S.Afr. Tydskr. Landbouvoorl./S. Afr. J. Agric. Ext., Stevens & Letty
Vol. 42, No. 2, 2014: 24 – 38
ISSN 0301-603X (Copyright)

UNDERSTANDING THE DYNAMICS OF MULTI-STAKEHOLDER INNOVATION SYSTEMS AND THE OPPORTUNITIES FOR JOINT LEARNING BY SMALL SCALE FARMERS

Stevens, J. B.[5] and Letty, B.[6]

Correspondence Author: joe.stevens@up.ac.za

ABSTRACT

Through a European Union funded project called JOLISAA (Joint Learning in Innovation Systems in African Agriculture), the nature of smallholder oriented innovation systems have been explored in terms of partnerships, triggers that have given rise to them and the nature of the innovations themselves. The main objective was to analyse a broad diversity of multi-stakeholder agricultural innovation processes involving smallholders. The analysis of 11 cases documented comprises innovation bundles composed of technical, organisational and institutional innovations. The eleven cases documented showed that six exhibited non-technical innovation processes frequently related to market access as well as to inputs and services. Triggers that drive smallholders and other stakeholders to initiate innovation processes include environment stress, introduction of new technologies, identification of market change as well as policy or regulatory changes. The cases that have been documented show a variation of stakeholders responsible for initiating the process. In some cases it was smallholders approaching other stakeholders for assistance with addressing a challenge, while in other cases it was researchers or extensionists who undertook to develop an innovation to address a challenge that they had encountered through their interaction with smallholders. All documented cases have involved the contribution of ideas, knowledge and skills by at least three different types of stakeholders and the role of local knowledge has been acknowledge through the study. Out of the eleven cases three cases have been selected for a collaborative case assessment which strives to assess further key issues such as actual roles and contributions of various role-players, the dynamics of the innovation process and outcome. Several opportunities arise for joint learning with small scale farmers.

1. INTRODUCTION

JOLISAA[7](Joint Learning in Innovation Systems in African Agriculture)[3] is a European Union funded research project that aims to increase understanding of multi-stakeholder innovation processes and recognises the benefit of combining different forms of knowledge systems, including local knowledge in joint learning. Its four European Union (EU) based and three Africa based consortium members aim to assess jointly recent or on-going innovation experiences in Benin, Kenya and South Africa as a basis for identifying relevant lessons and recommendations in terms of policy, research and practice.

[5] *Department of Agricultural Economics, Extension and Rural Development, Faculty of Biological and Agricultural Sciences, University of Pretoria, Pretoria.*
[6] *Institute of Natural Resources, PO Box 100 396, Scottsville, 3209, South Africa*
[7] *JOLISAA is coordinated by the French research organisation, CIRAD, and operates in South Africa, Kenya and Benin. In South Africa, the project is hosted by the Department of Agriculture, Extension and Rural Development at the University of Pretoria.*

'Innovation' is defined as the act or process of innovating; something newly introduced; a new method, custom, device; as well as a change in the way of doing things[8]. Innovation systems are a concept that defines how societies generate, exchange and use knowledge such that the information and knowledge is translated into useful social or economic activity in agriculture (Spielman & Kelemework, 2009). Another definition is that an innovation system comprises of organisations, enterprises and individuals that demand and supply knowledge and technologies, and the policies, rules and mechanisms which affect the way different change agents interact to share, access, and exchange and use knowledge (World Bank, 2006). For every agricultural innovation specialist there is a different interpretation of what this idea means. This knowledge, however, cannot be considered as an innovation until it is applied (Hall, Mytelka, & Oyeyinka, 2005).

Successful agricultural innovation is seen to require the combination of multiple sources of knowledge to develop solutions that are specific to a certain context (Hall, 2007) and a range of stakeholders including 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 and civil society organisations (Spielman, 2005).

While the role of local innovation (i.e. innovation by farmers to meet their own needs) is appreciated, it has also been recognised that development processes should seek to enhance farmers' links with other stakeholders that are part of the system as they can be a source of new ideas, a channel for communication, a partner in exploration or implementation, or a user of the outputs of the local innovation process (Waters-Bayer, van Veldhuizen, Wongtschowskil, & Wettasinha, undated).

Joint learning in the JOLISAA project refers to a learning process among a heterogeneous group of stakeholder agricultural innovation including researchers, farmers, farmer organisations, entrepreneurs, extension agents, members of NGOs and policy makers (van den Bergh, 2012). In general terms joint learning allows participating stakeholders (including researchers) to get a new, broader perspective on innovation issues and subsequently identify shared goals or common ground for future actions that will enhance the capacity of multi-stakeholder innovation processes to build into small scale farmers knowledge and interest. Therefore in JOLISAA joint learning in agricultural innovation is perceived as interplay between: knowledge building, networking and capacity building. Therefore joint learning in this project was regarded as a form of social learning.

