Driving innovations in the agri-food system

In many developing countries, targeted action will be needed to develop the existing agri-food system in order to meet the challenge of expanding the supply of sufficient, healthy, and nutritious food in a sustainable and efficient manner. Based on practical experience in the field, researchers from Wageningen UR have gained some insight into the innovation processes within the agri-food system. They have identified general patterns in the development of this system, and propose a generic model and a set of interventions for action towards speeding and scaling up a process of change within value chains.

As many as ten cases in different agricultural sub-sectors and stages of development are being studied, including vegetable and root crops, poultry farming, and high-end food chains for fresh dairy and meat products. Study sites are located in Ethiopia, Ghana, Kenya, Mexico, South Africa and Vietnam.

Description of the agri-food system development model

The agri-food system development (AFSD) model is used as a kind of map to help guide the process of driving innovations. Four stages of value chain development can be distinguished (Figure 1): *Informal*: subsistence or smallholder farmers marketing surplus to local fresh markets; *Local chain*: emerging farmers marketing to wholesale markets; *Formal chain*: emerging or commercial farmers marketing to wholesale, retail or out-of-

home consumption markets; *High-end chain*: commercial or industrial farmers selling to retail or specialised markets. It assumes that agri-food value chains behave in a way typically associated with complex adaptive systems. There are three major phases of transition hypothesised in the AFSD model and they form a sort of barrier between the different stages. In developing and emerging market economies, the transaction costs involved in moving up the ladder towards more advanced value chains can be rather high as new production-marketing mechanisms and systems have to be developed when markets are functioning poorly or are non-existent

To examine the wide range of agri-food value chains and their differentiation, they are plotted in the model on the basis of a) their level of product and production sophistication, and b) the level of
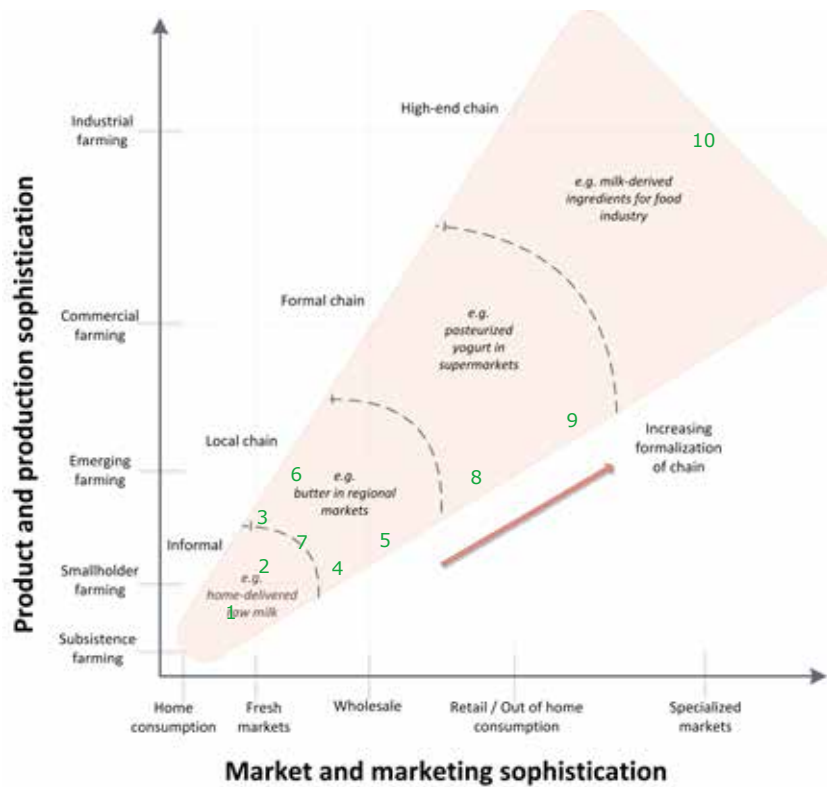
Figure 1 AFSD model showing pathways for value chain development

market and marketing sophistication. The cone-shaped area in the diagram represents the area where cases can be positioned. It shows that higher up in the scales the options for differentiation increase. The location of the barriers where the hypothesised phase transitions are likely to take place is drawn into the diagram as well. These are frontiers or tipping points where, once passed, a return to the original state is impossible. In the model this transpires when, viewed from an original position, a new product(ion) *and* new market(ing) position in the diagram has been obtained in a

different phase. The cases presented in Table 1 have been plotted in the ADFS model (Figure 1).

