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GLOBAL REVIEW OF EXTENSION APPROACHES AND MODELS

Best Practices

LRD, the Pacific Community

INTERNATIONAL EXAMPLES OF GOOD EXTENSION PRACTICE

Pacific Islands Extension Strategy Consultancy Report to SPC

1. Summary:

The purpose of this report is to identify strengths, weaknesses and best practice from international experiences with extension. Extension service provision has shifted from 'push' based approaches, where research is shared through government extension officers, to 'pull' based approaches where extension is based on farmer needs, to 'innovation systems' approaches where groups (including farmer groups and co-operatives) are formed as intermediaries between farmers, market suppliers and buyers, extension workers and researchers. Experiences with these approaches have been mixed, working well in some countries and poorly in others. The most promising approaches appear to be those involving farmer groups and where the role of government agents is more advisory, facilitating opportunities at the local scale by co-ordinating networks between researchers, technical experts and markets, and providing regional co-ordination and records of farmer needs and matching these with research activity.

2. Purpose and scope

This report was prepared as part of the Pacific Islands Extension Consultancy for SPC, as part of the Pacific Agriculture Policy Project. The specific consultancy aims are to:

1. Evaluate AAS (Agricultural Advisory Service) and Rural Advisory Service in the Pacific Island Countries and Territories, and identify priority challenges and capacity strengthening needs that can be supported through regional intervention
2. Identify best practices and AAS models suited to different contexts and needs
3. Develop a regional extension strategy

This report focusses on extension practices beyond the Pacific region, identifying strengths, weaknesses and best practices. In conjunction with the report *Pacific examples of good extension practice* the analyses will be used to inform development of a Pacific Islands Regional Extension Strategy.

3. Methods

To develop this report, we reviewed:

- international strategies and project reports, using the key search terms 'extension', 'agriculture', 'market' and regional terms including 'Asia', 'Latin America' and 'Africa'; and
- major development programs managed or funded by GFRAS, FAO, IFAD, IFPRI, ACIAR, CIRAD and others.

We limit our review to 2005-, covering major developments since the last major Pacific Extension Summit. Our review is also supplemented by reviews of research by leading extension academics, and our own international experiences.

4. Analysis and key lessons

Two approaches to extension have been dominant: (1) linear 'push' based approaches to extension (researchers sharing with extension agents who then share with farmers); and (2) 'pull' based approaches to agricultural development, where farmer needs drive extension and research. A third approach type 'innovation platforms' has become fashionable in the past 10 years. Innovation platforms recognise the

role of social networks in generating increased productivity through access to knowledge, markets, technology and training. A summary of the three approaches is provided in Table 1.

Table 1: A summary of extension approaches and methods referred to in this report.

	'Push' based approaches	'Pull' based approaches	'Innovation' based approaches
Assumptions	Early adopters will create market competition that results in broad technology adoption	Farmers need to be able to understand how technology will work in their context before adoption	Develop networks and create new institutions that address value chains
Needs identification	Researchers identify how production could be improved	Farmer based needs analysis	Farmers, trainers, market organisations, researchers, extension agents
Locus and role of extension agent	Information provider and educator	Facilitator and educator	Knowledge, network, systems and enterprise broker and convenor
Tools/Techniques	Supply chain analysis, field trials, train the trainer, train and visit	Participatory needs analysis / PRA Farmer field schools Participatory research – farmer led experiments Farmer to farmer and group learning processes	Farmer groups and or co-operatives Group learning processes
Limitations	Assumes relevance of technology to farmers and ignores contextual barriers to uptake	Ineffective on its own as farmers have insufficient power to challenge institutional norms that influence value-adding opportunities	Often focusses on early adopters who may narrow conversation scope to avoid losing competitive edge; Fails to address expectations of passive receipt of information

The shift in these models has been complemented by a shift from government based to pluralist extension service provision, where governments, input suppliers, exporters, NGOs, farmer organisations, and co-operatives are engaged in extension provision. Feder (2011) demonstrates multiple ways in which the public and private sectors can work together to deliver extension, as outlined in Table 2 (grey shading highlights the traditional approach).

