

*Ambidextrous management in potato nechains in Sub-Sahara and Central Africa*

## **Mobiles hubs of innovation networks and their dynamic meta-governance in multi-stakeholder innovation platforms for tackling societal challenges**

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The study addresses research gaps concerning multi-organisational arrangements in innovation networks, specifically how innovation networks are orchestrated- or managed. This paper presents the concept of *mobiles of innovation networks* and their dynamic meta-governance, from a longitudinal and relational view. It shows evidence on different governance modes of the mobiles hubs at different network levels and different stages of an innovation process.

Case studies of farmer groups that participate in different trajectories to foster innovations in the potato netchain in Uganda, Rwanda and DRC are presented. Social network and netchain analyses are combined for tracking dynamics of innovation networks over time and how they tackle different challenges.

Multi-stakeholder innovation platforms (MSIPs) are presented in this paper as an example of mobiles hub of innovation networks, and how an *ambidextrous management* combines and balances dynamics of managed-orchestrated and resilient innovation networks. Ambidexterity is found to be a dynamic and reflexive managerial capability of networks, that goes further the capability of organisations. Changes in roles of from managers and innovation agents are described for facilitating dynamics of innovation.

*Mobile learning hubs* were also identified as dynamic hybrid communities of practice for knowledge and learning at different network levels in the innovation process, which follow the governance mechanisms of innovation networks to foster different modes of knowledge production and learning, which were sometimes aided by the use of ICT's.

Keywords: mobile hubs, innovation; networks, value chains; network governance; netchains, resiliency, management, challenges, Uganda, Democratic Republic of Congo, Rwanda.

## 1 Introduction

Innovation is a *sine qua non* process in all societal activities and it cannot take place in isolation. In the context of rural innovation and agricultural research, there are various examples of intervention approaches in developing countries that seek to improve farmers' livelihoods, through facilitating different arrangements for innovation.

In the context of food netchains, a combination of numerous conditions that need to be in place before a product is consumed, such as: organisational arrangements, capacity building, technological options (e.g. mechanisation of agriculture), compliance with quality standards and control, a supporting policy framework, financial incentives, and credit access, to mention but a few (Vellema and Boselie, 2003; KIT, 2006; Vermeulen et al., 2008; Mendoza and Thelen, 2008). These conditions are a challenge for small farmers to participate in international markets and local modernised food outlets such as supermarkets, hotels, and fast-food restaurants (Reardon et al., 2003). Being part of innovation networks becomes one possibility for small farmers to face challenges, being these a 'temporary organisational hybrid phenomenon', a social mechanism of collective action (Pika 2002) to cope with challenges.

Particularly, this paper looks at how dynamics of innovation networks take place in multi-stakeholder innovation platforms for fostering innovation in the netchain. Multi-stakeholder innovation platforms are type of hybrid organisation in which farmers connect to other stakeholders at various levels in the netchain forming innovation networks to cope more effectively with the every time more complex dynamics of markets and consumer demands and their rapid changes that occur over time (Kaplinsky and Morris, 2000; Hanf and Pieniadz, 2007; Ruben et al., 2006). Experiences of multi-stakeholder platforms (Pérez Perdomo et al., 2010; Devaux et al., 2009; Devaux, et al., 2007) showed that these are a collective action strategy in which farmers and other groups of stakeholders voluntarily join innovation networks at different social levels to co-produce multidimensional innovations, with socio-technical and institutional arrangements (Horton et al., 2009; Shepherd, 2007; Lightfoot and Scheuermeier, 2007; Pant and Hambly-Odame, 2009; Devaux, et al., 2007; KIT et al., 2006; Kaaria et al., 2008; Kaganzi et al., 2009; Sanginga et al., 2004; Gildemacher et al., 2009; Devaux et al., 2009). Devaux, et al., 2007). Multi-stakeholder platforms have been studied also as dialogical or boundary spaces to share knowledge and sustain learning processes to innovate (Kristjanson et al., 2009; Goldberger, 2007).

Netchains and supply chain networks are highly complex systems (Kaplinsky and Morris, 2000; Hanf and Pieniadz, 2007; Ruben and Slingerland, 2006), with flows of resources and information at various levels. In a netchain, "a set of networks comprised of horizontal ties between firms within a particular industry or group, such that these networks (or layers) are sequentially arranged based on the vertical ties between firms in different layers" (Lazzarini et al., 2001:7). These vertical and horizontal dimensions are related to two main undertakings respectively: (i) chain activities, (e.g. land preparation, weeding, harvesting, storing), that aim for the vertical integration of the value chain; and, (ii) chain governance, and involvement in decision making processes, which entails participation in the design and steering of the

production process and forms of cooperation for the horizontal integration, which has to do with processes like the management of information, quality, marketing, cooperation and innovation (Ruben et al., 2007). There is little evidence on how the dynamics of innovation networks, i.e. the innovation arrangements and relationships sustained among actors in a network, take place along its horizontal and vertical dimensions. Also, insufficient attention has been given to how and why participation in innovation networks can enhance progressively the capacity of farmers to react and adapt to various types of shocks – such as market failures - or solve complex problems. How this process takes place and through which governance mechanisms is a gap in the literature of innovation, management and networks, how the social organisation of networks for innovation takes place, being the social dimension of innovation where all arrangements among people are shaped and negotiated. More empirical evidence is required to get more specific insights for the orchestration of innovation in complex systems like in networks. Further research has been recommended on a “dynamic analysis of the evolution of networks, in particular in regard to possible changes in the interdependencies between agents when they transact over time” Lazzarini et al., 2001) since there are few process and relational oriented studies and empirical evidence on these dynamics (Hoang and Antoncic, 2002; Lazzarini et al, 2001).

This paper addresses a critical gap in the literature is still the lack of investigation on the multi-organisational arrangements in networks for innovation, specifically innovation networks evolve over time and through which governance mechanisms (Salancik, 1995; Hanna and Walsh, 2002; Pittaway et al., 2004; Shaw, 2006; Howells, 2006) when actors are confronted to different dilemmas and paradoxes faced in complex systems. Governance of networks entails the alignment of efforts, use of resources, flow of information, knowledge management and social learning processes, and capacity to respond to complex problems in innovative ways (Alter and Hage 1993; Provan and Kenis, 2007), which is related to the concept of ambidexterity as a dynamic and reflexive capability of organisations to innovate. Qualitative and longitudinal studies have been recommended on the importance of ambidexterity as a managerial reflexive and dynamic capability of organisations for balancing different paradoxes in innovation process (Turner et al; 2013; Oborn, 2010; Mueller, 2013). Addressing these multiple research gaps could provide insights useful for the effective design of intervention approaches and policies (Hämäläinen and Schienstock, 2000; Spielman, 2007).

The research question that will be addressed in this paper is *How do innovation networks are managed over time and through which governance mechanisms? Does an ambidextrous management in the multi-stakeholder innovation platforms, through facilitating dynamic-hybrid governance of innovation networks over time, fosters the innovation- ambidextrous capability of farmers (and other actors) of the network to deal simultaneously with various types of challenges?*

The paper is organised as follows, firstly, a review of the literature on the cyclical nature of innovation, ambidexterity as a managerial capability and its relation with governance mechanisms. Secondly, it presents the research question and the methodology used. We compare dynamics of innovation networks in different trajectories of farmers' groups that participate in multi-stakeholder platforms in Uganda and other types of trajectories to foster

innovation in potato netchains in Rwanda and the Democratic Republic of Congo. The third section of the paper analyses cases in the light of the theory. Finally, it presents the discussion and a research agenda.

## **2 Theoretical framework**

### ***2.1 Innovation as a cyclical process***

For an innovation networks to become a business network in a netchain, there is a process that has to take place. Looking at the governance mechanisms of innovation networks in multi-stakeholder platforms has to do with their timing and then it requires a dynamic approach.

In theory, innovation is a cyclical and dynamic process that has stages of Exploitation and Exploration that are in continuous flux, which is called the cycle of innovation (Gilsing and Nooteboom, 2006, Van de Ven et al., 2008) (Figure 1), concept that integrates the Schumpeterian concept of creative destruction, disintegration and integration (Nooteboom, 2000). An exploitative stage, this cycle is characterised by processes that seek minor adjustments to a practice/process (a phase called differentiation), with incremental innovation and improvement on knowledge and resources enhancing competence (Henderson and Clark, 1990). However, when those adjustments are not be enough to fit properly in a new context, alternative (and often exogenous) innovations are needed (a phase called reciprocation). Less frequently encountered are combinations of old and new components forming a new radical configuration of the former system of exploitation (Gilsing and Nooteboom, 2006), with radical innovation (Henderson and Clark, 1990), which implies that there is flow of new knowledge and/or resources. Sometimes changes or adjustments cease, so the innovations become a dominant design (a phase of consolidation) and the cycle of innovation remains in the Explorative stage. The dominant design can then be replicated in other contexts (a phase of generalisation) and the cycle moves to the stage of exploitation, with further differentiation to adapt to new contexts.

Movement of innovation networks through the cycle of innovation can be erratic, phases may be missed and reverses possible, and if a stable configuration of actors and practices is maintained, the cycle of innovation may stall. In explorative and exploitative stages knowledge also evolve, with combination and conversion of tacit and codified knowledge, through processes of externalisation and internalisation (Nonaka and Taekuchi, 1995).

Exploration and exploitation take places in a cyclical way, and at every stage different governance mechanisms of networks are expected to be observed in nethains, when stakeholders join the networks and make different arrangements during the innovation process.

## 2.2 *Ambidexterity and governance of networks*

As stages of exploration and exploitation are cyclical, it is expected that different governance mechanisms of networks change over time.

Governance of networks entails the alignment of efforts, use of resources, flow of information, knowledge management and social learning processes, and capacity to respond to complex problems in innovative ways (Alter and Hage 1993; Provan and Kenis, 2007), which is related to the concept of ambidexterity as a dynamic and reflexive capability of organisations to innovate. Ambidexterity is a capability of organisations that has been researched in the context of small to medium size firms, supply chain management, but more qualitative research has been recommended on how to implement ambidexterity in the supply chain (Blome, 2013). There is also an emergence of studies of ambidexterity in international new ventures (INV), adaptable international organisations and inter organisational (IOs)-Hybrids and networks, although with few studies (Schemeil, 2013, Mueller, 2013), as new social structures of the paradigm of open innovation.

The debate on organizational ambidexterity is on different ways of alignment of efforts, i.e., in its governance for exploration and exploitation. Volberda (1998) stated that flexible structures in organizations to pursue exploration and exploitation can be the solution to manage possible paradoxes or challenges. This paper explores this flexibility but at the network level, how these structural dynamics of networks are governed over time in the making of different formal and informal arrangements. More research has been recommended to explore the levels in which ambidexterity takes place (Nosella et al, 2012).

Three general governance modes have been identified from various strands of the literature for studying dynamics of innovation networks. These governances also have to do with the inter-organisational relationships among their members in the making of multidimensional innovation arrangements (technological, knowledge, policy, etc). According to Li et al (2008), changes in inter-organisational relationships or interdependencies among actors depend on their activities and their motivations. In innovation networks, these activities and motivations can be focused on exploration, on exploitation, or in both exploration and exploitation, being the types of inter-organisational relationships (informal or formal manner) indicators of explorative and/or exploitative alliances.

The first governance mechanism is *mutual adjustment*, characteristic of *peer groups* (Bouma and Schreuder, 2008), which can be the governance of small innovation networks. One indicator of this governance mode is that members have face to face communication (Dhanaraj, and Parkhe, 2006), they belong to the same organisational level, work together without hierarchy and without higher levels of authority. This type of governance is similar to what Dhanaraj, and Parkhe (2006) named a *participant governance mode*. Advantages of this governance mechanism are that members of the group can better share resources (like knowledge and information), manage risks in a collective way and so can get better benefits in economies of scale and reduced transaction costs, compared to the isolated efforts of

individuals. Members also receive the same benefits equally and have the same rights, and participate in decision making. However, from an economic perspective, Bouma and Schreuder (2008) underline that the limitation of this governance mechanism is the risk of shirking by members.

Another characteristic of the mutual adjustment governance mode is the type of inter-organisational relationships among members. Depending on how informal or formal are the relationships among members, these inter-organisational relationships can be reciprocal interdependencies (governance mode of mutual adjustment), or pooled interdependencies with loose and sparse social ties (governance mode of standardization, Thompson, 1967). Specifically in the context of netchains, Lazzarini et al (2001) similarly describes reciprocal ( $\leftrightarrow$ ) and pooled (---) interdependencies, which are sustained among actors that belong to the same group or layer, i.e. the relationships among peers for mutual adjustment. Both reciprocal and pooled interdependencies entail the participation of actors in the design and steering of the production process and forms of cooperation, which have to do with horizontal ways of integration (Ruben et al., 2006).

The second governance mechanism is called *simple hierarchy* (Bouma and Schreuder, 2008), which can be the case of larger innovation networks (compared to the previous governance mechanism). This coordination mechanism differs from the previous one because it has a hierarchy, with a configuration of larger innovation networks of medium sized firms in which face to face communication is not easy. According to Bouma and Schreuder (2008), one person can be intermediary in the communication, so be this governance a communication economy over a peer group. The members receive benefits according to their performance, and a manager supervises the group to reduce shrinking. This is similar to what Dhanaraj and Parkhe (2006) refer to as *lead governance mode*. If the lead governance is governed or coordinated by a third and independent party, it would be called *Non Administrative Organisation* (NAO) governance mode. Inter-organisational relationships in this type of governance are more hierarchical and made with other actors that belong to different layers (downstream or upstream). In the context of netchains, Lazzarini et al (2001) describe sequential interdependencies ( $\downarrow$ ) that are established between actors that are directly related in an activity that is sequential (i.e. vertical integration, Ruben et al., 2006), which can be associated with buyer-supplier relationships, or it might be the case of small farmers that do contract farming. Thompson (1967) related this type of interdependency to the *Plan* governance mode. In *simple hierarchy* is expected that interdependencies among members are formally established, for instance, through contracts.

