Knowledge along traditional rice value chains – a practice-based approach: are there lessons for Sub-Saharan Africa?

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Global food demand is expected to increase by 50% over the next 20 years. The productive potential of many small-scale farmers, however, remains untapped. SNV Netherlands Development Organisation is a non-profit, international development organisation, established in 1965 with operations in 36 countries in Africa, Asia and Latin America. SNV works in Agriculture, Renewable Energy and Water, Sanitation & Hygiene (WASH) sectors providing capacity development services to diverse partners in developing countries. A multi-disciplinary advisory team, complemented by networks of local service providers, works together to strengthen the capacities of national and local actors to achieve on-the-ground results. This paper focuses on the experiences of SNV's work in the rice value chain in Vietnam, Lao PDR and Cambodia. It especially zooms in on the role of the traditional knowledge system and the changes and adaption taking place because of the effects of market developments and private sector involvement. It also analyses how the actors in the value chain adapt and make use of both traditional and modern knowledge sets in changing environment.

The rice value chain

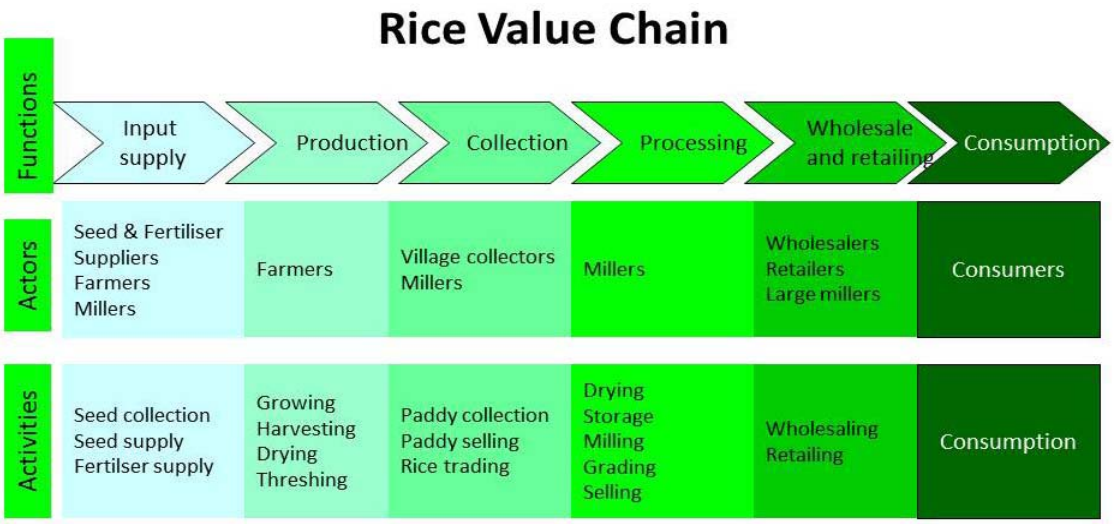
Rice is and will remain the dominant crop in South-East Asia, which represents the world's greatest grain-producing area. Rice exports from Thailand, Vietnam, Laos, Cambodia and Myanmar total more than 20 million tonnes, or two-thirds of the world market share, according to the International Grain Council (http://www.igc.int/). It is more than just food, as it also has a significant cultural value embedded in many local traditions. Of all farming households in Laos, 92% grow rice according to the Agriculture Census 2010/11 (Laos Agricultural Census Office, 2012). Rice plays a key role in food security, while at the same time South-East Asian nations have become the leading rice exporting countries.

The rice value chain is characterised by a smallholder-based production system in which farming households own on average around 1 hectare of paddy land. Many different sub-value chains or supply chains ranging from own production and storage with interaction with small local millers only to highly specialised rice export commodity supply chains with complex certification systems, can be found. Within this, the main feature of smallholder production stands firm. The knowledge system they work in or with plays an essential role in their capacity to participate in one or another supply chain.

The rice value chain is also an intrinsic network of public and private interactions and responsibilities. The public responsibilities are often in infrastructure (roads and irrigation), policies and regulations (seed laws, use of inputs, export policies, tax incentives, etc.), research and development (variety selection, etc.) and agricultural extension. The private

responsibilities are concentrated along the supply chain from provision of inputs through production to processing and trade.

A major observed weakness or dilemma is the undervaluing of other private sector actors higher up the value chain, especially their role in knowledge management and dissemination to create a win-win situation that also benefits the smallholder farmers.