Table 2: Different combinations of funder and provider of extension services

		Funding			
		Public sector	Farmers	Private & NGOs	Farmer based organisation
Provider	Public sector	Free (Common in India)	Fee based	Private contracts public sector	FBOs contract public sector
	Private sector & NGOs	Public contracts private sector, e.g. using vouchers (e.g. IFAD Cambodia Aspire)	Private sector provides fee-based extension	Service embedded with input sales, harvest sales and market access (Common in multiple countries)	FBOs contract private sector providers
	Farmer based organisation	Public contracts farmer organisations	Farmer pays fees for extension agents hired by organisations (common in Latin America)	NGOs fund farmer organisations for free service provision	Organisations hire agents to provide free services

The remainder of this report includes an overview of regional approaches to extension, using national examples, and summarises experiences with different extension approaches and methods within Table 2.

4.1 REGIONAL ANALYSES

Sub-Saharan Africa

African experiences are relevant to the Pacific because of the similarities in lack of competition in agricultural exporters and input suppliers, and the difficulties in meeting export standards. Sub-Saharan Africa (SSA) is characterised by comparatively slow growth in agricultural productivity. Extension services are currently supported by a range of government, donor-based, co-operative and farmer groups and private agents. Ethiopia is often considered a leader in its commitment to extension. Ethiopia's approach to extension centres on a 'pull' based Participatory Training Extension System, with extension teams that have reached one third of farmers, vocational education and farmer training centres. However, a lack of land ownership, under-investment in micro-credit facilities and a lack of competition in input provision and markets limits farmer's willingness to risk land improvements required for increased productivity (Berhanu

and Poulton 2014). Field evidence shows that while extension agents have a high immediate influence on productivity, farmer-to-farmer learning is more enduring (Krishnan and Patnam 2013). Government control of input supply and over community based 'savings groups' (where credit must be repaid once crops are harvested) has resulted in the politicisation of extension. Hounkomau et al. (2012) call for strengthened institutions across SSA to address weak production growth. More recent promotion (by the aid sector) of innovation based approaches at the local, district and national levels, and models of public-private extension service provision that strengthen supply chains should facilitate strengthened institutions.

Key lessons:

- Mixed private-public models work well when co-ordination exists at both local and regional scales
 - While linking farmers with input suppliers and markets can increase opportunities for private extension service provision, a lack of competition in markets can hinder financial rewards to increased productivity
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Asia

South East Asia is similar to the Pacific in terms of land parcel size (0.5-3ha per smallholder) and population density (85-338 persons per sq km); especially Cambodia, Thailand and Indonesia, and to a lesser extent, Viet Nam and Philippines, which are more equivalent to Pacific Atolls (see FAO 2010, and IMF data). Like the Pacific, SE Asia also utilises a mix of government-based and pluralist (government and private sector) approaches to extension provision.

The shift from 'push' to 'pull' based models of public extension, coupled with shifts towards more market based economies, has resulted in the so-called 'green revolution' in many parts of Asia with significant a three-fold productivity increase since the 1960s, mostly on the basis of input subsidies for rice production. Asia is also characterised by high rates of rural migration, with implications for extension methods. Like Africa, land tenure security also affects extension outcomes. The principle mode of government support is the commune extension worker (CEW). On the basis of an Asian roundtable consultation on Agricultural extension, Binswanger-Mkhize and Zhou (2012) note:

- Smallholders prefer learning from progressive farmers, input dealers and radio;
- Partial or full payment for extension services is unlikely to be effective, particularly for women who suffer higher rates of tenure insecurity and are unlikely to be able to afford them;
- CEW to farmer ratios are highly varied (1 per 300 farmers in Viet Nam, 1 per 7 villages India) and have not been correlated with productivity increases;
- Decentralisation of extension services is often followed by a phase of underfunding, so productivity gains remain stagnant or decline; and
- Private extension services are beginning to be embedded in public systems, and while this approach works well for medium to large farms, it is less effective in reaching smallholders and vulnerable groups.

