"Innovation is the only sustainable route out of poverty" Metcalfe, 2009

Assessing the impact of grassroots innovation in agriculture

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Abstract

This study focuses on two cases of joint innovation that have been led by innovative smallholder farmers. The innovation processes were supported by PROLINNOVA (an international network that promotes local innovation), and an associated project called FAIR (Farmer Access to Innovation Resources). The one involves the investigation of an alternative production practice for growing potatoes, while the other involves the production of a new cash crop and the establishment of a new marketing relationship. Interviews and focus group discussions took place with the farmers associated with the two cases in order to identify indicators that can be used to determine the impact of these processes. The study has defined grassroots innovation in terms of formal innovation systems thinking and concepts and has also reviewed policy documents to assess the extent to which grassroots innovation processes are currently supported in South Africa. The study has outlined the type of activities that are required to create an enabling environment for grassroots innovation that is undertaken jointly with farmers, rather than on their behalf.

JEL Codes: O31, O32, O33

Key words: Agriculture, Agricultural Innovation, Organizational Innovation

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1 INTRODUCTION

UNU-Merit[1], with support from Canada's International Development Research Centre (IDRC), circulated a call for proposals for the development of case studies of innovation processes in Mozambique, Rwanda and South Africa. The purpose of the initiative was to build the capacity of the project teams regarding innovation processes and the use of indicators for tracking and measuring innovation processes. The Institute of Natural Resources (INR), in partnership with the Farmer Support Group (FSG), the outreach arm of the University of KwaZulu-Natal, submitted a proposal to explore cases of grassroots innovation associated with a sub-programme of the PROLINNOVA[2] network.

2 BACKGROUND TO THE CASE

2.1 Introduction to the South African context

In South Africa, there are some 1.25 million smallholder farmers (on communal land, allotments and market gardens), 64% of which are operating on less than 0.5ha of land. In comparison, there are approximately 46,400 commercial farmers operating on private land and approximately 35,000 emerging commercial farmers operating in communal areas (Vink & van Rooyen, 2009). Prior to 1994, the agricultural research facilities focused largely on commercial agriculture but have had to transform in order to service all farmers. The research system's capacity to deliver research output has been compromised by the fact that there has been a substantial loss of key research staff from public research services since 1993 (Vink & van Rooyen, 2009). The same study concluded that smallholder production in South Africa had declined over the period 1994 to 2009 and that the disparity between commercial and smallholder agriculture was increasing rather than decreasing. Declining research and extension services were cited as some of the reasons for this decline.

The change of government in 1994 led to great expectations of change for people living in rural areas. As mentioned above, this has not transpired and thus new approaches that could yield greater impacts on rural livelihoods are even more urgently required.

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[1] UNU-MERIT is a research and training centre of United Nations University (UNU) and Maastricht University (UM), based in southeast Netherlands. The institution explores the social, political and economic factors that drive technological innovation, with a particular focus on creation, diffusion and access to knowledge (http://www.merit.unu.edu/about/).

[2] PROLINNOVA is an international network that 'promotes local innovation'

2.2 Introduction to PROLINNOVA

The PROLINNOVA network is an international network of organisations and is active in some 20 countries throughout the developing world. The network promotes innovation processes and appreciates the role that local innovativeness can play in overcoming challenges faced by smallholder farmers and rural communities (Wettasinha & Waters-Bayer, 2010).

PROLINNOVA has a number of different sub-programmes, one of which is called 'Farmer access to Innovation Resources, or 'FAIR'. FAIR is an initiative that has explored the concept of local innovation support funds (LISFs) as vehicles for facilitating access to resources for supporting farmer experimentation.

The FAIR project (and PROLINNOVA) has recognised that farmers have the capacities to conduct their own experiments and investigations, but also recognises that these processes can be strengthened through creating linkages with other actors who can bring knowledge, new ideas or access to markets. In South Africa, the FAIR project has been piloting local innovation support funds (LISFs) in the Okhahlamba District of KwaZulu-Natal. This case study focuses on FAIR-related activities within the community of Potshini

LISFs are funding initiatives that put funds in the hands of farmers or structures that directly represent farmers, so that they can support farmer experimentation not only with funds, but by establishing linkages with other actors such as markets, researchers, input suppliers, etc. Currently research funds go either to research institutions or to NGOs that might then pass on some of those resources to farmers. This is a means of allowing farmers to define the research agenda more effectively.

2.3 Current policies in South Africa

Current policy does not give sufficient attention to the role of grassroots innovation. Beyond making reference to the role of indigenous knowledge systems in poverty reduction, (and its being one area of advantage for South Africa), the National Research and Development Strategy (NR&DS) for South Africa, which was developed by Department of Science and Technology in 2002, gives little recognition to the role that rural communities can play in solving their own challenges. There is little understanding of the dynamic nature of indigenous knowledge (IK), which grows and changes over time as a result of the innovativeness of people within the communities where it exists and is used. Given that the NR&DS recognises that the two high-level goals of good systems of innovation are 'quality of life' and 'growth and wealth creation', there should be more attention given to the contribution that rural innovators can make to the improvement of their own livelihoods as well as those of their communities. Despite this being seemingly obvious, the performance indicators of the national system of innovation, which form the basis for long-term planning (See Table 1), seem only to track formal research and technology development undertaken by

scientists. The strategy makes reference to 'innovation for poverty reduction', but this seems to focus on technology development on behalf of communities to overcome the challenges that they face, especially those related to HIV/AIDS.

Table 1: Some of the key indicators of the national system of innovation[1]

Indicators of science, engineering and technology human capital: • Researchers per thousand of workforce • Science, Engineering and Technology (SET) Demography	**Technical progress:** • Patents • High-tech start-ups • Business innovation investment • Key technology mission
Current R&D capacity: • Publications • Global share of publications • R&D intensity (investment)	**Future R&D capacity:** • University enrolments (SET proportion) • S&T post graduate degrees • Matriculants with maths and science

[1] Adapted from Figure 2 in the NR&DS, 2002.

The National Agricultural Research and Development Strategy (NARDS) was developed in 2008 by the National Department of Agriculture, in line with the requirements of the NR&DS for sectoral R&D strategies. The NARDS makes reference to civil society, farmer organisations and professional associations as key stakeholders. The roles are said to include policy advocacy, facilitation of resource allocation, development training, capacity strengthening, adaptive research, technology transfer and provision of support services. It is unclear which roles are allocated to each of the above – to what extent is adaptive research seen as a role of farmers organisations representing smallholder farmers? There is certainly little reference made to the smallholder farmers themselves as being roleplayers in developing and adapting technologies.

The formal system that monitors research and development as well as innovation has developed a system of terms and concepts and if we wish to draw attention to the importance of 'grassroots innovation' within the developing agricultural sector, there is a need to find ways to apply these terms and concepts to this context too. For example, the Oslo Manual (OECD/Eurostat 2005) refers to the idea of the 'firm' as the unit within which one seeks to quantify innovation and the impact that it is having. There is also reference to 'enterprise'. In agricultural development, the idea of an enterprise is relevant as it can refer to an individual farming household or it can refer to a group that is collectively farming.

