

Social Innovation Challenge – Zero Hunger

Challenge Problem

There are currently over 7 billion people living on the planet, however that number is expected to reach 8 billion by 2030¹, with the majority of the growth occurring in developing nations. Given that we are unable to provide quality food in sufficient quantities for the current 7 billion people, and with global food supplies stagnating and in some areas actually decreasing, there is increasing concern and uncertainty over how we will feed our growing global population. This is of particular concern in developing countries, which are especially vulnerable to food security threats.

While the industrialized world is mainly supported by relatively few farmers, this is not the case in the developing world, where livelihoods dependent on food security make up 80% of the workforce. As such, the agricultural strategies of industrialized countries such as large monocropping agribusinesses, agrochemicals usage, vast global food supply-chains, and calorie-dense diets are not necessarily appropriate solutions for the developing world. New and innovative approaches are needed—ones that do not necessarily replicate past experiences, but rather learn from them— if we are to going to meet Sustainable Development Goal #2;

'End hunger, achieve food security and improved nutrition and promote sustainable agriculture'

Instead, the focus in the coming decades needs to be on smallholder farmers and the strengthening of end-to-end value chain services. Smallholder farmers often lack of access to markets, new innovative technologies, proper processing and storage equipment, strong supply-chains, healthy environments, arable land, and disaster/conflict-free situations. The lack of investment into these areas reduces the production and diversity of crops, and often leads to unsustainable practices in order maintain productions systems.

Strengthening the base of agricultural productivity can improve access to safe and nutritious food, however, consumers, especially the most vulnerable, also need better quality and targeted options if we are to reduce global malnutrition. This requires

¹ UNCSO Secretariat, 2012

considering how end products are priced and consumed, and ensuring proper processing and accessibility for those that need it most.

By implementing innovations that are targeted at vulnerable smallholder farmers in developing countries, food production can be expanded significantly, while also protecting the environment, communities, and people's wellbeing.

The criteria below focus on both those that produce the food and the necessary services they require, as well as those that consume the food and the value chains that define their consumption patterns.

Challenge Criteria

Land Rights Challenges

Smallholder farmers in developing countries face many land use challenges that hinder their ability to start and/or grow their agricultural business. Three of these challenges include: arable land loss due to urbanization, weak land ownership systems, and land ownership models that do not allow for long term sustainable practices.

Developing countries are facing the same challenges as developed countries regarding the protection their fertile and very valuable agricultural land from urban development². Interestingly, in developing nations, urbanization is expected to not only put increasing pressure on agricultural land holdings from a strict land use perspective, but also to "simultaneously fuel demand for arable land due to increased urban food demand"³. In short, there will be less arable land available and it will be in higher demand (due to an increase of 50% in the global population by 2050), which will raise land values⁴. This will, in turn, hurt the most vulnerable: the smallholder farmer who is least able to compete with the rising cost of land.

Illegitimate land-grabbing is a problem in the developing world as land administration institutions are weak or non-existent, and, as noted in the section above, land scarcity is driving up demand for arable land⁵. This land-grabbing is being committed not only by foreigners, but also by national and local elites, competing land users (pastoralists, crop farmers), and within families (men from women and, where the incidence of HIV/AIDS is high, from widows and orphans)⁶. There is a distinct lack of transparency, accountability, and accessibility to land administration institutions that protect the rights of vulnerable people against land-grabbing practices⁷.

² UN Secretary-General, 2015: 3-4

³ UN Secretary-General, 2015: 3-4

⁴ Liversage, 2010: 5

⁵ Liversage, 2010: 5

⁶ Liversage, 2010: 5

⁷ Liversage, 2010: 5

Land ownership is a critical barrier to sustainable production as it provides few incentives for the care of the land and the adoption of sustainable agricultural and land management practices. Renters are less likely to ensure the long term sustainability of land they do not own. Further, if people do not own the land, they cannot use it as collateral to borrow against. Limits to gaining ownership/title of land is created by the sheer complexity of land acquisition and transfer (overlapping rules, laws, customs, traditions, acquisition and registration procedures, and taxation measures), meaning that in many developing countries, there is a lack of clear, transparent processes to facilitate the transfer of land ownership from one generation to the next.

Addressing land use policies needs to include a focus on supporting smallholder farmers and providing institutional tools for land administration, such as those to record land ownership, and which provide clearly identified mechanisms for challenging land zoning.

From Planting to Harvesting

Crop production is entirely dependent upon the service the natural environment provides such as soil, water, natural and crop biodiversity. Simultaneously agricultural activities have significant impacts upon the natural environment, which if not managed sustainably, can have significant long-term impacts on productivity and efficiency.

Currently, 95% of our food is directly or indirectly produced on soils⁸. However, the Food and Agriculture Organization states that one-third of farmland on our planet is degraded⁹. This is due to unsustainable farming practices such as conventional agriculture, monoculture, and deep tillage practices that lead to soil erosion, salinization, compaction, acidification and chemical pollution¹⁰. Where long-term soil degradation has occurred, yields have fallen, which leads not only to decreased output and sales, but also the need to find new virgin land to exploit to maintain the needed yields.

