

# Sustainable Intensification at Scale

## *A Framework for Strategy Design*



### Sustainable intensification:

#### an absolute necessity

The coming decades the demand for high-quality food will continue to increase due to a growing world population, changing diet patterns and the increasing use of biofuels. The Food and Agriculture Organization of the United Nations (FAO) predicts that overall food production will have to grow by almost 70% by 2050<sup>i</sup>, meaning an annual increase of 1.75% in productivity to meet future demand<sup>ii</sup>. Although the world is currently on track, certain regions are lagging behind. Agricultural productivity in sub-Saharan Africa, for example, is growing at 0.5% annually<sup>iii</sup>. Typically, the regions that are falling behind in generating the productivity growth required to feed their populations are also the regions where poverty and undernourishment are most prevalent<sup>iv</sup>.

Poverty and (low) productivity are linked. The poorest regions are also the regions where the vast majority of the population relies on agriculture for their livelihoods and where agriculture accounts for a large part of the Gross Domestic Product<sup>4</sup>. This seems like a paradox: the economies and people who rely on agriculture the most are the ones failing to generate sufficient agricultural resources for themselves. Therefore, improving agricultural productivity would not only address global food insecurity, it would also help lift a large part of the world population out of poverty through sustainable economic growth.

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Nevertheless, raising agricultural productivity could come at a high price. Already the agricultural sector is predominantly unsustainable, even more so in developing economies. Agriculture is linked with large-scale soil depletion and erosion<sup>v</sup>, 70% of fresh

water use<sup>vi</sup>, it accounts for 30% of global greenhouse gas emissions thereby contributing to climate change<sup>vii</sup>, and it is one of the largest drivers of deforestation and biodiversity loss<sup>viii</sup>. Using the wrong models, developing countries run the risk of growing their agricultural production in the short run at the

expense of their long-term prospects.

The paradigm for agriculture should be *sustainable intensification*: optimizing production (in quantity and/or quality) relative to inputs (e.g. land, water, fertilizer, labor), improving the livelihoods of farmers, while minimizing negative externalities (e.g. pollution, deforestation, depletion of soil and water sources)<sup>ix</sup>.

### Lessons learned from the past

Over the past 50 years there have been many widespread efforts to intensify agriculture in developing economies. Donor institutions from developed economies have traditionally tried this through transferring resources (knowledge, capital) for capacity-building projects of groups or institutions in developing economies. Donors invested heavily in agriculture in the 50s, 60s and 70s, resulting in the *Green Revolution* in Asia and Latin America and a series of large-scale interventions in Africa. The Green Revolution in Asia and Latin America was considered a success from a productivity point of view, while agricultural development in

Africa was perceived as a failure. Both had the effect that agriculture stopped being a policy priority in the late 80s, leaving behind the inheritance of an unsustainable, intensified agricultural sector in Asia and Latin America, and little to no impact on African productivity<sup>x</sup>.

During the neoliberal period that followed in the 80s, the world saw a paring down of government support and regulating functions to make way for a liberal market-oriented system. Donor aid shifted back to economic growth and market liberalization<sup>xi</sup>. The liberal market approach they put in place then failed to address some of the elements essential to an economically viable agricultural sector. The market, left to its own devices, fails to effectively organize farmers, train them or provide them with access to finance. It does not take into account social and environmental protection or farmer income and livelihoods to a sufficient extent. Neither can it develop the roads that are required to transport agricultural goods or the broader education that will enable farmers to develop their business skills.

Recognizing the failures of markets and governments as drivers for sustainable change, sustainability standards rose to prominence over the past two decades. Sustainability standards and labels offered value chain stakeholders a hybrid model that linked improvements towards more sustainable production in developing economies to a demand for sustainably produced products in developed economies. Sustainability standards have contributed to more environmentally and socially sustainable supply chains. However, they did not bring sustainable *intensification* on a large scale. Standards provide only limited agricultural and management advice for higher productivity and good management, and certified farmers still lack high-quality inputs and access to finance.

