Commercialising smallholder agricultural production in Lao People's Democratic Republic

Kim S. Alexander [a]
[a] *College of Business, Law and Governance, Division of Tropical Environments and Societies, James Cook University Townsville, Australia. kim.alexander56@gmail.com (Corresponding author)*

Peter Case [a, b]
[a] *College of Business, Law and Governance, Division of Tropical Environments and Societies, James Cook University Townsville, Australia. peter.case@jcu.edu.au*
[b] *Bristol Business School, University of the West of England*

Michael J. Jones [a]
[a] *College of Business, Law and Governance, Division of Tropical Environments and Societies, James Cook University Townsville, Australia. umalemusan@gmail.com*

John G. Connell [a]
[a] *College of Business, Law and Governance, Division of Tropical Environments and Societies, James Cook University Townsville, Australia. john.connell@jcu.edu.au*

Dr Kim Alexander is an adjunct senior research fellow at the College of Business, Law & Governance, James Cook University. She has held social science research positions at CSIRO and Australian universities. Her research deals with social aspects of agricultural change and development in South East Asia.

Prof Peter Case is professor of management and organisation in the College of Business, Law & Governance, James Cook University and professor of organisation studies at Bristol Business School. His research encompasses leadership studies, organisational development and international development. He leads and collaborates in international development projects in South East Asia. He is Project Director for a malaria control/elimination programme in the Greater Mekong Sub-region.

Mr Michael Jones is a rural advisory services development consultant in South East Asia. He has specialist knowledge and expertise in rural and farmer organisational development, equitable market engagement, and value chain governance. He is an adjunct research fellowship in the College of Business, Law and Governance, James Cook University and has commenced PhD studies in, Faculty of Business and Law, UWE, Bristol.

Mr John Connell has worked for over 30 years in S.E Asia in the development of extension systems, including value-chain development and governance in the agriculture sector. These have included long-term assignments in Lao PDR, where he managed a series of formative projects. He holds the position of adjunct senior research fellow in the College of Business, Law and Governance, James Cook University.

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Abstract

Many smallholder farmers in Lao People's Democratic Republic are transitioning from subsistence to commercial production. This paper employs the Agriculture Innovation System (AIS) framework to report on empirical findings from six case studies of Lao smallholder production. It identifies the actors, organisations, and institutions involved in systemic commercialisation of subsistence farming and articulate patterns of interactions that contribute to the relative success of the transition. Of the factors identified in our case studies, the most important enablers of commercial production and adoption of innovative technologies were technical and financial assistance, access to markets and the formation of farmer associations/organisations.

Keywords: agricultural innovation systems; market engagement; smallholder farmers; Lao PDR; extension; farmer organisations.

Introduction

Situated in South East Asia, the Lao People's Democratic Republic (Lao PDR) is governed by a single-party socialist regime and has a population of 6.9 million at the time of writing (Central Intelligence Agency (CIA) 2016). In an emerging market-based liberal economy, private enterprise and foreign direct investments have significantly contributed to economic growth of over 7.8 per cent in the last five years, primarily through the rapid expansion of mining, hydropower and plantation investments (Government of Lao (MPI) 2015; Vongpraseuth and Choi 2015). The high economic growth is not evident in consumption patterns and although overall poverty continues to decline, nearly a quarter of the population continues to live in poverty (Lao Statistics Bureau 2014). Two thirds of the population lives on less than two dollars purchasing power parity (PPP) a day with all human development measures, still lagging behind most other countries in Asia (Belloni 2014).

Over two thirds of the population live in rural areas and engage in farming activities (Asia and Pacific Commission on Agriculture Statistics (APCAS) 2012). Hence, the agricultural sector remains crucial to the country's ongoing development as it is large both in terms of aggregate income, at 25 per cent of GDP (Lao Statistics Bureau 2015) and total labour force, with national figures indicating 70 per cent of the country's labour contributes to agricultural production (Government of Lao (MPI) 2015, 36). While the current five-year national Socio-Economic Development Plan indicates that self-

sufficiency in domestic food production of rice, crops, livestock, and fisheries has been achieved, further commercialisation within the sector is expected (MPI 2015). The focus is on commercial plantations of coffee, cassava, maize, tobacco, and sugarcane; namely, crops best suited to agro-processing for the export market (MPI 2015). The government indicates that future efforts will be to engage private sectors and investment to support agro-processing in order to increase export commodity sales.

In order to assess the viability of commercialisation of agricultural production, the authors have used the Agricultural Innovation Systems (AIS) framework to review interactions between actors, organisations, and institutions operating in the agricultural production sector (Basu and Leeuwis 2012; Spielman et al. 2009). Interactions are required for provision of services, establishment of communication channels, and improvement of overall connectivity for commercialisation processes. The Agricultural Innovation Systems (AIS) framework based on innovation systems concepts (Hall et al. 2006) is featured in the World Bank (WB) Report (2012) wherein they describe how the farmer is central to innovation and change, primarily influenced by actors supplying agricultural knowledge and providing technologies. Bridging or intermediary institutions can facilitate interactions between actors throughout the value chain. Government agricultural policies and informal institutions, attitudes, behaviour and practices may support or hinder the processes of innovation. The AIS concept has been previously operationalised empirically, with studies having been conducted at national, regional, sectoral and technological levels (Klerkx and Nettle 2013). Following the example provided by Lamprinopoulou et al. (2014), the research reported below provides a micro-level analysis of interactions of actors and institutions, and the capacity of selected villages to engage in innovation.

The research draws data and evidence from a project designed to assist the Department of Agricultural Extension and Cooperatives (DAEC) in Laos support the comprehensive services needed to realise the government's social and economic development goals. Several case studies are presented which detail provision of services by a range of actors from the public, private, and non-government sectors in Xiangkhoang and Bolikhamxai Provinces (northern and central Lao PDR, respectively).

The paper is structured in the following way. It beings by using the AIS framework to identify key actors, organisations and institutions within the system as well as articulating the interactions that enhance innovation and productivity in the Lao context. There follows a brief outline of the methodology used to collect data and construct six empirical case studies of differing production models that illustrate the transition from

subsistence to sustainable commercial production on the part of smallholder farmers. Key findings and patterns of interaction resulting from the AIS-informed case analysis is presented in Figure 2. By viewing the actors and organisations involved in embedding new practices, the framework reveals crucial factors associated with local innovation and identifies opportunities for improving service provision in support of commercialisation goals. The presentation of cases is followed by a discussion of findings and, finally, a conclusion.

