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Innovation grants to smallholder farmers: Revisiting the key assumptions in the impact pathways

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ABSTRACT

Grant funds specifically targeted to smallholder farmers to facilitate innovation are a promising agricultural policy instrument. They stimulate smallholders to experiment with improved practices, and to engage with research, extension and business development services providers. However, evidence on impact and effectiveness of these grants is scarce. Partly, because attribution of changes in practices and performance to the grant alone is challenging, and the grant is often invested in innovation processes that benefitted from other support in the past. We discuss three modalities: vouchers, business development matching grants and farmer-driven innovation support funds. Our review points to an important and transversal outcome area of innovation grant systems: the creation of human and social capital to sustain creative thinking and innovative practices. Harmonising measurement on these outcomes could enhance the usefulness and comparability of impact studies and facilitate benchmarking of different policy options for smallholder innovation.

Introduction

There is widespread consensus that users need to be endowed with decision-making authority to influence the research processes and other service provision (extension, business services, inputs) that support innovation (Douthwaite, 2002; Klerkx and Leeuwis, 2008; Klerkx et al., 2006; Neef and Neubert, 2011; Poulton et al., 2010). This makes it essential to have, besides financial support for the formal research, extension and business development organisations, research and extension approaches to support experimentation and innovation for and by smallholder agricultural producers (Hall et al., 2007; Wongtschowski et al., 2010). Innovation grant funds are receiving increasing recognition as a promising avenue for agricultural innovation (World Bank, 2012). Nevertheless, funds that are specifically targeted to smallholder farmers are quite rare.

Grants for agricultural innovation are used to stimulate private sector and farmer engagement in activities related to technology generation, technology dissemination and overall innovation processes. The increased use of innovation grants in the last decade is a result of two tendencies that shape policies on agricultural extension and advisory services. Firstly, many countries have shifted to a more demand-led agricultural research system, in which users of research have a voice in determining research and innovation priorities or even decision-making authority (Klerkx and Leeuwis, 2009; Neef and Neubert, 2011). Simultaneously, also extension and business development support systems (including input supply) are moving towards demand-driven systems (Kilelu et al., 2011; Klerkx et al., 2006; Minh et al., 2014). Secondly, there is growing awareness that agricultural development is not only driven by technology produced by agricultural research but also encompasses organisational and institutional change (Hounkonnou et al., 2012; Klerkx and Nettle, 2013). Agricultural innovation is, therefore, not only about adopting new technologies; it also requires a balance among new technical practices and alternative ways of organising, for example, markets, labour, land tenure and distribution of benefits (Adjei-Nsiah et al., 2008; Dormon et al., 2004; Pamuk et al., 2014). Agricultural innovation is a co-evolutionary process, i.e. combined technological, social, economic and institutional change (Kilelu et al., 2013), which may be both driven by top-down interventions, and bottom-up farmer's grassroots activities (Smith et al., 2014). The process of obtaining and using the grants stimulates smallholders to be more pro-active and critical towards research and extension providers instead of being passive recipients of top-down technological recipes (Heemskerk and Wennink, 2005; Rivera, 2000). A key premise is that the separation of the funding of the research, extension or business service provision from the provisioning of the research would make service provision more demand-driven. Also, because, in a market setting, several providers may compete for the

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contract, this would enhance the performance of the provider and its orientation towards the wishes of the smallholder clients (Klerkx et al., 2006; Klerkx and Leeuwis, 2008).

While there has been considerable policy attention to the importance of co-funding the innovation processes by smallholders, and governments and donors are experimenting with different grant modalities, there is little and dispersed information on the impact and effectiveness of these grants in facilitating agricultural innovation. In 2011 we reviewed the studies that analysed the impacts of innovation grants to smallholders in developing countries (Ton et al., 2013). The systematic review combined an electronic search in academic data-bases with follow-up searches of gray literature.

To facilitate comparative analysis, we divided the innovation grant systems into three types, each with a different funding modality and objectives.

A = Voucher systems: These provide grants directly to the end-users to enable them to procure goods (e.g. fertilizers) or services (e.g., research and extension) either in the form of vouchers that represent a certain monetary value or through reimbursement of investments after proof of the transaction has been provided. Users can try out a service without investment risk, create access for people who previously did not have sufficient purchasing power, and facilitate a relationship of accountability between the service provider and the client. (Bebbington and Sotomayor, 1998b; Kidd et al., 2000; Klerkx et al., 2006). For proper functioning of voucher systems, potential users of services must learn to identify and articulate their needs, negotiate with service providers and judge and control service quality, and service providers must have the right skills and knowledge to provide the required services. In order to ensure the longevity of demand-side financed extension systems, generally a financial contribution from the end-user is required.

B = Business development matching grants: Often these grant fund ask for business proposals for which co-funding is needed. These grants are seldom directed to individual smallholders but to organised groups, like cooperatives, associations or village organisations that coordinate input provisioning, marketing or added-value production (Donovan et al., 2008; Poulton et al., 2010; Ton et al., 2014a; Yang et al., 2014). Often international donors, like IFAD or World Bank, contribute development funds that are used to establish dedicated governmental and non-governmental business plan competitions. These tend to collaborate with intermediary organisations to help local groups of smallholders to generate a feasible business proposal eligible for funding. These grant systems do not focus on a predefined menu of technological options, and therefore are more flexible and functional for smallholder specialisation in markets.

C = Farmer-driven agricultural innovation funds: As Neef and Neubert (2011) argue, one important dimension of participatory research and innovation is the extent to which farmers have an institutionalised influence on the whole process of research agenda setting (i.e. query generation, prioritization and fund decision making – see Klerkx and Leeuwis, 2008) and research execution. Farmer-driven funds are those grant funds where smallholders take part in the governance of the grant fund. This gives farmers the possibility to determine what type of research is needed and to represent the interests of smallholders in their relationship with research providers. Often, these funds are multistakeholder partnerships in which there is a facilitating role by a research institute or development NGO (Gandarillas et al., 2007; Klerkx and Leeuwis, 2009). This facilitation may conflict with the capacity of the farmer organisations in effectively influencing the governance of the innovation fund, creating blurred line between farmer-driven or facilitator-driven agricultural innovation funds (Córdoba et al., 2014). Therefore, we only included studies on those grant funds where, according to the studies, smallholder organisations had a visible and active role in the grant governance system.

Each type has its specific way(s) of facilitating innovation. To review the evidence on effectiveness in facilitating agricultural innovation, as recommended by Snilstveit (2012) and White (2011), we developed a core impact logic for each of these types. These impact logics relate to the causal steps that are expected to translate the grant for innovation into outcomes for smallholders (Figs. 2–4).

Methods

The paper discusses the findings of a systematic review of impact studies done in 2011–2012, published as Ton et al. (2013), that synthesised the available literature in order to explore under what conditions innovation funds to smallholder farmers tend to be effective in facilitating agricultural innovation.

There are widely divergent methods of systematic review. (Gough et al., 2012; Pawson, 2002; Snilstveit, 2012; Thomas and Harden, 2008). Thomas et al. (2012) differentiate between those reviews that aggregate the evidence in studies on similar treatments to make more generic inferences (meta-analysis), explorative systematic reviews that make a typology of the evidence provided to reflect on causal pathways (realist synthesis, framework synthesis) and interpretive systematic reviews that makes sense of the literature without an a priori defined framework or typology. Fig. 1 present this methodological continuum of approaches to systematic review.

Our explorative systematic review organised the studies according to core impact logics, which reflect different rationales behind the support, and associated with different grant implementation modalities. Within this framework, we reviewed the evidence on effectiveness and the information on the processes and conditions that influenced the effectiveness of the funds. We wanted to avoid a situation, common to several systematic reviews on international development interventions (Hagen-Zanker et al., 2012), where a sole focus on studies with a (quasi)-experimental design reduces the richness of information in such a way that it proves fairly uninformative for practitioners that want to learn about the reasons why some grant systems are more effective than others. The low number of rigorous studies that remains after a very strict screening of the impact evaluation research design may negatively affect the possibility to provide answers to this question (Woolcock, 2013). Therefore, we included, in addition to the quantitative effectiveness studies, also more process-oriented qualitative studies in our systematic review (see Tables 1–4).