*Multi-stage hierarchy* (Bouma and Schreuder, 2008) is the third governance mode and is more characteristic of medium size firms that benefit from economies of scale, with hybrid modes of governance, so this can be the case of complex structures of innovation networks. Bouma and Schreuder (2008) explain that when the numbers of members of the team are large, the teams are divided according to different tasks and coordinated by a manager, but supervised by a general manager. This hybrid type of governance in a multi-stakeholder innovation platform could imply a combination of multiple and sometimes simultaneous inter-

organisational relationships, like the types of interdependencies described by Lazzarini (reciprocal, pooled and sequential interdependencies).

### 3 Methodology

#### 3.1 *Tracking dynamics of innovation networks over time*

An explorative longitudinal multi-case study design was conducted for tracking the governance mechanisms of innovation networks in different types of interventions or trajectories that aimed to foster innovations to make netchains more favourable for small farmers from south west Uganda, north west Rwanda and the eastern Democratic Republic of the Congo (DRC) (Table 1). We select the case study method since is it appropriate for addressing research in which the researcher has little or no control of events (Yin, 2003).

To explore the research question some empirical data was used from farmer groups some of which were participating in Research and Developmental (R&D) intervention approaches, and in multi-stakeholder innovation platforms with various stakeholders from the civil society that organised in innovation networks to tackle challenges.

We selected 6 farmer groups and producer organisations from south west Uganda, north west Rwanda and the eastern Democratic Republic of the Congo (DRC) who faced similar problems since they were all producing the same commodity (potato, *solanum tuberosum*). Three of the producer organisations were participating in the Integrated Agricultural Research for Development (IAR4D) developed by the Sub-Saharan Africa Challenge Program (SSA-CP) intervention approach, through Multi-Stakeholder Innovation Platforms (MSIPs). Key principles of IAR4D at the time of implementation (FARA, 2007) were: (i) working in an Innovation Platform that is a multi-sectoral, multi-institution coalition of actors in the agricultural value chain, organised to bring about change, and able to innovate; (ii) non-linear collaboration among actors, in contrast to conventional Agricultural Research for Development (ARD) that is focused on technology transfer; (iii) address constraints along whole value chain; (iv) multidisciplinary and participatory research process, and; (v) incorporate capacity building for all actors. The Sub-Saharan African Challenge Program (SSACP) was conceived to implement and prove the effectiveness of IAR4D, an approach that focus on the understanding a complex problem and its solution, addressing interactions between agricultural productivity, natural resource management and linkages to markets (Hawkins et al., 2009).

Each MSIPs involves various clusters of stakeholders at different levels, who collaborate in the making of different innovation arrangements (organisational, technological, knowledge, institutional, financial and other). The other three farmer groups were selected in each country, within the same agro-ecological zones where the multi-stakeholder platforms are located (Figure 1, Farrow et al, 2013). This sample allowed exploring different types of

governance mechanisms at different scales of innovation networks of the producer organisations (small, medium and larger netchains).

Data collection was divided in two phases to observe dynamics of innovation networks over time.

Semi-structured interviews, observations and focus groups were conducted with key informants represented by key informant representing different stakeholder of the potato netchain (Table 1). Retrospective questions related to ‘challenges of innovation’ (See figures in annexes) for tracking the dynamics of innovation networks (See Perez report, 2011<sup>1</sup>, Van de Ven et al. (2008) and their arrangements over time, and how the approach was helping them to come to a solution, and how this process was orchestrated-managed and by whom (presence or absence of facilitation). Special attention was paid to the types of arrangements among network actors (technological, social, knowledge, policy, etc) and if these were more oriented to facilitate vertical or horizontal integration, or both, in the netchain. Decision making and knowledge sharing strategies were here a special component to look at, since these can result in different ways of learning and production of knowledge as a public good and source of innovations (World Bank, 2006).

Questions were also asked to informants on the general societal challenges and contextual conditions for drawing the “environment” for innovation (if amicable or not).

This data was complemented with secondary data (project reports, documents of the principles of approaches, institutional brochures, minutes of meetings, didactic manuals, innovation platform action plans, book of visits). Interaction of netchain actors in meetings were also observed and recorded.

The principles of governance, decision making and management structures, type of inter-organisational relationships (formal or informal), variety of stakeholders participating and size of the networks was observed. To track changes in the governance mechanisms I applied netchain analysis (which combines social network and chain analysis) of innovation networks at certain stages to observe their structural dynamics when facing certain challenges. I used the classification of reciprocal, sequential and pooled inter-dependencies of Lazzarini et al. (2008) as indicators of governance mechanisms.

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[http://academia.edu/3521932/Dynamics\\_of\\_innovation\\_networks\\_and\\_the\\_roles\\_of\\_innovation\\_intermediaries\\_to\\_foster\\_innovation\\_in\\_agricultural\\_netchains](http://academia.edu/3521932/Dynamics_of_innovation_networks_and_the_roles_of_innovation_intermediaries_to_foster_innovation_in_agricultural_netchains)



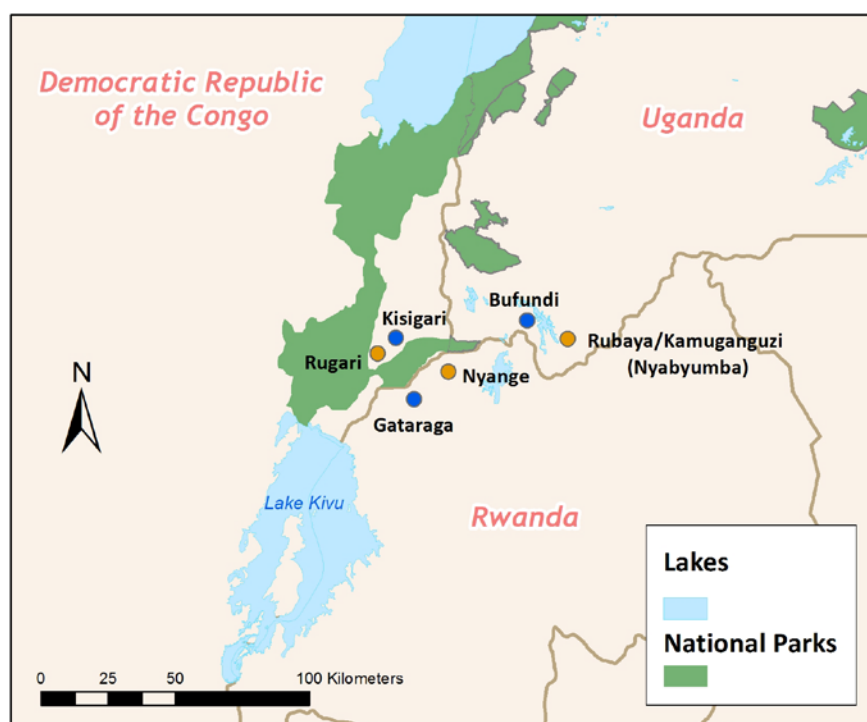


Figure 1. Data collection sites

| Country | Stakeholders in innovation networks  | District                                | Key informants (potato enterprise)   | Estimated size of innovation network and linkages (BEFORE 2010)  | Estimated size of innovation network and linkages (2010-2011)   |
|---------|--|---|--|--|---|
| Uganda  | <i>Bufundi United</i> Multi-stakeholder cooperative. Innovation Platform, Integrated Agricultural Research for Development (IAR4D).                          | Kampala,                                | 1 task force leader / researcher / manager (Makerere University), 1 researcher (Open Distance Learning Network)  | Farmers not organised as a producer organisation   | 157 members organised as a producer organisation. With linkages to various clusters of the potato netchain.                       |
|         |  | Kabale district                         | 1 researcher (NARO), 1 policy-maker (Kabale district), 1 national data manager (MUK), 1 processor / retailer (Huntex), 1 seed processor, IP national coordinator   |  |   |
|         |  | Bufundi sub-county, Kabale district     | President IP, secretary IP, 3 farmers, 1 trader<br>2011 focus group with farmer group  |  |   |
|         | <i>Nyabyumba</i> producer organisation<br>Various interventions, currently contract farming.   | Kamuganguzi sub-county, Kabale district | President cooperative, secretary cooperative, 10 farmers, 1 researcher, (CIAT/NARO)<br>2011 focus group with farmer group  | Farmers participated in a MSIP and formed a producer organisation, with multiple linkages to other clusters of the potato netchain | 120 members doing contract farming. Limited linkages to clusters of the potato netchain.  |
| Rwanda  | <i>Gataraga Multi-stakeholder cooperative.</i> Innovation Platform. Integrated Agricultural Research for Development (IAR4D). Multi-stakeholder cooperative. | Ruhengeri                               | 1 task force leader / researcher / manager (ISAR), IP national coordinator, 1 farmer association extension agent value addition (IMBARAGA), 1 national data manager (ISAR), 1 university researcher (NUR), 1 M&E manager (FARA/ISAR) | Farmers linked to Imbaraga, the umbrella national farmer federation of Rwanda.   | 200 members organised as a producer organisation to sell potatoes in Kigali. Linkages to various clusters of the potato netchain. |
|         |  | Gataraga secteur,                       | President IP, secretary IP, 3 farmers, 1 trader  |  |   |

|     |  |   |   |  |  |
|-----|--|---|---|--|--|
|     |  | Musanze district, Nord Province                               | 2011 focus group with farmer group  | Farmers linked to Imbaraga, the umbrella national farmer federation of Rwanda.   | 40 members, part of Imbaraga national farmer federation of Rwanda. Very limited linkages to other clusters of the potato netchain. |
|     |  | Kigali  | 1 Supermarket retailer  |  |  |
|     | <i>Abahujumugambi</i> producer organisation. 3G Potato project by International Potato Center (CIP).     | Nyange secteur, Musanze district, Nord Province               | 1 facilitator-researcher (CIP), 1 extension worker, 10 farmers 2011 focus group with farmer group   |  |  |
| DRC | <i>Muungano Multi-stakeholder cooperative.</i> Integrated Agricultural Research for Development (IAR4D). | Goma  | 1 private sector credit (MECRECO), 1 farmer association extension agents (SYDIP), 1 Research extension agent (CIAT/TSBF), 1 NGO manager (Diobass), IP national coordinator (INERA), 1 researcher (Observatoire), 1 processor, 1 national data manager (Diobass) | Most of farmers belonged to religious community, which facilitated education for children and other community activities, giving support especially after civil war. | 450 members (including producer organisations in different villages). With linkages to various clusters of the potato netchain     |
|     |  | Kisigari groupement, Rutshuru territoire, North Kivu province | President IP, secretary IP, 3 farmers, 1 trader 2011 focus group with farmer group  |  |  |
|     | <i>Gamaru</i> farmers' group. Subsistence agriculture. Small farmer group.                               | Rugari groupement, Rutshuru territoire, North Kivu province   | 6 farmers 2011 focus group with farmer group  | Producer organisation organised, with eventual linkages with extension agents, but when civil war took place, farmers were isolated.                                 | 80 members. Very limited linkages with other clusters of the potato netchain   |

Table1. Case studies and key informants

## 4. Results

### 4.1. The setting and types of challenges to tackle

In general, problems faced by famers and other stakeholders of the potato netchains in Uganda, Rwanda and Congo were complex and of different types. Soil fertility problems, lack of clean seeds of potato, lack of knowledge on cropping, harvesting and processing techniques on potato; lack of technology, poor organisational capacity to do collective marketing, lack of access to credit are some of the most common in the three countries. Other problems that are not directly related to the value chain also affect innovation like no good infrastructure (like roads), a non-supportive policy environment; poor or absent facilitation of institutions to innovation processes, corruption, lack of trust and even situation of war. Intervention approaches have been trying to tackle some of these problems, however some of the problems are far of being under their scope and even have been tried to bring on board the respective actors that can contribute to the solution. (See table 2).

| Producer organisations   | Country | District                                 | Challenges faced in the potato enterprise before 2010  | Opportunities  |
|--|---------|--|--|--|
| <i>Bufundi United</i> Multi-stakeholder cooperative. Innovation Platform, Integrated Agricultural Research for Development (IAR4D).                          | Uganda  | Kabale district                          | <ul style="list-style-type: none"> <li>• Land use competing claims</li> <li>• Poor farmer organisation</li> <li>• Scattered marketing</li> <li>• Limited access to technologies -(clean seeds and agricultural inputs)</li> <li>• Soil infertility and erosion</li> <li>• Limited knowledge on natural resource and crop management.</li> <li>• Production of potatoes with bad quality due to diseases (like bacterial wilt)</li> <li>• Poor financial capacity of farmers to access (lack of collateral) and respond to credit</li> <li>• Corruption, governance problems</li> <li>• No operational policies</li> <li>• Lack of information on markets and prices.</li> <li>• Poor bargaining power</li> <li>• Poor linkages to other actors of the potato netchain</li> <li>• Poor infrastructure of roads, high transport costs</li> </ul>   | <ul style="list-style-type: none"> <li>• East African Common Market</li> <li>• Written policies</li> <li>• Microfinance facilities like Savings and Credit Cooperatives (SACCOS)</li> <li>• Connectivity of farmers using mobiles phones</li> </ul>  |
| <i>Nyabyumba</i> farmer cooperative. Various interventions, currently contract farming.  |         |  |  |  |
| <i>Gataraga Multi-stakeholder cooperative.</i> Innovation Platform. Integrated Agricultural Research for Development (IAR4D). Multi-stakeholder cooperative. | Rwanda  | Musanze district, Nord Province          | <ul style="list-style-type: none"> <li>• Land use competing claims.</li> <li>• Small plots for producing potatoes</li> <li>• Production of potatoes with bad quality due to diseases (like bacterial wilt)</li> <li>• Limited financial capacity of farmers to respond to credit.</li> <li>• Limited knowledge on natural resource and crop management.</li> <li>• Little information on markets and prices. Imbalance on bargaining power.</li> <li>• Poor linkages to other actors of the potato netchain</li> </ul>   | <ul style="list-style-type: none"> <li>• Organised farmers</li> <li>• Increasing financial opportunities</li> <li>• Access to technologies (clean seeds and agricultural inputs) coordinated through farmer groups (For instance, Imbaraga national farmer association).</li> <li>• East African Common Market</li> <li>• Written policies and more operational policies (compared to Uganda)</li> <li>• Government fighting corruption</li> <li>• Good infrastructure, no high transport costs</li> <li>• Connectivity of farmers using mobiles phones</li> </ul> |
| <i>Abahujumugambi</i> farmer cooperative. 3G Potato project by International Potato Center (CIP).  |         |  |  |  |
| <i>Muungano Multi-stakeholder cooperative.</i> Integrated Agricultural Research for Development (IAR4D).   | DRC     | Rutshuru territoire, North Kivu province | <ul style="list-style-type: none"> <li>• Very poor farmers</li> <li>• Civil war, impossibility of farmers to be organised.</li> <li>• High migratory movements</li> <li>• Untrusting environment</li> <li>• Land use competing claims</li> <li>• Erosion</li> <li>• No access to technologies (clean seeds and agricultural inputs)</li> <li>• Limited knowledge on natural resource and crop management.</li> <li>• Production of potatoes with very bad quality due to diseases (like bacterial wilt). Bad reputation of potatoes in this area is used by middlemen for reducing bargaining power of farmers.</li> <li>• Scattered marketing</li> <li>• Lack of information on markets and prices. No access to ICTs like mobiles phones. No bargaining power.</li> <li>• No financial options and lack of financial capacity of farmers to access (lack of collateral) and respond to credit</li> <li>• Corruption, governance problems</li> <li>• No written policies</li> </ul> | <ul style="list-style-type: none"> <li>• High prices of potatoes in Kinshasa, where eating potatoes is considered a luxury. Processors interested to buy potatoes from small farmers to reach this market opportunity. Value addition is needed: technology for drying potatoes to be transported to Kinshasa by air since there are no roads.</li> <li>• East African Common Market</li> </ul>  |
| <i>Gamaru</i> farmers' group. Subsistence agriculture. Small farmer group.   |         |  |  |  |

Table 2. Case studies and challenges faced by farmers in Sub-Saharan Africa: potato enterprise

The way how the challenges were tackled in each trajectory of the farmer groups implied different ways of organisation of innovation networks over the process, as it is described in the next section.