Agricultural innovation system: Actors and institutions

The AIS has been conceived as public and private sectors involved in the creation, diffusion, adaptation, and use of all types of knowledge relevant to agricultural production and marketing (Hall et al. 2006). Lamprinopoulou et al. (2014) categorises innovation actors in terms of their domain of influence (research, enterprise, innovation or intermediate) and association with the supply chain. The research domain provides basic or applied research and codified knowledge (e.g., universities, research institutes, private R&D department, companies or NGOs). The enterprise domain involves supply chain actors reliant on codified and tacit knowledge (e.g., farmers, input suppliers, food manufacturers, retailers). Actors influencing innovation include: consumers, policymakers, social interest groups (e.g., charities and NGOs) and complementary markets (e.g., energy, pharmaceutical). Organisations catalysing actors and facilitating knowledge/innovation flows (e.g., education, extension services, and levy or trade industry boards, consulting services, innovation knowledge brokers) are also implicated (Lamprinopoulou et al. 2014).

The following section describes the actors, interactions, supporting infrastructure, extension and institutional forces influencing smallholder farmers' productivity in Lao PDR.

Smallholder Farmers

The range of farming practices in Lao PDR has been described in detail by APACS (2012). Often conducted on farms of less than two hectares, most smallholder farmers rely on livelihoods comprising subsistence production of rice and small-scale raising of livestock, generating income from cash crops and small-scale livestock rearing (Alexander et al. 2010). Non-timber forest products and off-farm labour may also be sources of income for many households. Agricultural production tends to be dispersed and not linked to processing industries and markets, especially in remote uplands or on populated plains. Geographic and social isolation in Lao PDR (ethnicity, language

diversity, economic striation, poor road and communications infrastructure) has, in the past, inhibited farmer access to information and knowledge exchange (Khumya and Kusakabe 2015).

Smallholder farmers face many institutional, policy, and social challenges when changing to commercial agricultural production. For example, low productivity can be a result of: (1) *practices* – small cultivation areas, limited use of machinery, geographic location, land and livestock ownership, irrigation use, limited fertiliser and pesticide application, unsustainable practices (degrading land productivity and eroding soil) (Manivong 2014); (2) *institutions and organisations* – lack of research and development, ineffective agricultural extension, few small and medium-sized enterprises, lack of service linkages, transport and rural infrastructure, poor access/connection to markets, limited access to credit, unfair terms of trade, and limited storage facilities (Manivong et al. 2015); (3) *attitudes* – ethnic preferences and practices (over 150 ethnic groups), gendered perceptions, mismatched labour skills, difficult working conditions and minimal compensation rates, inconsistent expectations of agriculture production for producers, buyers, and service providers, and migration alternatives (Molland 2010); and (4) *government policies* – property rights, land tenure, user rights, and land concessions (Kaegi 2015; MPI 2015). More recently, in response to insurmountable barriers and constraints to production, farmers have been diversifying livelihoods and embracing off-farm income options, with migrant workers' remittances becoming an increasingly significant contribution to rural incomes (Estudillo et al. 2013; Manivong et al. 2014).

Farmers' Organisations

Farmers' organisations are important bridging or intermediary institutions that can also facilitate interactions between actors throughout the value chain (WB 2012). In Lao PDR, farmer associations (non-profit) and farmer cooperatives (profit-sharing) are organisational groups enabled under new decrees, to improve business negotiation, capitalise on production coordination strategies and access resources and training. As farmer organisations are at an early stage of development there is a clear need for cooperation and collaboration between and among organisations.

A study by Folkard et al. (2011) found that farmer organisations have been shown to be effective in filling various roles, from accessing inputs provided by projects to organising coordinated production and joint marketing. However, nationally, there are to date few examples of effectively functioning farmer organisations (Castella and

Bouahom 2014). Farmer organisations working to coordinate members' activity with a market orientation tend to have the most stability and demonstrate potential for dynamic growth, particularly when bulking products for collective gains. Improved sales efficiency and added product value has benefited farmers, traders and buyers, so too should coordinated production, synchronised to market demand (Folkard et al. 2011).

Agricultural Extension Services

National research and extension and business development services facilitate interactions amongst actors throughout the value chain of: 'consumers, agro-processors, exporters, and producer organisations, input suppliers, standards agencies, land agencies and credit agencies' (World Bank 2012: 4). Lamprinopoulou et al. (2014) describes these innovation systems actors not necessarily involved in knowledge creation or usage, as playing a catalytic role in joining fragmented actors and further facilitating knowledge/ innovation flows.

The primary mechanism of support for smallholder farmers in Lao PDR has been government extension services provided under the auspices of the Ministry of Agriculture and Forestry's (MAF) Department of Agriculture Extension and Cooperatives (DAEC), and delivered by Provincial Agriculture Extension and Cooperatives Sections (PAECS) and District Agriculture and Forestry Offices (DAFO). Extension services rely on government funding with significant assistance from the private sector, international development agencies and Non-Government Organisations (NGOs). Lao extension services have largely focused on production issues such as, *inter alia*: improvements in crops and livestock production, training for farmer-led irrigation systems, integrated pest management and participatory natural resource management (Bartlett 2012).

In most countries, agricultural extension includes an array of public and private sector activities relating to technology transfer, education, attitude change, human resource development, and dissemination and collection of information. Aguilar-Gallegos et al. (2015), have defined the array as *technologies* – devices such as machines; inputs such as fertilisers and pesticides; practices concerning cultivation (planting, weeding); sale of produce (e.g., through traders, or direct sales on local markets) and purchase of inputs (e.g., from local stores, through contracts with agri-business). Understanding the strengths and weaknesses of the various actors, interactions and institutions delivering a pluralistic system of technology services allows for improved design of services and identification of support requirements (Feder et al. 2011).

Significantly, attention to the broader set of conditions and connections that enable sector-wide innovation and production improvements has been largely absent in Lao extension services (Bartlett 2012). Primarily, government agricultural officers in the field have been responsible for monitoring production statistics and relaying government production targets and quotas to farmers. Secondly, government field officers are expected to enforce market quotas and production restrictions to ensure government policies are enacted. In order to meet their own informational and production needs, farmers in the Lao PDR access a broad network of local and international non-government organisations (NGOs), informal networks, and private sector actors for useful technical assistance, financing, market facilitation, and organisational support (Jones et al. 2012).