Source: Shrestha, 2012

From inputs to production

Traditionally, rice cultivation was a low-external-input system, where farmers grew rain-fed rice in the main wet season and animals grazed on the fields in the dry season, returning some nutrients back to the fields. Rice seed was kept from harvest to the next season through a process of natural selection, and farmer knowledge in this system is highly specialised. From surveys done in North-West Vietnam, mainly among ethnic hill-tribes, SNV had identified already over 200 different rice varieties that were all still under cultivation. Many of these varieties have an important cultural value as they are glutinous types, which are used in festivals and ceremonies. Similarly, Laos has the second-largest rice variety collection in the world with more than 3,000 rice varieties conserved in the International Rice Genebank at the International Rice Research Institute (see TABI, 2011).

With increasing population size, urbanisation and drive for exports this production system has come under pressure. Rain-fed cultivation has been replaced by intensive irrigation combined with intensive use of chemical fertilisers and high-yielding varieties (the so-called “green revolution” effects). This has also had a major impact on agricultural knowledge. Farmers are becoming more and more dependent on external knowledge sources and, with a lack of investment in public R&D and extension, they are at risk of not receiving adequate information and advisory services, resulting in the wrong use of inputs and consequent loss of productivity.

SNV has been working in Vietnam and Lao on ways to strengthen farmer capacity to ensure that they have access to good-quality inputs and access to knowledge on the use of these.

Local seed producer groups in North-West Vietnam

SNV was working with the extension services in Son La province and one of the major constraints identified was the access to good-quality and reliable seeds. According to Ministry of Agriculture statistics, around 70% of farmers were still working with farm-saved seed. The extension services were promoting new high-yielding varieties but local farmers were not always happy with the choices made and preferred to keep growing traditional sticky (glutinous) rice varieties. SNV and local partners then decided to start a trial on local seed production. Through a process of focus group discussions, an improved sticky rice variety was selected and two farmer cooperatives were supported to produce seed. After two seasons of technical and farmer group training, these groups produced around 14 tons of seed per season, which they marketed successfully to other neighbouring communities. At the same time the district and provincial authorities supported them with legal registration and permits to produce good quality seed.

Source: Bergeron and Tuan, 2006

Private sector model for seed market development in EMRIP Project, Lao PDR

It was realized that there is a huge problem in seed production, distribution and marketing of good quality seed in Laos. In order to address this issue, seven seed producer groups and six rice mills were selected to test a private sector model for seed production, distribution and marketing. Selected farmer groups previously trained in seed production by other projects have been facilitated to collaborate with millers to produce and market high-quality R3 rice seeds, capitalizing on millers' marketing expertise and existing links to 1,000 rice-producing households per rice mill. These seed producer groups received a set of equipment to produce clean, dry ungraded rice seed and millers have received rice seed graders to process this seed into a high-quality product. The seed producer groups also received on-farm training and coaching on good-quality seed production.

With this intervention, the creation of a market mechanism for good-quality rice seed being produced under other projects started to take place. With millers acting as a link between seed suppliers and seed users, there is now a workable model to deal with one of the most important and longstanding market failures in Lao agriculture.

Source: Shrestha, 2012

Rice trial, Yen Chau, Song La, Vietnam

As the examples in the boxes show, strong partnerships need to be in place between public and private sector actors to ensure that knowledge is passed through from one to the other and that holding on to knowledge without sharing it will not only disfavour others but also oneself.

Production, productivity and post-harvest

Since the second half of the 20th century, rice has increasingly become a commodity crop for international trade. This has provided significant challenges to boosting productivity, both from an increase in production output (tonne/ha) but also in reducing post-harvest losses. The rapid growth of the rice trade in both domestic and international markets has exposed serious weaknesses in public knowledge services around production and productivity increases.

With support from donors, international organisations and NGOs, countries have been able to improve their R&D and provide more and better services to farmers. However, these were often mainly focused on quantity of output with major interventions targeted at farmers and to a lesser extent on the production of homogeneous quality that conforms to market requirements. These types of interventions have been found to be unsustainable unless strong linkages with existing market systems exist.

SNV, in partnership with Helvetas, has experimented with a new approach to knowledge management in Lao PDR, where rice millers have taken up the key responsibility to provide extension services to rice producers to ensure that they have up-to-date knowledge on

market demand, use of rice seed varieties, approved use of agro-chemicals, etc. The rice millers provide a whole package of services, including good-quality input, extension, credit and information, which has resulted in an increase in rice yield of around 30% with premium price for good-quality rice[1].

In Vietnam, while working with agricultural cooperatives, it has been observed that they have often shifted away from depending on public extension providers and started recruiting agricultural specialists to support their production of better quality rice that conforms to market requirements.