From analysis to a strategic action plan
Case number 8 on the marketing of milk through dairy business hubs in Kenya is a good example where intervention has helped the sector move from a local to a formal chain. An interventionist approach to agri-food system development is useful in order to avoid 'lock-in' and to keep the system moving towards meaningful change within the context of food security.

Box 1 What happens in agri-food value chains when a collective innovation process is put in motion

Reduced transaction costs in production processes can be to the benefit of producers (higher margins) or consumers (lower prices or better products) or both, depending on the nature of competition. When cost reduction is at least partly passed on to consumers, it may create additional demand from existing and possibly new consumers, particularly for the food products that are part of richer diets such as livestock products or processed foods. The expanded demand may result in higher farmgate prices and a higher income for producers, which can contribute to an upward spiral of the local economy. To keep the process in motion, it is critical that at least part of the cost reduction is used to beef up producer margins and invested into productive assets, to deliver the necessary output expansion and stimulate entry of new producers. Once this is achieved, the next challenge in the AFSD model is to ensure continued innovation and transition in the agri-food system. Innovation platforms can play a pivotal role in ensuring that the process is continued.
Note: the AFSD model uses the 'asset pentagon' of the Sustainable Livelihood Approach (SLA) to analyse the transition process from smallholder producer and/or micro entrepreneur to emerging producer and/or small to medium-sized entrepreneur.

The researchers apply approaches such as the Chain-wide learning (CWL) to kick-start an innovation process. This methodology was originally developed to link smallholders to modern markets (Vermeulen et al., 2008) and has been adapted in such a way that it results in the development of a strategic action plan that aims at substantially reducing the level of transaction costs in the agri-food value chain. Transaction costs are key to whether a business can operate profitably within the agri-food system and have to do with the costs involved when participating in the market. At the same time, as part of a strategic action plan, the groundwork is being laid to enhance the particular agri-food value chain case in a new period. For example, when an agri-food value chain develops, a new marketing model may need to be initiated. The strategic plan may anticipate this next period situation.

A set of interventions for moving value chains up the development ladder

Seven types of interventions are available to drive the innovation process further. Strong supportive evidence from the cases shows that these interventions are most effective at a particular stage, and hence are connected with the starting position of the specific case. To transit from stage 1 to 2, typically Rural Peoples' Organisations (RPOs) and Agribusiness Development (ABD) seem to be most effective; to transit from stage 2 to 3, these are Public-Private Partnerships (PPPs) and Corporate Social Responsibility Initiatives (CSRI); and to transit from stage 3 to 4, these are Supply Chain Management (SCM) and Metropolitan Food Clusters (MFCs). The CWL methodology can be used in all phases. The intervention types take advantage of the income and multiplier effects and help agri-food value chains develop their product(ion) and/or market(ing) sophistication.

The intended result of each particular intervention is an expansion of the volume or quality of output in response to demand, which may result in rising income opportunities throughout the value chain and subsequent multiplier effects in the economy (Box 1). Along the pathway of the innovative change of the agri-food system, the innovation process can be further promoted by institutions like innovation platforms, communities-of-practice, agribusiness clusters, business-hub networks, rural transformation centres, etc.

Drawing on the example of the dairy sector in Kenya, dairy business hubs have been springing up around the country, currently providing services to

Box 2 Next period scenarios: Coping with uncertain futures

Building on the illustration in Box 1, it can be expected that all chain actors will, to some extent, convert the temporary extra income gained into productive assets. This expectation is based on the assumption that chain actors would like to earn the extra income on a more permanent basis. Principally, this will lead to a structurally higher output of the agri-food value chain. If the extra output is not being absorbed by extra demand, the development of the agri-food value chain comes to a halt and income effects peter out. The interventionist approach in the AFSD model will accommodate for new futures by including the creation of extra market demand into the intervention.

some 25% of smallholder farmers. This case shows how the innovation process driven by PPP interventions has led to scaling up within the sector – larger numbers of smallholder dairy farmers have come together to supply their milk through hubs and this in turn has created momentum for the sector to transition to the formal value chain.