Methodology

We conducted field research over of a period of 3 months in 2013 to investigate interactions between actors, organisations, and institutions operating in Xiangkhoang and Bolikhamxai provinces, where public, private and non-government providers were supporting innovative, market-orientated production. The two provinces situated in northern and central Laos, respectively, vary in terms of: access to markets; border effects and opportunities; range of production environments and systems (from lowland irrigated rice areas to upland rain-fed cultivation); and extension expertise. The main observed differences were geo-physical conditions, commodities produced, access to markets, available infrastructure, and extension staff skills. The villages selected in this study were primarily composed of the Lao Loum major ethnic group, who are more commonly exposed to new technologies and practices. Village selection was dependent on the uptake of innovative practices, where there had been a positive impact on farmers' livelihoods, a sustainable, viable marketable product, farmer collaboration, and involvement of extension services from private, public, and non-government organisations. Villages were then selected according to accessibility to larger markets and proximity to the provincial capital. The final sample was confirmed through negotiation with district and provincial officers.

Key informant interviews were conducted in villages with participants involved in extension interventions during field visits in the fall of 2013. This was followed by semi-structured focus group discussions and in-depth interviews with community leaders. Production and processing sites associated with farming activities were visited and farmers interviewed in regard to unique and improved aspects of their farming production models. Those interviewed were: (1) farmers who had received services, (2)

farmer leaders who organised farmers for activities and (3) service providers, whether district officers, private sector or non-government actors. Discussions centred on five specific topics: (1) service delivery steps, (2) the production model, (3) social/production/economic conditions, (4) general benefits, and (5) the impact of specific key services.

The interactions of actors and institutions supporting innovative practices have been highlighted within the research results compiled from visits to villages where rice crops, tobacco, chili and vegetables were produced. Villages accessed in this study are situated within the darkly shaded areas in Figure 1, representing the districts in Xiangkhoang and Bolikhamsai provinces and production details are presented in Table 1.

[Insert Figure 1 here]

Figure 1. Map of Lao PDR and Location of Northern Lao, Pek and Khoune Districts in Xiangkhoang Province and Central Lao, Paksane District in Bolikhamsai Province.
Map prepared by Michelle Esparon, James Cook University, Townsville, Australia, and reproduced with permission.

Table 1. Village Location, Commercial Product, and Production Issues

[Insert Table 1 here]

A detailed report by Jones et al. (2013) provides an in-depth account of the situational features; size of villages, ethnicity, general geography and collation of detailed qualitative research.

Findings

In the following section we describe the influence of the actors and institutions affecting the pathways to commercialisation in case study villages.

Commercial Rice Production

The Enhancing Milled Rice Production in Lao PDR project (EMRIP 2010-2011) involved SNV-Helvetas (NGOs), collaborating with the Ministry of Industry and Commerce, MAF, Laos Extension for Agriculture Project (LEAP) and DAEC. The project aimed to enable provincial and district offices to work with local millers to improve the quality and quantity of local rice paddy production, primarily through

provision of seed and chemical inputs. Delivery of services to farmer groups was coordinated by local millers who provided finance and directed field activities with assistance of private and public extension agents.

Rice millers intending to sell into higher value markets for 'A-grade rice' potentially for export sales require single variety rice, in large volumes and of consistent quality. EMRIP coached millers in strategies to work with farmers to obtain quality paddy rice supplies for their mills. Rice millers increased production support by: organising farmer production groups, outlining production requirements, providing seed for the preferred rice variety, providing inputs on credit for repayment 'in-kind', and offering purchase guarantees for a portion of the rice crop at near-market price values. This arrangement allowed farmers to cover input costs, repay credit and afford management fees. Millers' purchased paddy rice to meet their market orders which dictated their purchase commitments, though they could not provide purchase guarantees for all rice produced. Rice millers purchased sufficient rice from farmers to recover the input costs. Farmers were able to sell rice to other buyers, though the sponsoring mill could request 'right of first refusal' matched to commercial prices and farmers could sell when and if higher prices were available.

In the 2012 growing season over 110 households in two villages planted 50 hectares of paddy with improved rice varieties, representing a 50 per cent increase in the use of improved varieties. Farmers with access to credit and improved seeds increased yields by 20 per cent and increased overall incomes, with only modest increases in expenses for inputs (seed and, chemical fertiliser). Farmers secured advanced sales at guaranteed higher prices than for the mixed variety paddy commonly grown. Millers benefited by securing a more dependable supply of a higher-quality product which they were able to mill and sell into a consistent quality-controlled market.

Commercial Tobacco Production

The Lao Tobacco Company Ltd. is a commercial partnership between the Lao government and the Imperial Tobacco Company which contracts famers to supply tobacco for Lao-based processing. Lowly graded tobacco, not meeting international quality standards is designated for local sale, while higher quality tobacco is reserved for export. Since 2001, the company has organised farmers into production groups and hired labour, provided technical instruction, offered access to credit for production and assured a purchase guarantee (contract) for the farmers who agree to follow standard production practices and sell a minimum quota to the company. The company proved a

consistent partner, renewing contracts with slightly increased prices each successive year of production.

Farmer organisations played a key role in the entire process: collecting production area plans and input estimates so the company could efficiently provide credit for seed, fertiliser, and pesticides. Organisation leaders led farmers through procedures to ensure production and fulfilment of quotas by all members. Surplus production was sold to other farmers unable to produce their quotas or sold on the open market.

In 2013, 32 households produced tobacco on a total of 29 hectares during the dry season. Tobacco production is labour intensive and most families approached the agriculture promotion bank for loans to pay the hired labour used to supplement family labour. Farmers aspired to a potentially significant income from tobacco production despite increased risks accorded from loans of 615 USD for kilns and ongoing production costs of 1,840 USD. Even with market fluctuations, tobacco production has substantially improved households' livelihoods over the last decade. Net household income from tobacco production can be as high as 2,760 USD per annum.

Yet more recently, 50 per cent of farmers in the study village have stopped production, citing excessive labour demands of their time. While expressing satisfaction with their accumulated wealth and economic position, farmers preferred to replace tobacco with less demanding and risky ventures, such as, vegetable and livestock production. Perhaps contradicting the farmers' explanation, company representatives explained that they had levied fines on farmer groups for elevated levels of chemical residues from prohibited pesticides (rendering the tobacco unmarketable internationally) and they suspected that farmers were protesting the fines by withdrawing from production.