Most importantly, sustainability standards have not succeeded in reaching smallholders on a sufficient scale<sup>xii</sup>.

New strategies are required for the much-needed, large-scale implementation and uptake of sustainable intensification. Neither markets nor governments can solve the issue by themselves. The solutions will come from models and policies that build on the strengths of both. The challenge is thus to find analytical frameworks that will allow different stakeholders, from the private and public sectors, with varying interests, cultures and priorities, to collectively work on strategies for intensifying agriculture in a sustainable way.

This paper presents such a framework. It was developed by the consultancy *NewForesight* to unite the many different stakeholders that it works with around a common understanding and language, before jointly conceptualizing concrete strategies for sustainable market transformation.

### A framework to scale sustainable intensification

Sustainable intensification requires farmers to be able to implement and use better agricultural and management practices, to have access to and properly use the right inputs, and have an enabling environment that provides access to training and finance.

A farmer's ability to absorb and access better agricultural and management practices and inputs – and thereby improve his or her productivity – depends to a large extent on the farmer's level of organization and professionalism (skills and knowledge).

Based on the degree of organization and professionalism, one can identify five categories of farmers: low-intensity smallholders that farm for subsistence, entrepreneurial smallholders, emerging

producer organizations (POs), professional POs, and competitive commercial farmers (estates and POs). The number of farmers in each category determines the *sector shape* of a commodity sector within a country.

The basic sector shape is generally presented as a pyramid where a majority of unorganized subsistence smallholders make up the bottom of the pyramid and a smaller number of larger, better-organized farmers are found at the top (see Figure 1).

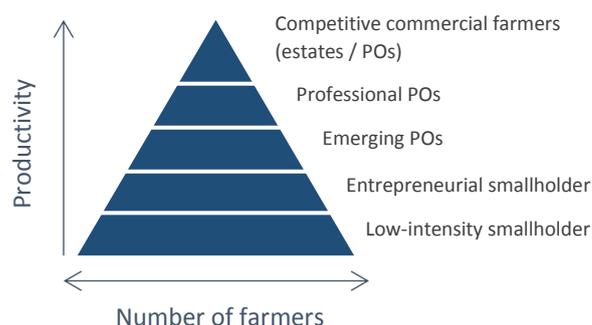


Figure 1: Basic sector shape with different segments of farmers (productivity x number of farmers)

However, in many cases agricultural sectors are not shaped like a pyramid. In reality at least four archetypes of the agricultural sector shape can be identified, each with their own characteristics and ability to increase productivity in a sustainable way.

### Four different archetypes of agricultural sectors



1. **The flat pyramid shape – consisting mainly of unorganized smallholders. The sector competes on poverty.** This is an unsustainable and unproductive sector, consisting of a vast majority of low-intensity smallholders that lack the required means, skills and incentives to produce efficiently. The bulk of production comes from

relatively poor, unorganized smallholders with low productivity. In these sectors farmers cannot differentiate their crop. They are dependent on their production for survival, with little alternatives. Examples of this type are the cocoa sector in West Africa and cotton in India.



2. The **pyramid** shape – a mix of unorganized, semi-organized and well-organized farmers. The sector is in transition. This is a slightly more efficient version of the previous, as some farmers have been able to organize themselves and create economies of scale, thereby increasing their productivity. They often still lack the resources to do so in a sustainable way, so environmental and social conditions suffer and poverty is prevalent. An example of this type is the coffee sector in Kenya.



3. The **diamond** shape – consisting mostly of organized medium-sized farms that are able to obtain the required inputs for growth, including finance. The sector competes on quality. A larger share of total production volume is produced at a higher productivity level. Poverty exists, but mainly

at the smaller base of the sector and there is a clear way out; the rest of the sector consists of small and medium businesses. The key to this model is market diversification between farmers: by selling a product that is distinct in quality, or sustainable, farmers receive a premium. Examples of this sector shape are found in wine and floriculture.