2. SMALL SCALE FARMING IN SOUTH AFRICA

In the coming 25 years global food production will have to be doubled in order to maintain food security at the global level. In South Africa approximately 1.3 million households are active in different forms of supplementary food production on at most 3.3 million ha of rain fed and irrigated agricultural land. For 83% of the households the size of the plot varies from less than 0.5ha to 1ha and 56% of the households are headed by women (Hart, 2009). These households rely on multiple sources of income, with rain fed and irrigated farming contributing respectively 10% and 30% to rural livelihoods. Various surveys indicate that 52% of all households in South Africa experience hunger and 59% of households are insecure.

[8] *Webster's New World Dictionary. 1982. Second College Edition*

With generally low levels of formal education, the challenge for increased future food production will be to invest in human and social capital through a better understanding of the contingencies of the small scale agriculture. There is a general concern that the current approach followed by government to strengthen the small scale farming sector has continued to rely on a linear technology transfer approach rather than the use of collective intelligence where stakeholders interactively learn from each other. It has been recognised in other parts of the world that a continuous process of innovation is essential if food security is to be addressed. The agriculture sector worldwide is moving into an era of rapidly changing markets, technological, social and environmental circumstances that are evolving in often unpredictable ways. Coping with these challenges of this new era will require extension change agents, researchers, policymakers, consumers, entrepreneurs to seamlessly organise their interactions in order to mobilise knowledge and continuously innovate in the face of change.

3. JOLISAA THREE PRONGED APPROACH

The JOLISAA project followed a three pronged approach. The first phase of the JOLISAA project was the compilation of an inventory of cases involving innovation processes. Firstly, 39 successful innovation cases all over South Africa were identified of which 27 were selected for assessment as part of an inventory. The objectives of the inventory were to:

- Take stock of the breadth and diversity of innovation experiences that met the aims of JOLISAA;
- Provide a basic description about what is actually known and available about each case, as to allow the selection of cases for the next phase of a more detailed collaborative assessment; and
- To provide an opportunity to develop / strengthen linkages and networking with partners and resource persons at the country/regional and international levels.

An **analytical framework** was developed for use in the three countries to roughly characterise the inventory cases, with the aim to analyse and compare the inventory cases within and across countries. Concretely, the framework was declined in two complementary templates: a spreadsheet template, and a text template. The spreadsheet consisted of a series of variables describing in a semi-quantitative manner major dimensions of each innovation case (Table 1) for which national JOLISAA national team members had to pick the appropriate pre-defined value (or class) in a closed drop-down list. The text template for its part allowed for the development of concise free-flowing narratives about key qualitative aspects of the innovation experiences. Both templates also included a few variables to assess the interest and actual potential for each case to be further investigated in collaboration with case holders and other stakeholders.

Table 1. Main categories and variables used for the Inventory templates.

Theme / Dimension / variable	**What JOLISAA tried to know about it**	**Addressed in Spread-sheet**	**Addressed in Text narrative**
Innovation: type, nature, domain	Whether the innovations were technical, organisational or institutional and the position along the value chain.	Yes	Description
Stakeholders' roles and interactions	Who has been the lead or active stakeholders? What type of coordination has taken place among stakeholders?	Crudely	Table and description
Role of local knowledge	Has local knowledge played a role?	No	Very crudely
Innovation triggers & drivers	What have been the key triggers and drivers of the innovation process?	Key categories only	In some details
Innovation dynamics	What have been the key phases the innovation process went through from t0 'til the present day	No	Main phases from t0 to today
Scale at which innovation is taking place	Whether the innovation process took place mainly at the local, regional, national scale, or at several scales?	Very crudely	In some details
Results and "Impact" obtained	What have been the effects so far, positive or negative, intended or not, in different dimensions?	Very crudely	Yes (list of results / effects of different kinds)
Availability of supporting documentation	What is already known / documented about this initiative?	Yes	List of key references / resource persons

Source: Adapted from Triomphe et al., 2012.

JOLISAA was looking for cases related to any type and domain of innovation, conducted at any scale: from natural resource management to production and agribusiness, from technical innovation to organisational and social innovation, from local initiatives to initiatives implemented at national or regional level, – but the focus was on multi-stakeholder innovation processes with direct relevance to smallholders. In South Africa, a questionnaire was developed based on the Excel inventory spreadsheet and the narrative questions. The questionnaire was sent to case holders in order to gather more information. From this it emerged that some cases were unsuitable (either not really an innovation case or too early in the innovation process to be included), furthermore some case-holders were not able to share information due to their organisations' tight intellectual property rights policies.