In order to influence policy there is need to gather quantitative and qualitative information from case studies that provide some evidence of the impact that innovation can have on local rural economies and therefore the value in supporting such processes. It would be useful to know who is innovating in order to make recommendations about 'who' government and other players should support. However, this is not advocating that only grassroots innovation should be supported as the contribution of formal R&D certainly cannot be overlooked. Nevertheless, it has been recognised that interventions to combine formal research-based and community-based capacity could result in pro-poor innovation capacity and have relatively high returns while not being very costly (The World Bank, 2006).

3 WHY INNOVATION MATTERS

3.1 Innovation systems and the benefits of innovation

Innovation is essential for development, especially given current global changes (whether related to climate or economic changes). Innovation systems are understood to be complex systems whereby different knowledge sources and different actors contribute to the development and application of knowledge. The range of different actors and the bodies of knowledge and the movement away from the concept of a linear transfer of knowledge from 'creator' to 'user' is part of the idea of innovation systems thinking. It is acknowledged that the systems of actors are embedded in an institutional context that determines how they behave and how they interact with each other and with other elements of the system. Thus decision makers who are planning and evaluating R&D processes must have an understanding of the social, political and institutional contexts within which it is taking place (Hall et al. 2003).

The greater attention being given to the social context in which R&D exists is due to an acknowledgement that the linear model does not respond adequately to rapidly changing conditions that users are experiencing and that the traditional roles of actors are changing, especially those of information producers and information users (Hall et al. 2003). Another key aspect of innovation systems thinking is that of learning cycles and self-reflection, which is seen as an integral part of the innovation process, and which also requires institutional support (Hall et al. 2003).

Linkages between actors are essential because people move and take technologies and ideas with them (Gault, 2008).

Successful agricultural innovation is seen to require multiple sources of knowledge, including users, sharing and combining their ideas to develop solutions that are specific to a certain context. The innovations that emerge are also shaped by the social and institutional environment (Hall, 2007).

Over time, there have been changes in understanding of research and development approaches from the initial technology transfer model - where farmers are recipients of knowledge, to the Farming Systems Research approach - where farmers are seen as sources of knowledge, to participatory research - where farmers are seen as colleagues to finally arrive at the innovation systems framework - where farmers are seen as 'co-generators' of knowledge (Hall, 2007). With the AIS approach, actors extend beyond farmers, NGOs and researchers (as typifies national agricultural research systems - NARS), to include all parties that are involved in the creation, adaption and use of all types of knowledge relevant to agricultural production and marketing. There has been a move away from the idea of 'centres of excellence' that can address challenges, towards the concept of 'collective intelligence', where public sector can play a key role in facilitating linkages / interactions. There is also recognition that different groupings of actors will be relevant for solving different challenges (Hall, 2007). Spielman (2005), raised questions about the extent to which the AIS approach is actually impacting on the poor, but highlighted that the approach is at least making researchers and policy makers consider the role of unconventional actors. Spielman (2003) noted that the agricultural knowledge and information systems (AKIS) approach was an improvement on the linear model and gave more attention to the dissemination and flow of knowledge, it was the development of the AIS framework that gave recognition to the wealth of actors that can play a role in creating and using knowledge – and to the relationships that exist between them. Besides formal R&D players, actors can include small and medium enterprises (SMEs) involved in agro-processing, marketing and distribution, civil society organisations (CSOs), farm labourers, private companies, consumer groups, farmers and rural communities. The AIS framework can allow for an analysis of the situation and a better understanding of those players that current policies are favouring. It allows for identification of mechanisms to improve the ways that innovation systems are functioning (Spielman, 2005). It is also possible to use this approach to analyse the way in which innovation is impacting on farmers livelihoods and on poverty. Spielman (2005) states that 'the institutional context under which technological changes occur, drives development'.

In Japan a system emerged, largely due to very limited national research funds but also due to the realisation that western technologies are not always appropriate to all circumstances. They used an approach called the 'Iterant Instructors System', where 'successful' farmers and recent graduates were employed in an effort to combine practical experience and scientific knowledge. While research focused on screening and improving indigenous practices, there was an appreciation of the value of local knowledge and experience. The system also supported the geographical transfer of local practices that were already in use by Japanese farmers (Hayami et al. 1991).

Conventionally recognised outcomes of innovation include increased revenue, market share and employment (Gault, 2008). The impacts on quality of life also need to be given consideration. It is the application of different types of knowledge and not science or technology that contributes to achieving desired social and economic outcomes. In addition, changes are often combinations of technical, social and institutional changes (The World bank, 2006).

Firms innovate to improve their performance, through reducing their costs or increasing the demand for their product. Innovation occurs as a result of both inbound and outbound diffusion of knowledge (OECD/Eurostat, 2005).

World Bank (2006) conducted case studies and found that innovation often combines technical, organisation and other sorts of changes. It was also found that innovation, which can be triggered in many ways, can comprise both radical changes as well as continuous upgrading through many small improvements that are made. Non R&D innovation can take place by adapting existing technology or by 'learning by doing' (Gault & Zhang, 2010). In least developed countries (and portions of South Africa), innovations are incremental, cumulative and mostly informal (without R&D), developed in traditional sectors and services that are not said to be 'high tech' – hence they are not captured by existing measurement systems (Kraemer-Mbula, 2009; Kraemer-Mbula & Wamae, 2010).

The value of grassroots innovation and traditional knowledge, which is largely held by marginalised communities, has also been widely recognised by other practitioners, including the Honey Bee Network (Gupta et al. 2003). Local innovations sometimes emerge that are able to solve challenges that are highly location specific. Some of these are based on traditional knowledge while others are based on new ideas or thoughts (Gupta et al. 2003).
There has been limited responsiveness of scientists to work with innovators to build on and improve existing cases of local innovation, which has limited the extent to which they could solve such challenges (Gupta et al. 2003).

Innovation systems that are aimed at supporting the poor generate and put into use new knowledge that expands the capabilities and opportunities of the poor (Berdeque, 2005). The importance of building innovative capacity rather than relying on strengthening research systems is being recognised (Rajalahti, 2009). There has been an exploration of mechanisms that can facilitate access to resources for farmer experimentation and innovation. Local innovation support funds (LISFs) are one such mechanism. LISFs not only make funding available for farmer experimentation, but are local level structures that are managed by communities, and which allow farmer innovators to prioritise their own needs (Waters-Bayer et al., 2004).

Innovation in formal institutions and 'firms' is measured using indicators but in developing countries much innovation takes place within the informal economy and is not so easy to monitor – but has an impact nonetheless. This is a potential domain for policy to create an enabling environment.