4. The **inverse pyramid** shape – mostly large-scale professional farms. The sector competes on efficiency. This is the dominant model in (more) developed economies and in sectors that rely on large-scale efficiencies to be profitable. Generally this involves mechanization, and diversification is not a factor of relevance. Examples of this type are soy and corn in the Americas.

The relationship between productivity and a sector's capacity to adopt sustainable farming practices and better management techniques is shown in a simplified way in Figure 2. Moving from shape 1 towards 3, most poverty-related issues are largely resolved by increasing economies of scale. However, closer to shape 4 the drive towards greater productivity tends to lead to exploitation of natural and social

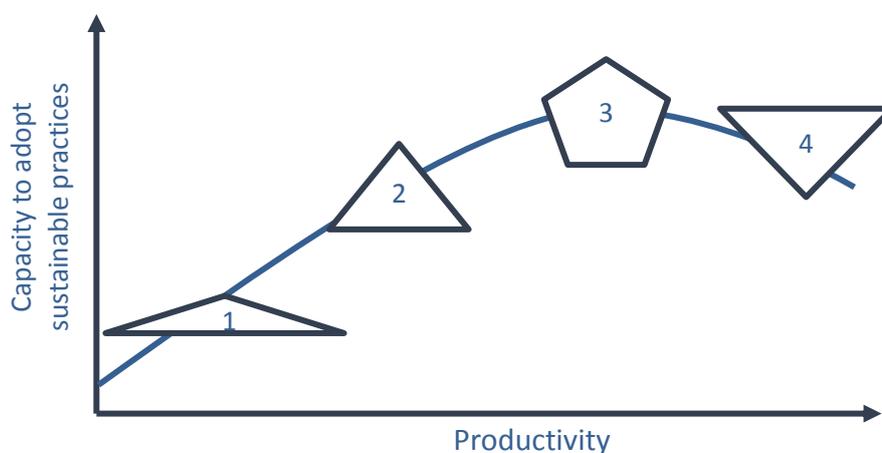


Figure 2: Sustainable intensification (sustainability x productivity) and the sector shapes

resources with increasing negative externalities.

The optimum exists around the diamond shape (shape 3). This does not mean that a diamond shaped sector is sustainable by default. It means that its degree of scale and organization is most suitable for intensifying production in a truly sustainable manner. On the one hand the structure of the sector allows the most entrepreneurial and professional farmers to scale up, employ rural workers, and absorb better management practices. On the other hand farm sizes allow for biodiversity zoning and avoid large-scale mono-cropping.

### Professionalism as a condition for sustainable intensification

A key factor in the model explained above is *professionalism*. To be more productive and sustainable farmers need three things that are only accessible at a certain level of farmer professionalism: (1) knowledge and technology practices and inputs); (2) access to finance; (3) more sophisticated trade and marketing<sup>xiii</sup>. Individual smallholder farmers often do not have the means to organize access to any of these three factors. The required level of professionalism can only be reached when a farm is of a critical size or when smaller farms

aggregate and organize at a higher level.

Figure 3 summarizes the dynamic of smallholder dominant sectors towards more professional farmers in shape three. In that process a sector will move towards fewer farmers while producing more. Currently too many farmers are farming for lack of other economic options.

Farming should be a chosen profession, one that requires skills and knowledge. Farming should no longer be the social safety net for people who have nowhere else to go. Not creating economies of scale means preserving economies of poverty.

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The move towards professionalism should be an organic process that allows those farmers that operate successfully to grow, expand, and organize themselves. Sustainable intensification in developing economies should be focused on generating the enabling environment that allows entrepreneurial farmers to enter the middle tier in terms of productivity through increased professionalism. That same enabling environment should stimulate and help other farmers to find employment elsewhere.