Of the 27 cases only 11 were retained in the inventory if they involved experiences where at least three stakeholders had been actively involved (thus trying to avoid the many cases in which research entertains an exclusive relationship with a group of farmers), and if the innovation processes were at least three years old (thus trying to target processes that were not in their infancy). The focus on working with existing networks and contacts restricted the

identification of a wider range of suitable cases across South Africa. The final number of cases identified for assessment was a result of the limited resources available and the assumption that cases would be identified more easily than proved to be the case. It is also possible that most development programmes and research aimed at supporting smallholder farmers is not aligned with what JOLISAA was seeking, in particular multi-stakeholder innovation processes where smallholder farmers have a played an active role as contributors of knowledge and ideas. The 11 cases included in the inventory are summarised in Table 2.

Table 2. Summary of the 11 cases in the inventory

Title: *Enhancing farmers' organisational capacities and experimentation for managing soil fertility (Case 48)* **Location:** Vhembe District of Limpopo Province (two villages Mpaila and Rambuda) **Mix of stakeholders:** Smallholder farmers, researchers, extension officers, academic staff **Description:** This innovation involves a process of increasing farmers' adaptive capacity to manage natural resources by combining local and external knowledge about the improvement of soil fertility in an irrigation scheme under cash cropping systems. At the same time, farmers' organizational capacities were strengthened to increase their bargaining power. Bulk buying of inputs was initiated to allow them to benefit from economies of scale. Based on the initial success farmers engaged in a subsequent innovation process to plant winter maize for selling of green cobs to increase off take and household income. Various stakeholders contributed their knowledge, with smallholder farmers at the centre contributing their local knowledge about risks and environment.
Title: *Adapting outside knowledge to increase food security in marginal areas: the case of low cost protein supplement for chicks (Case 23)* **Location:** Msinga Local Municipality in KwaZulu-Natal **Mix of stakeholders:** Smallholder farmers, Non Governmental Organisation NGO, Chicken interest group, expert introduced by NGO **Description:** In this innovation process, smallholder farmers, with support from the NGO Mdukatshani Rural Development Trust (MRDT) adapted an external idea introduced by a poultry specialist to suit their context by using their own knowledge and resources. The main objective was to improve the diets of chicks during the winter. This was achieved by taking advantage of old, unhatched eggs, mixed with cooked maize meal (phuthu) and sunflower seed.
Title: *Maize seed production innovation system in the Vhembe district (Limpopo Province) (Case 46)* ***Locality:*** *Limpopo Province* **Mix of stakeholders:** Smallholder farmers, research, extension, university, seed company **Description:** This case documents the evolution of a community-driven system of producing maize seed that was suited to the local condition. It happened in response to smallholder farmers in Limpopo Province expressing the challenge of low maize yields. It shows how more than 10 different categories of actors were mobilised to create a common vision, harmonise their approaches and work together in response to the needs of the farmers.
Title: *Production and marketing of a new cash crop (cherry peppers) (Case 21)* **Location:** Potshini, Okhahlamba Local Municipality in KwaZulu Natal KZN **Mix of stakeholders:** Smallholders, neighbouring commercial farmer, university outreach and NGO **Description:** This case involves a group of smallholder farmers who wanted to diversify their farming activities and start producing a new cash crop. Through discussions with a neighbouring commercial farmer, one of the farmers identified a market opportunity for cherry peppers. The innovation process, supported by Farmer Support Group (FSG), has