Innovation is the application of new ideas and knowledge. We should be clear that R&D is not the same as innovation as many technologies that are developed by researchers are not taken up by the target users and therefore do not lead to social or economic change. This is why innovation is said to include an element of 'into the market' or 'application'. Commercialisation is a closely related concept, being defined as the creation of market value from knowledge (Gault, 2008). There is a wide range of knowledge types (technical, organisational/managerial, etc) as well as sources of knowledge (conventional providers such as public research organisations) or less conventional sources such as any entities that introduce new knowledge into a social or economic process, such as neighbours, civil society organisations, etc (Spielman, 2005).

When innovation in firms is assessed using tools such as surveys supported by the Oslo Manual (2005), innovative behaviour is classified in terms of the 'level' of novelty. Most novel innovations would be those that are 'new to the world' while least novel are those that are 'new to the firm' – where a firm incorporates a new process or product which is already being used / produced by other firms. It is also useful to distinguish between different types of innovations, namely product, process, institutional and marketing. The Oslo Manual (OECD/Eurostat 2005) defines product innovations as changes in goods and services, process innovations as changes in production and delivery methods, organisational innovations as changes in firms' external relationships and marketing innovations as new marketing approaches.

Another concept is that of 'user innovation' – where the user (the firm) innovates to address a challenge that it is facing. In this case, the 'user' benefits from the service or product themselves, not from selling it. The innovation process is initiated by the affected party as a result of user need or curiosity to address a challenge (von Hippel, 2005). Opportunity-driven innovation systems also deserve attention as this is where entrepreneurs often get involved – it is not only about overcoming challenges, but can also be about exploiting opportunities that are identified (The Word Bank, 2006). Incremental innovation is also seen as important because it allows for problem solving – it is often characteristic of user innovation. Much technological knowledge creation in developing countries is developed in this manner (Kraemer-Mbula and Wamae, 2010) and it allows for a continuous process of upgrading (The World Bank, 2006).

Research and development is often seen as a function of research institutions, universities and high-tech firms, but in this case, the researcher is outside the system, which has its limitations (Russell and Ison, 2000), while users are best suited to understand their needs as well as possibilities for innovation (Metcalfe, 2009). Small-scale farmers are often said to be constrained by inappropriate technology developed on their behalf by other research entities, which highlights the need for linkages between different actors (Rajalahti, 2009). Farmers are known to engage in informal experimentation and this is recognised as having an important role to play in building their resilience (Milestad et al., 2010). They test different practices, select for specific characteristics in their crops, etc. They frequently adapt their farming practices as required to address the challenges that they face, which can be seen as 'incremental innovation.'

Besides the fact that recognition is not always given to farmer experimentation, it is also important to realise that innovation is not restricted to research and development (whether formal or informal), but also includes changes in institutional arrangements (including linkages with external actors – external relations) as well as changes in the way that firms market their products (OECD/Eurostat 2005). Informal innovation does have its limitations as farmers that are innovating, while they are knowledgeable of the local environment, sometimes have restricted vision, limited sources of knowledge and technical potential (Biggs & Clay, 1981) – this highlights the need for combining different bodies of knowledge through involving different actors.

3.2 Intellectual property and innovation

According to the Intellectual Property Rights from Publicly Financed Research and Development Act (No. 51 of 2008) of the Republic of South Africa, intellectual property (IP) is defined as creations of the mind that can be protected by law from use by another person. Commercialisation of IP is the adaptation / usage of IP for any purpose that can provide benefit to society or commercial use (RSA 2008). The Act was put in place to ensure that IP from publicly financed R&D, which is said to lie with the recipient of the funding, is effectively utilised. Recipients could be persons or institutions such as the Agricultural Research Council (ARC) or the Water Research Commission (WRC). According to the Act, recipients of public funds are expected to ensure that the IP is protected from appropriation and SMEs and BBEEEs should have preferential access to such opportunities. The Department of Trade and Industry (DTI) has prepared the Policy Framework for the Protection of Indigenous Knowledge (IK) through the IP System. This framework was developed subsequent to the adoption of the Indigenous Knowledge Systems (IKS) Policy in 2004 and guides the use of IP (for example patents, copyrights, trademarks, registers and databases) to protect IKS. The purpose of the policy is to prevent the exploitation of traditional knowledge by other nations. The framework document highlights the limitations

of the formal IP system, which does not always allow for communities to collectively protect their knowledge. In some circumstances, people have also used the IP system to register ownership of knowledge without the holders of the knowledge actually benefiting. In addition, other authors have highlighted that formal systems of protecting intellectual property are often too costly for local innovators to make use of, for example international patents (Gupta et al. 2003).

4 MEASURING INNOVATION

The current paper looks at two cases of joint experimentation that have been supported by PROLINNOVA and FAIR and presents them using current AIS concepts and thinking and then evaluates the impact that they are having (using various indicators).

Previous research provided some background to the cases. In addition, interviews took place with the farmer innovators involved in both cases, as well as with members of the institutions that have been established through the FAIR programme (See Appendix 1 for questionnaires used to gather information).

Discussion took place with farmers involved in the two cases to identify indicators that could be used to measure the impact of grassroots innovation on livelihoods as well as indicators to quantify innovation. If one wishes to show that rural communities are characterised by farmer experimentation and local innovation, then it is necessary to identify indicators for quantifying the extent to which this is taking place. Due to the informal nature of local innovation, and joint experimentation, it is not easy to track the innovation processes. The studies also investigated ways to track the extent to which innovation is taking place.

The analysis of each case considered the triggers as well as the impacts of the innovation process. Since innovation needs to involve the application of the knowledge beyond the R&D phase, the continued application of the innovation has also been explored.

In addition, discussions took place with representatives of structures established through the FAIR initiative to manage funds, i.e. the Hlahlindlela Trust (HT) and to support and encourage innovation, i.e. the Sivusimpilo Okhahlamba Farmers Forum (SOFF). This was done to better understand the type of support that is required.

5 FINDINGS

5.1 Understanding the FAIR-related support systems

The local innovation support fund

The HT is a locally managed legal entity established through the FAIR initiative with support from FSG to manage the funds available for supporting local innovation processes.

The HT has a number of committees responsible for tasks such as screening applications and monitoring experimentation (See Appendix 1 for list of experiments supported). The criteria for selecting innovations / experiments to be supported by the LISF include:

1. Innovator has prior record of experience with food production, agriculture and/or natural resource management.
2. Preferably innovator has some prior experience of innovation.
3. The idea is technically, economically and institutionally feasible / acceptable.
4. The idea is replicable amongst the poor and vulnerable.
5. The innovator is able to meet the requirements for own contribution.
6. The innovator is willing to share the results with others.