Farmer organisation and trade

With increasing commercialisation of rice, the challenges for smallholders to connect to the rice value chain have shifted as well. Whereas at first they were merely confronted with technical production-related issues and knowledge upgrading, now they also have to be more and more entrepreneurial, as well as being relationship managers with other rice value-chain actors and service providers.

Economies of scale and farmer agencies are playing a more and more important role in achieving success. For smallholder farmers to be attractive to traders as serious business partners, and earn adequate returns on their investments, transaction costs need to be kept low. This requires more collaboration when planning production but also agreement on choice of variety and production methods (use of external inputs, water regulation, etc.).

Access to finance to facilitate investing in higher-quality production is another one of the key services that smallholders need to be able to access in a timely fashion as they become more market-integrated. With the increasing complexity of markets and their regulations, public sector agencies are not able to upgrade their knowledge rapidly enough and solutions to service provision could be sought in the private domain. Smallholder farmers must be able to pay for these services and as such the policy environment becomes even more critical.

[1] http://www.snvworld.org/sites/www.snvworld.org/files/publications/soc_laos_rice.pdf

A business module that promotes an equitable partnership between the rice miller and smallholder rice farmers

In Laos, rice production is mainly for the farmers' own consumption and they are reluctant to invest in good-quality inputs, resulting in low yield and poor quality of rice. In order to address the productivity and quality issue in the rice sector, EMRIP activities focused on improving the capacity of millers as an entry point in establishing and strengthening fair trading linkages with the smallholder farmers and improving post-harvest handling and processing. Socially committed and capable millers were selected as engines of the project through a rigorous selection process. Criteria used to aid the selection of millers were, among others, a substantial capacity to support smallholders, and a reputation as trusted and honest players. The project helped the selected millers to develop an Inclusive Business Plan, which described the necessary steps to increase productivity, and supported farmers in producing high-quality paddy rice. The millers implemented the formation of farmer groups together with SNV. Millers received training and advice on forming and strengthening farmer groups, input provision, and business management skills. They also improved extension services by collaborating with the government extension officers. This enabled them to expand their traditional trading role to incorporate the provision of seed, fertiliser and extension services based on production agreements with their farmer groups. It has resulted in a steady supply of high-quality paddy rice, along with higher revenues for farmers and millers.

The project has been able to develop fair trading relations between 21,361 smallholder rice-producing households and 21 selected rice mills within 23 months of the project's duration. The project proved a unique success because of the stimulation of co-operation between millers and farmers; millers supported farmers with inputs, extension services and better prices. In return for investing their time and money in small-scale farmers, millers received project support, funded by SNV, Helvetas and an EU grant, to improve milling facilities and equipment. At the base of the success of the project lies a rigorous selection process that chose the most promising millers for the project. Farmer crop yields increased by 30%; income from rice increased by around 60% and millers saw improved profitability in addition to a 10% increase in throughputs and supply of high-quality, single-variety rice. Elements of the programme are now spreading (including spontaneously), especially through "miller groups".

Source: Shrestha, 2011

Equally important is to look at areas of competitiveness or how competitiveness can be influenced and changed. For instance, in Cambodia rice milling is economically less interesting than milling in Vietnam or Thailand, primarily as a result of much higher energy costs. As a result, the majority of paddy is transported to Vietnam or Thailand for milling (and value adding). SNV is now working with technology partners and rice millers to lower the cost of milling by offering biomass energy solutions. Rice-millers can thus generate all their required energy by using the waste rice-husk.

Manichanh rice mill, Lao.

Increased Competitiveness – Application of Waste to Energy (WtE) in the Rice Value Chain

Cambodia reached self-sufficiency in rice in 1985 and became a net exporter of rice and paddy in 1995. Estimates are that 1.86 million tonnes of paddy are transported to Vietnam while Thailand imports about 330,000 tonnes of paddy. This results in a significant loss to the Cambodian economy in terms of value adding and job creation. In 2010 the Royal Government has adopted a formal rice export policy. However, rice milling in Cambodia remains a challenge as the level of competitiveness is low because of high energy prices.

Based on a report from IFC on gasifier technology, the current average cost of milling per tonne of rice is US$40. With the use of rice husk gasifier technology, a rice mill with 4,000 tons/year (tonnes or tons???/ – be consistent) of processing capacity can save rice processing cost of US$30,000 per year. With this saving, the same rice mills will be able to process per tonne of milled rice at US$32.50. Hence, the cost of processing paddy will decrease by 13%, increasing competitiveness for milled rice in the market.