Water access for crops is also critical to increasing yields. Water usage demand will continue to rise as the global population grows both larger and more urbanized. Agricultural demand for water is enormous, with crops and livestock currently using 70% of all water withdrawals globally, and with agriculture in developing nations using up to 95% of all water withdrawals¹¹. By 2050, water demand is projected to increase by 55% globally, with domestic water use rising by 130%¹². Because of this, there will be a limited ability to increase water supplies for irrigation, hindering the growth of agricultural

⁸ UN Secretary-General, 2015: 3

⁹ FAO, 2015a: 5

¹⁰ UN Secretary-General, 2015: 3

¹¹ FAO, 2015a: 6

¹² UN Secretary-General, 2015: 5

outputs¹³. Reservoirs recharged by groundwater cannot refill fast enough to meet the increasing demand, and as a result, are also being depleted¹⁴.

Biodiversity, both in the natural environment and domesticated crops, is critical for the future of agricultural productivity. Farmers are increasingly using more herbicides, pesticides, and insecticides to protect their crops from short term losses, even at high costs and low profitability, and as such, there is a poor outlook for meeting long-term crop yield production requirements. Insecticides such as neonicotinoids harm beneficial insects, as well as pests. For example, when neonicotinoids are used, between 11-24% of pollen and 17-65% of nectar are contaminated with them, negatively impacting the health and survival of bees by damaging their immune systems and causing them to contract more viral diseases¹⁵. Since bees are major pollinators, this represents a very serious threat to the sustainability of our food productivity. Not only does the contamination spread to beneficial insects, but it also strengthens herbicide resistance in weeds, which is caused by cross-pollination with genetically engineered herbicide-resistant crops¹⁶.

There has been a dramatic decrease in crop and livestock diversity over the last few decades, with up to 75% of crop genetic diversity lost, and 22% of animal breeds at risk of being lost¹⁷. Surprisingly, a mere 40 crops provide 95% of the world's food supply, and an even more shocking 5 cereal crops account for 60%¹⁸. This is a serious threat to global food security, since the loss of only a handful of crops to pests or disease could potentially wipe out a huge swath of our food supply.

Approximately 29% of commercially-important assessed marine fish stocks are overfished, and 61% are fully fished per the Food and Agriculture Organization¹⁹. Since nearly 3 billion people rely upon fish for 20% of their daily animal protein intake, this is a worrying trend²⁰. Global population growth, higher living standards, increased levels of development, urbanization, and rising incomes are all driving up the demand for fish and seafood, with an annual growth rate of more than 2.5% since 1950²¹. Demand is expected to continue rising, so alternatives must be found if fish stocks and ecosystems are to be sustained in the long term²².

The challenge we face now is to effectively improve and implement sustainable agricultural practices, such as developing crop production technologies that build soil fertility; conserve and make efficient use of the water supply; support conventional

¹³ UN Secretary-General, 2015: 5

¹⁴ UN Secretary-General, 2015: 5

¹⁵ UN Secretary-General, 2015: 4

¹⁶ UN Secretary-General, 2015: 4

¹⁷ FAO, 2015a: 5

¹⁸ UN Secretary-General, 2015: 4-5

¹⁹ FAO, 2015a: 5

²⁰ FAO, 2015a: 5

²¹ UN Secretary-General, 2014: 4

²² UN Secretary-General, 2014: 4

crop breeding with marker-assisted and genomics-assisted breeding; and work towards reducing the use and need of pesticides and herbicides.

From Harvesting to Market

An important part of ensuring smallholders can meet food security needs requires creating farms that can operate with a net profit at the end of a harvest season. This necessitates approaches that support market pricing and the ability to strengthen smallholders' bargaining power, and that allow better access to key business supports and new technologies that can reduce costs and improve sales.

Smallholder farmers often struggle to gain access to reliable markets, whether they are buying from others or selling to them. Market participation is often uncertain, risky, and conducted on unfavorable terms, further hampering agricultural investment and growth²³. In fact, "under such conditions, many households seek to grow their own food rather than buying it in local markets, while others limit their investments in market-oriented crops in the absence of reliable produce markets"²⁴. In addition, smallholder farmers are often excluded from markets due to higher product and processing standards by retailers in the Global North²⁵. Traditionally, efforts have been poured into boosting agricultural outputs for smallholder farmers, but without the complementary boosting of processing capabilities, supply-chains, and markets, agricultural gains have been hindered²⁶. Small island developing states (SIDS) face many barriers to markets to sell their goods (usually fish products) due to their remoteness and limited ability of local markets to absorb the marine food products²⁷.