The team responsible for monitoring and evaluation not only monitors the experimentation processes, but also evaluates the outcomes of other activities (or learning events) such as cross-visits, which are funded in order to encourage innovation. The committee then provides feedback on progress at the HT meetings. The FSG and other players have been supporting the M&E committee to conduct participatory evaluation. Generally experiments are monitored against the original objective, such as the performance of the crop/livestock. The level of commitment of the innovator is also assessed. The M&E team has also been provided with a digital camera to assist with monitoring the experimentation process. Photography is a method used in the community to document innovations.

Though the functions of the HT are currently limited to implementation of the FAIR project, it is envisaged that it could fundraise for other community development activities and create an opportunity for community members to participate in buying of inputs in bulk. The Trust is not yet fully functional and still needs to improve a number of its roles such as reporting of meetings, monitoring of project activities, etc.

The demand for support for farmer experimentation

The nature of the people who have made use of the LISF is another factor that warrants exploration is. In terms of the FAIR initiative, the fund has been available to anyone within the community as long as the proposed idea is innovative enough to meet the criteria for support. Those who apply are said to be those that have an understanding of what constitutes

innovative behaviour. In South Africa, this farmer innovation is not a concept that has previously received much attention, recognition or support. People are used to applying for funds for items that they need for production e.g. a pump, fence, etc., but not for materials or support need for experimentation or innovation. As Thabane Madondo, local farmer innovator, said, 'Those who are applying are those who have their own ideas about ways to solve problems they are facing'. He highlighted that there are not many people applying to the fund and he suggested that more people could, but they withhold since they may not want to share their ideas with the rest of the community.

There has been much less demand for the funds than was anticipated. People are not accustomed to accessing funds for the sort of activities supported through LISF. A few people in the community have clearly articulated how they would like to test or develop something and the resources that they will need to do this. It is perhaps more than just 'learning by doing'.

Stimulating farmer experimentation

The other aspect that deserves attention is that of the systems that can be put in place to stimulate farmer experimentation. The SOFF is a farmers' forum established with support from FSG to facilitate sharing between farmers. It has also provided a useful vehicle to stimulate local innovation and to share the outcomes of joint experimentation processes supported by FAIR. Farmers with ideas that they would like to present to HT for financial support are encouraged to first share their ideas at the SOFF meetings. HT members then facilitate discussions regarding compliance with criteria for receiving funding and if the idea is found to be satisfactory, then the innovator is encouraged to fill in an application form for submission to the HT screening sub-committee. The SOFF also provides an opportunity for sharing of innovations that do not require support from the LISF. This sharing of innovations helps farmers to understand and develop solutions to their problems.

5.2 The case of the alternative potato production practice

Description of the innovator and his case

Thabane Madondo is an active community member and farmer in Potshini. He is one of three leaders of SOFF and is also a member of HT. He has been experimenting with conservation agriculture and sustainable farming techniques and processes for nearly six years. Together with other farmers, he has worked with a number of organisations involved in different agricultural and community-based natural resource management activities, including the University of KwaZulu-Natal and the Agricultural Research Council.

During a visit from a pastor through the conservation agriculture initiative, Madondo came across an idea of growing potatoes under mulch rather than using the conventional method of planting them in the soil. Madondo was motivated to experiment with this method because he saw challenges being experienced in his community, e.g., older women encountering difficulties in ploughing the soil, managing the crop and digging to harvest the crop. Therefore, he saw this as a way of easing this burden. He did not see this as a method for transforming all potato production in the area but saw it as a way for people to grow potatoes in their home gardens and improve their food security. He conducted a small experiment on his own and concluded that the technique had much potential. Through another PROLINNOVA-South Africa initiative aimed at piloting joint experimentation processes, he developed a proposal to support this experiment. He then worked on the experiment with staff from a local organisation and FSG. The experiment compared the performance of crops grown using the two techniques, i.e. conventional planting and planting under a grass mulch. Joint planning was made for experimentation and the innovator led the experimentation process. Madondo had ideas about different depths of mulch and different materials to use for mulching.

Erna Kruger, a researcher from another organisation, Mahlathini Organics, provided technical support in the initiative and gave advice to the innovator regarding experimental design, data collection, record keeping and monitoring. FSG worked at a village level, facilitating the joint experimentation process and ensuring that the experiment was shared with farmers at various platforms, including innovation markets and meetings of SOFF. FSG further facilitated the involvement of ten other farmers to participate in the experiment. In addition, it organised the engagement of the government extension and research staff in 'on-farm experimentation.' As a result, the researchers replicated the experiment on the research station. Thereafter, FSG facilitated a cross visit to CEDARA, the government research station, where the experiment was replicated on station. This proved to be a good example of how farmers can play a meaningful role in informing the formal research agenda.

Triggers for innovation

Apart from the reduction in labour requirement, the new technique also showed potential to build soil structure and improve soil fertility. In addition, the plots that have been harvested can be used directly after harvesting for growing another type of crop.

HIV/AIDS and migratory labour practices, which often result in old women having to grow food is one of the reasons why there is a need to reduce labour requirements. Thus the trigger is actually the loss of the economically active sector of the population through HIV/AIDS or migration to the urban areas, rather than just the need to reduce labour requirements, which is in fact a symptom of the underlying challenge. Apart from the impact of HIV/AIDS, women

and children in rural areas often have to juggle a number of different chores and responsibilities. Freeing up time by making use of labour-saving technologies means that this time can be used for other household chores or for education-related activities such as studying or homework.

Outcomes of the innovation process

The first year of experimentation in 2008 revealed some interesting results, which would need to be confirmed by subsequent cropping seasons. In terms of productivity, the mulching practice resulted in a 26.7% reduction in yield, when compared with the conventional production. The experiment showed that germination rates were lower with the mulched plots, which was thought to be responsible for the total weight of potatoes produced under mulch in October 2008 being 184.6kg, versus 252kg for those grown conventionally on a similar sized plot (Malinga et al. 2010). Madondo believed this poor result was largely the result of the material used for mulching, which inhibited germination. He still believed that the benefit of the reduced labour requirement outweighed the reduction in yield and undertook to continue experimenting.

An effort was made to quantify the labour saving benefit of the mulching technique compared against conventional production (See Table 2). The comparison was based on a limited area as might be planted within a household garden (Approximately 48m^2 in area).

Madondo's estimate of labour requirements revealed that the mulching technique resulted in a 72.1% reduction in labour. If one compares input/output ratios for the two systems that convert both the labour and yield into monetary terms, then one finds that the mulching system has a ratio of 0.48 while for the conventional system, a ratio of 1.27 is obtained. In addition, the reduction in yield and the reduction in labour were also expressed in monetary terms based on the area that was used to estimate labour requirements. Based on the proportional reduction in yield, a loss of 51kg (valued at some R179), would be almost compensated for by the reduction in labour, which is valued at R176 (at a rate of R8/hour – the current minimum wage). From this it is clear, that the conventional use of yield as a measure of productivity will not always provide meaningful results.