Instances of Integrated Pest Management have worked well in Thailand, where pesticide costs and concerns about health impacts are high; however, there is still a need to overcome a belief that synthetics are better and to improve the education of extension staff and there has been limited cost-benefit analysis of IPM outcomes (Tionco et al. 2015). In Asia, Farmer to Farmer learning (e.g. through Farmer Field Schools, Integrated Pest Management and Participatory Learning and Action, with a combination of government, non-government and private providers have improved the capacity of farmers involved and improved outcomes. However, there has been limited diffusion beyond those directly involved, and costs associated with these programs mean their scalability is problematic (O'Halloran and Murray-Prior 2014). In Indonesia, centres such as the International Potato Centre (an NGO) and work towards market chain development through trained leaders of farmer groups has increased agribusiness capacity, but there has been limited efforts to upscale the approach to the district, and the 'one village one product' emphasis has meant broader benefits of extension provision have been more limited. Despite agriculture policy supporting extension provision in the Philippines, and sector diversification (particularly through micro-finance and extension in the fruit and vegetable sectors), agricultural growth has lagged behind the rest of SE Asia, and

agricultural employment remains high and remittances now account for 70% of income for rural landholders (Oksuka 2014, Briones and Galang 2013)

India

Early gains in agricultural productivity in India were supported by a government 'pull' based training and visit system. In 2007, the Indian government scaled up the Agricultural Technology Management Agency (ATMA) reform, responding to farmers' preferences for extension providers. This new reform includes:

- Community engagement at all scales: Community and farmer groups, block (commune scale) advisory committee, district advisory committee and state advisory committee to oversee 'bottom up' integration of farmer needs / priorities into extension plans, beginning with participatory rural appraisal and involving the selection from a 'cafeteria' of extension options;
- Extension supported at the block scale by farm schools and farmer friends (a progressive farmer who facilitates extension activities, averaging one for every two villages); and
- Block technology teams, district training centres, and state level research institutes.

This shift from a decentralised to devolved delivery of extension services is perceived as more responsive and credible. However, advisory committees remain dominated by innovative farmers, meaning some smallholders and the most vulnerable are still not receiving good extension services. Farmers' ideas are not always evident in district extension plans, and ATMA is still viewed as a state scheme despite attempts to imbed it in community based processes (Babu et al. 2013).

Cambodia

Agricultural development in Cambodia includes: (1) irrigated and flood plain rice in the lowlands, and (2) a mix of small holder subsistence and production crops in the foothills and uplands. Extension success has been affected by: (1) high levels of migration away from rural areas (gender and age biased) and labour shortage but providing livelihood support through remittances and driving agricultural mechanisation; (2) high levels of land tenure insecurity, driving agriculture into less fertile areas due to opportunities created through land concessions; (3) climate and market fluctuations that have resulted in widening economic disparities; and (4) an aid budget more than double that of government spending.

Current extension includes a pluralist approach, emphasising 'pull' based approaches. Despite the various efforts in place, agriculture extension is considered ineffective, with low economic margins despite yield increases. Recent ACIAR and World Bank reviews highlight the low quality of information provided by the private sector, particularly from input suppliers, whereas the public sector is highly regarded. In 2014 the government committed to the new \$82millionUSD ASPIRE project in 5 provinces that addresses some of these gaps. \$45.5 million is committed to capacity development and extension, including:

- Provincial agriculture department extension sub-program (PAD), with strategies developed from farmer needs assessments (updated annually);
- Smallholder learning groups (SLGs), comprising of 25 innovative yet vulnerable farmers, and a CEW (farmer friend) to facilitate farmer to farmer learning;
- Competitive funding for SLGs to support extension activities, based on provincial development strategies;
- A train the trainer program at the provincial level; and
- An internet based extension hub.

Unlike the ATMA reform in India, PAD services can be provided by NGO and private sector workers, with a required co-investment.

Viet Nam

Viet Nam initiated a more decentralised demand-driven and liberalised approach to agriculture following the *Đôì Mới* economic reforms (1986-). Through the Ministry of Agriculture and Rural Development and related provincial and district level departments, the government invests around \$20 million per annum in Commune Extension Workers (CEW) and through provincial investment plans (with input from commune

and district officials), although some additional funding is available through specific private partnership programs (such as integrated pest management, conducted in partnership with pesticide companies) (Binswanger-Mkhize and Zhou 2012). Farmers in Viet Nam, like China and Cambodia have insecure land title and therefore lack incentives to invest in farm improvements. The government focus on agricultural growth also appears to have shifted to larger scale land concessions in order to increase market supply. In 2011, a government decree allowed extension service provision by the private sector; 40% of the extension budget is now allocated to private organisations and NGOs to deliver extension services. The withdrawal of government from extension service provision (similar to Latin America) is a risk in the future (Schad et al. 2011, Minh and Hoffman 2012, Friederichsen et al. 2013).

