How the performance rationales of organisations providing farm advice explain persistent difficulties in addressing societal goals in agriculture

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Abstract

This article posits that an economic analysis of the full diversity of organisations providing agricultural advice is needed to explore how societal issues related to environment and occupational health are addressed in the provision of such advice. Our theoretical framework draws on existing research in institutional economics applied to services, in particular to Knowledge Intensive Business Services (KIBS). The methodology is based on a case study, the French seed potato supply chain. The results consider all the KIBS suppliers that deliver advice to farmers in the supply chain. They demonstrate the importance of organisations (linked to upstream and downstream industries) that are often neglected in studies on the pluralism of farm advisory services. Four main types of KIBS are described: client-owned advisory organisations; integrated services where service are developed primarily to accompany a commercial activity; consultancy firms; and parastatals. Each of them design both front-office and back-office service activities, according to their own profitability objectives. The analysis of the performance rationale of these different types of KIBS organisations provides an in-depth understanding of their economic strategies and the reasons why they address – or ignore – the possible adverse effects of their activity on occupational health and the environment. In such a context, public policy seems necessary to frame collective action and integrate environment and human health issues into farm advice. The conditions of efficiency of such interventions are discussed.

Key words: farm advisory services; knowledge-intensive business services; pesticides; potato; health; France

1. INTRODUCTION

Advisory services for farmers employ hundreds of thousands of advisors worldwide (Swanson and Rajalahti 2010). They contribute to innovation and knowledge creation for agricultural and rural development (Leeuwis and van den Ban 2004), and are considered a key asset for meeting the many challenges facing agriculture in both the global South (Faure et al. 2012) and the global North. In particular, the need to feed a growing population and to address new societal issues such as environmental and health is generating a strong demand for technical support for farmers. A case in point is pesticide reduction in the European Union (EU), where there is mounting evidence of the harmful effects of pesticides on both human health and on the environment. Advisory services are expected to contribute to the reduction of the use of pesticides in various regulations at EU, national and regional scale.

In this context, we need a better understanding of how these objectives are being pursued by the increasingly diverse economic actors investing in advisory services (Birner et al. 2009, Knierim et al. 2017). Extensive debate exists as to the effect of this pluralism on the supply of services, between "fragmentation and creative diversity" (Garforth et al. 2003). Recently, various researchers have contributed to a better understanding of the implications of this pluralism of advisory service suppliers. They provide insights on how the coexistence of these actors play on farmer's access to services (Labarthe and Laurent 2013a), on the relationship between advisors and farmers (Sutherland et al. 2013), on the quality of services (Prager et al. 2016), or on the relations between advisory organisations (Klerkx and Proctor 2013, Compagnone and Simon 2018). We aim to contribute to this stream of research by strengthening it in two respects.

First, the research mentioned above are focused on organisations specialised in the supply of advisory services (public extension services, private consultants, chambers of agriculture,

farmers' associations, etc.), and overlooks the contribution of other organisations within supply chains. Thus, while some studies include in their analysis the role of cooperatives and intermediaries in farmers' decisions and the exchange of knowledge, for example through contracts and associated quality requirements (Cholez et al. 2017), other upstream and downstream industries are often overlooked, with the exception of a few studies (Klerkx and Jansen 2010). In other contexts, such as the US, researchers have demonstrated that corporations in the pesticide or seed industries play a growing role in farmers' decision, thus raising many issues in the integration of societal and environmental issues (Wolf 1995, Wolf and Nowak 1999). We posit that such actors are also transforming the supply of farm advisory services in the EU.

Second, many of the studies on the plurality of farm advisory services are sociological studies that document the micro-level of interactions between farmers and advisors (e.g. Cerf and Hemidy 1999), or the transformation of agricultural advisors' profession (e.g. Nettle et al. 2018). There are fewer economic analyses at the level of the organisations. We posit that the economic resources and strategies of advisory organisations determine the very content of advice.

Our hypothesis is that an economic analysis of the full diversity of organisations providing agricultural advice in the supply chain is needed to discuss the integration of societal issues in the provision of advice. Such an analysis will reveal the interests of stakeholders that are currently neglected in analyses of the pluralism of agricultural advice providers, even though they influence overall technical choices.