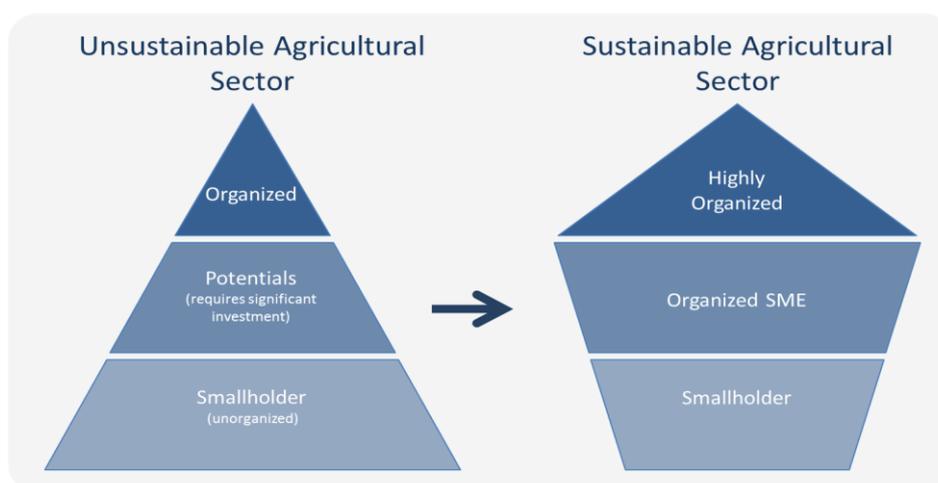


Figure 3: Sustainable intensification requires different sector shapes

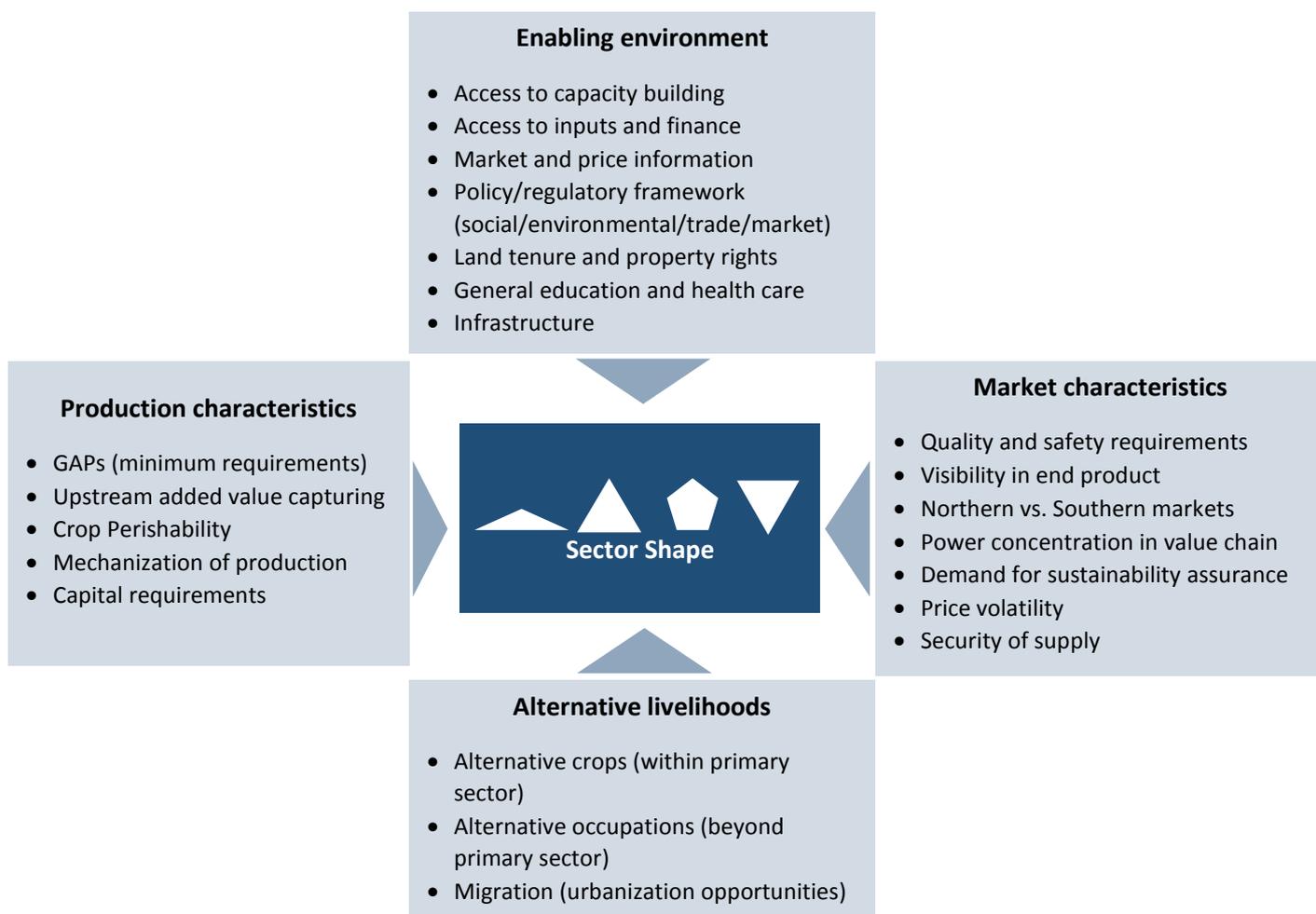


Figure 4: The forces shaping agricultural sectors

## Forces that shape the sectors

The shape determines the sector's ability to implement sustainable intensification. An interplay of four different (types of) forces determine what shape a sector has: the level of organization and productivity in a sector (see Figure 4).

The forces are:

- (1) Production characteristics – what it takes to be a (successful) farmer, and what the barriers are to entry;
- (2) Market characteristics – the product and practices that the market rewards;

- (3) The enabling environment – the support structures of the sector;
- (4) Alternative livelihoods – whether farmers can seek their livelihood in another crop or line of work.

The specific combination of these forces, and their relative significance, leads to varying sector shapes.

A *flat pyramid* is commonly the result of low requirements for crop production (the crop does not require particular skills or resources to grow), a high level of commoditization of the crop and little demand for quality by the market (hence low reward for differentiation),

a poorly functioning enabling environment (the farmer does not get the necessary support), and the absence of alternative livelihoods (farmers are dependent on the specific crop for their livelihood). This combination of forces leads to competition on poverty and a flat pyramid sector shape.