Table 2: Comparison of labour required for 48m^2 of potatoes

Conventional practice	**Timeframe**	**Mulching practice**	**Time-frame**
Manual 'ploughing'	8 hours	*Assume that the farmer has a source of dry bean residue for mulching* Collect the mulch	1 hour
Open furrows	2 hours	Lay the potatoes, Water the soil, Place the mulch (15cm), Water the mulch, Cover with a second layer of mulch (15cm), Water the mulch. *Assume no fertilizer is applied*	4 hours
Apply fertilizer / manure	20 minutes		
Cover with soil	5 minutes		
Place seed potato	5 minutes		
Cover seed potatoes	30 minutes		
Hand-weeding	2 hours	No weeding	0
Watering (if no rain)	1.5 hours every two weeks	Watering (if no use)	1.5 hours every two weeks
Ridge I	1 hour	No ridging	0
Weed (hand-hoe)	2 hours	No weeding	0
Ridge II	1 hour	No ridging	0
Hand-weed	4 hours	No weeding	0
Harvesting	8 hours	Harvesting	2 hours
TOTAL TIME	**30.5 hours**	**TOTAL TIME**	**8.5 hours**

Dissemination of the findings

Despite fact that the yield results were not as favourable as had been expected, Madondo organised an information day to share the progress on the experiment with SOF farmers who participated in the planting of the experiment. Having heard about the outcomes of Madondo's experiment, four small-scale farmers from other locations went on to replicate the experiment, while another farmer innovator, Mr Mcijeni Mbhele, investigated ways to improve the system by making more efficient use of the mulch. In addition, researchers at Cedara, the KwaZulu-Natal's Department of Agriculture's research station, replicated the potato trial with additional treatments and held an open day to share with the farmers from all

over KwaZulu-Natal in March 2009. Madondo has continued with a second phase of experimentation supported by FAIR. He is considering different planting times as well as different mulching materials.

5.3 The case of a new cash crop and a new marketing arrangement

Description of the innovation case

In 2009, farmers who participate in the Sivusimpilo Farmers Forum in the Okhahlamba District of KwaZulu-Natal, South Africa, started discussions about the possibilities of growing new high value 'cash' crops rather than the more conventional crops such as maize and cabbages. One of the groups represented by the forum, the Walani Group (which has nine members), took a field trip to the Mkondeni Fresh Produce Market in Pietermaritzburg to get an idea of possible crops. This was covered by funds available through FAIR.

One of the leaders of the farmers' forum had a discussion with a commercial farmer whose farm borders the community of Potshini. The commercial farmer suggested the growing of 'cherry peppers' (capsicums) that would be supplied to his processing facility. In addition, some of the smallholder farmers in Potshini have previously worked as seasonal labourers on the farmer's property and have been involved in the production of the cherry peppers. One of the farmers had even grown a few of them at home and brought a sample of the fruit to the forum to share with other farmers.

The farmers at the forum discussed how to explore the opportunity. Two groups (Walane and *Phutumani*, which is located some 60km away from Potshini) undertook to try out the production of the cherry peppers. They wanted to experiment with the production of the crop under their circumstances and, in the process, see whether it could be grown in their area. The objectives of the experiment were (1) to test the performance and survival of the new crop under local conditions, (2) to explore marketing opportunities and (3) to establish a positive working relationship with the neighbouring commercial farmer and thus to move beyond a 'employer-labourer relationship', as had previously existed. Thus it is clear the joint experimentation process had both social and technical elements.

The FAIR coordinator, Nono Shezi played a key role in facilitating discussions between the commercial farmer and the Walane members. The commercial farmer also provided valuable input, assisting with inputs and containers for harvesting, as well as technical expertise - and ultimately providing a market for the fruit. Field staff from FSG assisted the two groups with planting the crop and applying the fertilizer. Farmers managed the crop, for example applying topdressing fertilizer once the crop started fruiting and keeping the crop free of weeds.

This innovation process showed examples of incremental innovation. The farmers incorporated a change in row spacing in order to address the challenge of crop loss resulting from the fact that green peppers were knocked from the bushes during the harvesting process. They felt that by widening the inter-row space, this loss could be minimised. They have also lengthened the inter-row space (the space between plants within a row) as they believe that the initial spacing resulted into interference between plants at the fruiting stage.

Triggers

The need to diversify into cash crops that generate more income and which have a more reliable market than conventional crops was a trigger. The Walane members encountered an opportunity provided by a neighbouring commercial farmer, which really was the key trigger.

Outcomes of the innovation process

This initiative led to the introduction of a new crop (product innovation), establishment of a improved relationship with the commercial farmer (institutional innovation) and a new marketing approach (a marketing innovation).

An effort was made to quantify the income generating potential of the innovation. Discussion with the members revealed that, when taking the costs into account, The Walane Group supplied approximately 180 lugboxes (each holding some 12kg of fruit) from their 0.25 ha and made a profit of some R7,500 (approximately 750 Euro), which translated into a gross margin of approximately R30,000 per hectare (approximately 3000 Euro). This is substantially higher returns than could be expected from maize or cabbage production (For example, standard gross margins are given as R13,436/ha for cabbages in the 2009/2010 COMBUD publication of the KwaZulu-Natal DAEARD publication).

They now grow a new crop that is generating substantially more income than their previous crops, have a new relationship with their neighbour (much interaction had in the past been confined to conflict over the illegal movement of animals from the community onto the farm to find grazing) and have a much more reliable market for their crop.

Pre-existing conditions (an enabling environment)

Besides the availability of resources for experimentation through the FAIR initiative, another factor that has contributed to the success of the initiative is the collective nature of the farming enterprise. The fact that they were already farming collectively provided a sound basis for their entry into this new enterprise. The farmers originally came together, back in 2001 and formed a group called *Isixaxambiji* (which means 'pulling together'). Their main objective at that time was to assist the community with farming activities, but ploughing in particular. They brought together their oxen and were thus able to help each other with

draught power to till the land, moving the combined team of oxen from one farmer's field to the next on a rotational basis.

In addition, the Walane farmers had a link with an employee on the commercial farmer who assisted with the collection and delivery of the crop. This was an informal arrangement that the allowed the farmers cheap transportation. During the interview, when asked what they would do if the farmer did not permit this arrangement to continue, they responded that they would make alternative arrangements – they did not see this as an insurmountable challenge, but it certainly was beneficial during the experimentation period when the farmers were unsure of how the new arrangement would work out.

Dissemination of findings

Throughout the growing season, other farmer groups came to observe the development of the crop at various stages, while some assisted during the planting of the crop. Farmer-led field days, innovation market as well as feedback provided at the Farmers' Forum meeting[3], also allowed other farmers to share in the outcomes of the experiment. This inspired other groups from different locations to replicate the experiment with technical assistance from the Walani farmers and the LIST. In addition, a cherry pepper production manual has been compiled and translated into local language and will be shared with the SOF farmers. Other Farmer Learning Groups have expressed an interest of growing the crop to ensure the wide spread of technology and sharing of experiences from the respective communities.

