmental practices, and in turn supply sustainable, tasty, nutritionally-rich foods to both rural and urban markets (ref. Dale Lewis); and in a new partnership between two social entrepreneurs, one Kenyan and one Swedish, that achieves financial, health and environmental profits by safely converting urban sanitation waste from over 25,000 people daily in poor neighborhoods into highly nutrient-rich fertilizers for sale to farmers (ref. Anders Wilhelmson and Haron Wachira).

Others we've been collaborating and exchanging ideas with are now helping inform understanding of cross-sectoral opportunities rooted in full nutrition, such as Dr. Buddy Ratner, director of the University of Washington Engineered Biomaterials center, whose lab is developing mini-mass spectrometry technologies with potential to measure full spectrum nutrition in multiple media, including people.

Value Proposition #2: Full nutrition focus within traditional sectors

The same practices that cultivate full nutrition and that focus attention on nourishment outcomes (rather than nutrient inputs) generate additional benefits within different segments along this value chain. Per the following summary chart, in some case they beget gains that can be capitalized upon independently, such as landscape resilience and carbon sequestration in the environmental sector. In other cases, they interact with systemic forces such as clean water and disease prevalence in people, which then collectively affect one's overall wellbeing.

In the environmental column, for example, social entrepreneurs in Ireland (ref. Brendan Dunford) and Zimbabwe and the United States (ref. Allan Savory) have developed enterprise models whereby livestock farmers can enhance soils, augmenting nutritional quality of their products and triggering additional revenue-generating and culturally-appealing benefits at the same time, like restoration of biodiverse grasslands and increases in ecotourism. In India, the remarkable *Timbaktu* restoration of thousands of acres of desertified land into rich farming and forest habitat highlights the direct, regenerative relationship between nutrition, soils, watersheds and people (ref. C.K. Ganguly). Numerous examples of Ashoka Fellows and other social entrepreneurs illustrate this point. The science underpinning this relationship between soils, human malnutrition and essential ecosystem services (such as provision of clean water and regulation of pollutants) has been highlighted, for example, by scientists we've been talking with over the past two years like Dr. Rattan Lal of The Ohio State University's Agricultural

Benefits correlating with full nutrition in different sectors			
Environment	Farming	Food Systems	Health and Wellness
Reinvigorate organic matter in soils: – Improve groundwater retention & watersheds; – Resist/reverse desertification; – Act as carbon sink, helping mitigate climate change; – Filter pollutants that poison ecosystems and people Re-use some human, industrial & farm wastes in unconventional ways, reducing pollution Strengthen local landscape resilience against weather & environmental risks	Reduce topsoil erosion, via increased organic matter in soils Foster more stable local water cycles, via increased organic matter in soils Fertilize crops sustainably and often with wider spectrum of nutrients, using many local inputs (including some that previously caused pollution) Improve health & productivity of farming communities via more nutritious local foods	Establish clear new value chain for foods with nutritional/ bioavailable outcomes: opportunities for marketing nutrition-rich products to stores, restaurants, large employers and the public Offer new and personally relevant evidence, examples, and tools for initiatives that focus on the portfolio of resources and opportunities for women in development	Reduce non-communicable diseases, from diabetes to depression Reduce incidence of infectious diseases, and improve recovery rates Per environment column, improve access to clean water Improve outcomes in critical areas: - Infant development - School performance - Worker productivity Improve overall wellbeing, including physical and mental capacity

Research and Development Center, and Dr. Hans Herren of the Millennium Institute. Advances in the capabilities and portability of soil testing technologies are also supporting and substantiating these trends, such as the Columbia University Agricultural and Food Security Center's *SoilDoc* system that now includes tests and farmer feedback on organic material in soils (in addition to traditional soil diagnostics), and the consumer-focused *Edyn* remote wireless soil probes invented by Ashoka Fellow Jason Aramburu for U.S. and African markets (ref. Jason Aramburu). Both of these emerging technologies connect with internet databases to provide real-time feedback to users while aggregating soil information from multiple sites to enable new levels of soil and nutrient data analysis.

In the farming column, appropriate-scale enterprise and technology innovations for producing and distributing biochar soil additives that improve water retention, fertilizer retention, and microbial activity (further ref. Jason Aramburu), and in setting standards for local fertilizer production (ref. Nelson Kariuki in Kenya), are fostering viable business models that increase traditional bulk and calorie yields, and we hypothesize nutritional yields too, with lower input costs. By enriching soils and reprocessing wastes in unconventional ways, these approaches also

help improve local resilience to economic and weather risks and provide other environmental benefits too.