Key lessons:

- Large productivity increases driven by farmer needs have been too expensive to sustain
 - A shift towards regional extension needs and delivery plans, with the trusted farmer friend as co-ordinator; s/he receives funds to organise activities but is not directly employed by government
 - Private sector extension service provision does not address the needs of the most vulnerable
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Latin America

After independence from Spanish colonisation, land has become concentrated in the hands of a few, with most subsistence smallholders (67% of all smallholders on 25% land) supported by off farm income (FAO 2011a). A review of Central American agricultural policy (FAO 2011b) shows that public sector support for extension has been mixed; in central Latin America it has been limited to supporting co-operatives and farmer-to-farmer approaches, whereas in the Caribbean, extension has been provided by government (emphasising Integrated Pest Management, Business development, ICT use and seed security) in either organisations with both research and extension services, or through individual government departments that support research and extension on a sectoral basis, but lack opportunities for co-ordinated evidence base that supports best practice extension service provision that matches farmer needs.

In 1990 Guatemala shifted to a predominantly user pays extension system; the remaining extension was insufficient for poor rural landholders – so for 20 years extension has been based on farmer to farmer learning and has relied on international support. The Post-war Nicaraguan government extension services supported vertically integrated co-operatives (i.e. local, regional national and international levels). In 1990s, it introduced the private extension program *campesino a campesino* (farmer to farmer) to support this. In Panama, the most vulnerable populations were left out of the agricultural reform program, with only a few specific groups benefiting. In Brazil, government-based rural development has emphasised social programs (e.g. food vouchers for school attendance in Brazil) rather than agricultural development.

More recent studies in Latin America highlight a shift towards private and public ‘pull’ based approaches to extension, emphasising micro-finance mechanisms and information technology. To support these approaches, NGOs and other groups must help organisations reform their ability to generate, adapt and translate technology to their context. One area where Latin America has excelled (albeit to varying extents) is through the support and establishment of farmer-co-operatives that support farmer to farmer learning. These have supported smallholders to share knowledge, increase food security, conserve agro-ecological knowledge and sustain environmental services. For example organic coffee co-operatives grown under forest cover in Chiapas region of Mexico (through ‘*campesino a campesino*’ – farmer to farmer learning) resulted in links with the international group La Via Campesina; other examples include the Landless Rural Workers movement in Brazil, and the National Confederation of Indigenous Nations in Ecuador (Zimmerer 2011, Altieri & Toledo 2011). In Colombia, extension occurs (1) through nationally driven training initiatives including dairy, pip-fruit and berry sectors based on a farmer levy system (2) through co-operatives where processes support extension and research, and (3) through regional level government. While providing support for farmers, extension services lack integration that would enable them to tackle more significant issues (e.g. land use reform).

Key lessons:

- Separation of research and extension has worked well to increase food security in simple contexts
 - ‘Campesino-a-campesino’ is popular in central America; this is a farmers fee-based network that provides extension, and operates at local, national and international level to support market access
 - Where government advisory services have been limited, private extension has benefited medium and larger farmers but not smallholders
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4.2 Experiences with pull-based approaches

‘Pull’ based approaches to extension have been common-place for over two decades. They are based on the assumption that farmers (including smallholders) are more inclined to adopt specific technologies (crop options, seeds and seeding, harvest techniques, fertiliser and pesticide use, soil management, harvesting techniques, market access and prices, etc.) when they can understand how that technology is directly related to their context. This includes understanding the types of soils they have, the performance of seed and seed varieties in their contexts, the production costs and gross margins that might be possible, their financial risks and cash flow available, etc. A range of common methods in ‘pull’ based approaches include:

- Farmer groups and co-operatives
- Farmer to farmer learning initiatives
- Participatory research