Commercialisation of the findings

The Walane group is continuing to grow cherry peppers in the 2010/2011 system, at an increased scale of production but with no support from FAIR. In addition, a number of other farmers groups have also planted cherry peppers to supply to the factory called 'Natal Peppers', which is located at the town of Ladysmith about 100km away . In addition, some of the Walane members collected seed from their crop and have produced their own seedlings which they have planted out at home to allow for additional income generation. This is clear evidence that the innovation has now 'entered the market' rather than still being within the R&D phase.

[3] Sivusimpilo Farmers' Forum is another initiative supported by FSG that encourages sharing between farmers

6 INNOVATION INDICATORS FOR GRASSROOTS INNOVATION

Innovation indicators of interest to the study were of two kinds, firstly those that allow us to measure the extent to which grassroots innovation is taking place (quantifying innovation), and secondly, the impact that such innovation processes are having on rural livelihoods (quantifying impact).

6.1 Indicators to quantify the impact of innovation

If the ultimate goal of innovation processes is seen to be an improvement in the livelihoods of rural communities and farmers, then any changes that increase income, food production, food security or simply make lives easier for rural people, especially women, would be evidence that the innovation process is having an impact. On the basis of this, indicators for measuring these impacts were investigated through the current study.

Production-related benefits

Labour-saving potential and income generating potential were the two indicators that were explored. Other less tangible benefits were also encountered and could be used as measures of impact.

Social benefits

In terms of social benefits, the improved relationship that was established with the commercial farmer in the case of the cherry peppers should not be underestimated.

Other potential impacts

Besides these more obvious benefits of innovation processes, some less apparent benefits could also be considered. For example, crop diversification results in increased biodiversity which could have knock-on effects on agricultural production in the area.

6.2 Indicators to quantify the amount of innovation taking place

In trying to capture the amount of grassroots innovation taking place, one also needs to consider mechanisms for identifying such cases. While the current study did not allow for an exploration of these indicators, this section attempts to outline how indicators could be developed to allow for quantification of the amount of grassroots innovation taking place.

One needs to consider both local innovation, which takes place without input/support from outsiders, as well as joint innovation processes, which are situations where outsiders, including formal R&D players, contribute to the innovation process.

Extent of local innovation

In order to fully appreciate the extent to which local innovation by farmers takes independently of the formal R&D system, it would be necessary to put systems in place that allowed for the identification of existing technologies, practices and systems that are unusual or new or novel to a particular area. This could be something put in place through the provincial departments of agriculture and drawing on their extension staff, who are based within farming communities, to identify such examples of grassroots innovation.

Extent of joint innovation

The identification of cases of joint innovation would potentially be less difficult to ascertain as it would rely on surveys of organisations not formally involved in R&D surveys, including NGOs, Provincial Departments of Agriculture, and National Department of Agriculture, Fisheries and Forestry. Of course, formal R&D organisations could also contribute substantially to such a survey since some staff of the CSIR and ARC have also been involved in joint innovation processes, though this has not perhaps been widespread.

The percentage of staff from formal R&D organisations that are involved in innovation processes that also involve farmers as 'innovators' rather than just as recipients of knowledge and technologies, would provide an effective measure of the commitment given to this approach to development. This would be a measure of the percentage of the R&D budget that is being spent on the informal sector. If it were possible to associate staff and operating capital with specific R&D processes, then one could also track the proportion of the R&D budget spent on supporting informal innovation processes. Given that much research is said to be targeting smallholder farmers, one would need to critically assess all cases of R&D to ascertain the role that smallholder farmers are actually playing in each case.

Over time, one could track changes in the percentage of staff that are involved in such R&D activities, which would give an indication of the extent to which policies are changing.

Another means of tracking the impact of joint innovation processes could be to determine the ratio of 'technologies adopted' to 'technologies developed' within the two systems of R&D (formal and informal). Given the widely accepted concerns regarding the lack of 'take-up' of technologies, this could provide interesting results.

We have demonstrated that there are potentially economic and social returns to grassroots innovation. Given the large number of subsistence farmers who are unable to afford to participate in formally supported high input agriculture, there seems much need to encourage and support grassroots innovation. We are aware that the activities supported by PROLINNOVA

are not isolated cases and as the next phase of the study it would be important to try and determine the scale to which it is taking place, as well as the investments that are being made.

7 DISCUSSION

7.1 The costs and benefits of innovation

General discussion about grassroots innovation is based on the two cases of joint experimentation (described below in Table 3). The various integrated components of the innovation process are illustrated below (Figure 3).

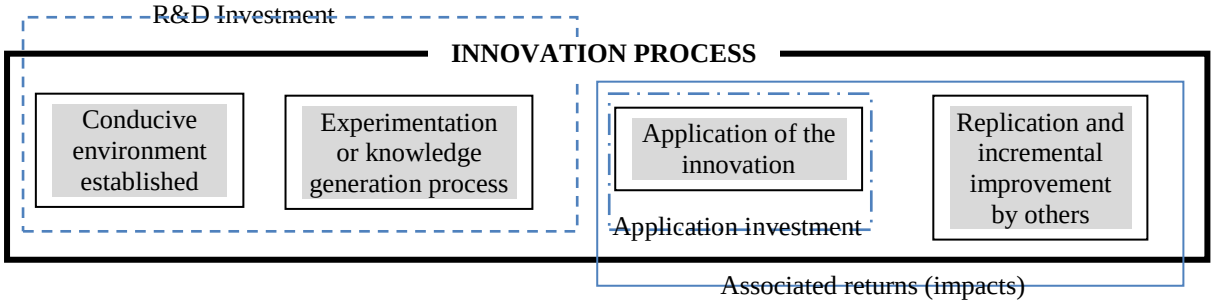

Figure 3: An illustration of the innovation process indicating where investment in R&D is made and where returns on investment can be measured.

From the illustration it becomes clear that one can distinguish between the process of developing new knowledge and then going on to apply it. While the cost of the R&D process (investment in R&D) refers to costs associated with creating the conducive environment and supporting the experimentation / knowledge generation process, it does not include the costs associated with applying the innovation. The costs of applying the innovation are the costs associated with 'commercialising the innovation'. It may have proved to be effective on a small-scale, but application of the new technology / knowledge on a larger scale may require investment in new equipment, for example. This cannot be attributed to the R&D cost. On the other hand, the returns on investment include the direct impacts of the application of the innovation as well as the 'spill-over' effects, which include replication of the new technologies / systems by other farmers, which in all likelihood will lead to further changes and improvements to the outcomes of the innovation process.

The cases show the value and potential impact that support to farmer experimentation can play in terms of improving the livelihoods of small-scale farmers that are not effectively supported by the formal R&D system.