The search strategy, as defined in the systematic research protocol (Ton et al., 2011), resulted in 4322 studies retrieved from the electronic data bases. As can be expected, when using a wide number of broadly defined search terms, like ‘innovation’ and ‘experimentation’, most of these studies had no relation at all to the object of our study, The screening of the information in the title and abstract, using the EPPI Reviewer 4 software application (Thomas et al., 2010), helped to reduce the number of relevant studies that were retrieved from the electronic data-bases to 227. Additionally, 41 studies were retrieved through searching of web-sites of development organisation, international research institutes and practitioner networks. The full-text screening of these 268 studies resulted in 53 studies included in the review. Most studies that were excluded in this full-text screening had no information on the grant system, had no grants to smallholder farmers or were not directed to smallholder farmer innovation.

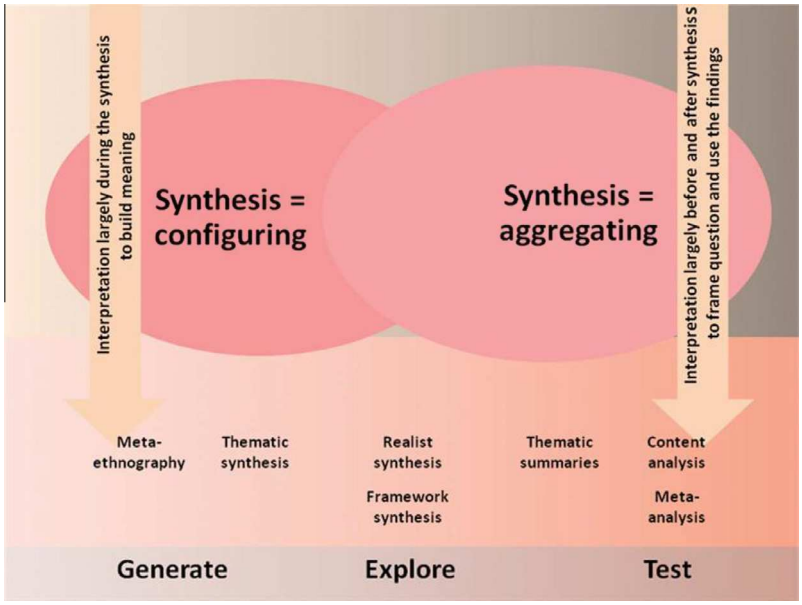

Fig. 1. Methodological continuum of synthesis approaches and methods. *Source:* Snilstveit et al. (2012). Based on Thomas et al. (2012)

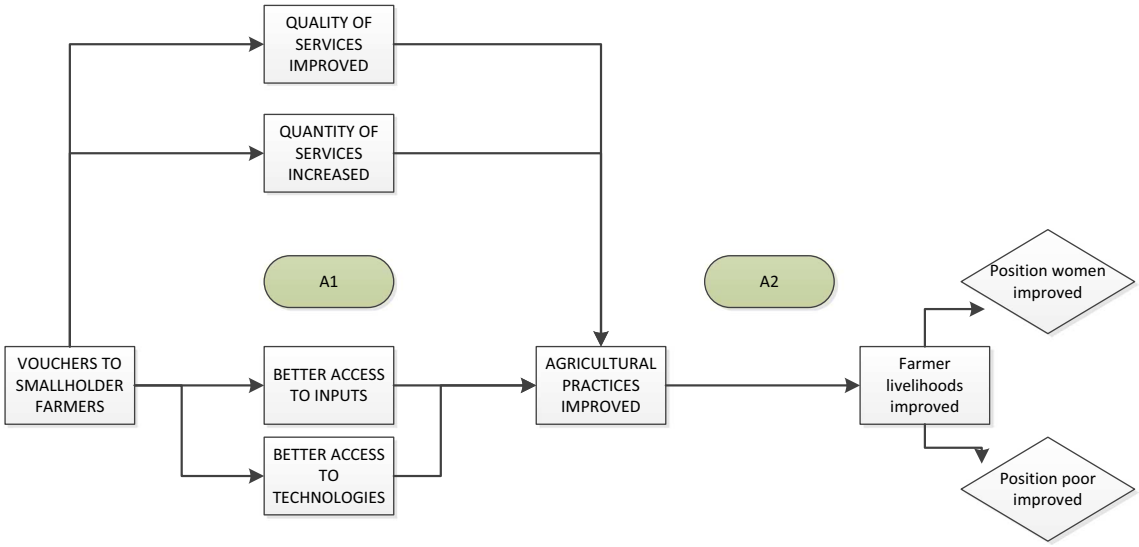

Fig. 2. Impact pathway for voucher grant systems. *Source:* Ton et al. (2013)

Based on the names of the authors and the grant system, we retrieved 11 more studies, making a total of 62 studies.

We mapped the relevant studies in three categories: (1) impact studies – studies with a structured process of data collection on outcomes of the grant system on agricultural innovation; (2) outcome monitoring reports – studies that present monitoring data without conclusions about impacts or effectiveness of the grant system; (3) descriptive studies – studies that discuss the merits and effectiveness of grant systems but without a systematic way of presenting evidence on outcomes of the grant system on agricultural innovation (see Table 1). Several of these studies were working papers that have been published in academic journals later on. In this article we refer to the published version when possible. For each impact study, we scrutinised the way in which evidence on outcomes was collected and how claims of attribution were made. We listed the outcome areas and proxy-indicators used in the impact evaluation.

Results

The twenty impact studies included in the synthesis related to a relatively small number of eleven empirical innovation funds. However, as we show in this paper, they had widely divergent indicators of outcomes, which prevented the use of systematic comparisons, like quantitative meta-analysis. Our synthesis of the evidence became essentially explorative and qualitative in nature. We discuss the evidence on the effectiveness of grant systems according to these three modalities, and illustrate them presenting some empirical instances in text boxes (Box 1–5).

In the Tables 2–4, we present the evidence, outcome areas covered in the impact study and the proxy-indicators used to assess changes in these outcome areas. For each of these proxy-indicators we indicate the direction of change and the rigour of the underlying study design. Authors often draw conclusions from a long list of outcome indicators in one and the same study, and

these are not always assessed with the same research design. Therefore, a study can be strong on the measurement of impact on one proxy-indicator, while being weak on another. We considered a method as being strong in rigour when the design had a process to assess the counterfactual with a design that addressed the issue of selection bias – the special characteristics of being a beneficiary of the grant. We considered a study to be moderate in rigour when a comparison group is used but without a procedure to eliminate the most obvious sources of selection bias. A study is considered weak when only the change in the beneficiary group are reported on, or comparisons are made with population averages.

Impact pathways type A: voucher grant systems

This type of innovation grant provides vouchers to distribute subsidies on inputs, technologies and/or services to trigger innovation in agriculture. For example, voucher programmes are used to subsidise the distribution of quality seeds and fertilisers, to promote micro-irrigation, to hand out tools and seeds after conflicts or natural disasters, to distribute heifers in dairy expansion programmes, etc. While in the absolute sense the degree of innovation might seem low, at the local level it does imply major changes in the socio-institutional and technical agricultural system around smallholder farming, and thus facilitates innovation at local level. The objective of input voucher programmes is to impact directly by improving on-farm production, productivity and income/food security. The vouchers are a way to target the subsidies to the recipient groups. A subtype of voucher scheme targets the development of an enabling institutional environment for farmers to produce. Fostering demand from smallholders, the vouchers are used to encourage a sector of service providers to develop knowledge and routines to target farmers, such as private extension services or business development services. This triggers the development of institutions and institutional arrangements that facilitate the innovation by farmers. Vouchers provide a means of 'incubating' a service sector for farmers and an incentive for experimenting with these services by farmers. Generally, they are