Co-operatives ensure farmer needs are clearly articulated to extension agents, co-ordinate and negotiate market access and fair prices for groups, that agents provide extension services and decrease costs associated with micro-finance. However, they appear more successful in some places than others. For example farmer groups in the Caribbean apparently have a high failure rate (Ramdwar et al. 2013), and lack government involvement, while in Cuba they have proven very effective, probably because of the lack of alternatives. In Cambodia, co-operatives are popular, usually structured with initial cash input, requiring a small membership fee, offering micro-credit at reasonable rates, and developing extensive cash surpluses. While these networks support learning between farmers, the hope that they might reinvest earnings in extension has not always occurred, and instead they have operated as cash generating enterprises supporting development rather than agricultural development per se.

Farmer to farmer learning, a common component of farmer co-operatives includes demonstration days, study visits to other sites and or districts, social learning where farmers share their experiences. Social learning appears more persistent than learning from extension agents. However, knowing who to involve is a challenge; early adopters are not always inclined to share despite being trusted, and may have a limited focus that fails to support whole farm systems approaches to sustainable agricultural development.

Participatory research, where farmers are engaged in designing and trialling different seed or crop varieties, planting rotations, fertiliser and pesticide techniques, etc. In these cases, farmers are sometimes paid to be involved, or offer their fields as demonstration areas, in exchange to access to reduced cost services. In a recent visit to Cambodia with a CIRAD project, farmers (relatively recent migrants on social concession lands) told us that their involvement in research had provided cheaper access to inputs and labour, had increased their opportunity to learn about how to improve productivity, and that they had begun experimenting with alternative crops and crop rotations on other family members lands. They hoped the additional income would mean they could reinvest the cash surpluses from crop improvements into higher value fruit trees in the near future. While participatory research often results in significant livelihood improvements, it is not without difficulties. Recent IFAD and ACIAR reviews in Cambodia found little evidence of extension beyond those directly involved in such activities.

Key lessons:

- Farmer-to-farmer learning, particularly through co-operatives, appears to deliver on farmer needs, and can easily incorporate a mix of private and public extension, but their agenda can be co-opted by specific interests.
 - Attention is needed with co-operatives to avoid corruption and ensure that the needs of the most vulnerable are addressed.
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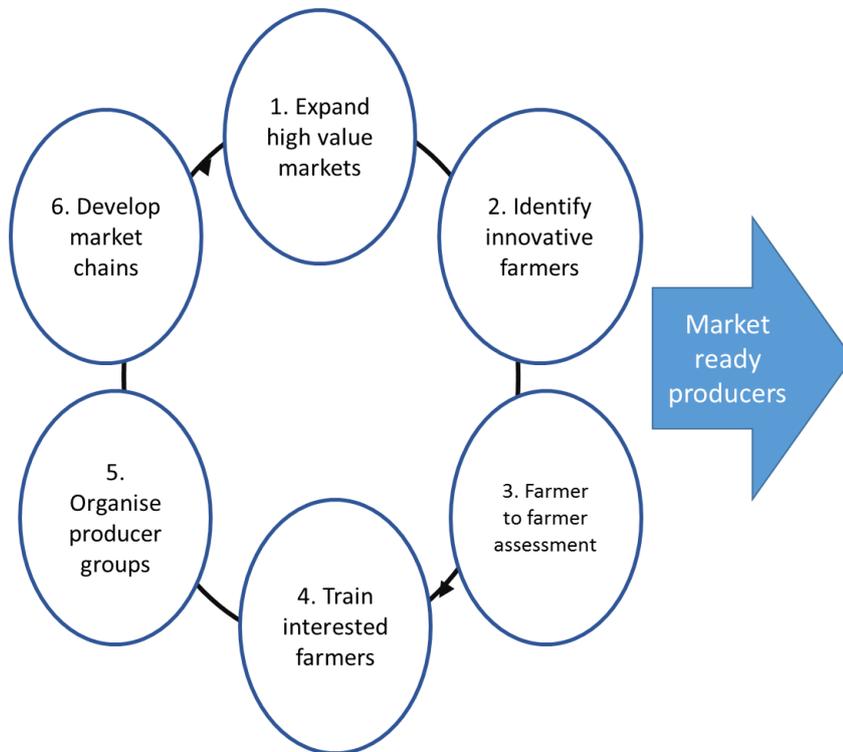
4.3 Innovation systems & the role of the private sector