The *pyramid* sectors differ from the flat pyramid because more buyers reward higher product quality and/or because the enabling environment is organized better or more stimulating in certain aspects. Still, there is not enough support by the enabling environment or (quality) demand from the market to stimulate a more organized, professional sector.

The *diamond* sector represents a sector where more sophisticated product qualities and market differentiation are inherent, stimulating farmer professionalism (to meet the demand for quality). The demand for variation in product quality can sometimes prevent the sector from being taken over by large-scale estates. The enabling environment is often supportive in this type of sector and there is ample opportunity for alternate forms of employment outside the sector.

The *inverse pyramid* is a sector that consists mostly of large-scale estate farms with monocultures. The crop farming tends to be highly mechanized and the enabling environment supports high levels of productivity, but less of sustainability. This type of farm often has negative impact on biodiversity and other environmental aspects. Low demand for differentiation within the commodity drives farmers to optimize productivity, often producing negative externalities in the process. If production allows for large-scale mechanization, markets generally focus on lowest price, and underperforming farmers opt for alternative

professions. Hence the sector will take the shape of an inverse pyramid.

## Making it happen

The presented model of sector shapes and forces helps us understand why sectors often remain the way they are, even despite large amounts of development aid and support. If aid and support are not impacting the forces that shape a sector sufficiently, the dynamics of the sector will not be altered and no sustainable intensification will take place.