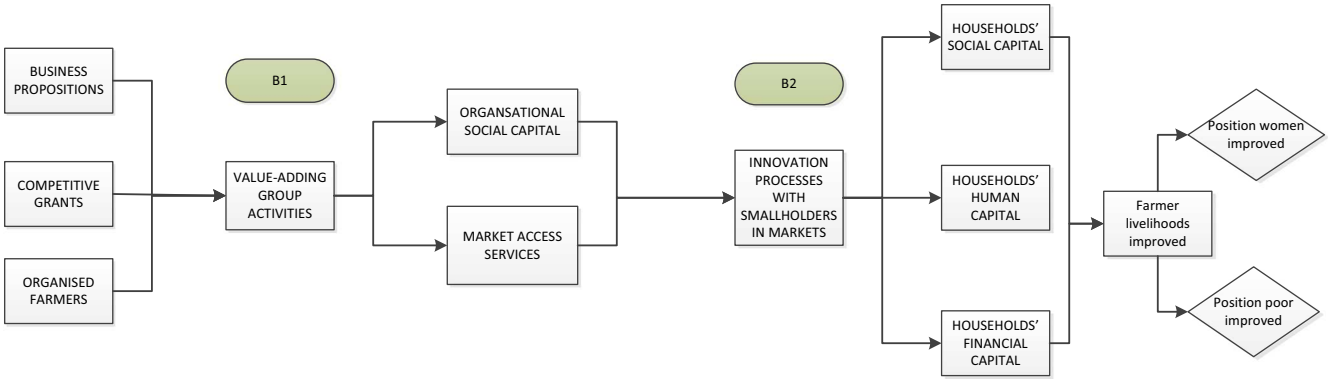

Fig. 3. Impact pathway for business development matching grants. *Source:* Ton et al. (2013)

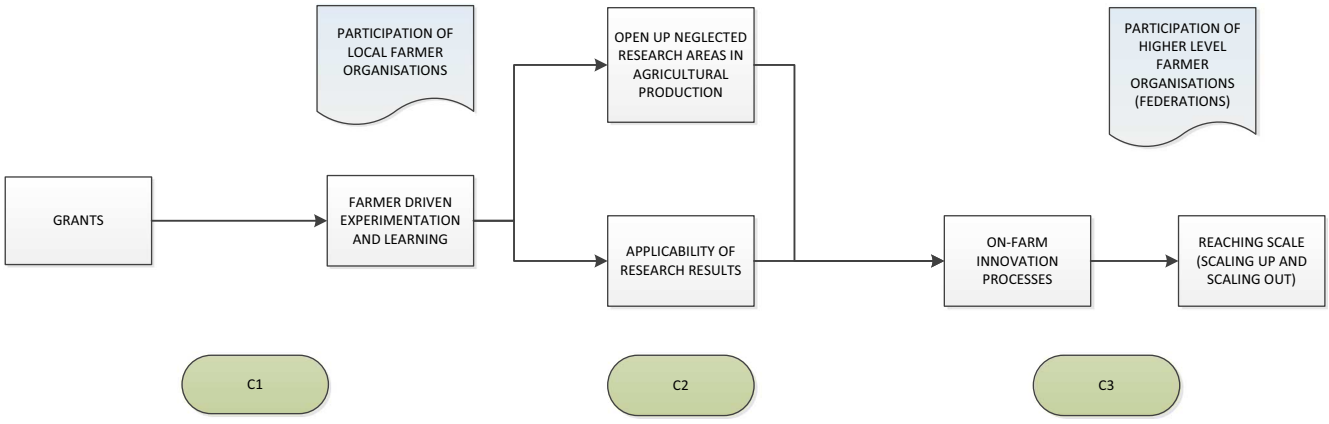

Fig. 4. Impact pathway for farmer-driven agricultural innovation grants. *Source:* Ton et al. (2013)

Table 1
Mapping of retrieved studies.

Type of study	A: Voucher systems	B: Business development grants	C: Farmer-driven innovation support funds	General studies	Subtotal
Impact studies	8	3	9	0	20
Outcome monitoring reports	0	0	6	0	6
Descriptive studies	5	5	17	9	36
Subtotal	13	8	32	9	62

intended to develop a sector that becomes economically sustainable when the voucher system ends.

Vouchers are used to increase the uptake of inputs or support use of services by a target group. The key causal steps in the impact logic behind voucher grant systems are related to the way that impact on agricultural practices is realised, and the way that these practices translate to improvements in farmer livelihoods.

- *Causal assumption A1:* The quantity and quality of inputs and services provided to smallholder famers are enhanced as a result of the voucher system and can be sustained in the future.
- *Causal assumption A2:* Farmers' livelihoods, and in particular those of the poor and women, start to change as a result of the improved agricultural practices enabled by these inputs and services.

Box 1 Malawi agricultural input supply programme.

- The Malawian government started implementing the Agricultural Input Supply Programme (AISP) in the 2005/2006 season with the stated objectives of improving smallholder productivity and food and cash crop production, and of reducing vulnerability to food insecurity and hunger. Other objectives were promotion of food self-sufficiency, development of the private sector input markets, and wider growth and development. Different suppliers offered different pack sizes of OPV (open pollinated variety) and hybrid seed and fertilisers (2 kg of hybrid seed or 2 kg or 3 kg of OPV seed, depending on supplier costs). The seed system introduced an element of farmer choice, with competition between suppliers. In the 2006/2007 growing season, the programme allocated two million seed and three million fertiliser coupons to districts and areas within districts for distribution to targeted households.

The included impact studies (see Table 2) are all independent evaluations and have random selection of respondents as part of their research design. Outcome indicators that proxy for agricultural innovation by smallholders are input use, especially fertiliser and improved seeds. Other proxy-indicators for farmer well-being covered in the study by Holden and Lunduka (2012) are crime levels, health and education, food security – though with evidence collected and analysed using weaker research methods than for the production and income indicators. As an indicator to monitor impact in the institutional organisation in the value chain, all impact studies mention the impact of the input voucher on agrodealers.

All impact studies on the Malawi voucher scheme – see Box 1 – (Dorward et al., 2008; Holden and Lunduka, 2010a, 2010b; Holden and Lunduka, 2012; Ricker-Gilbert and Jayne, 2009) present evidence for positive impacts on yields and household income when farmers used new seeds and fertiliser. This observation has been affirmed in more recent review articles by Ricker-Gilbert et al. (2013). The impact of the vouchers on farmers' asset accumulation is less strong, implying that the cash generated from production (or from the sale of the subsidised inputs on the market) was probably spent on household expenses and food security. The studies on voucher systems show ample evidence that the vouchers indeed lead to the uptake of practices that enhance innovation in the smallholder farming system. The impact studies support the assumption in the impact pathway that vouchers increase inputs or services to farmers. The vouchers facilitate the growth of an agro-input 'market': the vouchers are a way to establish input supply chains in rural areas that need a threshold market demand; that is, they provide an effective demand for inputs for private investors (agrodealers) to come in with their investments.

Whereas the link between fertiliser use and yields seems quite positive, the picture of impacts on poverty (income) is less clear. Though it seems plausible that the voucher scheme has a positive impact on income, the analytical techniques to capture this impact (or refute the claim of impact) are prone with methodological challenges, especially those related with the definition of the treatment (e.g. Do the authors measure the access to or use of the voucher or to the use of the voucher or to the application of the inputs?) and the instrumental variables used to control for selection bias (Ricker-Gilbert et al., 2013).

The main mechanism that can prevent the increased yield from translating into better well-being is the impact of a better harvest on farm prices. Market conditions are thus especially important as a moderating factor. In some regions of Kenya, market prices are mentioned as being negatively affected by the increased supply of the crop to remote local markets (KENFAP, 2010) in such a way that these locations did not benefit. Even in these places, however, the farmers that apply the package will be better off than those who do not, because the additional yields would provide these farmers with more income and food than farmers who had not applied the package. Most studies, therefore, point to the necessary complementing of a voucher scheme with effective market-stabilising local institutions and infrastructure, such as storage facilities and roads and regional trading networks. Without this market infrastructure, a rapid increase in production of one specific crop in an isolated locality can lead to a very low price and provide negative incentives for future farm investments.

All impact studies mention the possibility that cash transfers instead of vouchers could have similar effects on food security and household well-being, though they would have had less effect on increased agricultural production. If farmer livelihoods and well-being were the sole objective of the implementing agency, cash transfers would be an alternative option that would increase farmer decision making on the grant use.

For a voucher scheme for seeds in Sierra Leone, Richards (2007a) points to the risk that the distribution through vouchers of a 'one size fits all' seed variety may tend to reduce farmer experimentation instead of facilitating it. The technology is introduced in a context where farmer innovation practices are already in place, e.g. the simultaneous cropping of a diversity of seeds in small plots, a practice that might be lost due to the cheap flow of the variety provided through the voucher system. The use of the voucher in a context of choice may remediate this. Linking up with seed fairs seems an effective way to provide a choice of seeds; this is a very promising activity that embeds the vouchers in a broader context of local farmer innovation (Remington et al., 2002), and generates possibilities for enabling both external certified seeds and locally improved varieties, in addition to possibilities for using the same venues to provide access to other technologies, such as ox-traction and storage facilities, that could trigger innovation by smallholders.