Table 3: Characteristics of the innovation processes making up the case study

Characteristic of the innovation system	Cherry peppers	Potato production
Context – what was there before, what is new?	The farmers were working collectively, but were growing conventional crops and were faced with the challenge of marketing their produce. They were members of the Farmer Forum that was being supported through the FAIR initiative	The farmer innovator was producing potatoes conventionally, but had already started exploring conservation tillage practice and had been involved in experimentation processes with various organisations.
Actors	Farmers, FSG, Commercial farmer, Extension	Pastor (source of original idea), Farmer innovator, Researcher, FSG field staff
Linkages – social capital / network capital	Linkages were established with the neighbouring commercial farmer.	A temporary linkage between the farmer innovator and the pastor who introduced the idea.
Types of innovation	Product, Institutional, Market	Process
Nature of the innovation process (Radical or incremental?)	Fairly radical initially, although there have been some elements of incremental innovation as the production practices have been adapted over time to address challenges encountered.	The introduction of the new production practice was radical but there has been incremental change in terms of the material used, depth of the mulching layer, planting date, etc.
Trigger	Interest in diversifying their enterprise; Challenge of marketing conventional produce.; Market opportunity identified - Demand for the product could be the underlying trigger)	Need to lesson labour requirements (HIV/AIDS or migration of men to urban centres could be the underlying trigger).
Supportive factors (Enabling environment) **Do national policies support grassroots innovation?**	Organisations supporting farmers through the FAIR initiative; Funding for inputs via the LISF and reduced risk.	Organisations supporting farmers through the Prolinnova-funded pilot initiative.

Impacts and outcomes (social, institutional, economic, environmental)	Income generation; Improved relationship with neighbouring commercial farmer.	Some indication of a production practice with a reduced labour requirement.
Diffusion / application of the knowledge and subsequent incremental improvement by other actors	Farmers continuing to grow new crop without any further support from FAIR.	Other farmers expanding / adapting the original research into different crops and different mulching practices.

7.2 Linkages between informal and formal players

Another aspect of the innovation process that the two cases illustrate is the potential linkages that exist between formal and informal R&D systems. To some extent, the innovativeness of smallholder farmers (farmer innovators) creates linkages with other stakeholders as they seek additional sources of knowledge to strengthen their own innovations. Thus, stimulating innovativeness amongst farmers could create a 'pull' on the formal R&D system. Thus, linkages develop as a consequence of the innovative activities of the enterprises. Without the supportive policy environment, it has in fact proved challenging to draw in the necessary skills and expertise required to strengthen innovation processes.

Potentially, innovative enterprises are more able to absorb new ideas from formal R&D and thus there is perhaps even more need to stimulate such behaviour amongst smallholder farmers, and even to build their capabilities to innovate and experiment.

7.3 Support to the process of innovation

To better understand each of the innovation systems, one needs to look at factors that have supported the innovation process.

Both PROLINNOVA as well as the FAIR initiative have provided opportunities to pilot the process of supporting farmer innovation. Having access to resources through the FAIR project enabled the testing of the new potato production practices as well as the testing of the new crop. Support has involved financial support to farmer innovators to allow for the purchase of inputs and materials required for testing new ideas. It has largely removed the risk associated with investigating and investing in new crops.

In addition to the financial support, the organisations involved have provided support in terms of additional ideas, facilitated interactions and exposure to more structured innovation processes. The LISF provided the farmer innovators with the necessary linkages and support – it is not just about financial resources but also about human capital (networks).

7.4 Intellectual property rights

Clearly there are IPR issues that require consideration, but since much of this type of work is undertaken with the purpose of diffusing findings, one needs to consider how the famer innovators who have contributed to the process could ultimately benefit, over and above the specific technology developed, given that this is to be available to other farmers too. The use of public funds to subsidise these R&D processes could be a way of achieving this. The registration of technologies and tools that are developed could be a mechanism to ensure that the knowledge holders gain both recognition and protection. The next phase of the study needs to give more attention to how the holders of intellectual property can be recognised and protected from exploitation, taking into account the current legislative framework that is in place in South Africa.

8 IMPLICATIONS FOR POLICY

This paper covers an approach to agricultural innovation that recognises the innovative capacity of smallholder farmers and puts resources, both financial and human, in the hands of those farmers to generate and implement innovations that are suited to their circumstances and address the challenges that they face. Instead of simply using participatory approaches that draw such farmers into the formal R&D system, they serve to strengthen the informal innovation system. Frequently they achieve this by actually drawing on the skills and knowledge that lie within the formal system, so highlighting the need for the two systems to complement each other.

Because of the lack of recognition of the role that communities could play as innovators, insufficient resources are made available to farmer experimentation or even farmer-led joint experimentation. We need to see the involvement of farmers in the innovation process, rather than R&D taking place on their behalf – since it is largely not appropriate to their circumstances and frequently not taken up by the target user. Expenditures on R&D generally refer to expenditure on researchers, technicians and support staff but make no reference to expenditure on farmers as researchers. R&D generally takes place in large companies and state organisations (OECD, 2007). We have a national innovation fund, and we need to find ways for farmers to be able to access it for grassroots innovation. Another matter to consider is the need for agricultural development to broaden its focus beyond technology-oriented research to include institutional / social innovation (The World Bank, 2006).

The current case study has highlighted that many farmers are inherently innovative and that support to this process can result in the development of new products and processes that can improve rural livelihoods. It also becomes apparent that some policy changes are needed to

ensure that resources are allocated to support farmer-led innovation or joint experimentation processes. Policy implications are to:

- Recognise and encourage farmer experimentation and innovativeness – and not see them as being only recipients of technology and knowledge;
- Support grassroots innovation with human and financial resources (for example through establishment of systems to support innovation such as LISFs);
- Create an enabling environment, which is supportive of grassroots innovation; and,
- Include involvement in joint experimentation as key performance indicators for extension staff and researchers.

9 LESSONS LEARNT FROM THE CASE STUDY

The case study has allowed for some understanding of grassroots innovation. It has explored the triggers that farmer innovators respond to, as well as the sort of enabling environment that is required to support innovation processes. The case of the potato production innovation has confirmed that the objectives of farmers often differ from commercially-oriented objectives. This is largely because of the nature of rural livelihoods, within which agricultural production is taking place. It is also clear that farmer experimentation is not always successful and requires perseverance. The case of the cherry peppers has shown that social and technical innovation processes are often linked. Besides changing the mindsets of policy makers and researchers, In South Africa, there is also a need to change rural communities' perceptions of support – that support can be to help people solve their own challenges rather than just supplying inputs and equipment.

From the study it is also clear that grassroots innovation can be described in terms used in more formal R&D and innovation systems.

10 CONCLUSION AND WAY FORWARD

This case study has been the first step in building an understanding of how the concept of innovation systems relates to grassroots innovation. There has been some exploration of indicators that can be used to measure the impact of innovation processes. The case has also explored the type of support that is required to facilitate grassroots innovation. While this has only considered two cases of grassroots innovation, the objective has been to initiate discussion regarding the value of such activities and the policy changes that need to take place to support it.