Regardless, tobacco production was clearly well supported by company extension services. The company hired capable technicians to teach and oversee all aspects of production, from preparation of soil and use of chemicals, through to harvest and drying. The company guaranteed purchase of product (as long as standards were adhered to), supported farmer group collaboration and worked extensively with group leaders. This comprehensive approach has increased farmer participation, at least in the short term. However, the discontinuation of tobacco production by significant numbers of farmers highlights the occurrence of adoption and dis-adoption within farming system production and the implications of enforcement of quality control measures when entering international markets.

Lao Tobacco production clearly offers effective, comprehensive and pluralistic services. The package of services intentionally includes technical, organisational, and market engagement with support from the company and government agencies.

Commercial Chili Pepper Production

DAFO officers, collaborating with the SDC-funded SADU project facilitated farmers in market analysis and production planning using the Agro-Enterprise Development Approach (AEDP). From 2008, 78 households began commercial production on an area of 16 hectares. Farmers took advantage of unique local production conditions and increased chili pepper production to commercial quantities during the rainy season when the rest of the country experiences a shortage of fresh peppers. Farmers successfully engaged independent traders who sold the produce into the national market at premium prices. They successfully engaged independent traders and sold over 18,000 USD of chili peppers in 2012. One family reportedly sold their chili crop for over 2,000 USD.

Farmers were self-motivated and formed their own production and marketing plans with farmers in several villages, significantly increasing production of chili pepper and attracting market traders from the national capital. Group unity, collaboration, cost and technical innovation was minimal, yet farmers benefited from simple methods of group coordination and joint marketing. Farmers coordinated harvest rotation among members, ensuring a steady supply of chili peppers for trade with independent farmers harvesting their product on agreed days. There were no reported peer monitoring/policing or even joint negotiations of sales. As a low input production model, using acceptable levels of family labour, saved seed (local variety), limited fertiliser, and inexpensive pesticides, there is minimal financial risk to the farmer. Over time, as more growers have entered the market, prices have dropped, though chili pepper production continues and is regarded as a sustained and profitable activity.

The key service provision for chilli pepper production was the DAFO facilitating farmers to undertake an analysis of the national market. The DAFO officers helped farmer representatives investigate the key issues of quantity, quality, timing, and pricing for market demand. Farmers discovered their own production advantage in that they could time production to coincide with national peak pricing and thus respond with increased production. The government played the key role of connecting the actors within the value chain to allow local actors to innovate to a new, sustainable production system.

Organic Vegetable Production

The Sustainable Agriculture and Environmental Development Association (SAEDA), an NGO, partnered with government agricultural officers in two districts. Established in 2001, the partnership promoted sustainable organic, low-input production technologies. Farmers' groups (mostly women) in five villages organised to produce six or more specific varieties of organic vegetables for the dedicated local market. Organic vegetable production is not as labour intensive as rice or crop production, and with few production expenses (seeds cost 12USD/season) production was profitable, and used to supplement family incomes throughout the year. In this study, 50 households produced vegetables on approximately 3 hectares of land.

Farmer groups have benefited from support and successfully launched an internal control system to apply Lao organic standards and monitor production, enforcing regulations more stringently than could an external monitoring agency. Organic vegetables are sold by each farmer directly to consumers at a twice-weekly organic farmers' market and some members report high monthly incomes. SAEDA sourced funds for a temporary market structure and the district government organised free space at the local permanent market. In addition to local radio promotion, local sales assisted organic producers in building product identity and to respond to consistent local market demand.

The partnership between SAEDA and government officers has ensured successful support by linking technical guidance with consistent production follow-up. SAEDA also managed to link local farmer group members to neighbouring countries through exchange visits and sourced long-term expert technical assistance. The farmer organisation levied fees for market sales and established a revolving loan fund to benefit members.

Nonetheless, there remain several substantial constraints to this model. Firstly, members are limited by the local demand for organic vegetables; expanding membership and production could overwhelm the market, undermining the premium prices members currently realise. Secondly, meeting demand through direct farmer-to-consumer sales precludes more efficient joint sale and entry into distant, larger markets. Finally, the system requires each member to produce a rotational mix of vegetables that is beneficial for soil and pest control, thereby restricting production.

Organic vegetable production illustrates the combination of service providers (international funders, local government, and an intermediary national NGO) who teamed up to provide a comprehensive set of services: production technology, market

engagement, and organisational development. This combination of services created a self-reinforcing set of incentives for innovation and sustainability. While production and sales are limited, strong links between actors within the innovation system may resolve current limitations. Realising sales into distant markets would require expanding the innovation network to include traders (or other actors who can access the markets such as a national farmers' network); this in turn, requires new mechanisms for collaboration, and exchanges, to enhance successful local networks fostered by this intervention.

Commercial Vegetable Production

Commencing in 2008, over 150 households by 2013 in four villages produce over 4 tons of vegetables during the wet season. Vegetables are exported daily to markets in the national capital. Annual production expenses can amount to 40 USD, with monthly sales of vegetables sold for over 245 USD. Commercial vegetable production began with incidental farmer-to-farmer technical exchange. Local DAFO supported by the SADU project, facilitated farmer analysis of market opportunities and constraints (as for chili production). Marketing their produce in informal groups, farmers provided dependable points of contact, coordinated production to meet expected market demand and, eventually, negotiated more advantageous prices for all members. Traders benefited from consistent and efficient supply. With access to information and sharing networks, farmers adjusted production to market fluctuations (vegetable varieties and quantities) and demand of traders.

Farmer groups in each village then formed farmer cooperatives (voluntary membership and nominal fees), to provide additional capacity when borrowing capital, financing farm activities, representing farmer concerns and engaging in value-adding or other trading activities. Traders paid a modest fee to the cooperatives for coordination services. Cooperatives have successfully benefited members by coordinating production to ensure meeting, but not exceeding daily demand, negotiating better terms of trade, ensuring reliable access to markets and relaying market information to allow more targeted production.

Farmers used low levels of inputs, moderating chemical fertilisers with organic compost and reportedly used pesticides only to control outbreaks. Vegetable production required non-intensive but frequent labour inputs However, insufficient water and fluctuating prices were barriers to production during the dry season.