Though vouchers stimulate the settlement of agrodealers in rural areas, there are also victims of these dynamics (Govere et al., 2009; Holden and Lunduka, 2010b). Competition between established and new agrodealers can force some previously existing agrodealers to shut down, especially when they are bypassed by the voucher system for political reasons. In Zambia, Xu et al., 2009 found that input vouchers stimulated agro-dealers in remote areas but crowded out the existing commercial fertilizer distribution in areas where agro-input dealers were already in place. For Malawi, Holden and Lunduka (2010b, 2012) suggest that the emergence of a secondary market of inputs is a threat to existing input-provisioning channels but do not provide evidence for this

Table 2
Grant impact studies on voucher schemes.

Grant system	Evidence base	Outcome areas	Proxy-indicators	Change	Methods used	Rigour	Independent evaluation
Malawi input starter pack	Holden and Lunduka (2010a,b)	Input use	Application of fertiliser	Positive	Matched comparison	Strong	Yes
			Use of improved seeds	Positive	Matched comparison	Strong	
			Intensified maize production	Positive	Matched comparison	Strong	
		Biodiversity effects	Application of manure	Positive	Matched comparison	Strong	
			Indigenous tree vegetation on farms	Negative	Matched comparison	Strong	
			Intercropping system in maize	Positive	Matched comparison	Strong	
	Holden and Lunduka (2010a,b)	Input market	Size of secondary market for inputs and input vouchers	Negative	*T*-test	Strong	Yes
		Farmer livelihoods	Self-perception on food security	Positive	*T*-test	Strong	
			Agricultural production	Positive	Regression	Strong	
			Perceived food security	Positive	Simple tabulation	Moderate	
			Health/school	Positive	Simple tabulation	Moderate	
			Crime level	Negative	Simple tabulation	Moderate	
			Assets accumulation	Neutral	Regression	Strong	
		Natural resource base	Area planted	Neutral	Simple tabulation	Moderate	
			Use of organic manure	Neutral	Simple tabulation	Moderate	
	Ricker-Gilbert and Jayne (2009) and Dorward et al. (2008)	Input use	Use of fertiliser	Positive	Regression	Strong	Yes
		Farmer livelihoods	Maize output	Positive	Matched comparisons and simulation	Strong	Yes
			Household food security	Positive	Regression and simulation	Strong	
		Input market	Number of agrodealers	Positive	Time-series	Strong	
			Changes in sales volume per agrodealer	Positive	Time-series	Strong	
		Input use	Use of fertiliser	Positive	Regression	Strong	
Sierra Leone – war rehabilitation	Richards (2007b)	Farmer organisation	Knowledge on composition village council	Positive	Interviews	Moderate	Not clear
			Perception of function	Positive	Interviews	Moderate	
			Quality of deliberation	Positive	Observations	Strong	
		Seed diversity	Number of rice varieties used per farmer	Positive	Interviews	Moderate	
			Range of seed varieties requested	Positive	Interviews	Strong	
Kenya inputs access programme	KENFAP (2010)	Farmer income	Maize production per acre	Positive	Panel survey	Moderate	No
			Gross margin	Positive	Panel survey	Weak	
Chilean extension vouchers	Bebbington and Sotomayor (1998a) referring to unavailable study by MIDEPLAN (1994)	Innovation system	Effective co-financing extension services by farmers	Neutral	Interviews	Strong	Yes
		Farmer livelihoods	Household income	Positive	Random survey	Moderate	

in their paper. More convincing is the argument that this secondary market undermines the targeting mechanism. The studies show that without effective targeting mechanisms to ensure they benefit the current non-users of inputs, the distribution of vouchers tends to be directed to the farmers who already use the inputs and technologies, substituting part of their cash expenses with government subsidy support, without facilitating agricultural innovation per se (Mason and Ricker-Gilbert, 2012). Voucher schemes that want to avoid subsidising farmers that already use these technologies need to target only the group of smallholders that is currently not using the inputs and can be expected to start doing so as a result of the vouchers (Dorward and Chirwa, 2011; Ricker-Gilbert et al., 2013).

There is a risk that vouchers are allocated in ways that strengthen existing power relations of exclusive clans (Richards, 2007a) or influence party politics (Banful Afua, 2011; Ricker-Gilbert and Jayne, 2009). Other studies in the East African region (Pan and Christiaensen, 2012) confirm this bias in the allocation of the voucher due political and social networks that tend to give some farmers better access to the vouchers than farmers without this social capital. However, vouchers can also be used to change power relations. Richards (2007a) gives an example where he points to the importance of transparency and 'ritual' in the distribution of seeds and inputs as a way to build more robust local institutions that might take up other roles and functions than 'just' channelling input subsidies. Dorward et al. (2008) and Denning et al. (2009) provide evidence that there might be some limits in the mechanisms to target the beneficiaries of the government subsidies, although this does not imply that there is a negative impact due to the voucher schemes on the related local institutions.

Conclusions on the assumptions in the impact logic for 'Voucher schemes'

Vouchers are used to increase the uptake of inputs or support services by a target group. They represent a certain monetary value with which purchases can be made or because farmers get a reimbursement of investments after proof of the transaction has been provided. As farmers become direct purchasers of inputs, a market develops in which there is a better match between demand and supply. The key causal steps in the impact logic behind voucher grant systems are related to the way that impact on agricultural practices is realised, and the way that these practices translate to improvements in farmer livelihoods.

- Causal assumption A1: The quantity and quality of inputs and services provided to smallholder famers are enhanced as a result of the voucher system and can be sustained in the future.

The studies on voucher systems show ample evidence that the vouchers indeed lead to the uptake of practices that enhance

innovation in the smallholder farming system. Effective targeting mechanisms to reach non-users are key.

Conclusion: *strong support in studies.*

- Causal assumption A2: *Farmers' livelihoods, and in particular those of the poor and women, start to change as a result of the improved agricultural practices enabled by these inputs and services.*

The studies show positive impact on key elements of farmer livelihoods, except when prices fall in response to an increase in production in a context of limited markets outside the production area. The content of 'one size fits all' technology package supplied through a voucher system could constrain agricultural innovation, while offering a menu of options to choose from would enhance innovation.

Conclusion: *moderate support in studies.*

Impact pathways type B: Business development matching grants

Increasingly, the execution of the agricultural support activities is delegated to implementing agencies through competitive grants systems (Garforth et al., 2003; Klerkx and Jansen, 2010). Through 'matching grants', these funds provide co-financing for agricultural business development (see Box 2). These activities can vary from research and extension support for companies and farmer organisations as well as for training workshops, pre-professional internships, and even direct subsidies, to necessary infrastructural investments. Generally, these grant funds are managed by decentralised, specialised governmental entities.

Many value-chain development projects have a grant component to help farmers overcome threshold investments hurdles to entering other (urban, regional, international) markets. Business plan competitions are a common term for this type of grant system. The short-term outcomes of these grants are not necessarily located in the farmer households but related to the economic and organisational performance of the group/business. Mid-term direct outcomes for farmers' livelihoods are reflected in better prices and increased sales though the marketing arrangement.

Business development matching grants are intended to enable farmer organisations to seize business opportunities that facilitate innovation processes in rural areas. The key assumptions relate to the impact on the capabilities of the group and the impact that these have on farmer livelihoods.

- Causal assumption B1: *Competitive matching grants trigger value-adding business activities by (groups of) farmers as a way to facilitate innovation processes for smallholder farmers in markets.*
- Causal assumption B2: *Farmers' livelihoods improve as a result of social activities and economic returns derived from the new value-adding business activities.*

Van der Meer and Noordam (2004) reviewed the World Bank portfolio of projects to address market failures, in which competitive grants for business development, 'productive-type projects' are a minor though growing part. They concluded that very few studies look at outcomes that have an economic character; most outcomes reported for this type of project are of a qualitative nature. Likewise, the Donor Committee for Enterprise Development (DCED) calls for more attention and more methodological rigour in monitoring and evaluation the outcomes of these type of funds (Kessler, 2013). However, it is difficult to capture the effects of these grants, especially as the number of beneficiaries of the business opportunities in the short term tends to be limited and comparison with non-supported business lack meaning due to essential heterogeneity. And, even more important, the effects of the business plans need time to mature. Scale can be reached only after some time, when other support and a range of other market factors will have complemented the grant support. Counterfactual designs with control groups at the level of the household are therefore ineffective to capture the impact of business grants, as these outcomes are beyond the span of direct influence (Ton et al., 2014).