Innovation systems approaches to extension (Fig. 1) reflect the fact that extension needs constantly change as farmer practices change. The role of extension agents is to broker social networks, negotiate interests and convene meetings to ensure knowledge and needs are shared across the supply chain – something extension agents are often considered poor at, as Chowdry et al. (2014) highlight in Bangladesh. Innovation systems approaches to extension also ensure demand and supply needs are well articulated and matched. Innovation systems approaches address the following challenges with ‘push’ and ‘pull’ based approaches to extension:

- A lack of power for farmers to change institutional norms, such as who is invited to participate in activities (for example, due to patronage networks associated with extension agents, or political allegiances)
- Input and produce markets dominated by single suppliers or buyers, resulting in high prices for inputs and / or poor prices for produce
- Inherent vulnerability to ‘externalities’ in supply chains, including tariffs and taxes that create un-level markets, and increase risks to farmers, e.g. through high micro-credit rates

Experiences from West Africa (Roling et al. 2014) emphasise the need to ensure ‘innovation’ approaches address needs of all groups within a value chain, and that this requires consideration of local, regional and national interests given policy development, transport and markets operate beyond specific regions.

Figure 1: an innovation systems approach. An example of innovation systems from ACIAR work in the Philippines (Bavor et al. 2012). In this case, a horticultural supply chain, the innovation system (based on a Catholic Relief service model) involved farmers, suppliers, scientists and others working together to assess market opportunities, determine market supply needs, and form, plan and test markets for products.



In Uganda, Tanzania, Kenya, FAO’s approach to innovation systems-based extension of livestock (FAO 2011a) includes: National marketing companies who provide market access services on a commercial basis through: marketing company that is also involved in business to business learning; finance and transactional security (i.e. providing contracts for volume of cattle at and agreed time for an agreed price); regional managers who act as local mentors facilitating link between farmers and markets through a local learners program; market access companies providing regionally oriented market intelligence and product marketing, and cash on deliver of produce to ease distrust within supply chains; and information boards and board managers at village levels who provide opportunities for farmers and traders to link.

Lastly, a note of caution regarding the innovation systems approach. While innovation systems approaches can improve market supply chains, working with early adopters is common and can affect success. In Morocco, Faysse et al. (2012) report on an example of innovation systems extension in milk supply co-operatives. They show that co-operatives led by experienced farmers have a much narrower scope of discussion than those led by non-leading farmers, and therefore reduce opportunities for farmer to farmer learning and for broader extension.

Of all regions, Africa has the widest variety of public-private extension models. Numerous examples are provided by Wongtschowski et al. (2013). In almost all cases, extension provider organisations are involved in a range of funding schemes. Extension services funded by the public sector often involve the distribution of a voucher for services by input providers, produce processors or exporters. There has been mixed success with these types of schemes. In Rawanda, a voucher based scheme was used where co-operatives provided extension services, resulting in high farmer satisfaction with services provided, and a twofold production increase in targeted crops. However, Zambia’s 3c scheme reinforced patronage issues, and sometimes resulted in cash distribution without service provision.

