

Innovation research in high-value commodity chains: Lessons learned

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Abstract: The current paper reports on the main findings emerging from a research alternative to the two dominant paradigms in agricultural development. This alternative is both context-driven and problem-focused on the rapidly developing East African market-oriented agriculture that demonstrates high economic growth rates based on high-value market-driven commodity chains. The approach to this innovative research in high-value chains includes information feedback loops that bring back translated reports regarding market requirements, retailers’ requests, tailor made production techniques, etc. These reports include price determining information like preferences for certain quality attributes such as colour, size, and texture in addition to extrinsic quality attributes such as food safety, production method, as well as the values that are embedded in certified organic, environmental issues or place of origin. The research was conducted in close collaboration with farmers to increase the adoption rate of the innovations being developed.

Innovations are changing the production-market landscape

Two paradigms or narratives have dominated agricultural research for several decades (Fig. 1). One is that Sub-Saharan Africa smallholders operate far inside their production-possibility frontier and industrialisation is required. Another suggests that farmers produced close to or on the frontier of the capacity of the Agroecology and focus on livelihood (1, 2).

Overtaking these two narratives is the rapid innovations and changes in the production-market landscape. This is better demonstrated by many smallholders in East Africa who are undergoing a profound transition from cereal-based subsistence farming to mixed-enterprise, market-oriented agriculture and the demonstrated high economic growth rates based on high-value market-driven commodity development (4). In this paper, we will call this last view the innovation narrative.

The lessons learned reported here are partly based on the research project “ProGroV” (Productivity and Growth in Organic Value-Chains), a project that aims at strengthening the farmers’ ability to supply the products that the markets require. ProGroV is supported by the Danish Government and partners are three East African and two Danish Universities, as well as AgroTech A/S, the International Centre for Research in Organic Food Systems, and the national organic organisations in Uganda, Kenya and Tanzania. <http://www.icrofs.org/Pages/Research/progrov.html>

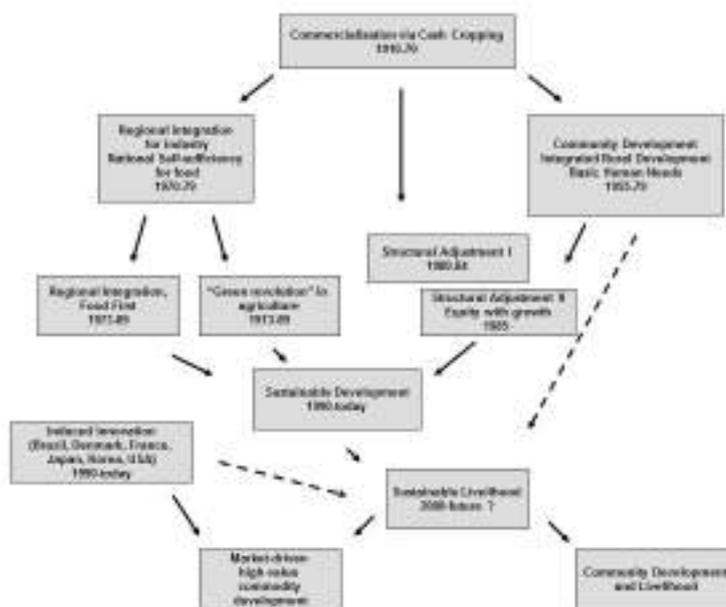


Figure 1. Chronology of paradigms in agricultural development. Two pathways dominate, one leading to a “green revolution” high-input approach and the other leading into community development (3).

The research concept

The basic characteristic of a value chain is that there is value addition at each step along the production chain (Fig. 2) through the combination of additional resources like manpower, tools, knowledge and skills, and perhaps other raw materials. To enable this value addition, there has to be feedback information from the market or retailers to the processors and the producers as per the systems thinking dynamics (5). The feedback loops need to ensure that the emerging opportunities and challenges from a dynamic market will be appropriately embraced by the actors in the chain.