Box 2 Matching grants to farmer groups in Latin America.

- Most impact studies focus on the experiences in Latin America, where in the last decades quite similar business grant systems were introduced in several countries. Through 'matching grants', these funds provide co-financing for agricultural business development. These activities can vary from research and extension support for companies and farmer organisations as well as for training workshops, pre-professional internships, and even direct subsidies to necessary infrastructural investments. Generally, these grant funds are managed by decentralised, specialised governmental entities. Producer organisations can apply for grants to fund applied technology innovation proposals. They are eligible for funding if they co-finance a percentage of the total funding requested (often 30%), either from their own resources or with the support of third parties, and, of course, if their business proposal meets minimum quality requirements defined by the grant system. When a proposal is deemed eligible for a matching grant, a public call for proposals is sometimes issued to invite private service providers to further elaborate the business case in co-ordination with the farmer organisation that originally submitted the business proposal.

The need to report within the project period means that most evaluation reports cover a short time span. They focus on disbursement of funds and the outreach (the number of smallholders involved) but only very superficially on the outcomes in terms of farmer livelihoods or changes in the innovation systems. Another reason is the 'embeddedness' of the grant systems in wider systems of support to agriculture, which induces the implementation agencies to evaluate not the effectiveness of the grant modality as a separate instrument, but the impacts on rural development of the total support package.

Most studies covered by the review highlight the outreach of their business development grant systems and the diversity of business proposals that have been funded. The evidence that the grant effectively triggers the start-up of value-adding activities by the target group is convincing. However, the evidence on the impact of the activities after start-up on farmer livelihoods is far less convincing, not the least because almost all studies reflected on the performance of the grant fund during its operation and did not follow up the businesses supported by it. Little is known about the performance of the business venture after the period of support. Berdegué (2001) conducts one of the few studies with a longer time-frame that examines this type of external support to farmer group business activities in a more-than-anecdotal manner. He concludes that the grants to associative business are more effective when they relate to activities in higher-end markets. He states that, in a market economy open to international competition, organisations involved in non-traditional products and in markets with high transaction costs will have more economic impact on their members' farms and households. His description

of the support package to small-scale producers in Chile points to the importance of a range of supporting services, in addition to the financial grant.

Support for the assumption that the business grants trigger changes at the household level is even weaker. Impact depends a lot on the performance of the farmer group that handles the grant. The performance of the group is influenced by many more factors than just the grant and, as a result, so are the quantity and quality of their services to their members, the smallholder farmers. The positive influence of farmer groups on their members is an axiom generally considered to be self-explanatory: if this were not the case, the members would withdraw their support. Clarification of membership and the development of internal regulations to sanction deviant behaviour are considered to be essential elements for farmer organisations' business plans to be successful (Berdegué, 2001; Lyon, 2000; Ostrom and Ahn, 2009; Ton, 2007, 2008). Trust in and commitment of smallholders to their organisation are strong mediating factors for grants to farmer groups to be effective.

Bebbington and Sotomayor (1998a) and Toro and Espinosa (2003) indicate a weak point in the Chilean and similar systems, where the limited market of service providers leads to a situation where farmers are already 'married' to a service provider when submitting a proposal to the grant system, and the co-financing requirements – an essential element for determining the seriousness of the proposal – exist only on paper. They are in fact co-financed by the service provider, not by the farmer group. Hartwich et al. (2007) and Ton (2007) report on similar processes in Bolivia. Hartwich et al. (2007) highlight the unintended effects of strict eligibility criteria for service providers being used during the bidding process. It tends to generate operational antagonism between the (locally scarce) service providers.

Because of the inherent dynamic nature of the business environment, time lags between the initial business proposal and the implementation of the plan tend to create a need for modifications of already approved proposals. However, as the evaluation criteria were applied to a written document and the verdict has to be 'fair' to proposals that were discarded, the room for such adaptability is generally constrained. This inflexibility creates room for 'white elephants', of unused or over-dimensioned infrastructure. Toro and Espinosa, 2003 advise instituting an independent 'flexibility committee' to make decisions on this.

The World Bank report on the design of agricultural innovation funds (World Bank, 2010) stresses the need to embed the matching grants of business development in a wider context of support, with specific attention to value-chain development platforms and the use of brokers in supporting the applicants to generate better business plans and comply with other fund requirements. While promoting this type of fund because of its flexibility in adapting to demands in diverse and changing contexts, the report advises concentrating the investments in sectors or clusters to generate multiplicity of experiences and a more developed market of service providers and market outlets. This may feed sector dynamics with spill overs and synergies beyond the direct applicants. The World Bank (2010) also stresses the need for field appraisals of the applicant's situation before approving the concept note for further development The information provided by the applicant on paper may differ quite dramatically from the reality on the ground.

Perrett (2004), reflecting on IFAD experiences with community development funds, is concerned about the mushrooming of this type of grant fund in the absence of a good initial understanding of whether a sufficiently enabling political, institutional and social environment exists for its use. He notes that these funds have generally performed better on short-term infrastructural and tangible achievements than on capacity building for longer-term impact, and are better at disbursing funds than channelling benefits to the targeted poor. And he points to another unintended effect, where the provision of a large number of grants may potentially undermine the credit culture and repayment rates for related programmes.

Conclusions on the assumptions in the impact pathway for 'Business development grants'

- Causal assumption B1: *Competitive matching grants trigger value-adding business activities by (groups of) farmers as a way to facilitate innovation processes with smallholder farmers in markets.*

The studies on business development matching grants show that the grants indeed translate into investments in technology or support services for business proposals from farmer groups. Initial organisational social capital within the groups is a necessary precondition to develop these proposals and to handle the grants. Grants tend to be only one in a wider constellation of factors that make business proposals successful. Therefore, outcomes of the grant system on organisational social capital that provide the context for further development of these business initiatives are important. The necessary transparent and sustained procedures needed for business support grants place high demands on the governance system. Participation of farmer organisations in the governing body is valued positively by most authors.

Conclusion: *strong support in studies.*

- Causal assumption B2: Farmers' livelihoods improve as a result of social activities and economic returns derived from the new value-adding business activities.

The three studies that analysed the impact of the business proposals supported by these grants documented positive impacts on producers, though their methodologies suffer from the absence in their research design of comparison groups or other methods of counterfactual reasoning. The change in income through the grant-supported business proposals is not necessarily attributable to the grant, and definitely not to the grant alone.

Conclusion: *weak support in studies.*

Box 3 National agricultural advisory services in Uganda.

- The NAADS programme in Uganda is a public-private extension delivery approach with the goal of providing a decentralised, farmer-owned and private sector extension system. When a farmer decides to participate, he or she has to do so through membership of a farmer group. Then, together with other NAADS-participating groups in the sub-county, they request specific technologies and advisory services associated with their preferred enterprises and also obtain grants to support acquisition and development of those technologies. The grants are mostly used to finance the establishment of an experimental plot, the proceeds of which become a revolving fund for members.

Impact pathways type C: farmer-driven innovation support funds

This type of grant system covers research support to farmers for experimentation enabled by the provision of a grant.

The logic behind this type of grant system is based on the assumption that farmer experimentation is key to developing, testing and/or adapting innovations that respond to the constraints experienced by the farmers.

Table 3
Grant impact studies on business development matching grants.

Grant system	Evidence base	Outcome areas	Proxy-indicators	Change	Methods used	Rigour	Independent evaluation
Corredor Puno – Cusco	Sotomayor et al. (2008)	Farmer livelihood	Farmer sales volume	Positive	Self-assessment	Moderate	No
			Food security	Positive	Household survey	Strong	
			Household income	Positive	Household survey	Strong	
		Farmer organisation	Use of business planning tools	Positive	Self-assessment	Moderate	
Inspección de Calidad Agricola (INCAGRO), Peru	IEG-World Bank (2009) referring to Escobal unpublished data (2003, 2005)	Farmer livelihood	Net income per hectare	Neutral	Matched comparison	Moderate	Yes
	IEG-World Bank (2009) referring to MINAG/ INCAGRO unpublished data (2009)		Producer income	Positive	Household survey	Strong	
			Technology adoption	Positive	Household survey	Moderate	
Centros de Gestión, INDAP, Chile	Fundación Chile (2009)	Farmer organisation	Profits	Positive	Business survey	Weak	No
			Use of business planning tools	Positive	Business survey	Weak	

Farmer-driven agricultural innovation grants are directed at learning about, and experimenting on, key constraints in the farmers' agricultural system. The difference from other agricultural extension and innovation approaches is the assumption that the participation of farmers, through their organisations, in the steering and governance of the grant system makes them effective to reach smallholder farmers who tend to be bypassed in traditional government-led or private-sector-led interventions. The issues that farmer-driven grant systems address are assumed to be different from, or complementary to, the issues that would normally be addressed in research and extension.