### **3.2 Governance of networks: A typology and roles**

Dynamics of innovation networks were governed in two different ways: Informal serendipitous and temporal dynamics of resilient innovation networks, and formal, orchestrated or managed dynamics, which sometimes were seen to take place in a cyclical way. It was observed that innovation networks sometimes evolved into more formal networks like business networks.

In the cases of farmers participating in the MSIPs, an ambidextrous, hybrid and dynamic governance was characteristic of innovation networks, which changed over time according to the types of challenges addressed, whether be short, medium or long term challenges (See innovation trajectories in annexes, and Perez, 2011).

Structural changes of innovation networks and changes in inter-organisational relationships were used as indicators of the governance mechanisms.

Innovation networks stabilised and disbanded (open and close) over time according to innovation challenges. As new challenges emerged, the configurations of actors participating in innovation networks of the potato netchain changed. In the cases of the multi-stakeholder cooperatives, these structural changes occurred in general in a more dynamic way. Accordingly, inter-organisational relationships also changed over time, as explorative-informal relationships and/or exploitative-formal alliances.

#### **3.2.1 First order governance of innovation networks for mutual adjustment: explorative and exploitative small networks**

*Mutual adjustment-first order governance* is a type of governance identified in small innovation networks in stages when actors representatives of different stakeholder need to organise in small groups at certain stages, having the need of mutual adjustment, whether in an informal or formal manner. Thus, inter organisational relationships were observed to be reciprocal or pooled, depending on the required formality of relationship. When there was high inter-dependency among members, reciprocal inter-dependencies were made. If there was a more informal relationship, pooled interdependencies were made. It was observed that the inter-organisational relationships, whether reciprocal or pooled were not necessarily established among actors that belong to the same organisational level, i.e., not necessarily with peers, and face to face communication was not always the case, since in some cases ICTs mediated the communication with the use of mobile phones and internet.

In all the cases was found the existence of this type of governance in the local governance mechanisms of farmer groups. A small group of representatives of different committees were organised in small groups to make decision instead of having the participation of all the farmers affiliated to a producer or farmer organisation.

In the cases of the MSIP, representatives of different stakeholders also meet to discuss collective issues. In this case, the local governance structures of the farmer groups were merged into the governance structure of the MSIP, but then with the participation of external actors (no part of the farmer group or producer organisation) to participate in democratic decision making in relation to how to organise innovation to tackle problems. By using longitudinal netchain analysis, it was identified that when a challenge emerged, generally small innovation networks (Figure 2a) were formed, with few members and without hierarchy.

In this type of governance, two types of inter-organisational relationships were identified: It was found that members of the innovation network sometimes sustain pooled interdependencies (---) with loosed and sparse ties, when there was no need of formal relationships because inter-organisational relationships were more for exploring new ways of doing things. The **openness of the innovation network and the informal character of relationships (loosed ties) fostered** novelty, important for innovation and particularly necessary to have sources of new knowledge, which was according to farmers the most important contribution of the MSIPs.

Reciprocal interdependencies ( $\leftrightarrow$ ) (see Figure 2b) were found at stages for exploiting innovations, in stages when there was a formal mutual dependency among actors in order to address some challenges. Then **stability of the innovation network was crucial**. For instance, when farmers needed to be very organised as a producer organisation to be able to do collective marketing; a stable innovation network was necessary to comply with production and quality demands. The formality of relationships gave stability to the innovation network and reduced uncertainty.

For the demonstrations, how many members of the association usually participate in those activities? When you go to plant and to show to other how to do things, you go by small groups? every parish there are some members who are selected and they are taught to

For the demonstrations, how many members of the association usually participate in those activities? When you go to plant and to show to other how to do things, you go by small groups?

"In every parish there are some members who are selected and they are taught to organize some other groups in their villages. When the time of planting comes, they call the groups, all the members to come and see what is being done on that plot".any members come to these demonstrations, just to have a

And how many members come to these demonstrations, just to have a number?

Sometimes like 20

We used to grow the potatoes some could not how much insecticide to apply, now we have known, by we have grown Victoria, when it have come from the soil we apply, we know the measures, and after we can harvest.

Do you think the IP is something that has contributed to innovate?

Yes, they have done a lot, the stakeholders from the MSIP have done a lot.

Yes they have done a lot, but for you, what is the contribution of that MSIP for you? As a woman as a farmer, what have you learnt?

It has driving me to be active, to know how to look after my family, and how to conserve my soil. They have taught us how to make the manure from the farmyard, from the green plants so that we can look after our soil. And even, we have been taught on how to add value on our crops, we have started food processing and value addition.

Kabale, Uganda

Jenny, farmer participating in MSIP in Kabale, Uganda.

In the MSIP was found that both explorative and exploitative dynamics of mutual adjustment were simultaneously organised over time in a dynamic manner.

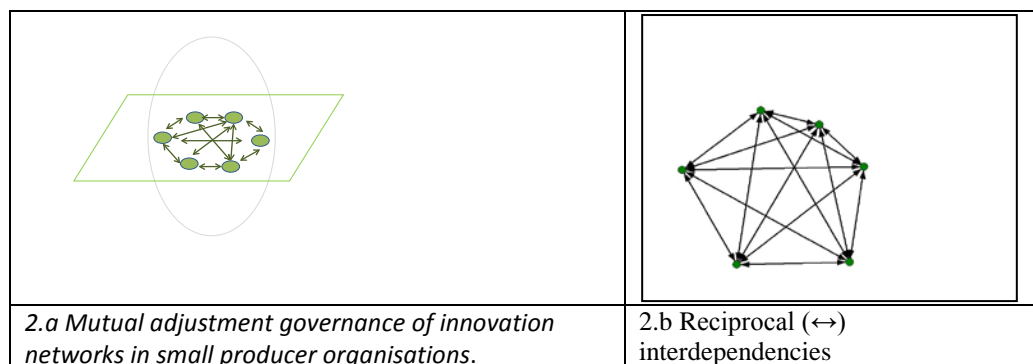


Figure 2.

### 3.2.2 Second order governance of innovation networks for scaling innovations and fostering entrepreneurship: larger innovation networks

*Hierarchical-second order governance* was a type of governance identified when larger innovation networks were formed at certain stages of the process. Compared to the networks of mutual adjustment governance, inter-organisational relationships in this case are more hierarchical, and established between actors that belong to a different layer (upstream or downstream) of the netchain (Figure 3) thus vertical integration between two different clusters of stakeholders was established. Actors of the innovation network sustain sequential interdependencies ( $\downarrow$ ) with other stakeholders with whom they are directly interdependent in an activity that is sequential (Figure 3a), for the *exploitation of innovations and capabilities*, not only for complying with economies of scale but for scaling innovations and capabilities. For instance, the type of inter-organisational relationship sustained among the farmers of the Nyabyumba producer organisation and Nandos (food outlet) in Kabale distric, Uganda (Figure 8), or the type of interdependency between Gataraga producer organisation as part of the MSIP in Muzanse distric (Rwanda) and the supermarket buyer of potatoes in Kigali. Another example is the type of inter-organisational relationship sustained among producer organisations and extension agents for the diffusion-adoption of technologies or knowledge transfer through linear R&D approaches, like the case of linear diffusion of technologies of the producer organisations in Nyange, Musanze district, Rwanda (Figure 3b). In both examples, there is a more formal relationship-transaction among parties (signing of a contract, agreement, and alike), which defines the hierarchy of the relationship between parties.

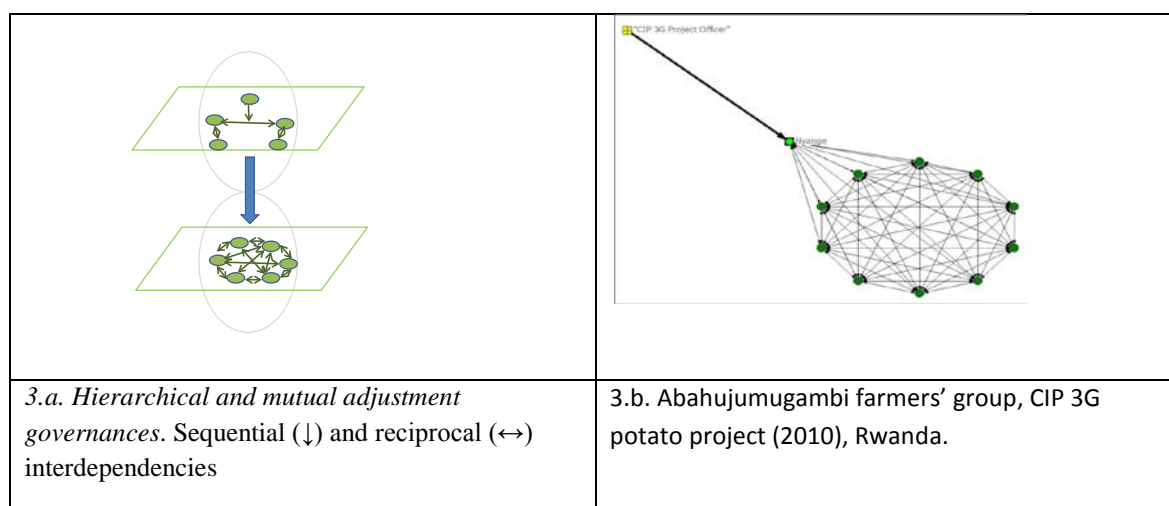


Figure 3. Reciprocal (↔) and sequential interdependencies (↓) occur among innovation networks of cooperatives which members are mutually dependent.

In Kabale district, Uganda, the *Nyabyumba* producer organisation (Figure 8, trajectory in annexes) also had a hierarchical governance formalised in a contractual relationship (contract farming-business oriented), with the specific interest in the economic outcome. However, when this governance mode of that type of intervention was consolidated and fixed for more than 8 years, farmers stagnated in their innovation trajectory. This is an example of how a fixed governance mechanism makes stagnant the innovation process. Along their innovation trajectory, farmers had developed their entrepreneurial skills to make innovation arrangements by themselves like acquiring technology (e.g. clean seeds), facilitation of NRM and other arrangements. However, their capacity to tackle various challenges like complying with production, quality, financial challenges was not as effective compared to when they were connected to a large innovation network, when the Enabling Rural Innovation consortium accrued various stakeholders and their capacities to solve various types of challenges. If well they had gained business and economic capacity, their innovation capacity was limited. With no novel and relevant connections, it was difficult for *Nyabyumba* farmers dealing with quantity and quality standards set in the contract, dealing with scarcity of resources like labour force, land and capacity of getting more credit. They were also limited to get new linkages to markets and also getting more possibilities of value addition. They were disconnected of the more resilient networks that had in the ERI MSIP.

In Musanze district, Rwanda, there was also a hierarchical governance in the *Abahujumugambi* producer organisation, which was participating in an initiative for technology adoption, the 3 G project of the International Potato Center (CIP). Innovation networks in this producer organisation had a hierarchical governance formalised through a contractual relationship (exploitative) as in the *Nyabyumba* case, and a vertical integration between the producer organisation and the provider of clean seed. In this case, the focus was tackling the innovation challenge of lack of clean seeds that farmers faced in the district, and some tackling some NRM challenges, no further arrangements. Comparatively and in the same district, farmers in Gataraga who participated in the multi-stakeholder cooperative



participating not only on provision of clean seeds and technology adoption and training, but also in the making of complementary arrangements.

Innovation network structures of farmers working with hierarchical ways of governance were relatively static over time, maintaining the same type of sequential interdependencies along the trajectory. For instance, in the case of the *Abahujumugambi* producer organisation (Figure 11, in annexes). The innovation network was more exclusive (closed) and static over time; farmers worked with the extension worker to translate an innovation into a concrete outcome (the adoption of the positive selection technology for tackling the problem of lack of clean seeds) to tackle the challenge of the lack of clean seeds. Farmers were restricted to passive agents of innovation for the vertical integration of the innovation network (between farmers and researchers), and were limited to farming activities. Yet, these traditional ARD intervention approaches were seen by farmers as very important for the facilitation of technology transfer and were a step to participating in more complex innovations.