Since the 2008 economic crisis, developing countries have been deeply affected by the volatility of food prices, both as buyers and sellers of food. Market price volatility reduces the incentive to invest in measures to raise agricultural productivity, and can even plunge farmers and consumers into poverty if they are forced to sell productive assets (land and livestock) below market value just to survive. When prices are high, the smallholder farmers struggle as they are typically net food buyers, and the urban poor struggle as they are also unable to afford the higher prices²⁸.

While obtaining higher market value and understanding pricing is important in generating sales, so too is keeping costs low. Farmers cannot reliably obtain the agricultural inputs, labour, and other goods and services, such as credit and insurance, needed to engage in agricultural activities successfully²⁹. Unlike their counterparts in developed nations, smallholder farmers in developing countries often lack access to

²³ IFAD, 2010: 5

²⁴ IFAD, 2010: 5

²⁵ IFAD, 2010: 6

²⁶ IFAD, 2014a: 1-2

²⁷ IFAD, 2014b: 6

²⁸ FAO, 2011

²⁹ FAO, 2015d:xiii

affordable agricultural insurance schemes³⁰. This leaves them extremely vulnerable to natural disasters, such as drought, floods, infestations, and makes them more hesitant when contemplating the expansion of their agricultural activities. This results in their focus on a reduced time horizon, where their primary is merely survival. Thus, they adopt low-risk, low-return agricultural and other income-generating strategies, and even adopt negative risk-coping strategies such as the distressed sale of assets to reduce their risk exposure³¹. Ultimately, this limits their ability to expand and improve their earning potential and agricultural output.

Although smallholder farmers produce 70% of the food consumed globally, they receive very little in the way of support for business development and research³². For example, in the European Union, 90% of research funds go to large monoculture agribusinesses, and the picture is similar regardless of which continent one goes to³³. Farmers need support in organizing so that they have a collective bargaining voice for both reducing inputs costs and improving market sales. Organized farmers can also invest into more value adding technology, and can improve the quality standards of crops being sold to consumers.

Finally, access to innovative technology can both create efficiencies and reduce the costs of production, while also generating value by managing quality control. Smallholder farming is still a very labor intensive activity in many developing economies, and as such, the ability to be efficient with resources is difficult. There is also a significant amount of food waste occurring along the supply-chain in developing nations. About one-third of food in developing countries, approximately 630 million tones, is wasted, with fruits, vegetables, roots, and tubers having the highest wastage rates³⁴. If even just one-fourth of the food currently lost or wasted in the developing world can be saved, it could feed over 400 million people³⁵.

Improving the lives and livelihoods of smallholder farmers needs to focus on how to provide farmers with tools that will allow them to connect to markets, understand pricing differences and where they can get the most value, and when to plant and harvest. Further, farmers also need support in organizing and developing the infrastructure to create food hubs, improve their bargaining power, and access technologies that will reduce their cost of operations.

Food and Nutrition

Even support for increasing the yields and incomes of smallholder farmers does not guarantee that the most vulnerable will be able to access sufficient quantities of quality food. Hunger is no longer an issue of insufficient global supply, but rather mainly reflects

³⁰ FAO, 2015d: xiii

³¹ FAO, 2015d: xiii

³² Ahmed, 2014

³³ Ahmed, 2014

³⁴ FAO, 2016

³⁵ FAO, 2016

a lack of access to the means to produce or purchase food³⁶. There has been a lag in the development of processing, product development, and marketing strategy capabilities for various crops targeted to the most vulnerable consumers. Changes need to be made to the current system of distributing food supplies for everyone to be able access safe and healthy foods in sufficient amounts.

People in the developing world are still suffering from hunger and nutrient deficiencies, especially those who are economically disadvantaged. The direct provision of extra nutrients by incorporating them into foods via micronutrient supplementation, enables people with moderate to severe malnutrition to access effective treatment. Building better products around this approach requires market research leading to a more targeted and better understanding of local cooking and consumption patterns. This will allow for more locally produced products that provide the most vulnerable with a consumable product to improve their daily nutritional intake.

Another way to boost the nutrient composition of agricultural products is to create and support shorter supply chains. When supply chains are kept short, foods do not require as much processing to maintain freshness and longevity, thus essential nutrients are preserved from loss during the processing stage³⁷. Although industrial farms must pursue higher-yield plant varieties that can withstand the rigors of traveling longer distances (due to long supply chains), smallholder farms do not, as their produce typically stays within the local/regional area and is consumed more quickly after harvest³⁸. What this means, is that smallholder farmers can allow their fruits and vegetables to ripen naturally on the parent plant, thus boosting the nutritional content and freshness. Regional food systems, and the shorter value chains that come with them, should be encouraged as the food that is produced and consumed will be healthier, fresher, and more nutritious.

The most vulnerable people need access to food that is affordable and nutritionally dense to meet their daily requirements.

³⁶ FAO, 2015a: 2

³⁷ FAO, 2014b: 3

³⁸ Grace Communications Foundation, 2012