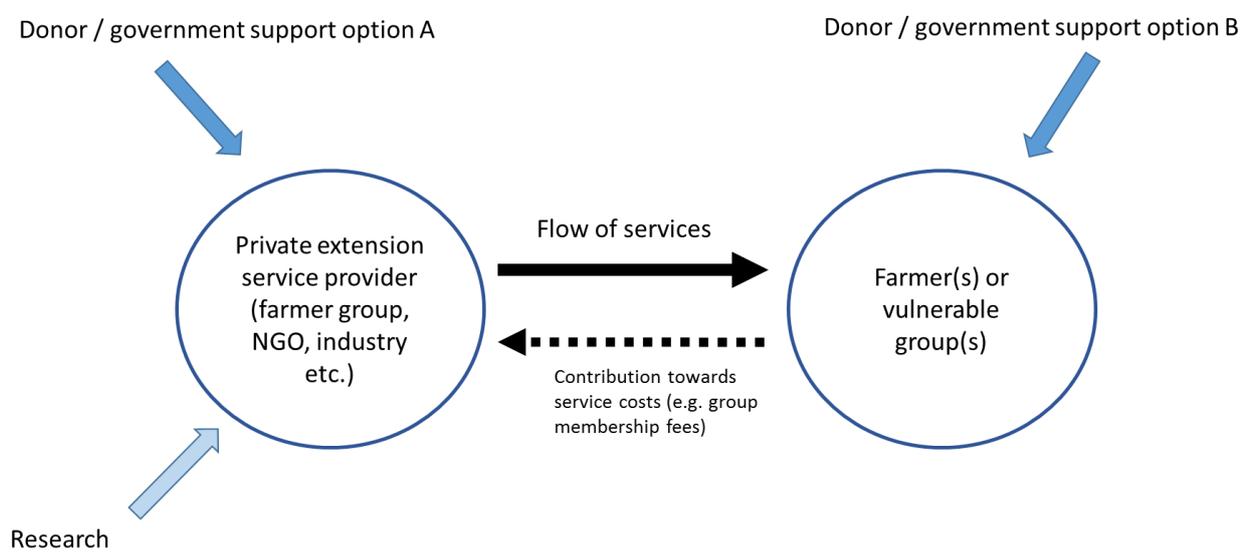
In many cases, farmers and small holders pay part or all of the costs of extension. These costs can be charged for directly (for example, through fees for attending training), indirectly (built into the costs of inputs such as fertiliser and pesticide), through co-operative membership and certification fees or build into returns from traders. Medium and large scale farmers provide other drawcards for private business. For example, through the provision of expensive machinery and or contractor services for planting and

harvesting of crops. Despite often having wide networks and regular contact with smallholders, the private sector may be less inclined to provide services where it perceives a competitive disadvantage in comparison to NGOs and the public sector, for example, because of the need to pay taxes. For this reason, we see that private sector provision of extension and other services is often targeted to medium and larger farmers only. Experiences from the European Union (Labarthe 2013) demonstrate how privatisation of the National Farm Advisory System has meant that smallholders are less economically relevant to extension providers, and as a consequence, research and development are no longer considered to meet their needs.

The supply of good and services invariably comes hand in hand with micro-credit services. While this shifts the risks associated with extension and credit from the public to the private sector, it can often result in (a) information oriented towards the sale of fertiliser and pesticides rather than their effective use (as has been reported in Cambodia), (b) targeting of economically profitable farmers, and (c) issues with micro-credit. In countries with rapidly changing climate (e.g. changes in the seasonal patterns of monsoon arrival and the intensity of rain and drought), crop failure is a constant risk; in combination with health and other stressors, land and stock are often sold to repay micro-finance. African success with micro-finance has been mixed; the Ghanain Cocoa business service centre, who holds a contact for fertiliser distribution and provides trade service in combination with extension has shown 100% repayment rates, whereas Bindzu in Mozambique shows poor success.

The alternative to privately provided services is public sector provision. The provision of free services by the public sector is also problematic when the focus is on markets and productivity: extension staff often lack both breadth and depth of knowledge to support diversified agricultural sector, services require high levels of recurrent funding, and services may not always address farmers' specific informational needs. One example of a way to address this is provided in China, where extension agents were paid bonuses based on a combination of client satisfaction and the number of farmers they provided service to. This increased the incentive and quality of extension for no additional costs. Figure 2 provides a summary of key public-private partnership models.

Figure 2: Public private partnership models. Private sector groups (e.g. NGOs, Farmer Organisations, and Industry) are beginning to replace government in the provision of extension service in many countries. This can occur through the provision of funds to providers related to service results (e.g. information provided to 100 farmers), or to farmers themselves (e.g. through a voucher systems). Alternatively, farmers can contribute a small fee to the service provider to cover or partially cover the costs of service provision. The linkages between research and extension providers in these service delivery models can be quite weak.