### **3.2.3 Dynamic meta-governance of innovation networks: hybrids of simultaneous ambidextrous (explorative and exploitative) and multi-dextrous innovation networks**

The same governance mode applied in the 3 cases:

1. *Bufundi united* producer organisation (Kabale distric, Uganda)
2. *Gataraga* producer organisation (Musanze district, Rwanda)
3. *Muungano* producer organisation (Rutshuro province, Democratic Republic of Congo)

In general, farmers participating in the Integrated Agricultural Research for Development (IAR4D) approach, with the facilitation of MSIPs (Figures 9,11 and 13, trajectories in annexes). A dynamic *metagovernance (ambidextrous hybrid governances) of innovation networks (complex innovation networks)* was identified in these MSIPs. This type of governance combines simultaneously the governance mechanisms previously described. The multi-stakeholder innovation platforms have a metagovernance (governance of governances), a hybrid and dynamic governance, which changes over time, according to innovation challenges. This metagovernance is allowed by an *ambidextrous management*, which facilitates the making of different types of inter-organisational relationships among stakeholders, for a simultaneous explorative and exploitative dynamics.

When comparing the structural changes of the innovation network of the cases, it was observed that innovation networks stabilise and disband over time according to the innovation challenges, actors organise through different governances, with a flexible management mechanism, which govern the *mobile hub of networks* and so the social organisation of innovation follows different governances in different structural network changes (See Figure 4). As new challenges emerged, the configurations of actors participating in innovation networks of the potato netchain changed, with innovation networks closing when there was a need for stability for exploiting innovations, and opening again for exploring new ways of doing things.



The metagovernance of innovation networks in the MSIPs took place over time balancing dynamics of exploration and exploitation, for a more sustained performance to solve various types of innovation challenges (see Table 2 and Table 3), for dealing with short, medium and long term challenges given in a particular context. A forum of stakeholders joined voluntarily the agricultural MSIP to work together in cooperation to find innovative ways of solving a common problem in a co-innovation process. There are monthly meetings at every level and regional workshops to share experiences and to ensure that the visions of the IP actors are reviewed and developed).

In relation to the timing of exploration and exploitation dynamics of the innovation process, two main and complementary governance mechanisms were identified in the innovation process: (1) Orchestrated or managed governance mechanisms (Figure 4) and (2) Self-organised-resilient governance mechanisms.

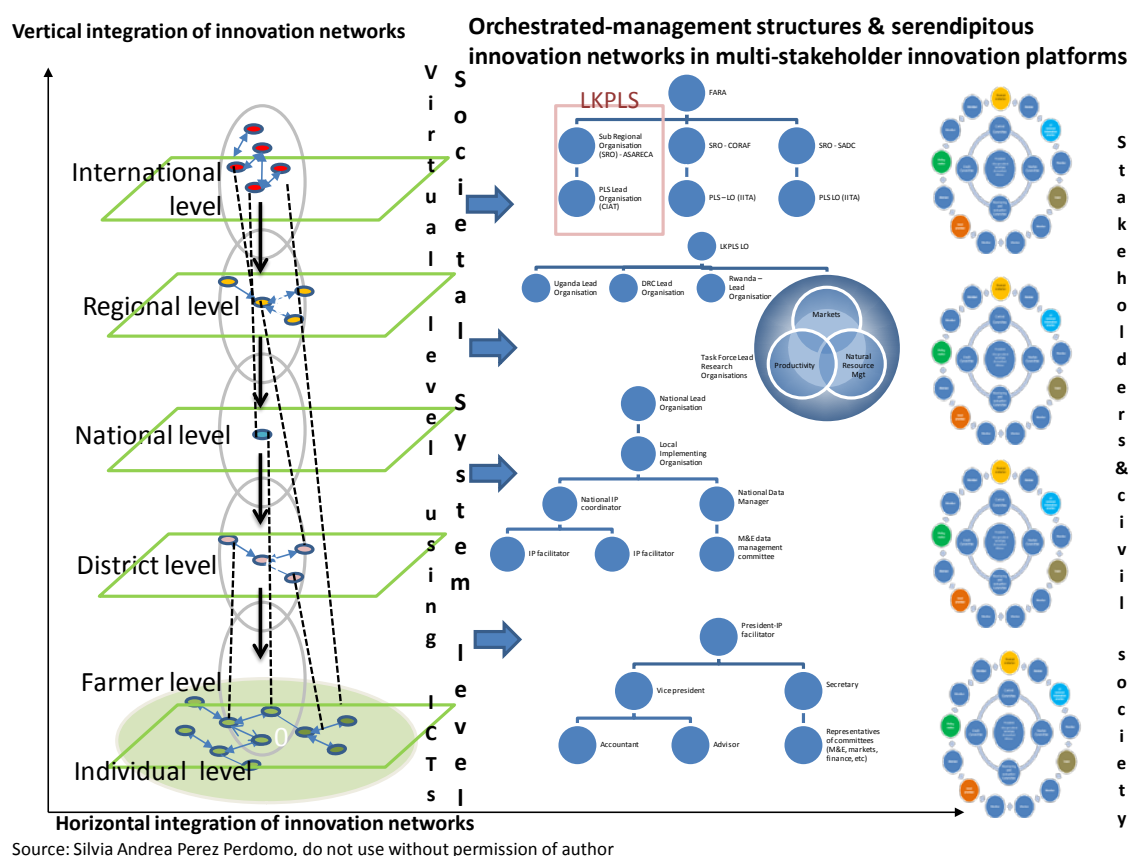


Figure 4. The orchestrated or management structure in the multi-stakeholder innovation networks was found to be multi-scalar and mobile over time (mobiles hubs), even mobiles in virtual spaces, which is defined as metagovernance of innovation networks.

As part of the orchestrated governance mechanisms there is a formal structure or management. At a higher organisational level, there are 'Task Force' managers from research institutions coordinating the strategies on the interfaces between markets, productivity and natural resource management across the three countries. At a meso-level, there are national coordinators of all the MSIPs in each country ("MSIP Coordinator" in Figure 4); these tend to be NGOs or research leading institutions (Lead network governance, sequential

interdependencies). There are also data managers in each country (“IAR4D Research” in Figure 4), who document and analyse processes, and draw lessons to be learned. They track changes in the action plans with a monitoring and evaluation team, which give feedback to other actors of the network. At the farmer level, the basic management structure of a MSIP is composed of a president, a vice-president, a secretary, the representatives of the committees and members of the MSIP, who are affiliated to farmer associations (Participant governed innovation networks, reciprocal interdependencies)(see Figure 5). The MSIP membership is also *voluntary and with open membership*, and it is an open innovation network, which has a *democratic member control* (one member-one vote). This management structure at the farmer level is based in the community governance structure so it is locally embedded and it follows a Constitution.

#### Do you think is necessary to have the stakeholders coming around?

Yes, when the stakeholders come, it is much useful to us, we MSIP members to sensitize those people at the villages. But sometimes when we go there alone, they don't agree with what we are telling them, but if they see some up people come from far parts, they will agree. Jenny, farmer in Kabale, Uganda.

We got some loans from DRC, those from Mercrego, by now they have lent us 11 million of shillings, then each farmer has been able to pick even one sack of potato seed. It is an agricultural loan, then after 5 month, that we should have harvested, sold and what the potatoes, we should give them a profit of 2% in January (2011). And we have also met the Kampala traders, where we have made a memorandum of understanding then they are the ones who are going to buy these irish potatoes ours, which are packed. And each farmer has got an account number in Equity bank.

Molly, farmer from Kabale, Uganda.

“(Facilitation) That is on financial side, they are the ones providing. Another kind of facilitation is by the district trying to organize some workshops where we are trying to get people to train our farmers. Then another facilitation is from Makerere and NARO, where we are being supported for other innovations, and even they are trained to train our farmers on potato production, the NARO is the one ahead of that program, and even this SSA-CP is helping us to coordinate the IP with other partner organizations where we are trying to look for those who can help us in some activities in which we don't have skilled people around”

Farmer in Bufundi.



Figure 5. Management structure of multi-stakeholder cooperative: a hub of innovation networks

Other self-organised-resilient governance mechanisms take place so it was found that the management structure changes its locus and composition, as a mobile hub of innovation networks. Thus hub moves from different network level or at a different cluster (layer of the supply chain), and also in virtual spaces, mediated by information and communication technologies. Since the core function of the MSIP is innovation, it is the nature and complexity of challenges that determines how this mobile hub of networks changes over time to tackle challenges. As a hub of innovation networks, it is monitored by all members giving more transparency and legitimacy to the making of arrangements.

This hub of innovation networks is integrated by representatives of stakeholders, committees, formal and informal institutions that interact at different network levels. Its functions consists mainly of: (1) Identify challenges and opportunities for innovation; (2) discuss the challenges and possibilities for exploring and exploiting innovations; (3) identify and invite the stakeholders who could contribute to the solution of the problems faced, (4) Propose actions plans, (5) Negotiation and (6) Monitor and adjust action plans according to the needs of stakeholders. In doing so different arrangements for a simultaneous exploration and exploitation of innovations are made with the participation of relevant stakeholders. Sometimes, the MSIP arrangements are made in a more serendipitous manner, as resilient innovation networks.

Differently to the NAO governance by Dhanaraj and Parkhe, 2006, the MSIPs are **mobile hubs of innovation networks** (Figure 6), which instead of governing organisations governs innovation networks at multiple organisational-networks levels over time through hybrid and dynamic governances. In doing so it facilitates different inter-organisational relationship among stakeholders (Figure 4), fostering cooperation in local, national and international and even virtual levels.

How is the coordination of those innovation platforms?

How is the coordination of those innovation platforms? 20

Coordination of course involves which is elected stakeholders meeting monthly, and there is normally a committee, which is elected by the stakeholders. And maybe when I also talk about stakeholders it is not only like about research organizations, but also the involves farmer organizations like which cooperatives. I mentioned already the of farmer federation, Imbaraga, which is where grew from small to big in terms of about farming. So with this platform is where rough people have a place to discuss about course has issues. Now the coordination is through maybe an collectively body, which of course has a chairman being in a committee, maybe That there is accounting issues, evaluation issues, marketing issues and so on. That how these IPs are coordinated. n platform,

which organization, the farmer

Who leads the innovation platform, which organization, the farmer associations or any other institution?

democratically elected. And I forgot that It is any institution, depends on the found democratically elected. And I forgot that n, but the IPs that we have here, we found and different leaders of this organization, but can be mostly we would like to put ahead that affect farmers to be about to so that they can be able to express their issues that affect onal their farming system. So the head, it can of the be a leader, a person of the National e ISAR, it University of Rwanda, maybe one of the participant institutions, it can be ISAR, it can be maybe a presence from the on the cooperatives that participates in the MSIP and all that. It depends on the capacity of that person who can lead the team. What is your definition of a Multi-

Stakeholder Innovation Platform

What is your definition of a Multi-Stakeholder Innovation Platform (MSIP)?

MSIP is a setting that brings together all the stakeholders, who are dealing An MSIP is a setting that brings together all the stakeholders, who are dealing with a problem to look together one innovation, solution, that is where the innovation hanisms, comes in. Now, why we call it innovation, ing a it is innovation because the mechanisms, e old the strategies, the tools used tin solving a problem are quite different from the old system. They are different... So it is about the problem, it is about the same level of solution finding, all the stakeholders are involved and they are at the same level of of understanding in how to tackle the the further, problem, that is why we need this type of innovation. Maybe, to go a little further, e to with innovations is also bringing if e is a possible new products, adding value to the products, it is a whole, there is a change involved in of systems. e National

University of Rwanda, stakeholder in the Researcher, lecturer at the National University of Rwanda, stakeholder in the MSIP in Gataraga, Rwanda.

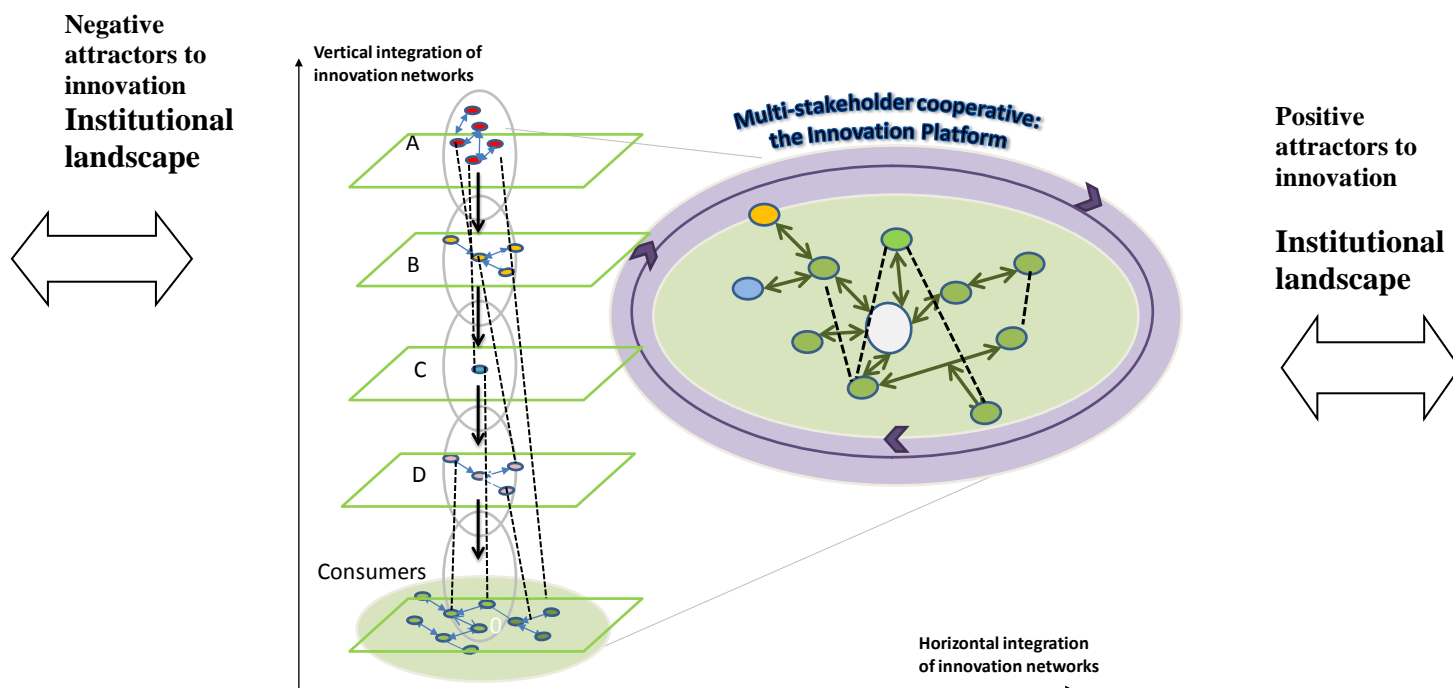


Figure 6. **The mobile hub of innovation networks** that facilitates pooled (---), sequential (↓) and reciprocal (↔) inter-organisational relationships among members.