involved both technical innovation (the introduction of a new crop) as well as institutional innovation (development of a marketing relationship).
Title: *Developing and testing an irrigation management tool (Case 39)* **Locality:** Limpopo, Mpumalanga, Northwest and Western Cape Provinces **Mix of stakeholders:** Smallholder and commercial farmers, university researchers, private sector manufacturing company, Water Research Commission **Description:** Researchers at Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia and the University of Pretoria drawing on knowledge gained through other irrigation-related programmes working with farmers, developed a simple irrigation-scheduling tool called a wetting front detector. They then fine-tuned the tool (and how it is used) through interaction with commercial and smallholder farmers, testing a prototype prior to up scaling and commercialisation.
Title: *Developing and adaptation of infield water-harvesting techniques (Case 38)* **Locality:** Thaba Nchu, Free State Province **Mix of stakeholders:** University researchers, Agricultural Research Council (ARC), Water Research Commission, smallholder farmers **Description:** In this initiative, funded by the Water Research Commission (WRC) and implemented by the Agricultural Research Council (ARC) and the Free State Department of Agriculture, smallholder farmers became active partners in the process of developing water harvesting technologies. They adapted the techniques for use with vegetables instead of just field crops, and adapted the specific technologies used to gather and store water.
Title: *Developing a winter-feed supplementation option. (Case 27)* **Locality:** Impendle in KwaZulu-Natal **Mix of stakeholders:** Smallholder farmers, Government research (on-station and off-station teams) **Description:** Researchers with the KZN Department of Agriculture, Environmental Affairs and Rural Development worked with a farmer to find a way to improve the intake of chopped maize stover that he fed to his cattle in winter. This led to the development of a low-cost option for locally available winter-feed supplementation. Livestock owners in Msinga and the Non Governmental Organisation (NGO) that supports them are now testing this option as a mechanism for creating agribusiness opportunities for youth as well as improving livestock productivity.
Title: *From unemployment to a viable egg layer production cooperative in Mahonisi village - Limpopo Province (Case 47)* **Locality:** Mahonisi Village in Limpopo Province **Mix of stakeholders:** Unemployed youths, extension officer, local supermarkets **Description:** In this innovation process, which was initiated and facilitated by an extension officer that had been part of a training programme, a group of 12 unemployed youths formed a cooperative and established a suite of agri-businesses. Concerned with their lack of jobs, the group sought support from the local extension officer from Limpopo Department of Agriculture, to start a small egg-production project, supplying local markets. This evolved into a multi-enterprise cooperative supplying four big supermarkets.
Title: *Mainstreaming of traditional healers' indigenous knowledge through manufacturing, processing and patenting a mosquito repellent from Lippia javanica shrub (Case 32)* **Location:** Giyani in Limpopo Province. **Mix of stakeholders:** Traditional healers, CSIR researchers, SA National Parks staff, Department of Science and Technology (funders) **Description:** The traditional healers in the Giyani area have always used some indigenous plants for different purposes. Through a self-organized traditional healers' committee, they

formed a partnership with researchers from Council for Scientific and Industrial Research (CSIR) to develop and commercialise a mosquito repellent made from an indigenous plant that has properties similar to citronella. This initiative was funded by the Department of Science and Technology and has yielded positive results. The product was marketed through Kruger Park tourist outlets because Malaria is a problem.

Title: *Collaboration of research, extensionist and farmers in developing biopesticides to control vegetable pests (Case 36)*
Location: Diphagane Village in Limpopo province
Mix of stakeholders: Smallholder farmers, Extension, Researchers
Description: The vegetable project farmers in the Diphagane village (Limpopo Province) could not afford the expensive chemicals, and therefore experimented with a combination of plants to develop their own recipes for pest control (biopesticides). Building on farmers' knowledge, the local extension officer in collaboration with the researchers from LDA established a joint learning process. The aim was to conduct formal experiments to test the performance of this biopesticide on different crops, and develop a market for it.

Title: *Developing a bulk buying system for agricultural inputs and equipment*
Locality: Okhahlamba District in KwaZulu-Natal
Mix of stakeholders: smallholder farmers, NGO, University outreach
Description: Smallholder farmers in Okhahlamba District of KwaZulu-Natal (KZN), who have been members of a farmers' forum supported by Farmer Support Group (FSG) from University of KwaZulu-Natal are also members of savings and credit groups set up by the NGO SaveAct. FSG and SaveAct are partners implementing the FAIR (Farmer Access to Innovation Resources) project, which has been piloting farmer-managed funds to support local innovation processes. They have strongly supported innovativeness in the community as a mechanism for addressing challenges.

Title: *Developing an irrigation management tool (a wetting front detector)*
Locality: Limpopo, Mpumalanga, Northwest and Western Cape Provinces
Mix of stakeholders: Smallholder and commercial farmers, university researchers, private sector manufacturing company, research organisation **,** extension officers
Description: Researchers at the University of Pretoria and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia, drawing on knowledge gained through other irrigation-related programmes working with farmers, developed a simple irrigation-scheduling tool called a wetting front detector. They then fine-tuned the tool (and how it is used) through interaction with commercial and smallholder farmers, testing a prototype prior to up scaling and commercialisation.

Title: *Developing and adapting infield water-harvesting techniques*
Locality: Thaba Nchu, Free State Province
Mix of stakeholders: University researchers, ARC, Water Research Commission, smallholder farmers, extension officers
Description: In this initiative, funded by the Water Research Commission (WRC) and implemented by the Agricultural Research Council (ARC) and the Free State Department of Agriculture, smallholder farmers became active partners in the process of developing in field water harvesting technologies. They adapted the techniques for use with vegetables instead of just field crops, and adapted the specific technologies used to gather and store water.