Key lessons:

- Numerous opportunities exist for a mixture of public-private collaboration in extension provision that can include researchers, extension agents, NGOs and co-operatives
 - Attention is needed with private providers to address the needs of the most vulnerable
 - When public-private models dominate advisory services, information fragmentation issues need to be addressed at the regional scale to take stock of farmer needs, to keep a record of key research findings, and to ensure the needs of the most vulnerable are not forgotten
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4.4 Additional considerations

ICTs

Internet communications technologies (ICT), particularly mobile phones, are commonly considered a means of improving small holder agricultural development. ICT have aided farmers in:

- Raising awareness of market rates for produce, to ensure a fair price for produce;
- Sharing orders for goods, especially for livestock and perishable goods;
- Providing up to date weather forecasting;
- Improving access to land records, to support credit applications; and
- Increased efficiency / reduced costs of access to extension services.

ICT penetration rates cover 60-89% of the population base, and 15-40% of the land areas in Sub-Saharan Africa, Asia and Latin America, and offer extension services at a cost on par with radio, about a quarter of the cost of personal visits (Aker 2011). While ICT is commonly promoted, limitations exist. Firstly, low cost ICT means that information that can be shared must be relatively simple, and may be more suited to follow-up type information from extension agents. Second, literacy (which is generally higher among rural women) can affect technology use. Thirdly, ICT does not overcome rural barriers to development, such as a lack of transport infrastructure which has been shown to account for up to 30% of the cost of market access for produce in Rural Viet Nam. Studies from both Zimbabwe and Oceania have also demonstrated that while ICT penetration is high, use remains low for farmers, but moderate for extension officers (Mugwisi et al. 2015, Abdon and Raab 2005).

Vulnerable groups

Our summary of regional experiences and extension approaches shows that vulnerable groups are still significantly disadvantaged in extension. This includes vulnerabilities associated with a combination of gender, tenure insecurity and belonging to an ethnic minority.

Women in many parts of the world have less access to land than men; only 15% of women own land in Sub Saharan Africa, 20% in Latin America and 10% in Asia (USAID 2012). Women are also more likely to be illiterate, and therefore have lower access to extension technology such as ICT. A recent Cambodian report shows that women own or manage nearly half of all small holdings, yet they receive only about 10% of all extension services. Extension services must consider the needs of women, many of whom may be new to farming given the migration of men out of their local area in search of off-farm work. Studies from Iran show that female farmers prefer to gain knowledge from female extension officers (USAID 2013). Training of female extension agents, who are under-represented in extension roles, is therefore important (Abi-Ghanem et al. 2013). USAID also recommend a combination of female only and mixed gender groups for farmer-to-farmer and participatory research extension methods, and that extension agents address the common perception that women are responsible for food crops, while men are responsible for cash crops.

A lack of secure land title has been linked with lack of investment in land improvement, poor access to credit and improved inputs in Ethiopia (Berhanu and Poulton 2014). In Cambodia, issuing of land title is a complex and expensive process, and farmers may occupy lands (illegally) in order to gain social concessions (a permit to use land which can then be sold after 3-5 years). This has multiple implications for extension. Farmers are increasingly migrating to new unimproved areas in order to gain access to lands and while they are productive in early phases, a lack of cash-flow means improvements required to maintain and improve

soil quality are often beyond their reach. What is more, farmers lack knowledge about appropriate crops and climate in areas they have migrated to. It is therefore particularly important to tailor extension services to the knowledge level and needs of farmers in these contexts. In the Pacific, climate change related impacts such as sea level rise and forced migration could have similar consequences.

In Viet Nam, Commune Extension Workers supported the development of farmer to farmer groups for sharing lessons and experiences in the introduction of pig raising in the uplands. However, these groups were not ethnically representative, meaning opportunities for sharing knowledge were lost. Membership was also perceived as biased (meaning it involved known community members rather than a diverse cross section), and training provided did not meet the expectations of farmers. As a result, participation was passive rather than active, and extension was not as effective as it might have been (Schad et al. 2011).

Key lessons

- For the time being, ICT development is probably better suited to extension agents and to short simple information services (e.g. weather or market updates) provided to farmers
- Attention needs to be given to rural community demographics to ensure advisory services are adapted to changes in gender, age, ethnicity and migration, and to take advantage of remittances

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