These inter-organisational relationships also changed over time (see in annexes): a combination of pooled (---), sequential (↓) and reciprocal (↔) interdependencies. The multi-stakeholder cooperative facilitated linkages among farmers and a diversity of stakeholders (See Figure 4 and table 4). Pooled inter-organisational relationships were given among actors who voluntarily wanted to join the innovation network, but these changes into sequential and reciprocal interdependencies dynamically in the process. Changes on partnerships were observed (See Table 4). A crucial outcome of the MSIP is the formalization of inter-organisational relationships like the formation of public and private partnerships, signing of contracts and other more entrepreneurial arrangements in which producer organisations worked together with different stakeholders. Value addition in netchains is achieved by not just innovating products and services, but also by a dynamic and open social organisation of innovation.

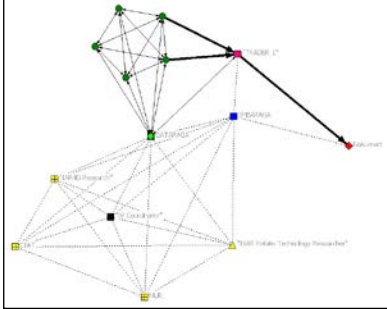
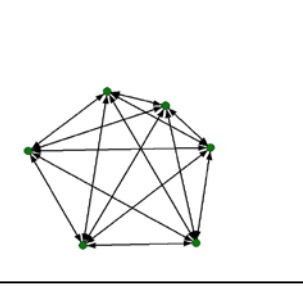
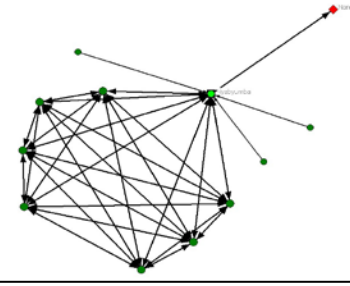
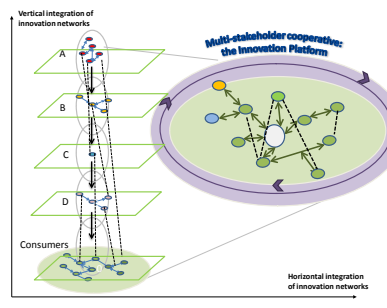
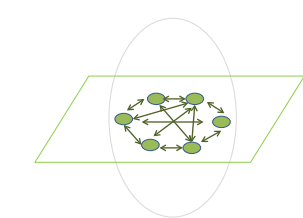
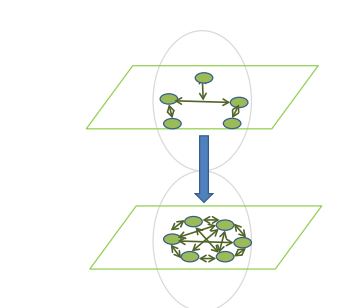
|  |   |   |
|--|---|---|
|   |  |                    |
| 2008 (a) Complex innovation challenges.  | 2009 (b) Innovation challenge of organising collective production of farmers      | 2010 (c) Innovation challenge of collective marketing of potatoes, contract with Nakumati supermarket |
|  |  |                   |
| Metagovernance. Pooled (---), sequential (↓) and reciprocal (↔) interdependencies  | Mutual adjustment governance. Reciprocal (↔) interdependencies                    | Hierarchical and mutual adjustment governance. Sequential (↓) and reciprocal (↔) interdependencies    |

Figure 7. Netchain analysis for tracking governance dynamics of innovation networks in an IP (multi-stakeholder cooperative). Netchain analysis of the Gataraga farmers' producer organisation and the Innovation Platform in Rwanda, IAR4D approach. (See trajectory in annexes).

| <b>Producer organisations</b>   | <b>Types of partnerships (2009)<br/>Diversity of actors in innovation networks</b>                      | <b>Types of partnerships (2011-2012)<br/>Diversity of actors in innovation networks</b>  |
|---|---|--|
| <i>Bufundi United</i> Multi-stakeholder cooperative. Innovation Platform, Integrated Agricultural Research for Development (IAR4D). | Public partnerships: Africa 2000 Network (A2N), NARO, CIAT  | Public and private partnerships facilitated in the MSIP: FARA, Makerere university, NARO, CIAT, Local government, Africa 2000 Network (A2N), Huntex industries, Mecreco. |
| <i>Nyabyumba</i> producer organisation. Various interventions, currently doing contract farming.                                    | Public and private partnerships facilitated in the MSIP: Africa 2000 Network (A2N), NARO, CIAT, Nandos. | Private partnership: Contract with Nandos, Tropical heat (Food outlet?)  |



|  |   |  |
|--|---|--|
| <i>Gataraga Multi-stakeholder cooperative. Innovation Platform. Integrated Agricultural Research for Development (IAR4D). Multi-stakeholder cooperative.</i> | Public partnerships: Imbaraga farmers national federation, ISAR | Public and private partnerships facilitated in the MSIP: FARA/ISAR, ISAR, Imbaraga farmers national federation, National University of Rwanda, CIAT, Mecreco. Nakumati supermarket, Ninzi hotel. |
| <i>Abahujumugambi producer organisation. 3G Potato project by International Potato Center (CIP).</i>   | Public partnerships: Imbaraga farmers national federation, ISAR | Public partnerships: 3G project Imbaraga Farmers national federation.  |
| <i>Muungano Multi-stakeholder cooperative. Integrated Agricultural Research for Development (IAR4D).</i>   | No formal partnerships  | Public and private partnerships facilitated in the MSIP: Diobass, INERA, Meteorological Observatory of Goma, SYDIP, Pronapika, CIALCA, Mecreco   |
| <i>Gamaru producer organisation.</i>   | No formal partnerships  | No formal partnerships, no intervention approaches   |

Table 4. Comparative table of partnerships of case studies.

Producer organisations participating in the IAR4D with the MSIP as a core component had a comparative advantage in relation to the other producer organisations and the dynamics of exploration and exploitation of innovations were more balanced in most of the cases (see Figures of trajectories in annexes and Table 3).

### **3.2.3.1. Mobile hubs of learning for information and knowledge sharing dynamics and social learning: Mobile communities of practice**

The most crucial innovation arrangement according to not only farmers but other stakeholder was the knowledge and learning arrangements. In the MSIPs, farmers participated in knowledge arranges that went further being recipients of diffusion of technologies. Trainings and field demonstrations were organised to enhance capacities of farmers on production and marketing standards, natural resource management, negotiation skills, etc. (for instance, farmers were taught the quantity notion of kilo to avoid to be cheated by traders). Both tacit and codified knowledge are shared.

The mobile hub of innovation networks also mobilises communities of practice at different network levels, and dynamically over time. We confirmed that these are networks with high levels of trust among members that usually share identity and norms (locally embedded networks), who sustain informal relationships, have flexible ties that help to create structural holes in networks (Burt, 2004) and opens more possibilities to explore innovations. The power of these small networks is seen in knowledge sharing processes, where members participate in communities of practice (Wenger, 1998) learn by doing and share tacit knowledge. However, the results of the key informant interviews suggest that the codification of necessary knowledge (information materials on quality standards, contracts, memorandums

of understanding, etc.) is low. Also, we observed that these dense open networks are more characteristic in Explorative stages of the cycle of innovation (Gilsing and Nooteboom, 2006).

Farmers participate in trainings on natural resource management, techniques for producing, harvesting, grading, processing of potatoes. They learn by doing in learning sites. They have exchange visits among groups from different countries. Also they are empowered on organisational skills for collective marketing, in the formation of associations legally registered. In the innovation platforms better linkages have been made among different clusters of the value chain, between farmers and traders, farmers and processors, farmers and service providers, traders and transporters; farmers and researchers and policy makers (who are supporting the process), adding value not just to the potato value chain but also to social processes, specially to like social learning. Also organised the farmers to participate in communities of practice (horizontal integration), having a variety of knowledge sharing mechanisms (including the use of Information and Communication Technologies to reduce information asymmetries of farmers and reducing opportunistic behaviour of traders), also taught farmers the quantity notion of kilo to avoid to be cheated by traders.

The MSIP as a hub also facilitates spaces for boundary spanning (Kristjanson, 2009; Goldberger, 2008), for sharing resources, experience and capacities; learning together and filling each other's gaps (technology, lack of information, access to land, political power, financial capacity for investment).

### 3.2.4. Roles of explorative, exploitative and ambidextrous networks

For instance, to tackle the challenge of lack of clean seeds, in the MSIP went further with a social value addition of connecting farmers to stakeholder, further the provision of resources like clean seeds and diffusion of technologies, but also for the creation of innovation capacities.

Other complementary innovation arrangements were facilitated and coordinated: (1) Facilitating the consolidation of the producer

"We now sale in kilograms, but before we could sell 140 or 150 in a sack, and they could here put more potatoes up in the sack, but those were not counted. They counted 100 hundred kilograms the sack, and the other quantity was for their profit"

Farmer from Kabale participating in MSIP, referring to the importance of the notion of kilo to measure their produce and not to be cheated by middlemen.

"Nowadays if you visit the supermarkets in Kigali, you go to Nakumat supermarket, you go to the Dori supermarket, you go to the Dori supermarket, you will find the potatoes labeled IP Gataraga in the supermarkets, packed in traditional very well prepared baskets and people are happy buying these products, before it was not possible. This is what we have really done to this product. So it is the issue of mobilizing farmers, teaching them, showing the opportunity. You know farmers sometimes are able to do things, but they are not informed where to take and how to do it. So this is really what has been done, it is one of the achievements actually, it is visible you can go and you can notice that are potatoes there and farmers are enjoying. Another indicator is maybe for that area of Gataraga the prices of potato before, I mean in the older markets, it is between 70 and 100 Rwandan Franks per kilo, the farmers can receive, that is the farmer net price. But within this IAR4D intervention, the farmer receives an addition, owned price, and addition of 45. Instead of 100 frank per kilo, the farmer this time receives 160 per kilo".

Researcher, lecturer at the National University of Rwanda, stakeholder in the MSIP in Gataraga, Rwanda.



organisation for collective production and marketing of potatoes (2) Facilitating linkages to relevant stakeholder to tackle challenges, (3) Facilitation of knowledge and learning arrangements: Building farmer's capacity on topics like management of natural resources, production, marketing technologies, etc. (4) Facilitating financial arrangements like markets organising access to credit for farmers, getting of loans, without asking for collateral, which allowed farmers to buy seeds and other market inputs (6) Facilitating institutional arrangements (working on policy, constituencies, creation of a system of reward and sanctions for avoiding free-riding behaviour, signing of contracts) among other arrangements.

### 3.2.5. Roles to balance institutional dynamics

Even if MSIP comparatively aimed to foster the innovation capacity of farmers and facilitated the making of various arrangements, not always the changes resulted in successful stories. Contextual dynamics, particularly the institutional landscape highly influenced the governance dynamics of innovation networks in positive and negative ways.

The institutional landscape exerted a big influence on the trajectories of innovation of the producer organisations presenting challenges and opportunities to innovation (See Table 2). In Rwanda for instance, there was in general better conditions to foster innovations in the potato netchain. This included better services to enhance the organisational capacity of farmers (for instance, counting with Imbaraga, the national farmer federation), better infrastructure of roads, more operational policies, and more support from the government to the development of cooperatives, for instance, the cooperative legal and statutory framework of 2006 (MINICOM, 2006). This supportive framework enhanced the organisational capacity of farmers for collective action and making of formal agreements like the contracts, like it happened in the multi-stakeholder cooperative in Gataraga. However, a negative factor that hinders innovation efforts of producer organisations in Rwanda is the land scarcity (Jayne et al., 2010), land use is highly regulated by government.

Due to the influence of the institutional landscape some trajectories of innovation networks were erratic, like the case of the producer organisation in the MSIP in Bufundi (Uganda), where power dynamics affected the process. In this case competing coordination mechanisms of innovation networks were observed; the local governance competed against the temporal-dynamic governance mechanism of the innovation networks in the multi-stakeholder cooperative (See innovation trajectories in annexes), hindering efforts. Despite the fact that negotiation was mediated in the multi-stakeholder cooperative with the making of by-laws with the support of the local government to solve competing claims on land use between agriculturalist and pastoralist, this negotiation was insufficient. According to farmers, hidden local agendas affected the process so they suggested that the inclusion of higher levels of governmental authorities would have been more effective for the negotiation process.

In contrast, and in an extreme position, the two cases of farmers in **Rutshuro province**, Democratic Republic of Congo show how value addition through social organisation of innovation can make some although slight change.

In one hand, Gamaru farmers' group was limited to survive doing to subsistence agriculture (Figure 12). They had been part of a producer organisation but because of civil war, the members of the group were dispersed. When the war ceased, farmers started coming back to their land and tried to re-organise their farmer producer organisation, but it was difficult because of the extreme poverty lacked enough resources and lack of external support (for instance) the extension agent that used to assist them no longer went to the area. Farmers were disconnected. They produced potatoes for their home consumption, but the thieves or displaced people in the area many times stole their produce. In a fortunate case, and when there was the need of getting some cash for urgent matters (like to buy medicines), the farmer took the potatoes to the market, but the bad reputation of potatoes of Rutshuru due to low quality (lack of water in the area), reduced the bargaining power. Then opportunistic behaviour of some traders takes advantage of the information asymmetry of farmers, who don't even have access to information of prices. At the end, farmers cannot even recover the transport costs with the money paid for their potatoes. With the bad state of roads and high costs of transport, farmers don't even have the possibility of exploring new markets.