Title: *Developing a winter-feed supplementation option.*
Locality: Impendle in KwaZulu-Natal
Mix of stakeholders: Smallholders, Government research (on-station and off-station teams)
Description: Researchers with the KZN Department of Agriculture, Environmental Affairs and Rural Development worked with a farmer to find a way to improve the intake of chopped

maize stover that he fed to his cattle in winter. This led to the development of a low-cost option for locally available winter-feed supplementation. Livestock owners in Msinga and the NGO that supports them are now testing this option as a mechanism for creating agribusiness opportunities for youth as well as improving livestock productivity.
Title: *Development of a suite of agri-businesses by a youth cooperative* **Locality:** Mahonisi Village in Limpopo Province **Mix of stakeholders:** Unemployed youths, extension officer, local supermarkets **Description:** In this innovation process, which was initiated and facilitated by an extension officer that had been part of a training programme, a group of 12 unemployed youths formed a cooperative and established a suite of agri-businesses. Concerned with their lack of jobs, the group sought support from the local extension officer from Limpopo Department of Agriculture, to start a small egg-production project, supplying local markets. This evolved into a multi-enterprise cooperative supplying four big supermarkets.
Title: *Use of local knowledge in developing a mosquito repellent* **Location:** Giyani in Limpopo Province. **Mix of stakeholders:** Traditional healers, CSIR researchers, SA National Parks staff, Department of Science and Technology (funders) **Description:** The traditional healers in the Giyani area have always used some indigenous plants for different purposes. Through a self-organized traditional healers' committee, they formed a partnership with researchers from Council for Scientific and Industrial Research (CSIR) to develop and commercialise a mosquito repellent made from an indigenous plant that has properties similar to citronella. This initiative was funded by the Department of Science and Technology and has yielded positive results. The product was marketed through Kruger Park tourist outlets because Malaria is a problem.
Title: *Farmer-extension-research joint learning for development of a biopesticide* **Location:** DiphganeVillage in Limpopo province **Mix of stakeholders:** Smallholder farmers, Extension, Researchers **Description:** The vegetable project farmers in the Diphagane village (Limpopo Province) could not afford the expensive chemicals, and therefore tried out a combination of plants to develop their own recipes for pest control (biopesticides). Building on farmers' knowledge, the local extension officer in collaboration with the Researchers from LDA established a joint learning process. The aim was to conduct formal experiments to test the performance of this biopesticide on different crops, and develop a market for it.
Title: *Bulk buying of agricultural inputs with savings* **Locality:** Okhahlamba District in KwaZulu-Natal **Mix of stakeholders:** smallholder farmers, NGO, University outreach **Description:** Smallholder farmers in Okhahlamba District of KwaZulu-Natal (KZN), who have been members of a farmers' forum supported by FSG from University of KwaZulu-Natal are also members of savings and credit groups set up by the NGO SaveAct. FSG and SaveAct are partners implementing the FAIR (Farmer Access to Innovation Resources) project, which has been piloting farmer-managed funds to support local innovation processes. They have strongly supported innovativeness in the community as a mechanism for addressing challenges.

Following the cross analysis of 11 inventory cases, three innovation cases were selected from three provinces in South Africa namely KwaZulu Natal, Free State and Limpopo Province to undergo a subsequent phase of collaborative case assessment (CCA) with the following objectives:

- To analyse aspects that could not been addressed adequately during the inventory process, namely the actual roles and contributions of the various stakeholders, the dynamics of the innovation process, key triggers and drivers which influenced the innovation process and the influence of the enabling environment on the innovation process and outcome.
- Its aim was also to extract cross cutting lessons from the three cases in order to make sound recommendations regarding innovation policy, as well as recommendations on innovation-related research and practice.

4. CROSS ANALYSIS OF ELEVEN CASES

A cross analysis of the 11 cases in the inventory was undertaken to build a better understanding of innovation processes is the field of agriculture in South Africa.

Location and scale of the innovation processes. The scale of the innovation processes has varied from those very locally-based, such as the local chick mash in Msinga, to those that have been up scaled internationally, as with the wetting front detector, which has been marketed as far afield as Latin America, USA, Europe and Australia. In terms of the scale of the eleven cases documented, besides the wetting front detector case, 8 were restricted to a single locality while 2 covered more than one province.

Types of innovations encountered. Nine of the 11 had some aspect of technical innovation, while six can be considered innovation bundles - a combination of different types of innovations (See Table 3).