- Causal assumption C1: Grants to facilitate farmer-driven experimentation and learning open up neglected research areas in agricultural production and enhance the applicability of research results.
- Causal assumption C2: Participation of local farmer organisations in decision making about research grant funds is effective in (re-)directing the research to critical constraints in on-farm agricultural innovation, and particularly to the needs of the poor and women.
- Causal assumption C3: Participation of higher-level farmer organisations in decision making about research grant funds is effective in scaling-up and scaling-out on-farm agricultural innovation processes.

The result of the studies on these types of funds are summarised in Table 4. Most of the impact studies retrieved under this grant modality relate to the NAADS programme (see Box 3). The objectives are to enable the 'economically active poor' farmers of Uganda to increase their agricultural productivity and incomes in a sustainable manner. Under the NAADS approach, farmer groups contract private sector service providers (including NGOs) who are awarded short-term contracts to promote specific agricultural activities (called 'enterprises') and provide advisory services. The two of the retrieved impact studies on NAADS, by IFPRI, the International Food Policy Research Institute, used a rigorous quasi-experimental research design (Benin et al., 2007, 2008). The 2008 report was published in a peer-reviewed article (Benin et al., 2011). The 2007 study used household surveys without matching the characteristics of the NAADS beneficiaries and the control group. The study was informative about the mixed results of NAADS. The follow-up report in 2008 (Benin et al., 2008), later published as Benin et al. (2011) applied robustness checks on the difference-in-difference regression using four different econometric methods for estimating average treatment effects. They corrected the differences in outcomes between participants and non-participants through a matching procedure. The four different estimation procedures, each with different matching algorithms, result in tables with mixed evidence on impact: some changes in outcome indicators are not significant with some estimation procedures while they are with others.

The study by Friis-Hansen (2008) focuses on one of the districts where NAADS was considered to be most successful. In his study he explored the heterogeneity of the impact for groups defined on a poverty ranking based on farmers' own perception of well-being. The complementary use of life-cycle interviews supports his inferences of positive impacts. The survey design included a group of respondents who were not member of a NAADS group.

Friis-Hansen refers especially to the processes and mechanism that created different responses of farmers to NAADS, which were induced by a former experience with FFS, Farmer Field Schools. He shows the role of an earlier FFS in improving the groups' organisational and productive capacities. The FFS-groups had already created a bank account and related administrative procedures that proved an advantage for obtaining access to support through the new NAADS system. Likewise, several of the FFS in Kenya, documented in the descriptive study by Gustafson (2002), have continued beyond the initial year as such, self-financed by commercial activities that FFS members implement with the knowledge or technologies they have acquired. Gustafson indicates that the size of a typical FFS has been designed to provide a critical mass that enables the group to continue when a support project withdraws. The sustainability of the innovation process is in the heads of the farmers, not in the support project that is by definition temporal. Gustafson (2002) mentions the establishing of personal links to the Kenya Agricultural Research Institute (KARI) staff as an important success, both for the farmer groups that obtain access to wider support than just the FFS, and for the KARI staff that can use them as social infrastructure for research and outreach with and beyond FFS. These FFS members are relatively affluent, but do not form a self-contained group, being in frequent contact with the poorer farmers (Braun et al., 2000; Friis-Hansen and Egelyng, 2006; Nathaniels, 2005). More than a way to open up neglected research areas, the FFS seem a way to articulate demand for already developed technologies (Gustafson, 2002), to test and 'peer-review' the innovations that are already available, and to promote 'first see then believe' outreach to the wider farming community. Interestingly, the FFS-led farmers seem particularly effective as facilitators

Table 4
Grant impact studies on farmer-driven innovation support funds.

Grant system	Evidence base	Outcome areas	Proxy-indicators	Change	Methods used	Rigour	Independent evaluation
NAADS	Benin et al. (2007)	Farmer livelihoods	Awareness of improved practices	Negative	Household survey	Strong	Yes
			Use of improved practices	Negative	Household survey	Strong	
			Participation in markets	Positive	Household survey	Strong	
			Famer income	Positive	Household survey	Strong	
			Food security	Positive	Household survey	Strong	
			Soil management	Negative	Household survey	Moderate	
			Farmer empowerment	Neutral	Group survey	Moderate	
		Innovation system	Access to services and institutions	Positive	Group survey	Moderate	
			Quality of advisory services	Positive	Group survey	Moderate	
		Farmer organisation	Participation in community activities	Neutral	Group survey	Moderate	
	Benin et al. (2008)	Farmer organisation	Farmer empowerment	Neutral	Household survey	Strong	Yes
		Innovation system	Quality of advisory services	Positive	Household survey	Strong	
		Farmer livelihoods	Improved agricultural practices	Positive	Regressions (IV, 2SWR)	Strong	
			Soil conservation	Neutral	Regression (IV, 2SWR)	Strong	
			Crop productivity	Positive	Regression (IV, 2SWR)	Strong	
			Participation in markets	Neutral	Regression (IV, 2SWR)	Strong	
			Livestock productivity	Negative	Regression (IV, 2SWR)	Strong	
			Farmer income	Neutral	Regression (IV, 2SWR)	Strong	
FFS/NAADS-Uganda	Friis-Hansen (2008)	Innovation system	Number of private extension providers	Positive	Interviews	Moderate	Yes
			Analytical and organisational skills	Positive	Interviews	Moderate	
		Farmer organisation	Trust among group members	Positive	Interviews	Moderate	
		Farmer livelihoods	Change in poverty status	Positive	Household survey and lifecycle interviews and well-being ranking	Strong	
			Improved agricultural practices	Positive	Household survey	Strong	
PROLINNOVA	Shroff et al. (2012)	Farmer livelihoods	Empowerment of farmers	Positive	Interviews	Weak	Not clear
			Engagement with research	Neutral	Interviews	Moderate	
			Income from innovations	Negative	Interviews	Weak	
CIAL	Kaaria et al. (2006)	Farmer livelihoods	Experimenting with new agricultural practice	Positive	Household survey	Moderate	No
			Adoption of new agricultural practice	Positive	Household survey	Moderate	
		Farmer organisation	Participation in community organisations	Positive	Household survey	Weak	
	Sandoval et al. (2009))	Farmer organisation	Participation in community organisations	Neutral	Household survey	Strong	No
			Farmer-to-farmer extension	Positive	Household survey	Moderate	
		Farmer livelihoods	Adoption of new seed varieties	Positive	Household survey	Strong	
			Adoption of other new agricultural practice	Neutral	Household survey	Moderate	
			Target crop yields (beans)	Positive	Household survey	Moderate	
			Non-target crop yields	Neutral	Household survey	Moderate	
			Analytical and organisational skills	Positive	Household survey	Moderate	
			Crop diversification	Positive	Household survey	Moderate	
			Yields	Positive	Household survey	Moderate	

of innovation when they share knowledge and experiences with farmers outside their own villages (Braun et al., 2000), when they are treated as knowledgeable experimenters only, free from other cultural stigmas that may influence the interaction with their neighbours.

The demand-led character of NAADS and the process of prioritising 'enterprises' (crops or livestock sectors to be developed as commercial farming activities by the community) indeed created room for manoeuvre for farmers to get the advisory services adapted to issues that they see as important. Opondo et al. (2006) point to the fact that the constrained number of enterprises from which farmers could choose led to the exclusion of certain social groups that had limited ability to work on these enterprises, especially due to limited access to land and labour for commercial crops. However, over time, enterprises selected under NAADS have tended to include activities with lower cost of adoption. Overall, NAADS seems to have made a difference in smallholder farming practices. A study by Ekwamu and Brown (2005) report that only 22% of the households in the NAADS districts have the same top two crops as 10 years ago, suggesting farm households are willing to change production in favour of crop and livestock activities that yield higher returns. Benin et al.