Slightly different and in the same district, is the situation of the Muungano producer organisation that is part of a MSIP. For farmers, participating in the MSIP represented a social innovation that helped them to re-organise, to connect to stakeholder that could contribute to solve their major problems. Farmers could get access to resources, specially information and knowledge sharing, access to agricultural technologies, organise collective production and marketing of potatoes, financial support, among other benefits. However, the outcomes of this producer organisation didn't reach a good outcome because of a combination of issues: the bad reputation of potatoes, the thieves, the little profit they made, etc. Also, when the civil war re-started in 2012, farmers were displaced again. In November 2013, some farmers of Rutshuru were contacted, they were refugees in Uganda, while others were returning to Rutshuru.

#### 4. Discussion

The research question that is addressed in this paper is *How do innovation networks are managed over time and through which governance mechanisms? Does an ambidextrous management in the multi-stakeholder innovation platforms, through facilitating dynamic-hybrid governances of innovation networks over time, fosters the innovation- ambidextrous capability of farmers (and other actors) of the netchain to deal simultaneously with various types of challenges?*

This paper presented empirical evidence showed empirical evidence of three main governance mechanisms that are three scenarios for dynamics of innovation networks: (1) Mutual adjustment-first order governance (small innovation network), (2) Hierarchical-second order governance (larger innovation networks) and (3) Dynamic meta-governance of innovation networks, with simultaneous hybrid governances for exploration and exploitation. These governance mechanisms were not found as static but flexible governance mechanisms of networks that adjust dynamically over time to respond to the challenges faced in a certain context. A dynamic and hybrid metagovernance (governance of governances) was identified in the MSIPs as mobile hubs of innovation networks, which governance mechanisms were

found to take place also in virtual spaces, mediated by the use of information and communication technologies (ICTs) that come along with dynamics of the network society.

The innovation process was facilitated by the MSIP, as a temporally, spatially (Glo-cal) and virtually mobile hub of innovation networks. An open forum of multiple actors or stakeholders (a multi-stakeholder platform) that simultaneously explores opportunities to innovate, and exploits consolidated capacities to innovate in order to tackle societal challenges. This forum of stakeholders joined voluntarily the agricultural MSIP to work together to find innovative ways of solving a common problem in a co-innovation process. Being connected to MSIPs, with a diversity of stakeholders showed to be a more effective way to tackle problems and leverage asymmetries given in the netchain. In general, it was observed that the governance mechanisms of innovation networks fostered the capacity of small and subsistence farmers to innovate and deal with different challenges. These governance mechanisms emerged depending on: (1) the types of challenges; (2) the size and diversity of the innovation network; (3) the interest of stakeholders; (4) linkages among stakeholders; (5) the timing of innovations, and; (6) the influence of the contextual dynamics. Depending on the type and complexity of the challenge(s), the mobile hub exerted different governance mechanisms at different networks levels and stages of the innovation process, facilitating different arrangements for innovation (institutional, technological, knowledge among other) over time (Figure 7 and 9). The governance mechanisms of networks changed according to the innovation challenges that farmers (and other stakeholders) were facing; and accordingly innovation networks stabilised and disbanded over time (opening and closing). The structural dynamics were used as indicators of the governance mechanisms and also the inter-organisational relationships. Explorative and/or exploitative alliances were expressed in types of contracts, which indicated changes of formal and informal inter-organisational relationships.

A dynamic meta-governance of innovation networks (Ambidextrous-hybrid governances) of MSIPs fostered more the innovation capacity not only of farmers but other stakeholders (horizontal and vertical integration of innovation networks in the netchain).

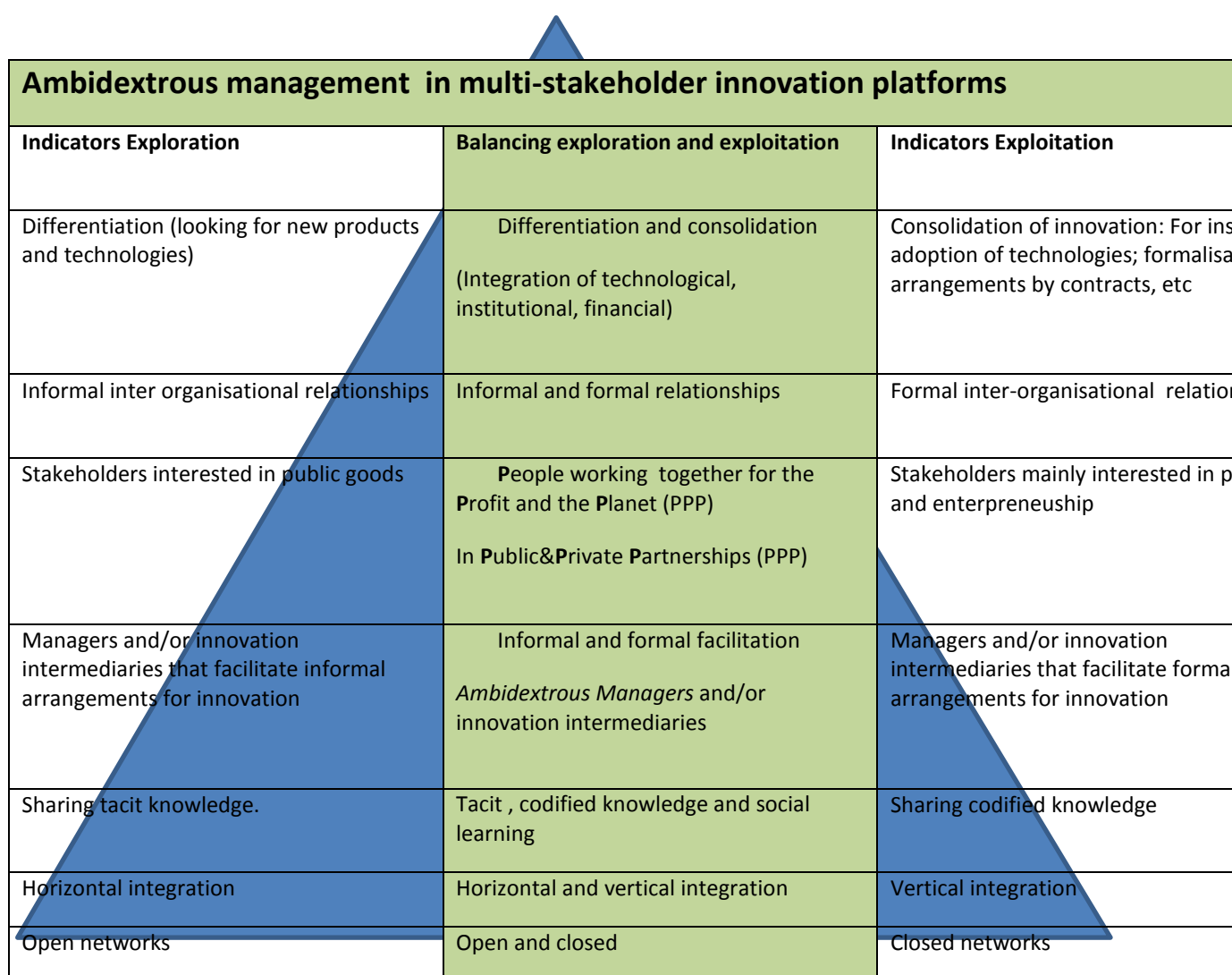
ICT's were found to play an important role for virtual type of ambidexterity and virtual mobility of innovation networks. Differently to the modes of governance presented in the conceptual framework, it was found that the social organisation of innovation networks is socially organised further spatial or systemic boundaries, integrating glo-cal and even virtual networks, and their governances are shaped by resilience mechanisms of the innovation networks and by contextual dynamics.

We found evidence of new ways of social mobility of communities of practice mediated by ICTs to shorten geographical boundaries (Kietzmann et al; 2013). This implies that the virtual embeddedness is also part of the environment or context in which dynamics of networks should be observed. We found evidence of mobile hubs of learning, as dynamic mobile communities of practice at different networks levels in the innovation process to foster

different modes of knowledge production and learning, which sometimes were aided by the use of ICT's.

#### 4.1. *Ambidextrous management of innovation networks for facing complex innovation challenges*

The cases of the multi-stakeholder innovation platforms there was an *ambidextrous management* (See figure 7 below) to balance dynamics of exploration and exploitation over time, for a more sustained performance to solve simultaneously various types of innovation challenges.



| Ambidextrous management in multi-stakeholder innovation platforms                              |   |   |
|--|---|---|
| Indicators Exploration   | Balancing exploration and exploitation  | Indicators Exploitation   |
| Differentiation (looking for new products and technologies)                                    | Differentiation and consolidation<br>(Integration of technological, institutional, financial)       | Consolidation of innovation: For ins adoption of technologies; formalisa arrangements by contracts, etc |
| Informal inter organisational relationships  | Informal and formal relationships   | Formal inter-organisational relation  |
| Stakeholders interested in public goods  | People working together for the Profit and the Planet (PPP)<br>In Public&Private Partnerships (PPP) | Stakeholders mainly interested in p and entrepreneurship  |
| Managers and/or innovation intermediaries that facilitate informal arrangements for innovation | Informal and formal facilitation<br><i>Ambidextrous Managers</i> and/or innovation intermediaries   | Managers and/or innovation intermediaries that facilitate forma arrangements for innovation             |
| Sharing tacit knowledge.   | Tacit , codified knowledge and social learning  | Sharing codified knowledge  |
| Horizontal integration   | Horizontal and vertical integration   | Vertical integration  |
| Open networks  | Open and closed   | Closed networks   |

Figure 7. Ambidextrous management

This ambidextrous management included: (1) Providing a boundary space for flexible dynamics of innovation networks, with dynamic and hybrid governance mechanisms over time, balancing inter-organisational relationships (explorative and exploitative partnerships).

This implies that *institutional flexibility* is also crucial, adapting the institutions or rules of the game over the process; (2) Facilitating the timing of the innovation process, explorative and exploitative stages of the innovation process; (3) Adjusting the dynamics of networks to the context in which innovation networks are embedded, which includes the virtual spaces. (4) Facilitating mobile hubs of knowledge and learning, with dynamic mobile communities of practice at different network levels (see Figure 8).

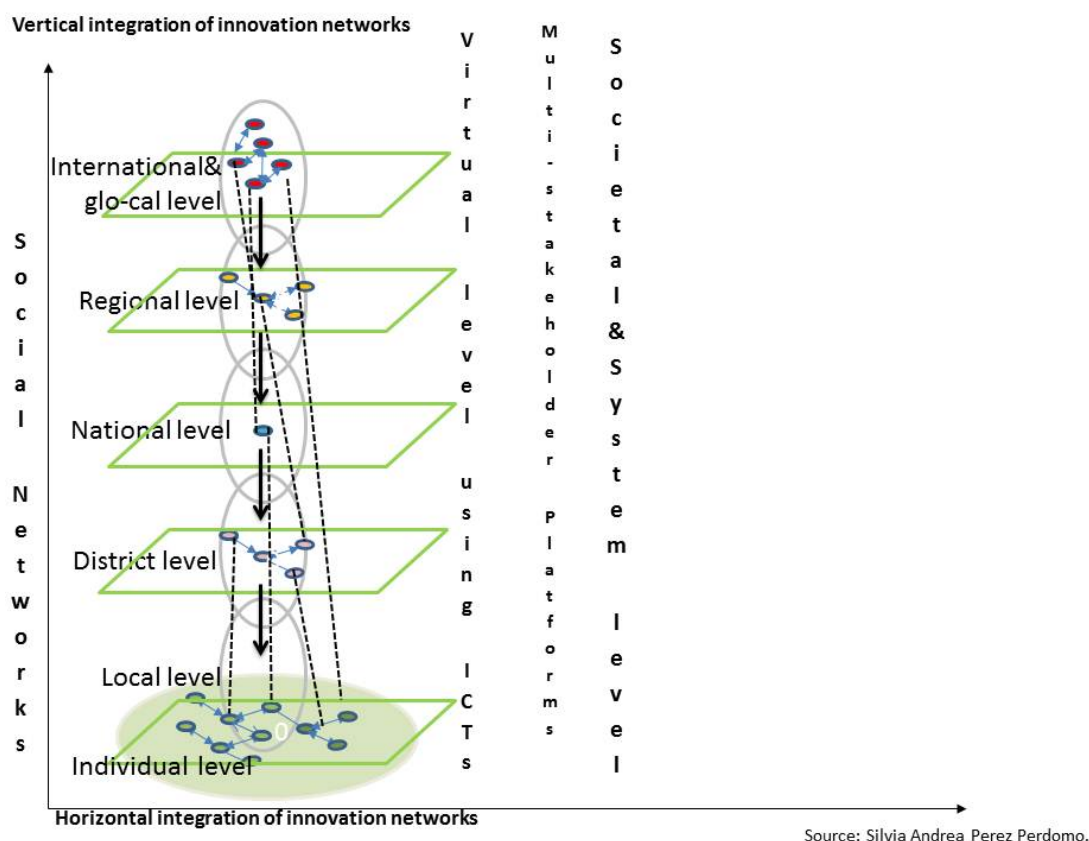


Figure 8. Social architecture of ambidexterity

We confirmed Volberda's (1998) ideas that the resolution of the flexibility paradox of exploration and exploitation depends on how flexible are the structures of organizations to manage complex problems that usually represent paradoxes. Ambidexterity is a capability that goes further organizations as a dynamic, reflexive managerial capability of social networks, in this case empirical evidence has been presented of networks for innovation networks for innovation. We add that this capability of networks also depends on how flexible structures of networks and their governance mechanisms managed over time (Figure 9); flexible networks to simultaneously explore and exploit capacities to innovate while promoting change. Mobile hubs of innovation networks are the new ambidextrous social structures of the new paradigm of open innovations.