Table 3. Types of innovation processes

Types of innovations	No
Technical only	3
Organisational only	2
Bundles – technical and institutional	2
Bundles – technical and organisational	2
Bundles – technical, organisational and institutional	2
Total	**11**

Examples of bundles of three different types of innovations were the maize seed production system and the *Lippia* mosquito repellent candles case. In both cases, there was technical innovation combined with new organisational structures / institutional arrangements that allowed access to new knowledge and markets and new approaches being used by organisations (institutional innovations) such as the memorandum of understanding (MOU) that was drawn up between the CSIR and the traditional healers to allow for benefit sharing. Institutional and organisational innovations are often less visible and are mainly identified when they occur in conjunction with a technical innovation. For example the soil fertility management case, where the farmer experimentation is visible, but is accompanied by innovative self-organisation of the farmers that has allowed them to access inputs. One case was identified that has been characterised as an organisation innovation only. This is the bulk buying case from KZN, where farmers have used savings to be able to buy agricultural inputs.

The analysis also considered the position along the value chain. This was defined as the nature of the innovation (Table 4). The most common combination was that of agricultural production and marketing. An example was the cherry pepper case from Okhahlamba where the farmers tried out a new crop and entered into a new marketing arrangement with a neighbouring commercial farmer.

Table 4. Nature of the innovation bundles

Nature of the innovations	No
Agricultural production only	1
Agricultural production and service delivery/logistics	2
Agricultural production and marketing	4
Agricultural production and processing	2
Processing and marketing	1
Agricultural production and natural resource management	1
Total	**11**

Triggers of innovation processes. The analysis considered the triggers that gave rise to innovation processes. Environmental stresses such as poor soils, erratic rainfall or insect damage featured in a total of seven cases. The introduction of new technology triggered innovation processes in a total of nine cases. This highlights that the introduction of new technologies, if carefully facilitated can lead to innovation processes as smallholders adapt the technologies to suit their local circumstances. Market changes/opportunities were triggers in four cases. Policy change (or a policy-related opportunity) triggered one innovation process, namely the egg production cooperative. The extension officer was aware that government was supporting cooperatives and used this as an entry point to initiate a youth project. Often there were combinations of triggers (Table 4). Environmental stress together with introduction of a new technology was the most common combination of triggers. It is understandable that if outsiders introduced a technology that farmers perceived to have the potential to address a challenge, this could lead to an innovation process. An example of this is the infield rainwater harvesting case from Thaba Nchu.

Table 5. Triggers that give rise to innovation processes

Combinations of triggers	No
Environmental stress and New technology	5
Environmental stress and Market opportunity	1
Market opportunity and New technology	2
New technology, Environmental stress and Market opportunity	1
Policy change, New technology and Other (high rates of unemployment)	1
Market change and Other (high transport costs)	1
Total	**11**

Stakeholders. Stakeholders involved in the innovation processes documented in the inventory were very varied. They included individual smallholder farmers in all 11 cases (functioning as leaders or co-leaders in four cases), community-based organisations (CBOs) or farmers organisations (such as the cooperative in Limpopo and the farmers' forum in KZN) in 10 cases (a leader or co-leader in two cases), extension officials in seven cases (leaders or co-leaders in two cases), formal research from government or in seven cases (leaders or co-leaders in six cases), NGOs in five cases (leaders or co-leaders in three cases) and private sector in six cases (leaders or co-leaders in two cases – the wetting front detector

and the cherry pepper cash crop case). Private sector stakeholders were mainly actively involved in innovation processes that had a commercialisation aspect. There were only four cases were formal research was not involved at all. The high incidence of cases where formal researchers were involved highlights the fact that innovation processes that are most easy to identify are those associated with formal research institutions.

Knowledge contributions. Since the focus of the JOLISAA study is on multi-stakeholder innovation processes, it was not surprising to find that the majority of cases (8) drew on mixed sources of knowledge (local knowledge of farmers and external knowledge of extensionists, researchers, the private sector and NGOs), while three of the cases mainly relied on external knowledge (the cherry pepper case from Potshini in KZN, the infield rainwater harvesting case from Free State and the youth cooperative from Limpopo), but even these involved local knowledge and experience in the adaptation and application of the innovations. Some examples of local knowledge encountered in developing the inventory included an understanding of local farming systems and implications for when share-outs of savings had to take place (from the bulk buying case), indigenous knowledge (of plants to use in biopesticide recipe and method of processing *Lippia* to produce a mosquito repellent. In some cases, farmers have taken introduced ideas and have adapted them to local conditions.