In the food systems column, Zambian restaurateur and businesswoman Sylvia Banda is now incorporating these insights around full nutrition (and its linkages to health and farming) into her food, cooking, finance and educational enterprises (ref. Sylvia Banda). Similarly, as noted above, the *Intelligent Nutrition* framework has become popular with chefs, and we've had informative and sometimes provocative discussions with some international food companies about how the Nutrient Value Chain does or could play out in their businesses.

In the human health and wellness column, emphasis on full nutritional outcomes and nutrient bioavailability are demonstrating substantial results in the form of recovery rates, improved capacity, and demand for full nutrition products with refugee populations, health clinics, orphanages and the general public (ref. Cindy Kaplan, Steve Collins, Basil Kransdorff). In the United States and Kenya, social entrepreneurs are working with insurance companies to improve health and reduce medical costs through business emphasis on more nutritional diets (ref. Zoe Finch Totten, Sam Agutu). Integration of gardens with health clinic treatment (ref. Julie Carney in Rwanda) and schools (ref. Mwalimu Musheshe in Uganda) is also showing substantial results. The evolving science around full spectrum nutrition and related health drivers and characteristics was synthesized in summer 2013 in *The Lancet*, one of the world's leading medical journals.

Value Proposition #3: Building blocks for "communities that nourish"

Based on our examples and experiences so far, we foresee these types of actions along the Nutrient Value Chain helping trigger an even larger force: a forward-leaning dynamic we call *Communities that Nourish*. This means, in essence, a growth cycle between human wellness and environmental wellness that is truly generative, where one begets the other, in contrast to extractive relationships that drain natural resources, human resources or both over time. This dynamic permeates both within a discrete community and to others along the food system.

As noted above, a focus on nutritional outcomes (not inputs) alongside other critical drivers of wellness (notably clean water and disease conditions) helps increase the developmental success of infant babies, school performance of children, workforce performance of adults, and recovery of very ill people. Those gains and others can drive consumer awareness and demand from health and wellness care to food suppliers, large and small farmers, and environmental stewards (ref. Michael Kelly). Responsive agricultural practices to produce nutrient-rich foods might include sustainable plant-side innovations (ref. Florence Wambugu) as well as soil-side solutions, which subsequently help strengthen surrounding ecosystem services like provision of clean water, resistance to erosion and desertification, and others listed in the chart above (ref. Nicolas Métro, Marta Echavarría, Pushkin Phartiyal). These dynamics seem promising in part because their

implications for local communities often resonate well with cultures, because they build local economy by calling into play some traditional practices (but with new, modern economic and technological tools and drivers) (ref. Paul Cohen and many others).

Furthermore, the opportunities and solutions that emerge in some places center clearly around people with the most pressing nutritional and economic needs, helping transform roles among the poorest in society, and for women in particular, in their own food, health and economic systems, with reverberations through families and communities (ref. Biplab Paul, Nora Tager, others).

This *Communities that Nourish* dynamic also plays strongly at the contemporary rural-urban interface, where cultural and economic ties remain strong even after people migrate from countryside to city, and where interdependence for essential resources is increasing between cities and rural areas.

We see that action along the Nutrient Value Chain often underlies these positive health, economic and creative forces in community development. We see an overarching rubric of sustainable wellness rather than reaction to sickness, and of communities nourishing others locally, regionally and globally by virtue of working to nourish themselves.

The Nutrient Value Chain as a New Frame of Reference

The number of social, business, technological and scientific initiatives stacking up around this proposition is compelling. The pattern was not easy to detect — we've been looking across hundreds of leading social innovations and more traditional knowledge for several years — but now seems quite clear.

With attention centered on full nutrition outcomes resting on the practicality of the emerging Nutrient Value Chain, important questions come to mind quickly:

- How differently should we diagnose problems and recalibrate approaches to issues like food security, climate change and/or sickness epidemics?

- How differently might we weigh impacts or conduct the cost-benefit analyses of public policy, scientific and investment decisions we are considering in any traditional sector?

- How might agriculture change locally, regionally and internationally when consumer demand reflects actual nutrient density or spectrum, alongside or above traditional considerations like crop efficiency and bulk yield, calories and storage life?

And others, of course. These just begin to illustrate issues that open up with new perspective when seen from within this frame of reference.

Acknowledgements

This is a work in progress. Our team's ability to identify this pattern and the approaches and trends underlying it depends on the ongoing collaboration of emerging and established social entrepreneurs and on wider rungs of technical and business experts. This includes leaders in the fields of nutrition, agriculture, environment, measurement sciences, economics and more. We'd like to thank everyone who has contributed up to this point.

Please contact us if you would like to know more about this work or to get involved. We see not just the opportunity but also the need to continue growing and accelerating this community.

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