This requires not only information flow but also skills to interpret the signals and react to them with skills and resources, e.g. in the form of new product innovations which again often require innovations in the primary production. For smallholder farmers this might pose a significant challenge without significant back-up or support from other chain actors. There are different options to ensure that the value addition is actually beneficial to the weaker agents in the chain, such as poorly organised smallholder farmers (7). ProGroV focuses on smallholder organic cash crop farmers.

In this context, we understand innovation as being linked to entrepreneurs and representing *newness*. It has a relation to *invention* or to its process of *adoption*. As such, innovation is both a *process* and an *outcome*, where the most important final feature may involve change or a *discontinuity* with the prevailing product or market (8). Local innovation can be triggered by many factors as farmers exploring new possibilities to solve a problem or a social way of responding and adapting to changes in access to natural resources, assets or markets (Fig. 2).

Our approach to research in innovation and high-value chains (Fig. 3) for agricultural commodities depicts information feedback loops that bring back translated reports (signals) regarding market requirements, retailers' requests, etc. These signals may include price determining information like preferences for certain intrinsic quality attributes (e.g. maturity, size/weight, uniformity in colour, shelf life). It could also be extrinsic quality attributes such as food safety, and the values that are embedded in certified organic farming, or place of origin.

In addition to this complexity, a product may have different markets that emphasise different attributes. An example is fruits that are needed at different degrees of maturity by two apparently fairly similar markets in Europe. Conversely, it can be a product that is sold both at a local market, which has an emphasis on its role as a traditional dish, and in an export market where it is valued because of its exotic flavour.

The approach to quality in ProGrOV research programme

During the early stages of ProGrOV it became clear that market requirements like quality attributes, were complicated to describe in ways that makes them "researchable" (quantify and/or qualify, reproducible). For the purpose of the ProGrOV project, we have *a priori* chosen to focus on organic value chains with certain extrinsic quality attributes attached like vegetable delivered for 'upper end' consumers. However, there are still important intrinsic quality attributes that organic products need to reach to gain market access at satisfactory prices (Fig. 3). Thus, research needs to take these intrinsic quality attributes into account to improve organic production at farm level.

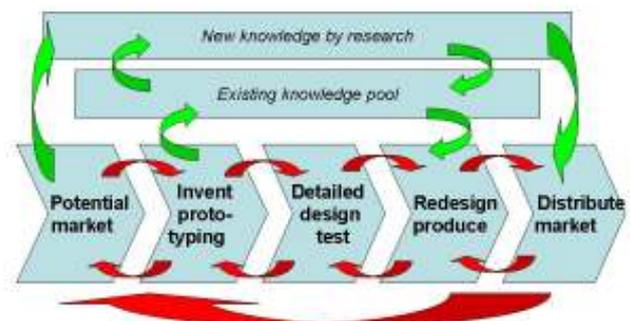


Figure 2. A general value chain-linked model showing flow paths of information and cooperation (9).

These intrinsic quality attributes should be translated into quantifiable quality criteria to be used for assessing the crop and livestock production resulting from the innovations tested in ProGrOV. An indication that, for example, *the colour of tomatoes* is an important attribute for the buyers that thus would need to be translated into *a scale of per cent green parts of a batch of tomatoes*, which would then be applied systematically to assess the tomatoes harvested in crop experiments with for example mulching materials.

The information on the attributes, their prioritization and thresholds will come from interactions with the chain agents e.g. buyers, retailers, hotels, etc. Thus, product quality in the ProGrOV project is a relative and context dependant concept and is neither objective nor covering all aspects of intrinsic product quality. The practical application of this is that project participants struggle to translate, back caste along the value chain, market intelligence into quantifiable indicators that operators of the practice would understand. Following the dynamic in value chains, the indicators must be questioned constantly to ensure that they still reflect the targeted market(s).