Initiators of innovation processes. While triggers give rise to innovation processes, it is useful to explore who has initiated the process and how the stakeholders have interacted. In terms of the origins of the innovation processes, four were farmer-led (e.g. development of a winter feed supplement), four were said to be development initiatives and three were researcher-led. Those driven by extension officials and NGOs (for example the Youth Co-op case in Limpopo and chick mash innovation from Msinga) that aim to improve rural livelihoods through income generation and/or improved household food security were categorised as development initiatives. With the cases were the innovation process was initiated by researchers, they introduced possible solutions for addressing challenges that they see affecting farmers. This was the case for the wetting front detector, where researchers were aware that many irrigation farmers are characterised by inefficient use of water. It became clear from the study that many of the innovations one is aware of are those associated with projects and programmes – the spontaneous cases that develop through unplanned interactions between stakeholders are less visible.

Associated activities. A wide range of activities have formed part of, been associated with, or have contributed to the innovation process (Table 6). Training and capacity building has been widely associated with innovation processes (10 cases). This is sometimes directly related to making use of the innovation itself, while in other cases it is part of creating an enabling environment. The need for platforms that facilitate sharing and discussion is highlighted by the extent to which user focus groups, exchange visits and the establishment of platforms and new institutions were mentioned. These are also mechanisms that can stimulate innovativeness by exposing people to new ideas. On-farm experimentation (generally managed and led by researchers) and farmer experimentation (led and undertaken by farmers) also appear to be key to agricultural innovation processes.

Table 6. Range of activities associated with innovation processes

Activities said to be essential or significant	No. of cases the activity is associated with
Diagnosis or thematic studies	5
On-station research	4
On-farm research	8
Exchange visits	8
Training and capacity building	10
User focus groups	9
Platforms or new institutions established	7
Support services developed	6
Other: Farmer experimentation	2

Innovation process dynamics. The innovation processes captured in the inventory range from those which have reached the point of being commercialised and up scaled (i.e. the wetting front detector) to those that were still at a fairly early stage of development (e.g. the bulk buying case). The winter feed supplementation case is one that did not move beyond joint experimentation for various reasons. Most of the cases captured showed some level of success. This was generally measured in terms of the outcome of the innovation process. If the process developed a useful innovation that was adopted and out scaled or taken forward to the commercialisation stage (where appropriate), then it was said to be successful

Contribution of smallholders (local knowledge)

The three cases that form the basis for a cross-analysis demonstrate the range of stakeholders engaging in innovation processes, although they are all quite different from each other. With all three cases, smallholder farmers are the target audience and are closely involved in the innovation process – though the extent to which they are contributing their own ideas/skills is variable.

The bulk buying case (BB) is mainly an NGO supported process (FSG and SaveAct), who have collectively contributed a combination of technical, institutional, brokering and financial literacy skills. There has been very little involvement of formal research or extension staff in this process. FSG has played a hands-on role in facilitating the negotiations for prices and so did not just play a role in contributing ideas about how the BB system could work. The farmers, who played a key role in initiating the BB innovation process, also had input into the functioning of the SCGs to ensure that share-outs would be available so as to allow for timeous purchase of inputs.

In the soil fertility case from Limpopo (case 48), the main contributors of inputs/ideas to the institutional innovation as well as the initial joint experimentation, were the LDA/GTZ BASED team (including the extension staff and the college staff) and the University professor who provided technical leadership. The smallholder irrigation farmers from Rammbuda and Mphaila Irrigation Schemes were recipients of technology rather than contributors to the joint experimentation process, but drew on their observations to initiate farmer experimentation activities.

The ARC researchers, who partnered with UFH, were the key drivers of the IFRWH case at Thaba Nchu, having sourced WRC funding to test the technologies, previously developed on-station, with smallholders. Other stakeholders included black commercial farmers on whose

land the trial was first conducted to attract smallholders. They found the manual methods to be too labour-intensive at this scale. The WRC and National Department of Agriculture NDA funded the work, and therefore also contributed to the innovation process. The Free State Department of Agriculture assisted with site identification and supported the process and helped with the dissemination of knowledge – but did not actively contribute ideas to the adaptation of the technologies. The lack of on-going support from the Department beyond the timeframe of the ARC project was also one of the factors that made the process unsustainable. This innovation process is one where the private sector contributed actively to the innovation process. A private seed company supported the process of modifying the IFRW technologies to suit vegetable production as the ARC had originally designed it for use with maize and sunflower production.

5. JOINT LEARNING OPPORTUNITIES

The joint learning within JOLISAA refers to a learning process among a heterogenous group of stakeholders (researchers and non-researchers) in smallholder agricultural innovation. These learning opportunities occurred on various occasions and involved different learning groups like researchers-researchers, researchers-farmers, researchers–non researchers (NGO members, policymakers, extension workers) (van den Bergh et al, 2012).