(2008, 2011) stress that the quality of advisory services is nevertheless not the only important factor influencing this technology adoption. Credit, access to inputs, adequate access to farming land and mechanisms to cope with unfavourable weather patterns and the incidence of pests are all mentioned as factors for which other government interventions are needed to complement and reinforce the extension support.

The technology areas ('enterprises') that were supported were selected through a participatory dialogue between three actors: sub-county farmer fora (representing all farmer groups), private service provider companies and district NAADS staff. All three actors influenced the technology enterprise selection and development. Over time, the control of the process by farmers' institutions (farmer fora) gradually increased. Especially after 2007, the emphasis became more on the transfer of technology. The key assumption that farmer-driven innovation grants would lead to a shift in research focus became, therefore, less relevant for NAADS, as the main characteristic became not the generation of improved knowledge and appropriate technologies, but the creation of awareness in farmers of existing technologies and knowledge and linking farmers with service providers that could train the groups on these issues, and/or provide the inputs to experiment with them. This feature also explains the problems encountered by NAADS where knowledge is less uniform and codified and where more interaction between the knowledge of the extension worker (private service provider) and the knowledge of farmers is needed, such as the experimentation and learning related to marketing, an issue which has consistently featured as a low priority in the implementation of the programme (Benin et al., 2007, 2008; Bukenya, 2010; Opondo et al., 2006).

The original NAADS guidelines called for formation of new agriculturally oriented farmer groups disregarding existing groups or assuming that there were none. Nevertheless, Opondo et al. (2006) and Friis-Hansen (2008) point to the fact that the districts where NAADS groups emerged often built on pre-existing groups and networks. As NAADS groups were formed by election in the village, people and groups that had previous experience in organisations and networks tended to be elected. As a result, the NAADS group members tend also to be more affluent than the average farmers in the area (Friis-Hansen, 2008). The initial high expectations (Bukenya, 2010; Opondo et al., 2006) motivated farmers to become active in the groups to obtain access to the (expected/promised) credit and technologies. This 'pull factor' was reinforced by the initial practice of paying farmers for their attendance at NAADS sensitisation sessions (Opondo et al., 2006). As the programme progressed, these groups tended to reorganise themselves in response to the reality of limited access to tangible inputs, with farmers that stopped their participation, leaving a core group, primarily motivated by agricultural experimentation.

NAADS is based on farmer groups managed through farmer representatives at sub-county and district levels known as 'farmer fora'. Opondo et al. (2006) point to the fact that these farmer fora did function, though with responsibilities for which capacity and 'voice' were initially quite low. The role assumed by the farmer fora was especially to monitor the performance of the service providers. It indeed reflected an empowerment of farmers in the advisory system but created also a certain antagonism between the farmer organisations at the higher level and the service providers and their client groups in the villages (Opondo et al., 2006). Friis-Hansen (2008) is more positive about the farmer fora and the empowerment that resulted from the NAADS governance structure, especially in the first phase of NAADS, till 2007.

Box 4 Promoting local innovation.

- PROLINNOVA is an NGO-initiated multi-stakeholder network to stimulate local innovation in ecologically oriented agriculture and natural resource management. The network builds on and scales up farmer-led approaches to development, which starts with finding out how farmers do informal experiments to develop and test ideas for better use of natural resources. The small grants (typically a few hundred dollars per group of farmers) specifically targeted poor and vulnerable households and focused more (but not exclusively) on local ideas and technologies. Grants can go up to US$2000 or more when stakeholders other than farmers are also involved in the joint experimentation.

Promoting Local Innovation – PROLINNOVA – (see Box 4) was mentioned in several comparative studies (Friis-Hansen, 2008; World Bank, 2012) as a promising example of farmer-driven innovation support funds. Our initial search did not produce any studies that described outcomes of the LISFs in a systematic way. The document most closely resembling an external evaluation (Shroff et al., 2012) has a strong focus on assessing changes as a result of the PROLINNOVA-supported grant system but is not based on structured data collection. The arguments are supported mainly by results of interviews with field staff in two countries, which focused more on the process than the impacts. It is not clear if it is an external and independent evaluation, as Rockefeller Foundation was the main donor of the intervention and sponsor of the study. The local support funds promoted by PROLINNOVA cover, compared to the other innovation grant systems studied in this review, a very broad pallet of innovations on crops, technologies and organisation. The comparative literature (Friis-Hansen and Egelyng, 2006; Triomphe et al., 2012; van Veldhuizen et al., 2005) suggests that assumption that these grant systems open-up of research to critical constraints of smallholders seems indeed effective and promising, though there is still very little systematic evidence on the discrete innovation processes funded with the grants, nor on the novelty of the experiments of the farmers for the formal research community. The grant amounts involved are also very small, which may make it challenging for implementing NGOs to allocate sufficient resources to structured monitoring and reporting.

The development of alternative farmer-governed funding mechanisms for local agricultural research for development is the stated objective of PROLINNOVA (Wongtschowski et al., 2010). The experiences from the PROLINNOVA programme are expected to lead to grant management formats that are easily manageable and will not need expensive local support by NGOs. If this indeed proves possible, the scaling-out through existing networks of farmer organisations or farmer federations looks promising in the future. PROLINNOVA objectives and future plans are assuming the above pathway, but studies do not yet provide the evidence to support or challenge the assumption that this farmer participation in the governance structure proves indeed more effective. PROLINNOVA facilitates an interface between farmers and support organisations in rural innovation. The pilots differ greatly in the way they relate to the wider innovation system. The links with the national research community seem less close than in other innovation grant funds covered in this review (CIALs, FFS, NAADS). The diversity of topics and the relatively unstructured and

interactive process of experimentation will make it more difficult to establish closer links with current formal agricultural research, which has organisational and institutional limitations to dealing with these dynamic changes in research questions and research process.

This articulation of farmers with researchers is a more prominent feature covered by the studies about the Local agricultural research committees (further referred to as CIAL, with its Spanish acronym – see Box 5). The descriptive studies on the experiences in CIALs (Ashby et al., 2000; Braun et al., 2000; Humphries et al., 2005, 2000) support the causal assumption that this approach generates a different research agenda and a different relationship between the researchers and the farmers. A high degree of pre-existing social capital is considered an asset that makes the innovation fund more effective. The regular meetings, inherent to the CIAL approach, build on social capital and, in doing so, help to enhance it. The organisational and leadership skills required to conduct the weekly/monthly meetings are strengthened and can help its members to become involved in a range of other social and economic activities. These skills are evidence of organisational maturity and capacity for collective action, which is helping to build social capital more broadly in the communities (Ashby et al., 2001; Humphries et al., 2000).

Box 5 Local agricultural research committees.

- The CIAL-approach was developed at CIAT (International Center for Tropical Agriculture) in Colombia in the 1990s, with the goal of increasing the efficiency of the agricultural research and technology development system by integrating farmers better into the process. The CIAL conducts research on priority issues identified through a diagnostic process, in which all are invited to participate. The community monitors the performance of the CIAL and is free to add, remove or replace committee members at any time. Each CIAL is supported by an agronomist or extension agent who trains the committee members in research design (controls, replicates, systematic evaluation of results) and who visits their trials regularly to provide technical support. Support for the agronomist comes from the institution supporting the CIAL, usually an NGO, the national research or extension service, or some other institution involved in technology development and transfer.

Comparing the two impact studies on CIALs that we retrieved proves interesting. The studies reflect the efforts of the authors to increase the validity of the evaluative findings; the first (2006) study was improved in the subsequent (2009) paper with additional data. The main difference in the analyses is the use, in the later study, of a comparison group of villages that are not supported by a CIAL to allow counterfactual reasoning about impact. Sandoval et al. (2009), using data from a comparison group, come to somewhat different conclusions to those in the earlier study (Kaaria et al., 2006). The difference in conclusions between the studies provides food for thought, especially with respect to the lack of significant impact on crop yields, and the small difference in the adoption of new agricultural practices between the treatment and control groups. This small difference is explained by the authors as a consequence of the fact that organisations and institutions other than the CIALs were working on agricultural development in the nearby 'control' areas. This illustrates the difficulty of applying a counterfactual design with an 'untreated' control group in rural development, as the counterfactual might not be the absence of a treatment but the presence of another type of treatment.