Incorporating various future development pathways in planning interventions

The AFSD model incorporates an innovative 'next period scenario' concept. By integrating scenario analysis into the planning process of an intervention, the planning can accommodate for the next-period situation. This is a way to cope with uncertain futures of adaptive, complex systems (Box 2). Case number 9 is a good example where future scenarios have been applied to the intervention of connecting small farmers to a retailer of a packaging centre. The AFSD model indicated that problems might occur in meeting the retailer's requirements because the farming systems have not yet adapted to new market demands.

To test the validity of the AFSD model as well as to refine it further, a number of cases are being described and researched, mainly focusing on agri-food value chains (Table 1). This evidence base of the Designing Innovative Pathways for Agri-food Systems (DIPAS) project is the source of empirical and supporting data. The project owners have been collaborating with an extensive network of researchers and research institutes, especially in Ethiopia, Kenya, South Africa and Ghana. For more information on the specific cases, the case 'owner' can be contacted directly.

Table 1 Overview of cases

	Case	Location, Country	Sub-sector	Phase	Action	Owner	Collaborators
1	Straw mushroom value chain	Vietnam	Upland crops	Smallholder/ fresh market	CWL	Helder	IAS, CTU
2	Locally traded and processed cassava	Kumasi, Ghana	Roots, tubers	Smallholder/-entrepreneur	CWL	Helder	BIRD/KNUST
3	Locally traded and processed tomatoes	Nakuru, Kenya	Fresh produce vegetables	Small-emergent/ fresh market	CWL	Helder	Egerton University
4	Vuselela sugar smallholder production scheme	KZN, South Africa	Sugarcane	Smallholder/ processing-wholesale	CSR	Helder	Tongaat Hulett Natal
5	Ware potato value chain	Harar, Ethiopia	Roots & tubers	Smallholder/ fresh market	CWL	Helder	Haramaya Univ, CASCAPE project
6	Commercial poultry production for urban markets	Ethiopia	Poultry	Emergent/fresh market	CWL, ABD	Vernooij	HAPP, EPPA
7	Local milk marketing	Asella, Ethiopia	Dairy	Smallholder/local market, processing		Van der Lee	Haramaya University
8	Marketing of milk through dairy business hubs	Kenya	Dairy	Smallholder/ processing-wholesale	ABD, PPP	Van der Lee	SNV
9	Direct farm pilot evaluation	Limpopo, South Africa	Fresh produce vegetables	Smallholder - wholesale	SCM	Groot	TechnoServe, Massmart
10	Agropark development	Mexico	Dairy, poultry, meat, fruits, vegetables	Industrial for high-end	MFC	Groot	FOCIR, SAGARPA

N.B. Cases with Friesland Campina in Vietnam and Indonesia are being considered, pending start-up of projects there.

Key: BIRD/KNUST-Bureau of Integrated Rural Development-Kwame Nkrumah University of Science and Technology; CASCAPE-Capacity building for scaling up of evidence-based best practices in agricultural production in Ethiopia; CTU-Can Tho University; EPPA-Ethiopian Poultry Producer Association; FOCIR-The Capitalization and Investment Fund for the Rural Sector in Mexico; HAPP-Holland-Africa Poultry Partners; IAS-Institute of Agricultural Sciences (of South Vietnam) SAGARPA-Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food in Mexico; SNV-Netherlands Development Organisation.

References and further reading materials

Vermeulen, S., Woodhill, J., Proctor, F. and Delnoye, R. (2008) Chain-wide learning for inclusive agrifood market development: a guide to multi-stakeholder processes for linking small-scale producers to modern markets. Wageningen, International Institute for Environmental and Development

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