The joint learning in the JOLISAA project was organised in three learning cycles namely:

a. During the phase where concepts like innovation and innovation systems were deliberated at national and international workshops
b. The inventory of 39 innovation cases where different stakeholders (researchers and non-researchers) jointly learned from each other with the documentation and analysis of innovation cases.
c. The main opportunity for joint learning happened during the documentation of the three CCA cases in KwaZulu Natal, Free State and Limpopo, where the cases were analysed in more in-depth. In two of the three CCA cases reflective monitoring took place after the fieldwork was completed during stakeholder workshops where data and lessons learnt during CCA were shared.

6. CONCLUSION

The analysis of the innovation systems in South Africa helped to gain a better understanding how to mobilise scientific and other sources of knowledge to cope and prosper in the future era of rapid change?

The inventory phase perhaps did not yield a large number of cases of innovation processes, but it did produce a diverse set of cases that demonstrate that multi-stakeholder processes do led to the development of new technologies (such as the maize seed), practices (such as infield rainwater harvesting) and tools (such as the wetting front detector) as well as new institutions (such as the MOU to allow for benefit sharing between traditional authorities and the CSIR) and new organisational arrangements (such as the bulk buying system). These cases reflect the diversity of stakeholders-beyond the formal ARD actors- involved in innovation processes and the wide range of knowledge contributions and skills that they are able to contribute to the process from technical, organisational to processing and marketing skills.

In fact this assessment of cases illustrated that any technical innovation unfolds together with organisational innovations and even institutional changes being required for the adoption and up scaling of technical innovations like the in-field water harvesting technique (case 38). Organising interactions for innovation is a question what policies and institutional arrangements need to make happen. A missing link may have a considerable restraining effect on the development of the innovation process, and may even stop the process. The cases reflect the innovativeness of the different stakeholders in finding mechanisms to address the challenges that smallholder farmers face in producing and marketing their produce.

Many of the innovation cases are triggered by projects at some stage in the process, mostly at the early stages. In most cases project managers cannot anticipate what really happens especially beyond the project time frame. In the case of the development of the bulk buying system the main innovation was the organising of farmers to buy inputs collectively through the established saving and credit groups (SCGs). This innovation developed over time into the mobilising of farmers to form learning groups used for sharing and exchanging of knowledge and experience (institutional innovation) which did not form part of the original planning of the project.

Lastly it is important that different innovation experiences like the JOLISAA experience should be deployed in institutional and policy change. Policies, research and practices will do better by recognising and strengthening existing local innovation processes rather than trying to replace it.

REFERENCES

HALL, A., MYTELKA, L & OYEYINKA, B. 2005. Innovation systems: Implications for agricultural policy and practice. ILAC Policy Brief No. 2, International Plant Genetic Resources Institute.

HALL, A. 2007. Challenges to Strengthening Agricultural Innovation Systems: Where Do We Go From Here? UNU-MERIT Working Paper Series #2007-038.

HART T, 2009. Food Security Review: South Africa and southern Africa. Centre for poverty employment and growth. Human Sciences Research Council, Pretoria.

TRIOMPHE, B., KAMAU, G., VODOUHE, S. D., LETTY, B., N'GAN'GA, T., HOCDES, H. & FLOQUET, A. (2012). Trends and lessons from an inventory of innovation experiences in Africa. Paper presented at the International Farming Systems Association, Denmark, July 2012.

RAJALAHTI, R. (2009). Promoting agricultural innovation systems approach: The way forward.[http://knowledge.cta.int/en/Dossiers/Demanding-Innovation/Innovation-systems/Articles/Promoting-Agricultural-Innovation-Systems-Approach-The-Way-Forward].

SPIELMAN, DAVID J. (2005). Innovation Systems Perspectives on Developing-country Agriculture: A Critical Review. International Food Policy Research Institute. International Service for National Agricultural Research Division, Discussion paper 2

SPIELMAN, D. J. & KELEMEWORK D. (2009), Measuring agricultural innovation system properties and performance: Illustrations from Ethiopia and Vietnam; IFPRI Discussion paper 00851, Washington, DC: International Food Policy Research Institute.

VAN DEN BERGH J, HARMS B, SELAMNA N, TRIOMPHE B & VODOUCHE S, 2012. JOLISAA approach to joint learning in agriculture innovation research: an interplay between knowledge building, network and capacity building. (Unpublished)

WATERS-BAYER, A., VAN VELDHUIZEN, L., WONGTSCHOWSKIL, M & WETTASINHA, C. (UNDATED). Recognising and enhancing local innovation processes. Prolinnova Working Paper 13.

WORLD BANK, 2006. Enhancing Agricultural Innovation: How to go beyond the strengthening of research systems. Economic Sector Work report. The World Bank, Washington DC.