Different from most other studies covered in the review, the studies on CIAL pay particular attention to impacts on social capital, especially on the organisation of farmers. In both Colombia and Honduras, where the CIAL approach was implemented on a relatively large scale, second-order farmer organisations were created on the basis of the local CIAL groups (Ashby et al., 2000; Humphries et al., 2000). The two documented higher-level organisations, in Colombia and Honduras, have the maintenance of the CIAL network as their prime focus. They did not exist before CIAL groups were formed. As such, these higher-level organisations cannot be considered as a moderating factor for faster scaling-up and scaling-out. Instead, it is the result of the scaling itself, realised through other mechanisms, principally through the networking with local development NGOs and local research institutes.

Conclusions on key assumptions in the impact logic for 'Farmer-driven innovation support funds'

- Causal assumption C1: Grants to facilitate farmer-driven experimentation and learning open up neglected research areas in agricultural production and enhance the applicability of research results.

The studies on farmer-driven innovation support funds in this review all made reference to the difference that doing this type of participatory research made compared with traditional research in the area and to the benefits of an interactive relationship between the farmers and the technical supporters or researchers. No study had a design that permitted counterfactual reasoning about which other research areas would or would not have been opened up without the grant. Impact studies provide weak support but the causal assumption is considered to be valid by most authors.

Conclusion: *moderate support in studies.*

- Causal assumption C2: *Participation of local farmer organisations in decision making about research grant funds is effective in (re-) directing the research to critical constraints in on-farm agricultural innovation, and particularly to the needs of the poor and women.*

The review only examined the studies where farmers participated in the governance structure. The studies show that this participation indeed defines the research activities in ways that make them more in line with their priorities.

Conclusion: *strong support in studies.*

- Causal assumption C3: *Participation of higher-level farmer organisations in decision making about research grant funds is effective in scaling-up and scaling-out on-farm agricultural innovation processes.*

The studies all mentioned the progressive involvement of higher-level farmer organisations in the scaling-up and scaling-out of the innovation grant activities. The organisations mentioned in the studies, however, are more a result of the scaling process itself, not the drivers of it. Supporting institutions (NGOs, governments) are more important in this respect.

Conclusion: *weak support in studies.*

Discussion and conclusion

Given the scarcity of studies that related to the same treatment/innovation grant system, the same context and the same outcome areas, we decided for an explorative synthesis of the available

Table 5
Proxy-indicators used in the impact studies to capture impact.

Agricultural practices	Environmental impacts	Knowledge on agricultural practices	Farmer organisation	Structure of the innovation system	Farmer income	Farmer livelihoods
Application of fertiliser	Application of manure	Awareness of improved practices	Participation in community organisations	Effective co-financing of extension services by farmers	Yields	Household food security
Use of improved seeds	Indigenous tree vegetation on farms	Farmers' analytical and organisational skills	Knowledge on composition village council	Access to services and institutions	Gross-margin	Farmer empowerment
Intensified maize production	Intercropping system in maize	Farmers' engagement with research	Perception of functions	Quality of advisory services	Household income	Livestock productivity
Technology adoption	Area planted (agricultural frontier)		Quality of deliberation	Number of private service providers	Farmer sales volume	Change in poverty status
Use of improved practices	Use of organic manure		Use of business planning tools	Size of secondary market of inputs	Net-income per hectare	Health/ schooling
Soil management			Profits made by the farmer groups	Number of agro-dealers	Farmer income	Crime levels
Adoption of new seed varieties			Participation in community activities	Sales volume per agro-dealer	Participation in markets	Assets accumulation
Adoption of new practices			Trust among group members		Agricultural revenue per adult equivalent	Crop diversification
Number of rice varieties			Farmer-to-farmer extension			
Range of seed qualities requested						

evidence (Ton et al., 2011). Interpretation of the findings in the studies may therefore be subjective (Wong et al., 2010). We distilled some issues from the studies that helped to improve our understanding of the diversity in innovation grant systems, and that tend to be relevant for the study of impacts of innovation grants to smallholders.

First, we found no study that challenged the relevance or effectiveness of innovation grant systems for smallholder farmers, as compared to conventional research and extension approaches. Though the evidence base is rather thin, the assumptions in the rationale, on which the decision to implement innovation grant systems is based, remain largely unchallenged. All studies present evidence of the positive changes as a result of these investments in agricultural innovation. Some of the impact studies show mixed impacts on natural resources, especially due to land clearing of tree species or increased cultivation without soil conservation. The negative outcomes reported in these studies are, however, always accompanied by a positive outcome in another area, such as an increase in yields or income. This general positive attitude by the authors of the studies contrasts with the policy reality, where still only a minor share of the funding on agricultural research and development is invested in this type of grant funds for smallholder innovation. This may point to a publication bias, but may also indicate that there exists a development potential. However, as a result of the wide diversity in contexts and implementation modalities of such funds, it is very difficult to assess their cost-effectiveness compared to other innovation policy instruments.

This leads to our second point. The evidence from the impact studies shows that input vouchers as such indeed cause better yields and, in doing so, trigger innovation in agriculture, but the studies do not provide the means to evaluate if these effects are commensurate to the investments made. There are some critical remarks in the studies, e.g. in the studies on input vouchers (Holden and Lunduka, 2010a; Mason and Ricker-Gilbert, 2012; Ricker-Gilbert et al., 2013) that question the political priority of funding innovation grant systems compared to infrastructural investments or cash transfers. This triggered a debate on the use of vouchers as a means to spur innovation in East African countries, especially in relation to the share of the government budget used to fund it, compared with infrastructural investments or market enabling policies. Unfortunately, none of the studies that we reviewed had a research design that could generate comparative information about the cost-effectiveness of these alternative policies on smallholder innovation.

Thirdly, we see that grant systems add to a pre-existing capacity for innovation. Grant systems that target lead farmers or farmer experimenters often build on the capacities created by earlier projects or programmes. Their main outcomes might also be realised in follow-up activities of farmers. Experiences with innovative practices will feed into a process of enhanced learning. Friis-Hansen (2008) points to the fact that in Uganda the FFS provided the social capital that explains positive outcomes of the NAADS systems that was implemented later on. Gustafson (2002) suggests to use the innovative behaviour and innovation capabilities of farmer groups a prime indicator of success. When considered as such, the innovation grant systems may contribute beyond the specific project and period.

Aa a fourth observation, we note that most of the quasi-experimental impact studies focus on field-level impacts only, and use household survey data to support their inferences. When the impact on households is more indirect, for example when facilitating innovation by farmer groups, household survey may not be able to capture the outcomes of the grant. The outcomes are group-based and need time to generate changes at household level. This partly explains the scarcity of impact studies on business development grants and innovation support funds. Often, these grant modalities explicitly target on-going innovation processes that had been started or shaped in cooperation with other support entities, next to the grant fund. Difference-in-difference designs, household surveys with treatment and comparison groups, may be appropriate for the assessment of short-term impact in common outcomes that directly result specific technology packages or other similar uniform treatments. However, they are not appropriate for measuring outcomes that need more time to mature, and that result from more complex and diverse innovation processes (Ton et al., 2014b). For the latter, complex multistakeholder processes, the major gains in the quality and usefulness of evaluations, will lie in the accuracy

and comparability of the monitoring of short-term outcomes in the group of direct beneficiaries. The studies point to one important and transversal and relatively short-term outcome of innovation grant systems that may be put more central in impact evaluation, at least in addition to the assessment of field-level impacts: the creation of human and social capital to sustain experimentation, creative thinking and innovative practices. Currently, the operationalisation of these indicators for human and social capital differs a lot between the studies.

This leads to our fifth and final point for discussion. The outcome areas and proxy-indicators used in the studies vary widely, even when researchers study the same type of intervention. Table 5 gives an overview of the different outcome areas and proxy-indicators used to assess the effectiveness of the innovation grant system. In line with the findings of Ricker-Gilbert et al. (2013), we argue that the empirical challenges for the evaluation of impacts of innovation grants are huge and that comparative research and common methods are needed to provide benchmark information about the effectiveness of these type of interventions in a way that facilitates informed decision making by policy makers and development cooperation. If common proxy-indicators to measure changes in this capacity for innovation could be developed, they would enable the comparison between alternative policies and projects. Potential transversal indicators to measure these outcomes are knowledge on good agricultural practices, implementation of these agricultural practices, capacities of farmers to learn and adapt, and capabilities of farmer groups to sustain collective action. Policy-makers and grant system designers may need to specify these areas as a major indicator of success and, doing so, create an incentive for projects to monitor human and social capital regularly.

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