

## Stakeholders involvement on establishing public-private partnerships through innovation in agricultural mechanization: a case study

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### ABSTRACT

Agricultural production has to increase drastically for the next years in order to meet societies' needs. At the same time, using sustainable ways to produce this huge amount of food and resources is becoming increasingly critical. Innovation, both in technologies and in uses/ practices, is strongly encouraged in Europe as a solution to these challenges. As this process remains very complex to manage, analysing it in real conditions seems crucial, especially to improve it. Then, in this paper, we will present and analyse an experimental Public-Private Partnerships Action launched at the European level. This one-year action aimed to gather together all the players involved at the European level for crop protection and to boost concrete innovation in ICT (Information and communication technology) to reduce the use of pesticides, especially around three types of technologies using ICT and robotics. For small and medium-sized enterprises, the particular area of agricultural machinery, solutions have to be found to offset the necessary confidentiality of private stakeholders' interests, and also to give them some reassurance, or at least advantages, on the results of such partnerships.

**KEYWORDS:** innovation process; value-chain; robotics; ICT

### 1. Introduction

Agricultural production has to increase drastically for the next years in order to meet societies' needs and, at the same time, should be more sustainable (Alexandros, 2012). Innovation is seen, in Europe among others, as the key solution to cope both with these challenges and to economic growth and employment. A lot of studies were done since the 80s' on innovation and several aspects, especially on its process, were highlighted. A main dimension revealed is the complexity of this process and the large number of people it implies. In short, innovation does not belong only to one kind of people (research or R&D - research and development services) but is composed by complex interactions between lots of different stakeholders. However, even if we know more about the innovation process, and as highlighted by the latest European initiatives, there is still today a gap between research and practices. This gap, and the work which remains to be done, is not so much part of the innovation theory elaboration, but is rather operational challenges (Hall, 2007).

Hence, this paper aims to contribute at this last level of operational challenges with a case-study, by producing materials, testing and analysing the management of

innovation process in agriculture. This initiative, launched within the context of a European ERA-NET, a project funded by the European Commission in order to link several researches within specific themes relevant to society, aimed to promote the set-up of public-private partnerships (PPPs), or at least to strengthening the links between the stakeholders, around innovations using ICT and robotics in agriculture targeted on the case of pesticides use.

For this study, the focus was both on the 'management' part of an innovation process and on the specificities related to 'technological' innovation in agriculture. Indeed, ICT, automation solutions, and robotics could play a considerable role in the development of sustainable and efficient farming systems by developing precision agriculture, as a result of the innovation process (new tools) or during the process it-self (by strengthening information exchange and networking among all relevant stakeholders).

### 2. Literature Review

Innovation 'is one of those words that suddenly seem to be on everybody's lips' and there is so many studies on the subject that the question of a new scientific field arose (Fagerberg & Verspagen, 2009). However, it seems

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worthwhile to briefly revisit what is meant by 'innovation' and what it defines and, secondly, to review some ways of managing the innovation process developed during the years, especially those involving several kinds of stakeholders.

### From Innovation to innovation systems

Innovation was first regarded as a 'source of energy' for economy in social sciences in 1939 by J. Schumpeter, but it is only a few years after that the interest around the question grew, in the 1960s for the United States and around the 1980s in Europe (Fagerberg & Sappasert, 2011). These studies moved gradually from focusing on isolated aspects of innovation to more holistic and complex approaches describing 'systems of innovation'. In other words, these studies highlighted the fact that for innovation success or failure isn't often due to technical or scientific problems but 'generally involves ethical; social, management, organisational and institutional problems' (Smits, 2002). Therefore, one of the main solutions investigated to improve the innovation process by taking into account its complexity is to create and strengthen the links between the several stakeholders involved: end users, industry, public research, and intermediaries.

### Methods of innovation with the involvement of the main stakeholders

The interest on involving several stakeholders in the innovation process is far from new, and how to involve them and how to manage interactions and processes could take different forms. Briefly, we could highlight three main aspects which differentiate these methods: the kind of stakeholders they involve, the degree of involvement of stakeholders they designed, and the form of organisation chosen (degree of openness and confidentiality).