Commercial vegetable production provides another example where DAFO have played an effective facilitating role, connecting actors within the value chain, enhancing the productivity and effectiveness of the entire chain. They not only assisted farmers to identify market opportunities for increased production, they also developed a collaborative farmer group to coordinate production and market interactions. This enabled farmers to communally sell their product, coordinated by one person responsible for gathering and disseminating information about market demand, prices, and timing). This arrangement also presented a more efficient trading opportunity to traders and, assisted by DAFO, farmers could therefore attract the interest and commitment of buyers, as well as gaining higher prices.

A simple communal value chain provides transaction efficiencies assumed by larger producers and has allowed smallholder farmers to become more competitive in the market place with commercial firms. The DAFO supported establishment and improvements in connectivity by building the capacity of the farmers to collaborate among themselves and their approach to the market.

Specialised Rice Variety

Community leaders undertook various efforts to improve production and marketing of specialised glutinous rice varieties known as ‘small chicken rice’ (*khao gai noi*). They worked to secure advanced purchase orders and contracts, introduced quality and variety controls, and encouraged organic technologies. As an informal association, members were free to participate in association activities, to sell through the association or privately. The association began in 2006, and worked with 180 households in 52 villages with production of over 750 hectares of specialised rice.

Traditionally, village families receive a significant source of income through the household production of *phö* noodles prepared, mainly by women, from glutinous rice and sold into a regional trading network. In addition, Lao Farmer Products, the primary buyer, has promoted the niche-market ‘small chicken rice’, providing a new production and market opportunity for farmers. Village leaders’ secured contracts for several hundred tons of village members’ specialised rice crops.

Difficulties arose as contracts were not consistently offered to farmers, and farmers were not regularly producing for the association. Organic standards were neither well defined nor monitored. Members were not constrained to sell through the association, though group leadership preferred to set the price and quality parameters. Generally, the organisation operated in a top-down fashion, and failed to attract commitment from

members for strong joint action. The group's informality and lack of systematic extension support made it difficult to coordinate production or better manage market transactions. The niche-market and high demand for 'small chicken rice' offered potential advantage to farmers, yet their current organisational structure and technical and marketing capacities limited access to additional markets. Producing a specialised grain with good market opportunities requires effective organisation and a collaborative approach with extension support linking the value chain actors.

The case studies provide examples of sectors in which interaction between actors fostered innovation, but can also highlight paucity of interaction that prevents innovation. Table 2 has been adapted from Hall et al. (2006:50) to compare the main interactions occurring in the examples of agricultural commercialisation.

Table 2 Comparison of Commercialised Products and the Main Interactions

[Insert Table 2 here]

The patterns of interaction outlined in Table 2 illustrate and confirm AIS theoretical propositions regarding the importance of the specificity of the technology transfer, the linkages between actors in the public and private sectors, the market segment and productivity barriers with respect to the relative success of agricultural innovation. Of the factors identified in our case studies, the most important enablers of commercial production and adoption of innovative technologies were technical and financial assistance, access to markets and the formation of healthy functioning farmer associations/organisations.

Discussion of Agricultural Innovation Systems

To examine functional and structural aspects of commercialising agricultural production we have used the concept of Agricultural Innovation Systems (Hall et al. 2006; World Bank 2012; Lamprinopoulou et al. 2014). We have detailed examples of the application of technologies and services provided to smallholder farmers by a range of actors from public, private, and non-government sectors and interactions occurring between actors in the supply chain. Viewing the research at the micro-level reveals the importance of: interactions, institutions, infrastructure, markets and capabilities, and when absent or poorly functioning, how these factors fail to support innovation and agricultural change (Lamprinopoulou et al. 2014). In the AIS framework the farmer is positioned as a change agent surrounded by actors and institutions that facilitate exchanges and service provision, and promote commercialisation opportunities. This approach

highlights whether existing frameworks and the current services adequately support smallholder farmers in transitioning to commercially-oriented production.

Commercialisation of products linked to international markets

Interrogation of the AIS production models identified *complex structures when upscaling into international markets.* Two examples of commercialised production for sales into national and international markets were described: commercial rice and commercial tobacco. Public-private collaboration was evident with a complex array of services, pluralistic service providers and institutions involved including: Lao government involvement, farmer organisations, NGOs, DAFOs, agro-processors (rice mills and tobacco factories), input suppliers, exporters, standards agencies, and credit involved. Consistent markets were available for produce, though surpluses were difficult to sell, over and above contracted volumes and purchase guarantees.

In the example of commercial rice production the millers were closely connected to farmers and interacted with local DAFO, government agricultural companies, local banks and hence were responsible for pluralistic service provision in this more complex model. Local millers hired and trained DAFO officers to deliver technical training. Some millers accessed seed from government seed producers, and the varieties produced were those approved by the government. Millers accessed finance from local banks, and sought to secure markets for their product. They replicated the set of services that a wide range of providers might otherwise be needed for farmers: access to inputs on credit, production technology and practices, market demand, and even establishing basic production groups to monitor production progress, organise input needs, and coordinate product procurement.

Tobacco production provided an example of provision of a comprehensive range of services necessary to initiate and sustain production of a new technology. The company provided technical support to every aspect of production, processing, and sorting, ensuring production to international standards. They supported group function and coordination by designing production group rules and roles. They provided quality control measures, by contracting supplies of high quality produce and selling into international markets. The company provided access to inputs of seeds and chemicals and facilitated access to credit through local banks.

The ongoing issue for tobacco production was largely due to standards of quality control of pesticides, which farmers had attempted to circumvent. Ongoing pluralistic service provision (training, information on application rates, quality control measures

etc.) will be required to ensure adherence to the production model. To profit from this enterprise, farmers were expected to engage in intensive farming practices, take more risks, plan activities, access credit and deal with market uncertainties. Equity issues arise, as risk adverse, poorer farmers may not be able to join in production.

Commercialisation of products linked to national markets

Interrogation of the AIS production models identified *simple structures underpinning successful upscaling of familiar products traded into national markets*. For example, commercial chili pepper production provided a very simple commercialisation model. Increasing supply of chili peppers, a previously grown, familiar product could simply and easily be accomplished through cooperative production stimulated by a lucrative off-season national market. The key intervention by DAFO was to help smallholder farmers identify the opportunity and then link them with traders who could sell into the national markets. With few additional costs or technologies, production up-scaling of chili was possible after market analysis and planning was conducted and supported by extension services.