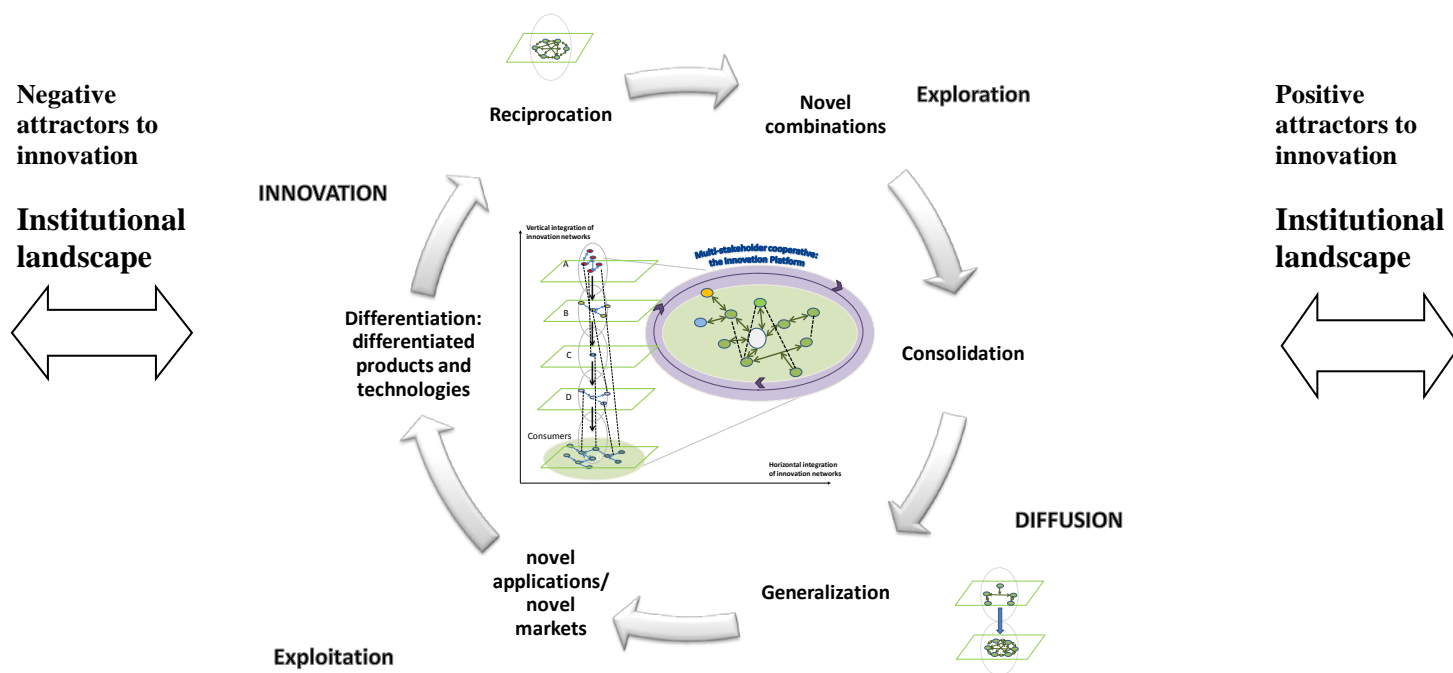


Figure 9. Dynamic governance of innovation networks and interdependencies over time facilitated in multi-stakeholder cooperatives or MSIP.

We confirmed that networking is a way for balancing different paradoxes or asymmetries, in this case, given in the potato netchain. An ambidextrous management of MSIPs made a difference for stakeholders and subsistence farmers, empowering small farmers to participate in food netchain in local markets. In a MSIPs farmers are no longer a recipient of technologies. They are active agents of the innovation process, being part of a more complex configuration of innovation networks that includes other stakeholders like seed producers, traders, extension agents, researchers, transporters, processor, delegates from local governments among other actors. Farmers participate in both the vertical and horizontal integration of innovation networks, not only in innovations related to chain activities in production and post-harvest activities (e.g. land preparation, weeding, harvesting, storing) for the vertical integration of innovation networks, but also in innovations related to the netchain governance (decision making processes, information, quality, marketing, cooperation and innovation management) for the horizontal integration of innovation networks (Figure 8).

Dynamics of innovation networks cannot be totally controlled and managed, but also cannot be taken for granted or leave in the hands of serendipity and resiliency. Resilient dynamics of innovation networks pose new roles to managers in the new paradigm of open innovation. Roles go further managing orchestrated governance dynamics in firms or organisations (at the micro-middle and top management levels), but also to facilitate various arrangements among other informal agents of innovation that take part of networks with more serendipitous-resilient approaches, which in combination can possibly tackle more effectively complex

societal paradoxes. Since innovation sensitiveness was also observed that affected the innovation process, managers should take into account the “pressure” of this as a mediated factor and evaluate the specific characteristics of the context that would hamper replicability of impacts.

A typology of innovation networks is drawn: (1) Explorative, (2) Exploitative and (3) Ambidextrous-multidextrous innovation network in multi-stakeholder innovation platforms. to show different facilitation roles by networks to tackle different challenges at different stages of the innovation process. Ambidextrous innovation networks were fostered through hybrid and dynamic governances, and played roles accordingly, facilitating simultaneously reciprocal, sequential and pooled interdependencies, for a simultaneous and balanced exploration and exploitation of multi-dimensional innovations.

There are various roles to be played for the management-facilitation of innovation networks dynamics, particularly important is their facilitation on the making of exploitative and explorative alliances and balancing the vertical and horizontal intertwining of the innovation networks. Facilitating these types of alliances can be the key for enhancing not only an ambidextrous but a multi-dextrous capacity of innovation networks in MSIPs. This is a crucial role that to be played also in other R&D interventions that aim to foster innovation. Other roles include:

- Facilitating new start-ups when the innovation process stagnates. Managing the timing and sustainability of innovations through fostering simultaneously the exploration and exploitation of innovations over time; helping the opening (differentiation) and closing of networks (consolidation) for facing, short, medium and long term challenges.
- Avoiding stagnant configurations of networks that hinder the emergence of innovations. This implies managing/facilitating formal and informal inter-organisational relationships among a diversity of stakeholders through Bonding, bridging and breaching mechanisms, building informal and formal inter-organisational relationships (reciprocal, sequential and pooled interdependencies) among stakeholders for the vertical and horizontal integration of innovation networks, particularly making the supply, value or netchain more inclusive of small farmers.
- Combining tacit and codified knowledge-sharing in communities of practice at different innovation network levels.
- Facilitating arrangements efforts towards balancing competing institutional landscapes.

Further research is being carried to test findings using quantitative approaches and a larger sample.

## 1 Annexes

### Innovation trajectories of farmer groups -producer organisations per country

#### UGANDA, Kabale district.

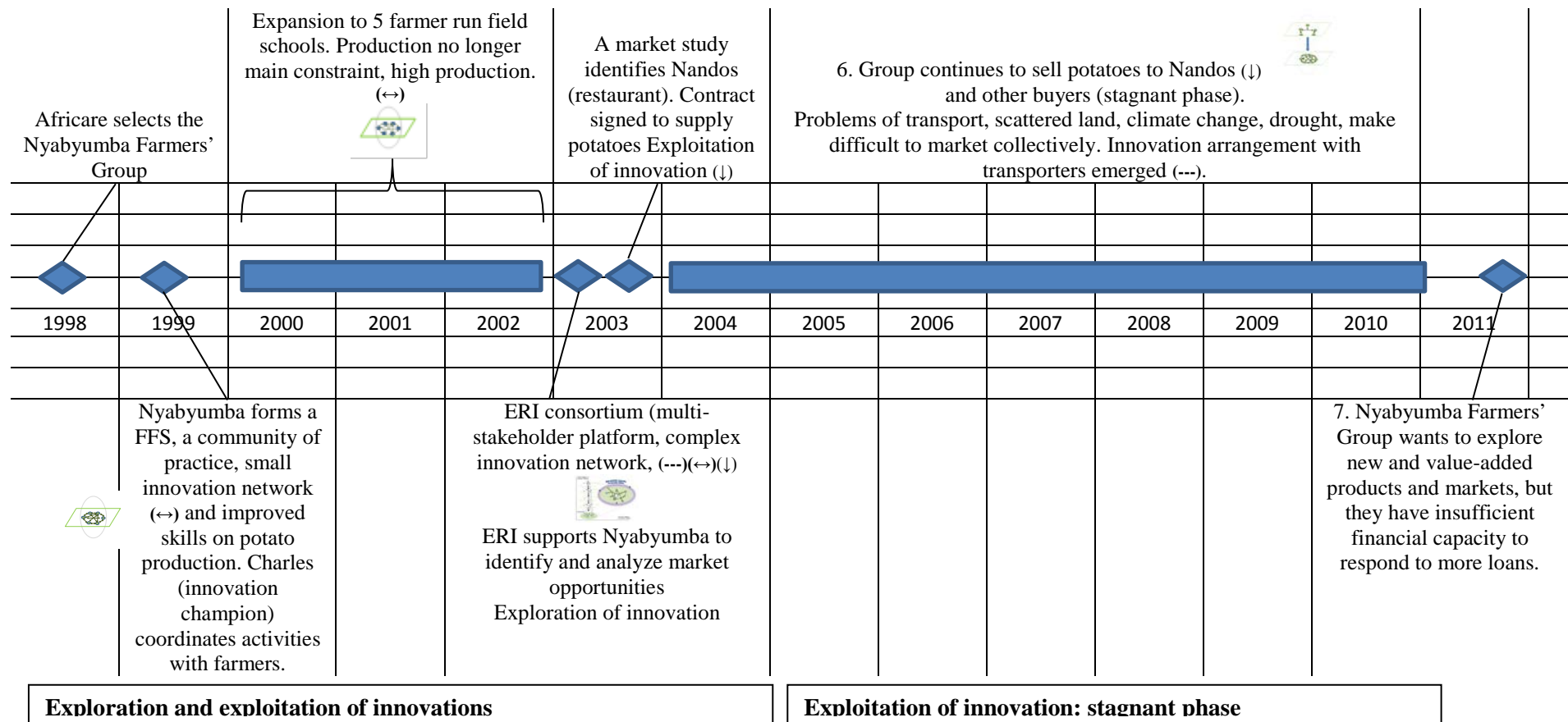


Figure 8. *Nyabyumba* producer organisation timeline



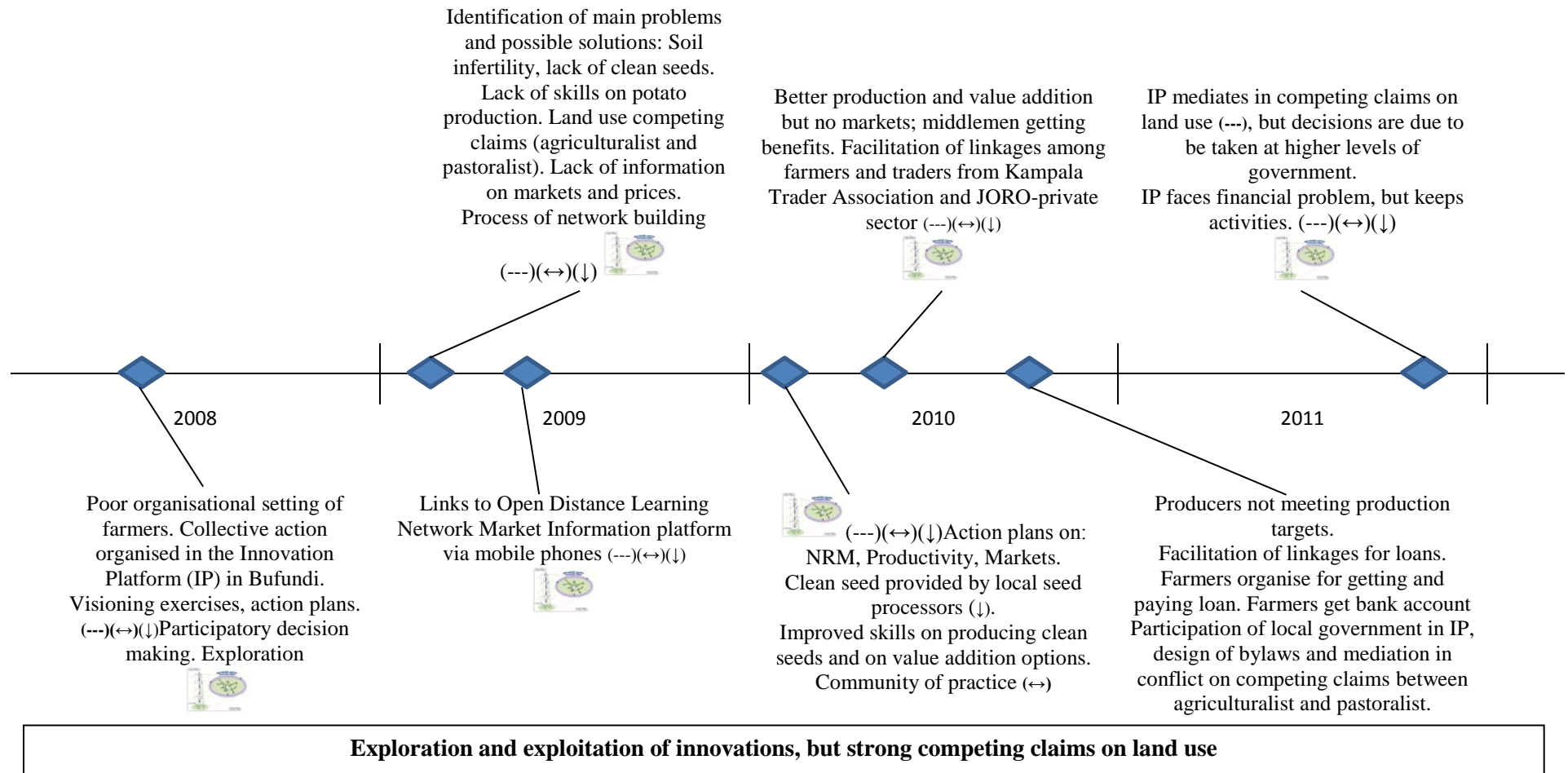
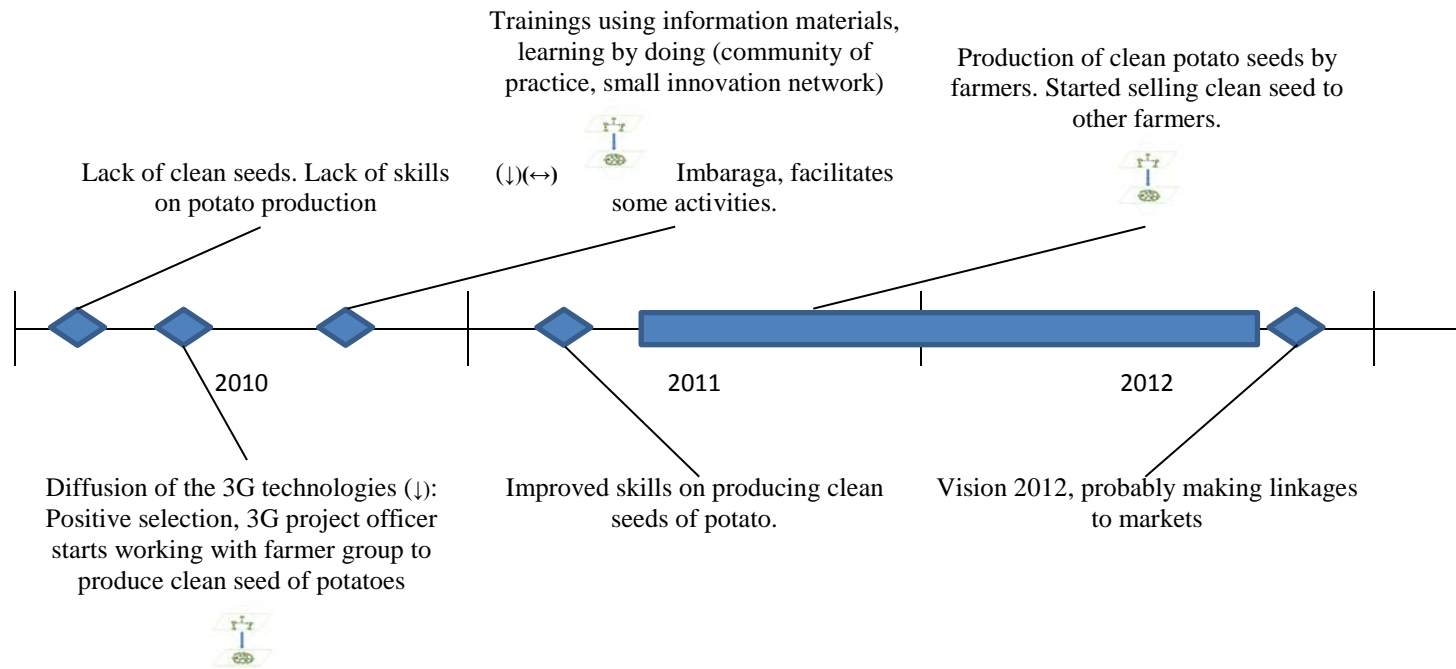