First, these methods could choose to focus on some kind of stakeholders. For example, it could focus on end users' involvement: 'Farmers' knowledge really does count' was proclaimed and studied since the 1990s, if not before (Hall, 2007). It could otherwise focus on industries participation (it is the case for PPPs used by industrial development and among others by UNIDO, 2008). Or finally, it could imply the participation of the greatest possible number of stakeholders (Bos & Groot Koerkamp, 2009).

These methods could also vary regarding the degree of involvement of the stakeholders. It could simply begin with interviews of stakeholders. Examples with end users (farmers) could be found in participatory methodologies (Chambers, 2008) and surveys of end users (Jørgensen *et al.*, 2006). Other methodologies, such as open innovation and Living Lab, not only include stakeholders' views or ideas in the innovation process, but make them work together with information and knowledge exchanges as well as with the sharing of results (advantageous or not). For example, it is the case in agriculture for the development of PPPs (Spielman, Hartwich, & von Grebmer, 2007) or for the RIO Reflexive Interactive Design (Bos & Groot Koerkamp, 2009).

Then, another main difference between all these methods is the degree of openness and information exchanges. Open innovation, 'one of the hottest topics in (current) innovation management', which helps practitioners and scholars to 'rethink the design of innovation strategies in a networked world' (Huizingh, 2011) focuses obviously on the openness and the sharing of information. Rather, PPPs allow the exchange and work on a more confidential level.

## 3. Study Development

The study was based on a European initiative launched by the ICT AGRI Era-net. This initiative, named PPP Action, took place during one year (from November 2011 to about October 2012).

### The ICT AGRI ERA-NET organization

ICT-AGRI ERA-NET [European Research Area Network for Coordination of Information and Communication Technology (ICT) and Robotics in Agriculture and Related Environmental Issues] is one of the ERA-NETS, funded under the 7th Framework Programme for Research (FP7). Initiated on May 2009 and running until March 2014, this ERA-NET has 18 partners and 14 observers from 21 countries. Its key concerns are to strengthen the international competitiveness of the European Union and to reduce the negative impact of agricultural production on the environment by using ICT and Robotics.

To date, ICT-AGRI ERA-NET 1 main results are a Strategic Research Agenda for ICT and robotics, 2 calls which have funded several research projects and a Meta-Knowledge Base (an online resource). A second ICT-AGRI ERA-NET, including more partners, was launched in 2014 and is more orientated towards innovation.

### The PPP Action

Even if ICT AGRI ERA-NET 1 was more focused on the coordination of research activities in Europe, it showed a growing interest toward innovation. Hence, from November 2011, the ERA-NET has launched an experimental one-year action on innovation. This initiative named 'PPP Action' aimed at promoting PPPs in a broader sense: all types of partnerships between actors from public research and other stakeholders such as end users, private companies and intermediaries (industrial clusters, professional associations...).

The action had a twofold objective. First, this PPP Action aimed to bring together the stakeholders of the innovation process in agriculture around a same challenge: the reduction of the use of pesticides in agriculture. Results expected could be, in the best case, the set-up of concrete partnerships involving public research, industries and end users. A less ambitious conclusion of this action could be the set-up and strengthening of linkages between these stakeholders.

The second objective of this PPP Action was reflexive: it concerns the study of the action itself. A methodology, based on existing methods, was designed and tested in order to manage this experimental action.

### The three 'supports' to boost exchanges and discussions between stakeholders

The three suggestions used to start and boost exchanges and discussions between the players were the following:

- An **E-services package**, a sharing services platform using ICT,
- **Smart adjustments tools on sprayers** which aim at improving techniques and conditions of pesticides application on short and mid-term,
- **Combined and modular robotic solutions** which, over a longer term, could combine multi-actions from a single robotic platform.

For these three suggestions, their different components and corresponding actors were identified. These aspects refer to technological elements and actors, but not only: societal, legal, and contextual aspects and actors were also identified collectively and were involved. The main idea was to start the discussion and not to realize these three suggestions. Any proposition of participants on other possibility was encouraged.

In order to gather together the main stakeholders concerned by the reduction of the use of pesticides, a method was designed, based on several existing methodologies. Three aspects of this method seemed crucial.