Similarly, specialised rice production provides an example of up-scaling production of a familiar but specialised niche-market quality product, into a national market. The farmer association negotiated sales with a reliable buyer and ensured successful trade outcomes, though attention to product quality was required. Production could be further enhanced by better functioning, coordinated groups, a greater understanding of potential markets, and improved production geared to market demands.

Commercialised vegetable production was enabled by successfully forging links between functional farmer groups/associations and national markets, supported by DAFO and NGO-assisted improvements in productivity and support with market analysis and planning. Coordinated production provided traders with a consistent, dependable supply of vegetables.

Commercialisation of products linked to local markets

Production of organic vegetables sold to the local market was possible through farmer organisations linkages to NGOs and DAFOs trained in production and marketing arrangements. Local markets were sufficient to manage supply and demand for products, though in the longer-term they may be a limiting factor to allowing new entrants and absorbing any increases in production. Significant challenges remain in

up-scaling productivity for other potential markets, including market access and applying and monitoring quality control systems.

Adoption of new technologies

Technical learning is fundamental to adopting commercialisation activities, and appeared to be improved through formal training delivered by outside public/private trainers to groups of farmers. In addition, formation of *farmer organisations* can have additional benefits, though group formation does not, in itself, constitute a sufficient condition for success. Other factors that need to be present include: effective group functioning, a suitable supply chain and presence of a market for the end goods. Market engagement appears to be critical to improved production models, though other factors such as demand, locality of market, product quality and regulatory issues still influence outcomes. When farmers were considering substantial production investments they responded positively when the contracts on offer included guaranteed purchase prices and when credit was embedded in the production model.

Conclusion

The agricultural sector accounts for approximately three quarters of Lao PDR's labour. Ongoing efforts in the agricultural sector are required to lift people out of poverty and bring them broadly in line in terms of material well-being with their urban counterparts. Increasing agricultural productivity to meet export aspirations and the commensurate improvement to rural livelihoods is a key policy priority of the Government of Lao. Using the AIS framework we have identified some of the key elements that need to be managed in order for the policy to succeed. These include a virtuous blend of: pluralistic services, technical and financial assistance, the formation of functioning farmer associations/organisations, and enhancements to productivity and innovation that result when robust linkages between farmer groups and local, national or international markets are established. With these enablers in place, a comprehensive set of services provided by a variety of actors has the best chance of successfully supporting smallholder farmers as they transition into commercial farming. Conventional agricultural extension services, concentrating on dissemination of technologies provided almost exclusively by government actors, *are inadequate to the task of supporting smallholder farmers in transitioning to a modern, commercial agriculture sector*. Recent restructuring of public sector government extension service provision have focussed on offering more comprehensive services, such as, support for farmer organisations and market engagement, to complement the 'technical advice'

model (Case et al. forthcoming). This focus is clearly supported by the AIS analysis of the production models, though in addition, private services, NGO's and supply chain linkages are required for holistic support.

In order to meet market demand, several key factors play a significant role: public and private agricultural extension systems, financial support, agricultural policies, and capacity development as well as functional farmer organisations. Of prime importance is support for farmers to sell produce into local or national markets. For example, DAFOs linked farmers to traders in chili pepper production and farmer associations negotiated sales for specialised rice. Where production models exhibited service provision directed at assisting farmers better assess market opportunities, farmer interest was high and sustained, producing the most obvious increases in production and value for farmers. Although not without challenges – e.g., the attraction of relatively low-risk off-farm incomes - with the support of effective pluralistic services, smallholder farmers may continue to move from subsistence to commercial production in line with government expectations of expanded agricultural production.

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REFERENCES

Aguilar-Gallegos, N. M. Muñoz-Rodríguez, H. Santoyo-Cortés, J. Aguilar-Ávila and L. Klerkx. 2015. "Information networks that generate economic value: A study on clusters of adopters of new or improved technologies and practices among oil palm growers in Mexico". *Agricultural Systems* 135: 122–132.

Alexander, K.S., J. Miller and N. Lipscombe. 2010. "Sustainable Development in the Uplands of Lao PDR". *Sustainable Development* 18: 62–70.

Asia and Pacific Commission on Agricultural Statistics (APCAS). 2012. "Asia and Pacific Commission on Agricultural Statistics", Twenty-fourth Session, Da Lat, Viet Nam, 8–12 October 2012 Agenda Item 7, Lao PDR – Agriculture Census. Accessed December 31. 2014. www.fao.org/fileadmin/templates/ess/ess_test_folder/Workshops_Events/APCAS_24/Paper_after/APCAS-12-11_-_Lao_PDR_Census_01.pdf

Bartlett, A. 2012. “Dynamics of food security in the uplands of Laos: A summary of 10 years of research”. Northern Uplands Development Programme (NUDP) and National Agriculture and Forestry Research Institute (NAFRI).Vientiane, Laos.

Basu, S. and C. Leeuwis. 2012. “Understanding the rapid spread of System of Rice Intensification (SRI) in Andhra Pradesh: Exploring the building of support networks and media representation”. *Agricultural Systems* 111: 34–44.

Belloni, R. 2014. “Building civil society in Lao PDR: the Decree on Associations”. *Development in Practice* 24(3): 353-365.

Case, P., J. Connell and M. Jones. Forthcoming. “The language of leadership in Laos”. *Leadership*.

Castella, J. C. and B. Bouahom. 2014. “Farmer cooperatives are the missing link to meet market demands in Laos”. *Development in Practice* 24(2): 185–198.

Central Intelligence Agency (CIA). 2015. ‘The World Factbook East & SouthEast Asia: Laos’. https://www.cia.gov/library/publications/the-world-factbook/geos/la.html (accessed 5 August 2016)

Estudillo, J. P., Y. Mano and S. Seng-Arloun. 2013. “Job Choice of Three Generations in Rural Laos”. *The Journal of Development Studies* 49: 991–1009.