In order to test this hypothesis, we propose a conceptual framework to describe the whole spectrum of farm advisory service suppliers (Section 2). We built on existing research in institutional economics applied to services, and more precisely to Knowledge Intensive and Business Services (KIBS). Section 3 presents the methodology and explains why the research

focuses on a case study, the French seed potato supply chain. The results section first provides a typology of farm advisory suppliers (Section 4.1), then analyses the performance rationale of these different types of KIBS organisations (Section 4.2) and highlights their consequences on the integration of societal issues (section 4.3). Section 5 discusses the heuristic value of this analytical framework and the policy implications of the results.

2. UNDERSTANDING THE PERFORMANCE OF A DIVERSITY OF KIBS SUPPLIERS

By definition, KIBS are services in which knowledge production is the most important component. Miles et al. (1995: 18) define KIBS as *"services that involve economic activities which are intended to result in the creation, accumulation or dissemination of knowledge"*. In this paper, we use the term KIBS to refer to the organisations providing such services. Den Hertog (2000: 505) defines them as organisations or companies that frequently use professional knowledge, whether related to a specific (technical) discipline or a (technical) domain, generating intermediary knowledge businesses (products or services).They can be considered as a group of companies that find solutions for other companies, based on specific knowledge (see J-Figueiredo et al. 2017 for a review). The KIBS literature has already been applied to agricultural advisory services. It has enabled a better understanding of the role of intermediaries acting as knowledge brokers within complex or fragmented advisory systems (Klerkx and Leeuwis 2008). It has also made it possible to specify the profile of independent consultants in contexts where farm advice has been privatised, such as the Netherlands and the UK (Klerkx and Proctor 2013). Yet the application of the KIBS framework to the agricultural sector has been restricted to specific types of organisation: mostly private companies (consultants) specialised in the delivery of services for farmers. We need to go one

step further because in many situations, farm advisory services are only a portion of the overall activity of economic organisations, which may also sell farm inputs or technologies such as seeds, fertilisers, pesticides, and GPS, or buy farm commodities. KIBS include farmers' cooperatives as well as private companies (with upstream or downstream activities). Such organisations are key players of advisory services in countries like France (Labarthe 2014). In this paper, we use the KIBS analytical framework to analyse the activity of those actors, regardless of the aim and legal status of the organisation.

2.1. Using KIBS literature to propose an analytical framework for classifying suppliers of farm advice

Agricultural advisory services fit the theoretical definition of KIBS. Farm advice is provided by organisations that co-produce knowledge with farmers. It helps them devise solutions to various problems relating to production, health, and/or environmental objectives. In particular, it helps farmers change their practices and comply with new regulations. This definition of course hides a wide range of practices and degrees of co-production of services, from in-depth co-construction of services between farmers and advisors to more top-down or injunctive advice with less interactions, depending on the level of complexity of the problem to be solved and on the suppliers' performance rationale (Laurent et al. 2006).

Recently, several typologies of farm advisory organisations were proposed in the debates about the privatisation of farm advice. Most of them focus on the legal status of organisations (public, private, non-profit associations, farmer-based organisations, etc.) and on their sources of funding (Birner et al. 2009). They often differentiate between organisations in terms of public, private, non-governmental (NGOs) or farmer-based (FBOs) (Knierim et al. 2017). However, they do not allow us to explain the reasons for organisations' investment in advisory services, nor the exact nature of the services they provide. The literature on KIBS

proposes guidelines to better define the variety of farm advisory services providers and to describe their economic strategy.

A first added value of KIBS literature is to enable a distinction according to the nature of the product of service providers. There is a long series of debates about how to define that product (Hill 1999, Gadrey 2000). Miles et al. (1995) proposed to distinguish between, on the one hand, KIBS that predominantly rely on specific competences of consultants, and on the other hand, cases where the services are delivered with the dissemination of technologies, mostly Information and Communication Technologies (ICT). The agricultural sector is characterised by this duality of services, with services based either on the sole competences of advisors or provided with digital technologies (software, decision support tools, smartphone applications, etc.).