The rice milling sector in Cambodia has potentially 1.6 million metric tonnes of rice husk available that could be converted into energy. At present, only about 10% of the rice husk is utilized as fuel biomass for WtE technologies. The study by IFC found that at least 200 other commercial rice mills could benefit from such application.

Utilising readily available rice husk as a source of energy can reduce rice milling costs and result in a more competitive rice milling sector. Based on calculations done by the SNV WtE project, a rice mill with 2-2.5 tonne/h milling capacity without rice husk gasifier technology can process approximately 3,067 tonnes of paddy/year (both dried and wet). A mill with the same capacity having gasifier technology can process approximately 5,000 tonne of paddy (both wet and dried), which is 1,933 tonne more per year as more running hours can be made with the new technology. This means that the introduction of gasifier technology to 150 rice mills would enable them to absorb additional 289,950 tonne of paddy per year. This additional volume and capacity creates an opportunity for smallholders to sell their additional paddy including wet paddy in the prevailing market rate directly to the nearby millers.

Hence, a major economic impact will be gained from in-country processing and subsequent export of processed rice compared to direct paddy exports. The installation of new WtE technologies by 150 project-targeted rice mills will result in an estimated increase of 200,000 tonnes of paddy processed in country, which results in the creation of additional US$2.8M worker income in the rice milling section of the value chain.

Finally, with application of such technology, each rice mill can save on average 80% of the total cost on energy required for processing of milled rice.

Source: SNV Cambodia, 2011

Part of the process of moving farmers on a pathway from self-sufficiency to commercial production is also to build the confidence to deal with the risks and uncertainty. Access to knowledge and information and creating a transparent and accountable playing field is crucial in that. But also the development of new innovative services can help farmers to deal with risks. In Vietnam, for instance, SNV is supporting the development a weather-index-based crop insurance systems, so that farmers can deal with potential crops (and income) losses and overcome the shocks. Especially with changing weather variations as a result of climate change, the possibilities for external shocks are increasing[2].

Climate Change Adaptation Measures in Vietnam to reduce vulnerability

Vietnam is one of the most vulnerable countries in the world to the effects of climate change, and especially the poorer parts of the population is at risk. SNV is currently working on two projects to reduce vulnerability to external shocks and adapt rice production systems to the effects of climate change, and also in light of reduced emissions of greenhouse gases.

The project "**Innovative Financing for Building Community Resilience to Climate Change in Coastal Vietnam"** aims to reduce poverty and vulnerability of Nghe An communes against climate risks. This will be achieved through three main intervention measures:
• Climate change adaptation (CCA) strategies that promote coastal community resilience, and strengthen local livelihoods;
• Weather-risk insurance model for rice that enables local stakeholders to minimise climate risks to their livelihoods; and
• Advocacy to raise awareness and enable information and knowledge.

The project **"Community-Based Climate Change Mitigation through Sustainable Rice Production"** aims to increase the resilience of smallholder rice farmers through improved rice production techniques, market linkages and rice residue management that will result in increased income for farmers and reduce greenhouse gas emissions from rice production systems.

This project will support and build the capacity of smallholder rice producers and provincial agencies to reduce greenhouse gas (GHG) emissions and improve smallholder benefits from rice production in Central Vietnam by introducing low-emission production practices, utilising renewable energy generated from rice residues and promoting the value chain of "green rice".
The rice production system will be improved by applying the System of Rice Intensification; an innovative, efficient and environmentally sustainable production system that increases productivity of rice cultivation while reducing requirements for water, seed, synthetic fertilizers, pesticides, herbicides and labour, especially tasks performed by women, as well as reducing GHG emissions.

[2] http://www.snvworld.org/en/countries/vietnam/our-work/projects/innovative-financing-to-enhance-resilience-to-climate-change-in
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Some lessons learned

Development has to come from within and be owned by the value-chain actors. Knowledge plays a central part in it and needs to be shared by all. How farmers learn, and from whom, needs careful analysis and these traditional learning systems need to be promoted and enhanced. The role of key or model farmers is central in this.

Farmer field conference, Yen Chau, Song La, Vietnam

A holistic approach to chain development needs to be taken. In-depth analysis of roles and functions of value-chain actors and service providers is required to identify constraints and development opportunities. These can then be used to find incentives for value-chain participants to bring change.

A multi-stakeholder approach is key to ensure ownership and sustainability. Facilitating win-win scenarios is necessary. As much as a certain re-distribution of value adding along the chain is often needed, this needs to go hand-in-hand with a clear understanding of risk sharing and understanding of (opportunity) costs.

The experiences from Asia may prove valuable for policymakers, research and development actors, extension and advisory service providers and smallholder rice farmers in Africa.

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