Folkard, A., B. Virvong, J.G. Connell, and V. Photakhoun. 2011. “Farmer Organisations: Opportunities, Constraints and Pathways for Development”. Report for the Sub Working Group on Farmers and Agribusiness (SWGAB). Vientiane, Lao PDR. Accessed May 18, 2015. www.swgard.maf.gov.la/sub-sector-working-groups/sub-sector-working-group-agribusiness/

Hall, A., W. Janssen, E. Pehu and R. Rajalahti. 2006. “Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems”. The International Bank for Reconstruction and Development / The World Bank, Washington DC. Accessed August 15, 2015. www.siteresources.worldbank.org/INTARD/Resources/Enhancing_Ag_Innovation.pdf

Jones, M.; P. Case and J. Connell. 2013. “Lao PDR Agricultural Extension Interventions: A Selective Assessment of Best Practice Cases”. ACIAR, Canberra, ACT: (ACIAR Project no. ASEM/2011/009). Accessed May 18, 2015. www.aciar.gov.au/files/asem-2011-009_final_report.pdf

Jones, M., K. Phommathath and S. Namvong. 2012. “Non-state actors in agriculture extension: farmers accessing services in Lao PDR”. Report for the Sub Sector Working Group on Farmers and Agribusiness (SSWGAB). Accessed October 19, 2015. www.laofab.org/document/view/2145

Kaegi, S. 2015. “Capitalisation of Experiences: Laos Extension for Agriculture Project (LEAP) Laos: 2001–2014. A study in the frame of an experience capitalisation in five SDC financed rural advisory services programmes in Asian countries”. Swiss Agency for Development and Cooperation (SDC). Global Programme Food Security. Federal Department of Foreign Affairs, FDFA. Accessed October 1, 2015. www.shareweb.ch/site/Agriculture-and-Food Security/focusareas/Documents/ras_capex_laos.pdf

Khumya, T. and K. Kusakabe. 2015. “Road development, and changes in livelihood and mobility in Savannakhet, Lao PDR”. *Development in Practice* 25(7): 1011–1024.

Klerkx, L. and R. Nettle. 2013. “Achievements and challenges of innovation coproduction support initiatives in the Australian and Dutch dairy sectors: a comparative study”. *Food Policy* 40: 74–89.

Lamprinopoulou, C., A. Renwick, L. Klerkx, F. Hermans and D. Roep. 2014. “Application of an integrated systemic framework for analysing agricultural innovation systems and informing innovation policies: Comparing the Dutch and Scottish agrifood sectors”. *Agricultural Systems* 129: 40–54.

Lao Statistics Bureau. 2015. “GDP”. Accessed October 19, 2015. www.nsc.gov.la/en/GDP2.php

Lao Statistics Bureau. 2014. “Lao expenditure and consumption survey 2012/13”. Accessed October 19, 2015. http://www.lsb.gov.la/en/%E0%BA%81%E0%BA%B2%E0%BA%99%E0%BA%AA%E0%BA%B3%E0%BA%AB%E0%BA%BC%E0%BA%A7%E0%BA%94%E0%BB%81%E0%BA%9A%E0%BA%9A%E0%BA%95%E0%BA%BB%E0%BA%A7%E0%BB%81%E0%BA%97%E0%BA%99/LECS%20I-V/LECS%205/luanching%20LECSV%20on%209.5.2014%20_%20Eng%20version%20%20for%20printing.pdf

Manivong, V. 2014. “Agrarian Transition in Lowland Southern Laos: Implications for Rural Livelihoods”. (PhD), University of Queensland, Queensland.

Manivong, V., R. Cramb and J. Newby. 2014. “Rice and Remittances: Crop Intensification Versus Labour Migration in Southern Laos”. *Human Ecology* 42(3): 367–379.

Manivong, V., P. Souvannavong, K. Souliyavongsa, P. Ouansamone, K. Sengphaxaiyalath and P. Ingxay. 2016. “Rice Value Chain Finance in Lao PDR”. Report prepared by the National Agriculture and Forestry Research Institute, Vientiane, Lao PDR.

Ministry of Planning and Investment. 2015. “Five Year National Socio-Economic Development Plan III (2016–2020) (8th NSEDP)”. 25 February 2015 5th Draft, Translation edit 01.Vientiane Capital, Lao PDR.

Molland, S., 2010. “The Perfect Business: Human Trafficking and Lao – Thai Cross-Border Migration”. *Development and Change* 41(5): 831–855.

Spielman, D. J., J. Ekboirand and K. Davis. 2009. “The art and science of innovation systems inquiry: Applications to Sub-Saharan African agriculture”. *Technology in Society* 31: 399–405.

Vongpraseuth, T. and C.G. Choi. 2015. “Globalisation, Foreign Direct Investment, and Urban Growth Management: Policies and conflicts in Vientiane, Laos”. *Land Use Policy* 42: 790–799.

World Bank. 2012. “Agricultural Innovations Systems – An Investment Source Book”. Washington D.C.: The World Bank.

World Bank Group. 2014. “Lao Development Report 2014. Expending productive employment for broad-based growth”. Accessed October 20, 2015. http://www.worldbank.org/en/country/lao/publication/lao-pdr-development-report-2014