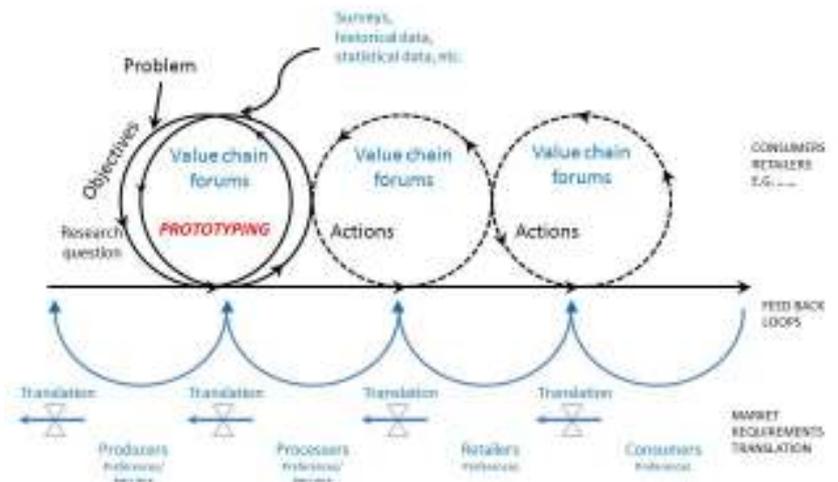


Figure 3. Schematic representation of innovation research in primary value chains involving relevant stakeholders (10).

Stakeholders test of prototypes

The ProGrov research process is informed by the stakeholders, like the national organic organisation, farmers, private companies, policy alliances, and local supermarkets (Fig. 3 – the upper side of the diagram). The research questions and research findings are tested in value-chain stakeholder forums to which possible solutions are being presented in the form of prototypes. These fora present an opportunity for reality checks for the researcher and enable the proposed solutions to be fine-tuned, i.e. they could be seen as Innovation Platforms. The forums obviously differ along the value chain (Fig. 3). Thus, if one assumes that a certain input of livestock manure could improve the amount and quality of vegetables, then before testing this intervention experimentally it is necessary to discuss the feasibility of the intervention with the farmers (e.g. would they be able to apply the tested amounts?). This process can be understood as prototyping. Farmers accepting or shunning the intervention during the forum consultations partly depends on their own request and initial framing of the problem that were fed into the research process. Yet barriers are met underway in the project process. An intensification of a livestock- vegetable production system could for example be thought to diversify farmers' earnings and empower them to be less vulnerable against natural and economic shocks associated with the single commodity approach in agriculture. This may however meet barriers such as how to handle and use manure efficiently from a resource use point of view or allocation of land for fodder vs. cash crops.

Value-chain research can thus be said to provide a tool or an interdisciplinary research approach to help researchers, entrepreneurs and other stakeholders at each node of the value chain, to identify relevant research questions that can help optimise the whole chain. This requires consultations,

interdisciplinary teams, and regular mutual reminding of the particular characteristics of *value chains* as many have a *supply chain approach* as their intuitive reflection of the African agri-business environment. This research approach is a further development of the general concepts described in the academic literature (Fig. 3) and the first lessons learned can be reported.

Approach and lessons learned

Complexities are a norm for real value-chain problems and hence we propose an approach to research in innovation that is both context-driven and problem-focused. This approach departs partly from the traditional university-based, investigator-initiated and discipline-based knowledge production, which focus on a linear dissemination process. Currently it is an open question to us how research in innovation and entrepreneurship, i.e. market-driven high-value commodity development (Figs. 1, 2, 3), can comply with agricultural research paradigms (see also 11, 12). Some lessons learned are in brief:

- When developing new value chains, there will be winners and losers as it takes capacity to join the market orientations towards high-value commodities. This counts for producers, processors, transporters, buyers, and retail sellers.
- To have a significant impact, the research must be accompanied by formalized networks of relevant actors, which may be termed “learning alliances” or innovation platforms as illustrated in the upper part of figure 3.
- Value-chain based research is a challenge in the discipline oriented university environments as the problems investigated cuts across discipline boundaries. But this can be developed.
- The agri-business in Africa has a history of being supply chain based. The perception of value additions must be kept in mind through constant reminding exercises. Researchers tend to be absorbed by their research questions and may forget to cross-check their temporary findings with stakeholder forums and the concept of prototyping has proven difficult.
- The paradigms that most agricultural research institutions follow are still dominantly the productivity narrative, which makes it difficult to legitimize research within a sufficiency or an innovative narrative.
- Academia has a long tradition for ways to merit research but how to merit research in innovation and entrepreneurship is yet to be established.

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