Moving forward, it is necessary to start giving more attention to tracking cases of joint experimentation being supported by various stakeholders such as researchers and NGO staff. It is also important to have further evidence of the impact that grassroots innovation with

rural communities, rather than on their behalf, can have on poverty reduction and improved livelihoods. The issue of finding ways to effectively protect the intellectual property of the knowledge holders or developers also needs to be given more attention.

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12 APPENDIX 1: INNOVATION PROCESSES SUPPORTED BY FAIR IN 2009/10

Innovator(s)	Description of the innovation supported	Type of innovation	Cost of direct support provided (Rands)
1. Phuthumani and Walani Farmer Groups	Cherry pepper trial: Testing of a new cash crop, exploration of marketing opportunities and strengthening of relationship with neighbouring commercial farmer.	Social & Technical	Materials : 6,000.00 Support: 10,125.00
2. Sicelumusa FLG	Green manure/cover crops: Testing of different types of legumes (i.e. velvet beans, sun hemp, clover, cowpeas) as crops to be incorporated into the soil, and allowed to decompose for a given period before planting of the following crops.	Technical	Materials: 1,468.50 Support: 11,400.00
3. Elakho-Ithuba FLG	Livestock fodder supplements: Testing the performance of various fodder species (lucerne, turnip and cocksfoot) for feeding milk cows in winter	Technical	Materials: 833.96 Support: 9,350.96
4. Thabani Madondo	Potato mulching practice: Testing of a new method of planting potatoes under a layer of mulch against conventional tillage.	Technical	Inputs: 808.00 Support: 13,680.00
5. Khethiwe Hlongwane	Planting vegetables in bags: Test the performance of spinach grown in bags containing either compost or manure	Technical	Inputs: 975.00 Support: 12,375.00
6. Ellen Moloi	Mole prevention in potatoes: Investigating the use of corrugated iron to prevent mole damage by burying the iron and planting on top of it.	Technical	Inputs: 408.00 Support: 15,290.00

13 APPENDIX 2: DATA COLLECTION INSTRUMENTS

The following questions guided discussions with farmer innovators and representatives of FAIR-related structures:

Questions for farmer innovators

1. Describe the experiment / innovation – what were you testing or developing? Is it a social or technical innovation?
2. What have the benefits been to you, your family and your community?
3. How would you tell if the outcome of the experiment / innovation process was having a positive impact on you livelihoods? *e.g. increased income*
4. Apart from an increase in income, what else would show that your livelihoods have been improved??
5. How could we monitor how much experimentation / innovation is taking place in the community?

Questions for leaders of the forum

Considering that the establishment of the farmers' forum could itself be seen as a social innovation, let us find out what people see as the benefits of the forum – and how we could measure the impact that it is having.

1. What is the purpose of the farmers' forum?
2. What are the benefits of the farmers' forum?
3. How could we monitor the performance / impact of the forum?
4. Was there any form of sharing taking place before the forum was established?
5. What has the benefit been since it was established?

Questions for the trust, especially the sub-committee responsible for M&E

We are wanting to monitor innovation processes and evaluate the impact that they are having on communities and households…..

Monitoring innovation processes

1. How do you monitor cases of innovation being funded through FAIR? What exactly are you monitoring?

2. Is there any way of monitoring cases of local investigation/research that are not receiving funding through FAIR?

3. How are cases of local innovation and farmer experimentation identified? Who is involved?

4. How do you think we should evaluate innovation processes? What would we measure or track to see if the innovation is having a positive impact on households? What sort of positive impacts could it have on the broader community? Are you measuring / monitoring anything at the moment related to the cases that have received funding?

Questions about the trust

5. What do you see as the benefits of the trust? Does it have any functions other than those related to the FAIR project? What are those functions?

6. How would you tell if the Trust is functioning properly?

7. Could the Trust have any added benefits besides FAIR activities? What would they be?

A framework for analysing cases of grassroots innovation

Understanding the innovation case	Indicators	How could one prove it	Influence policies
• LISF as a new idea (potentially an innovation) that is being driven by university… • Still in R&D stage • How has the LISF stimulated innovative behaviour? • What people are applying to the LISF? • What people are not applying to the LISF?	• Lack of improvement in household income / poverty status over 15 years • Amount spent on R&D and extension (see budget) • Amount of funds managed, number of cases supported, existence of committees that effectively take decisions • Case story: the impact of the LISF	• Show evidence that formal R&D systems do not impact sufficiently on smallholder farmers and that there is a need for an alternative • Show evidence that local structures can manage funds • Show evidence that LISFs encourage innovation (what is the change since the LISF came into being?_ • *Then show evidence that local innovation improves livelihoods*	• Make funds available to local structures to support grassroots innovation

Describe the types of activities that have been undertaken to support and stimulate innovative behaviour	Indicators: • Cases that have emerged through these activities • Innovation cases that have been stimulated through these activities	• Impacts of activities such as cross-visits, innovation markets, forum meetings, field days, etc	• Show that supportive environments are necessary for innovation to take place

Understand innovation systems better – those funded by FAIR and Prolinnova
• Describe the innovation process
  ○ User innovation
  ○ Where are we on the novelty chain? Is it 'new to the firm' or 'new to the market'?
  ○ Any evidence of incremental innovation to solve immediate problems?
  ○ Different sources of knowledge / sources of ideas / linkages that are important to farmers as user innovators
  ○ Who generally funds user innovation?
• Who are the different stakeholders and what are their roles?
• What has changed for the Walani group as a result of participating in the innovation process? *Cropping practices, relationships, own capacities, etc (*What was there before versus what is there now?)
• How has this spilled into other aspects of their lives or their joint activities?
	Evidence of:
	• Improved access to markets
	• "Widening horizons"
	• Income generation
	• Labour saving
	• Improved food security
	• Increased biodiversity (any new crop rotations, new crops, etc)
	• People's ability to work in groups effectively
		• Show that innovation is taking place (supported as well as independently)
		• Show that local innovation improves livelihoods
		• Show that returns on investment are greater than with formal systems
			• Support local innovation processes as an alternative to formal R&D

• The broader context
  ○ Framework conditions that shape innovation
  ○ What gave rise to innovation?
  ○ What triggered the innovation?
  ○ Factors supporting and constraining innovative behaviour? - Social capital (networks, partnerships), Human capital (literacy, creativity), Extent of risk-taking behaviour
  ○ Things that are complementary to the innovation process – what needed to be in place in order for innovation process to be possible
  ○ What capabilities allow for integration of ideas encountered elsewhere?
• Describe any diffusion of the product/practice
• Describe diffusion of innovative behaviour in general
 	
What system could we put in place to measure innovation in the informal sector? How do we quantify innovation that is not part of FAIR?
	• Establishment of partnerships and linkages		