In order to achieve large-scale uptake of sustainable intensification in sector shapes 1 and 2, development strategies first have to focus on organizing and professionalizing farmers. Eventually these strategies have to transform sectors into diamond-shaped structures with less farmers, producing more in a sustainable way. To make sector shapes 3 and 4 more sustainable (they are generally sufficiently productive) requires an entirely different approach, organized more around policy and market incentives.

The focus of interventions in a sector will generally be on those forces related to the enabling environment and the market. Production characteristics are to a large degree inherent to the crop. The fourth force, alternative livelihood options, should not be disregarded so those farmers that only farm for lack of better options can leave the sector without falling (deeper) into poverty.

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These are some basic recommendations to indicate what the presented model can do for policy formulation and dialogue. Its strength lies in the coherence it brings to such a dialogue, and the fact that it provides stakeholders with an understanding of what is required to *fundamentally* change the dynamics of an agricultural sector and foster sustainable intensification.

The key to success is to understand the forces that shape a sector and how to influence them in a comprehensive, holistic way. It is a challenge that can only be understood and addressed at a macro level.

If ever there was an opportunity for the necessary fundamental reform, it seems to be now. Developing economies are showing they are ready to end their dependency and take their rightful place in the global agricultural economy. Donors are starting to show signs they are heeding their call. Above all, companies have realized that sustainability means sustainable intensification. All these stakeholders know that without sustainable intensification the world will not have the agricultural resources it needs without draining the environment that produces it.

This paper provides the various stakeholders involved with a framework for what needs to be done and a direction on how it can be done. The time to get started is now.

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- <sup>i</sup> FAO (2009) *Global Agriculture towards 2050*. Expert forum 'How to Feed the World 2050' Issues brief
  - <sup>ii</sup> Global Harvest Initiative (2010), *Global Agricultural Productivity Report*.
  - <sup>iii</sup> Fuglie, Ball & Wang (2012), *Productivity Growth in Agriculture: An International Perspective*
  - <sup>iv</sup> FAO (2012) *The State of Food Insecurity in the World*
  - <sup>v</sup> Henao & Baanante (1999). *Nutrient depletion in the agricultural soils in Africa*. International Food Policy Research Institute.
  - <sup>vi</sup> UN Water (2013). *Statistics Graphs & Maps: water use*. [http://www.unwater.org/statistics\\_use.html](http://www.unwater.org/statistics_use.html)
  - <sup>vii</sup> Vermeulen, Campbell, Ingram (2012) *Climate change and food systems*. Annual Review of Environment and Resources 37: 195-222
  - <sup>viii</sup> Kissinger, Herold, de Sy (2012). *Drivers of deforestation and forest degradation: a synthesis report for REDD+ policy makers*.
  - <sup>ix</sup> FAO (2013). *Compendium for Sustainable Crop Production Intensification*.
  - <sup>x</sup> The World Bank (1991). *Aid to African Agriculture*.
  - <sup>xi</sup> Eicker (2003). *Flashback: fifty years of donor aid to African agriculture*. International Food Aid and Policy Research Institute.
  - <sup>xii</sup> De Battisti, McGregor, Graffham (2009). *Standard bearers: horticultural exports and private standards in Africa*. IIED, London.
  - <sup>xiii</sup> Collier & Dercon (2009), *African agriculture in 50 years: smallholders in a rapidly changing world?* Expert Forum 'How to Feed the World in 2050'. FAO.

This paper was developed by **NewForesight**, a strategic consultancy firm focused on global development and sustainable market transformation. NewForesight specializes in multi-stakeholder process facilitation and program design: uniting diverse groups of stakeholders around a vision of a sustainable sector, and then collectively working out the program that will bring about the required change. The paper builds on the company's experience in developing market transformation programs and initiatives in a wide range of agricultural sectors.