- First, we have decided to develop PPPs, with a focus on private companies, without excluding other stakeholders. Indeed, private partners could be interested more directly by the ICT AGRI activities (for example with the opportunity to participate to scientific project funded by ERA-NET)
- Secondly, as particularly highlighted in open innovation approaches, some flexibility was left in order for creativity and collective work to develop. In our case, the degree of openness was up to the players involved and could have been different regarding the content as well as for the type of partnerships created.
- Lastly, as our challenge was mainly operational with time constraints, we have decided to use existing methods (the value chain approach) with some improvements due to the specificities of our action.

In order to nurture the first spark of discussion between the players of our PPP experimental action, a **value-chain approach** was adopted. This approach, applied originally inside the firm, allows to identify all the players who are involved in the innovation process 'from conception, through the different phases of production, delivery to final consumers, and final disposal after use' (Kaplinsky & Morris, 2001). Then, each brick of the innovation process provides a useful basis for the discussion and collective work. Our main objective was to create the right condition to stimulate interactions and collective work of the participants.

## 4. Survey Impressions

The experimental PPP action of ICT AGRI ERA-NET ran during one year at the European level and both the evolution of the action and the results (positive and negative) are important to be analysed. The concrete positive results were: links made between several partners interested by crop protection, better knowledge of these players, a 200 participants conference organized

with two other European projects and some recommendations for next innovation management action. We present and discuss in this Section the main mitigated aspects of the management of this action and some recommendations.

### Finding the right stakeholders and involving the intermediaries first

Most of the difficulties we met during our experimental action were due to the time and challenge of identifying **the right stakeholders**. Hence, **intermediaries** such as industrial clusters, national or local associations, and also era-net, have a very important role to play there, and they should be encouraged to do so. In our action, the involvement of intermediaries and the lack of mapping of these players were underestimated and not done at the right scale: local intermediaries showed more interest and were more active than most of the intermediaries contacted at the wider level.

### Creating a motivation for all the stakeholders involved

Strongly linked to the previous aspect, the **motivation of the players and the way to manage it** are also important. Indeed, PPPs are interesting for both public and private players (Hartwich, Janssen, & Tola, 2003). For public players, it ties research more closely to users' needs (and can augment investments in research). And for the private sector, it improves competitiveness (as other forms of outsources activities). But, in the operational action, stakeholders do not really measure the interest of these partnerships and are not able to see, in a lot of different existing actions and initiatives, which one is interesting for them. A constant reminder of the interests and gains for each player is necessary, as well as other form of motivation (such as financial help to set up the project for example).

### Mapping and – or coordination of innovation funding programs

Several funding mechanisms for innovation, promoting projects with industrial partners, exist in some European countries. It could be important to map these mechanisms in order to inform the stakeholders, or even better, to support them to benefit from these mechanisms in trans-national projects including companies.

### Managing the confidentiality and the diversity

As we experienced in the PPP action, some private partners (large companies or SMEs – small and medium-sized enterprises) expressed their interest without participating directly to the collective work. The main reasons of this distance could be the early stage of the project and a need for confidentiality: Ways of managing these interests and some confidentiality required should be found while at the same time going on with the collective work. Also, involving the different intermediaries of the players at different moment of the innovation process could offer more efficiency. For example, an earlier involvement of private companies and consumers (or their representatives) was strongly

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suggested by all the stakeholders involved in our action and could offset the issue of 'economic viability' which appears to be essential, as well as other issue already highlighted such as 'ease of use, reliability and legislation or liability issues' (Blackmore, 2007). A specific work on motivate them had to be done and took several forms: examples of successful PPPs, assessments on the impact of such partnerships, financial (or other types of) advantages to linked with public research, and end users associations.

## 5. Conclusions

To conclude, this work stresses the importance of the intermediaries' role (both for public and private players), the involvement of local intermediaries and projects, and the necessary space to create to let the partners choose their types of partnerships or organisation. Then, for the particular area of agricultural machinery, solutions have to be found to offset the necessary confidentiality of private stakeholders' interests, and also to give them some reassurance, or at least advantages, on the results of such partnerships. This is particularly true for SMEs. Regarding ICT innovation, on the contrary, open innovation and sharing of information and exchanges seem a good way to boost partnerships.

In all the cases, a main point which should be developed is the sharing of these experiences which try to boost innovation, at the European level. Exchange of experiences and good practices of innovations, as well as bad ones, such as in a 'community of practice', as suggested by Hall (2007), will significantly help to manage better these innovation process.

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