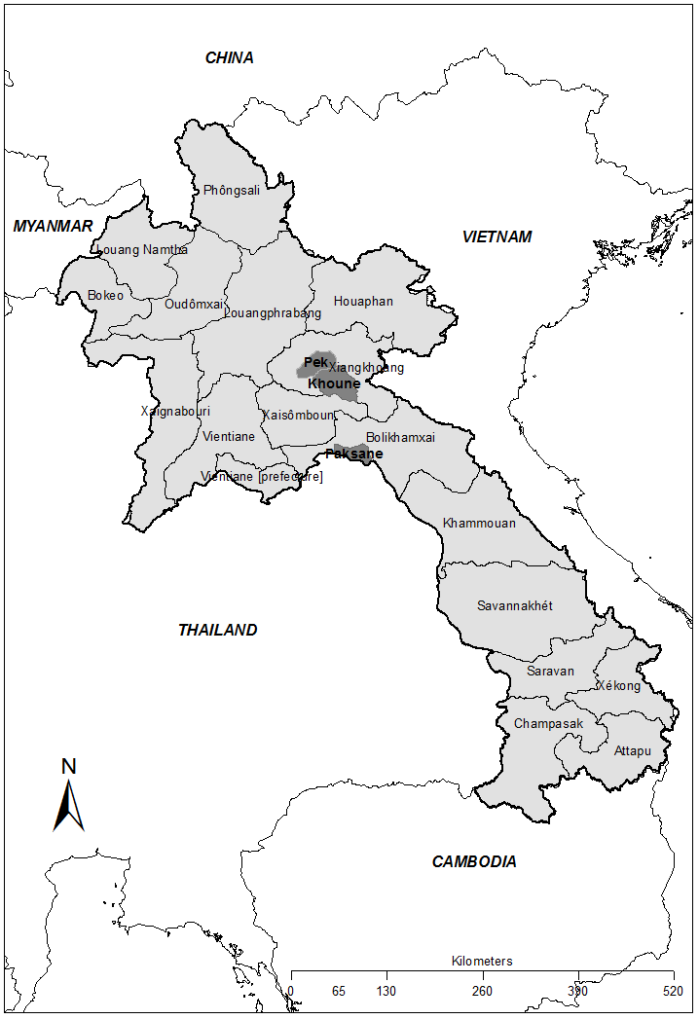

Figure 1. Map of Lao PDR and Location of Northern Lao, Pek and Khoune Districts in Xiangkhoang Province and Central Lao, Paksane District in Bolikhamsai Province. Map prepared by Michelle Esparon, James Cook University, Townsville, Australia, and reproduced with permission.

Table 1. Village Location, Commercial Product, and Production Issues

Location and year of initial production	**Commercial Product**	**Production issues**
Thongwanh village, Paksane District, Bolikhamsai Province (2010)	Rice	Improved rice varieties Post-harvest handling Fertiliser use
Pbak Beung and Hat Sai Khun villages, Paksane District, Bolikhamsai Province (2001)	Tobacco	Production Post-harvest packaging
Ban Pan village, Pek District, Xiangkhouang Province (2007**)**	Chili	Coordinated production and marketing
Ban Tuern village, Pek District, Xiangkhouang Province (2009)	Organic vegetables	Organic production methods
Ban Houy village, Khoune, District, Xiangkhouang Province (2008)	Vegetables	Coordinated market production
Na Ou village, Khoune District , Xiangkhouang Province (2006)	Specialised rice variety	'Small Chicken' niche-market rice production

Table 2 Comparison of Commercialised Products and the Main Interactions

Product	Main interactions
Commercial rice production	**Technology transfer:** Private company provided inputs, credit, technical support, purchase agreements. **Multi-actor interaction:** Private – public sector partnerships: NGO (SNV-HELVETAS) , Government Ministry of Industry and Commerce, Ministry of Agriculture and Forestry, Laos Extension for Agriculture Project (LEAP), Department of Agricultural Extension and Cooperative (DAEC). **Multi-actor interaction:** Farmer-to-farmer: farmer production groups receive extension training from company trained District Agriculture and Forestry Officers (DAFO). **Market segment:** Contracts for national and international markets, well-developed value chain. **Productivity barriers:** Mills capacity to absorb increased production. **Enabling innovation:** Technical and financial assistance, farmer associations, contract sales.
Tobacco	**Technology transfer:** Jointly-owned company provided inputs, technical information (soil, chemical, harvest, drying), access to credit/loans (seeds, fertiliser, and pesticides), organised farmer groups, provided purchase contracts, set quotas, and quality control (fines for illegal pesticide use). **Multi-actor interaction:** Private – public sector partnerships: Lao Tobacco/Government joint ownership. **Multi-actor interaction:** Lao Agricultural Promotion Bank provides credit. **Multi-actor interaction:** Company-trained technicians provide extension to farmer production groups. **Missing interactions:** Farmer knowledge of quality control. **Market segment:** Contracts for national and international markets, well-developed value chain. **Productivity barriers:** Quality control for products into international markets. **Enabling innovation:** Technical and financial assistance, contract sales.
Chili	**Technology transfer:** NGO/development project/state provided technical and marketing support. **Multi-actor interaction:** Public sector partnerships: Swiss Development Corporation (SDC), International Center for Tropical Agriculture (CIAT), Small-scale Agro enterprise Development in the Uplands project (SADU), DAFO. **Multi-actor interaction:** SADU trained DAFO for market analysis and production planning with farmers- quantity, quality, timing, and pricing for market demand. **Multi-actor interaction:** Farmer-to-farmer: cooperation and coordination of harvests. **Multi-actor interaction:** Farmer to traders: meeting national demand. **Missing interactions:** Private – public sector partnerships. **Market segment:** Trader sales into national markets, well-developed value chain. **Productivity barriers:** Scaling up for increased market share. **Enabling innovation:** Familiarity with product, farmer associations,

	support in market analysis and production planning.
Organic vegetables	**Technology transfer:** NGO/state organised farmer associations, provided market and production advice. **Multi-actor interaction:** Public sector partnerships-Sustainable Agriculture and Environment Development Association (SAEDA) and local government DAFO provided a comprehensive set of services. **Multi-actor interaction:** Farmer-to-farmer: farmer organisation (mostly women) levied funds and established a revolving fund for credit. **Missing interactions:** Private – public sector partnerships, traders, upscaling into national markets. **Market segment:** local markets, under-developed value chain. **Productivity barriers:** limited by the local demand, production restrictions, inability to upscale into larger markets, maintaining quality control of niche-product. **Enabling innovation:** Technical production advice and farmer associations.
Commercial Vegetables	**Technology transfer:** Development project/state assisted farmer group development, providing technical and marketing support and access to credit. **Multi-actor interaction:** Public sector partnerships: International Center for Tropical Agriculture (CIAT), Small-scale Agro enterprise Development in the Uplands project (SADU), DAFO. **Multi-actor interaction:** Farmer-to-farmer: farmer groups coordinated production, loans and sales as a communal value chain, providing more efficient trading opportunity for traders. **Missing interactions:** Private – public sector partnerships. **Market segment:** local into national markets. **Productivity barriers:** insufficient water, fluctuating prices, inability to upscale to greater market demands, value returns for labour productivity. **Enabling innovation:** Technical and financial assistance.
Specialised rice variety	**Technology transfer:** NGO supports farmer association and market access, collaboration with local government. **Multi-actor interaction:** Lao Farmer Products public enterprise partnership with farmer association promoted niche-market national rice sales, formalising production, branding, quality control, with organic production methods preferred. **Market segment:** farmers produce into national markets assisted by private-public enterprise **Productivity barriers:** difficulties in honouring contracts, lack of organic quality control, informality of farmers association, lack of extension support, current organisational structure, and technical and marketing capacities limits access to additional markets. **Enabling innovation:** Continued support in product branding and sourcing markets.