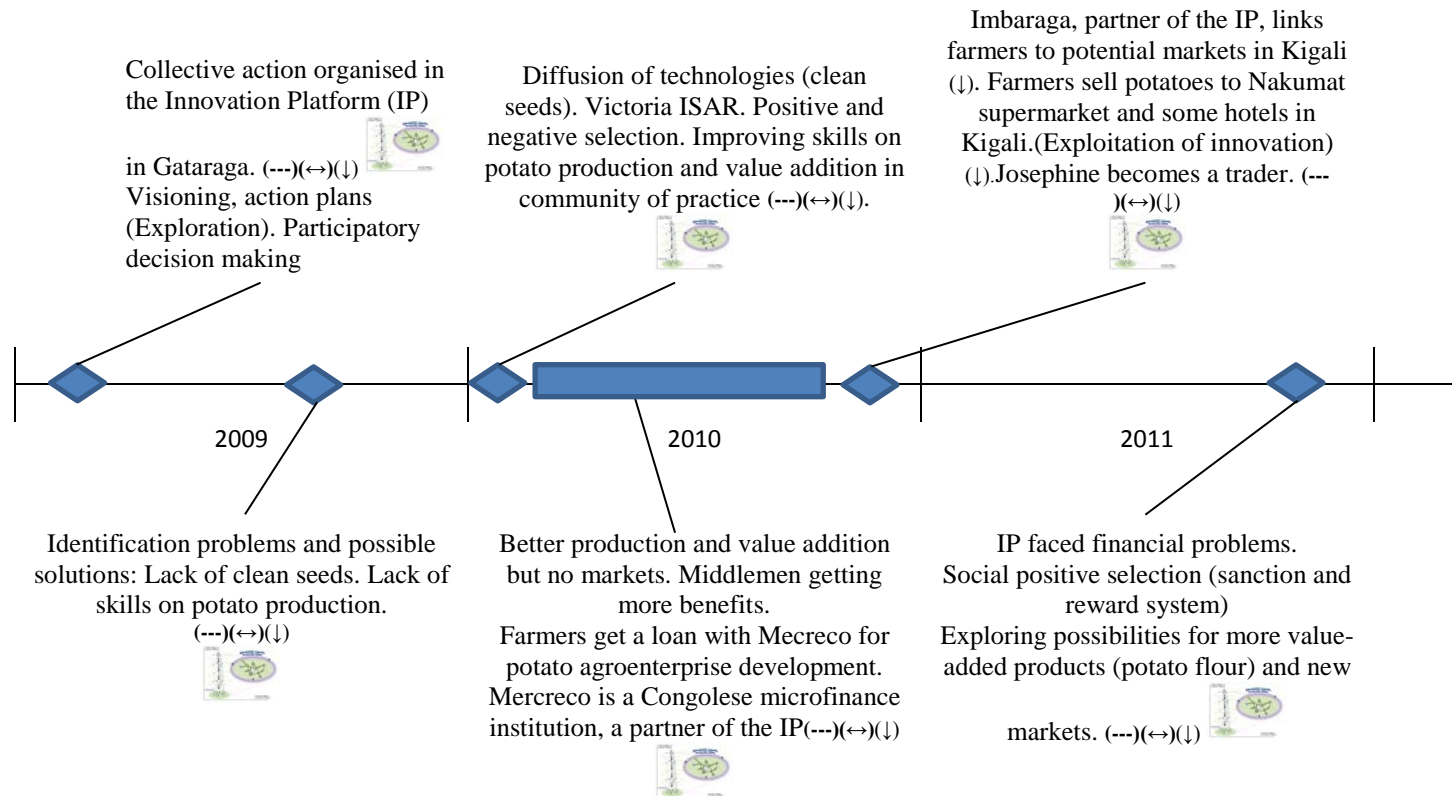
Figure 9. *Bufundi united* producer organisation timeline

# **RWANDA, Musanze district.**



## **Exploitation of innovation: Diffusion of positive selection**

Figure 10. Abahujumugambi producer organisation timeline



**Exploration and exploitation of innovation: favorable institutional landscape**

Figure 11. *Gataraga* producer organisation timeline

## DR CONGO, Rutshuro province.

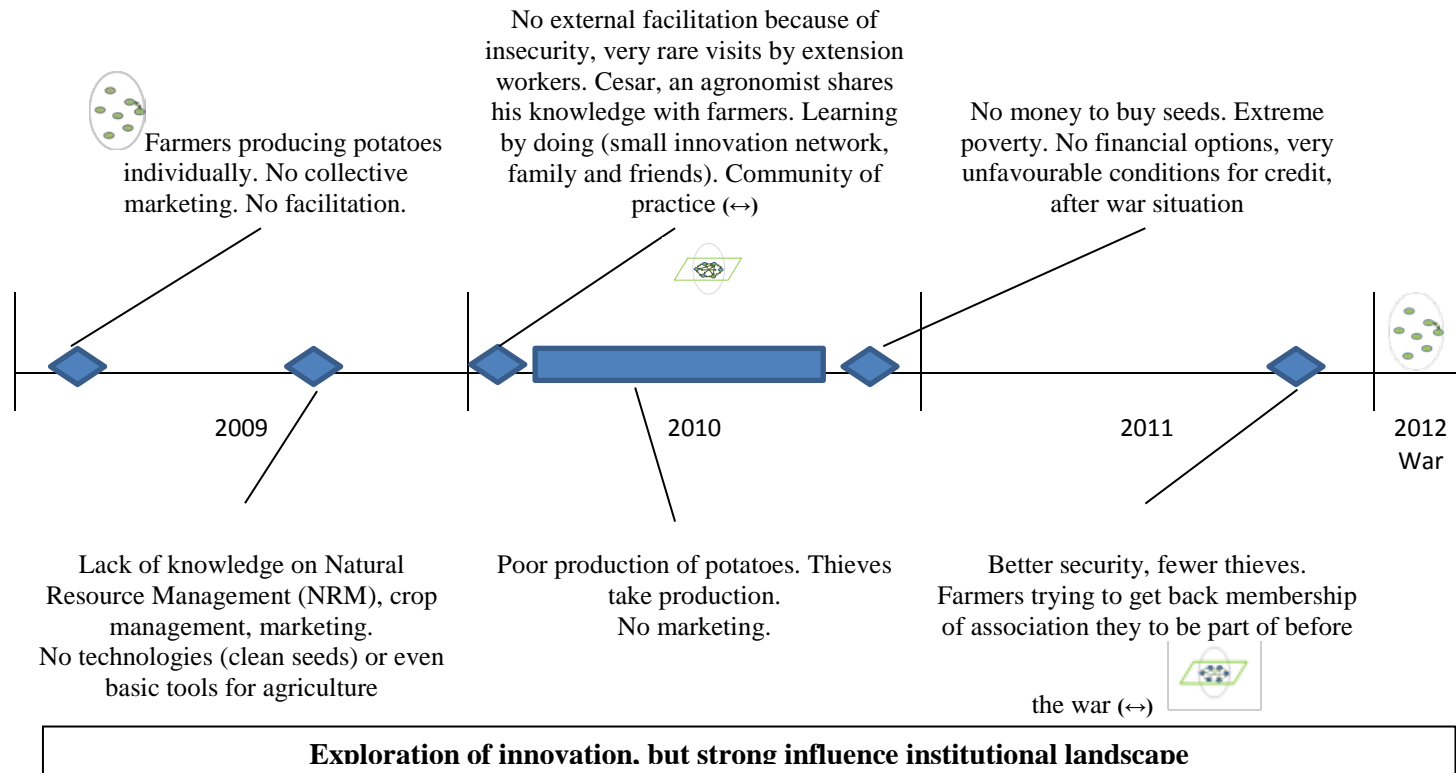


Figure 12. *Gamaru* producer organisation timeline

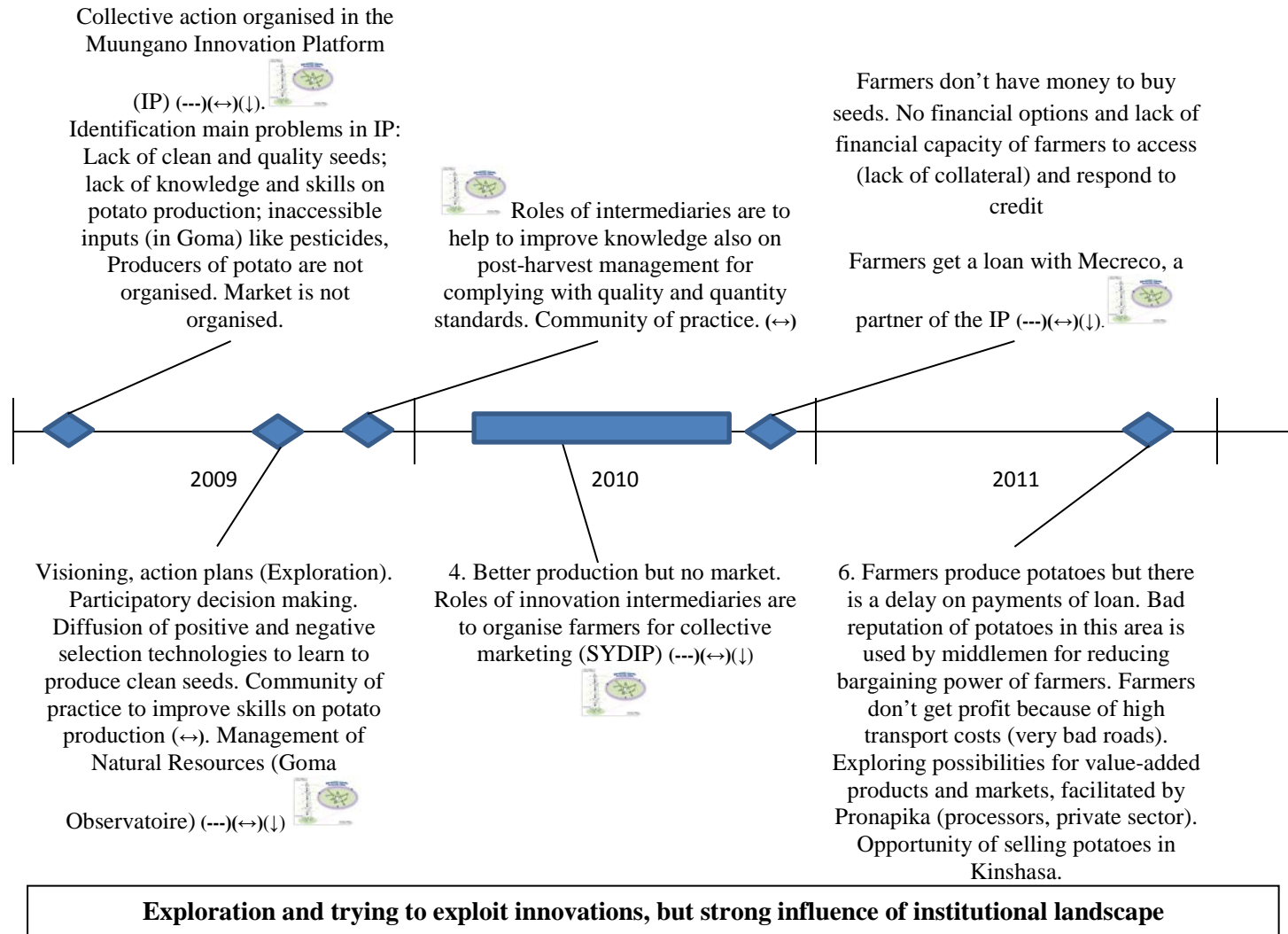


Figure 13. *Muungano* producer organisation timeline

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