A second added value of the KIBS literature is to integrate into the typology of KIBS providers the patterns of clients' engagements in service relationships (Muller and Doloreux 2009). Different patterns of client engagement co-exist (Brodie et al. 2011), from independent enterprises where clients are involved only in front-office exchanges, to situations in which clients own the whole enterprise and have a say in its strategies. All of them will be considered in our analysis. Gadrey (1990) has emphasised that service relationships are embedded in social relations that may determine not only the process of service production, but also the very content of advice. Understanding who controls this service relationship (through ownerships, contracts, etc.) is very important to understand the strategy of construction of the supply (both front- and back-office). One might expect that a greater control by clients could lead to a better integration of the societal issues faced by these clients. In particular, a greater control of advice by farmers could lead to a better integration of the health issues facing them. Understanding who controls advisory organisations may also have some consequences on farmers' access to services, as service markets are described as

network markets, where the belonging to a specific social group can determine access to services (Sauviat 1994).

The combination of this literature on KIBS with recent work on the plurality of farm advice, has spawned new classification principles to describe KIBS organisations in agriculture. Five key criteria can structure the analysis: i) the organisation's status (Are clients legally associated in the organisation, e.g. as investors for a private firm, or on the board of an association?); ii) the organisation's activity; iii) the purpose of the organisation's investment in services (What is the share of services in the overall activity of the organisation? Why does it invest in such activities?); iv) the types of relationship with clients (How do clients – here, farmers – finance the service: though contracting, contributions, other methods?); and v) the nature of the product of services (services based either on the competences of advisors or on digital technologies, e.g. software, decision support tools, smartphone applications).

Faced with distinct constraints and types of client interaction, the various types of KIBS organisations may display different economic behaviours and conceptions of the performance of services.

2.2. Using KIBS literature to understand the performance rationales of farm advisory suppliers

Academic debates on performance measurement of services abound, and are supported by frameworks in different disciplines and case studies from many sectors (Loveman 1998). In economics, the debates primarily deal with the limitations of traditional productivity measurement. Standard productivity and growth indicators used in industry exclude several dimensions of service firms' performance, in particular those linked to the relational dimension of the co-production of services (Coombs and Miles 2000, Gadrey 1996, Bettencourt et al. 2002). However, productivity improvement is part of the typical strategy of

service providers, as attested by efforts to standardise services (Tether et al. 2001). This issue is also found in agricultural advisory services, which may have important standardised components (collective advice, production of standardised decision support tools, etc.) or, alternatively, be considered as an activity exclusively centred on face-to-face relationships. To overcome this difficulty, we propose a qualitative analysis of the performance rationale of farm advisory suppliers. This analysis can be based on two core principles.

First, the performance rationale relates to how suppliers mediate between front-office and back-office activities (Labarthe and Laurent 2013b). Front-office corresponds to interactions between the service provider and the client. Back-office work supports the building of the service supply and takes place in the absence of the client. It can include scientific and technological monitoring, advisor training, management of technical references (e.g. the construction and use of databases), and even the production of original knowledge (through experimentation and R&D). KIBS organisations are caught in a dialectic between "standardisation and particularisation" (Tether et al. 2001): they need to contextualise knowledge in order to solve specific problems and integrate farmers' specific needs, but at the same time they also need to build on codified and validated knowledge (Toivonen 2004). This twofold imperative is reflected in the distinction between front- and back-office activities. Many studies seek to describe the effects of different front-office configurations on the quality of services (e.g. Gremler and Gwinner 2000). This focus on the micro-level front-office interactions between service employees (e.g. advisors) and their clients, and the lack of research on back-office, is not peculiar to agriculture. It has for instance been extensively discussed by Sousa and Voss (2006) in the case of e-services. We argue that back-office activities are an essential component of KIBS providers' strategies. In order to fully understand these strategies, the analysis must fully consider both front-office and back-office activities.

Second, the performance rationales are multi-dimensional (Gallouj et al. 2009). Various authors (Djellal and Gallouj 2010, Viitamo and Toivonen 2013, Janeschek et al 2013) have indeed pointed out that a multi-criteria analysis is the most appropriate method for analysing advisory services' performance rationales, and highlight the trade-off between front- and back-office dimensions. The idea of this multi-criteria analysis is to understand how KIBS suppliers justify the performance of their services according to different dimensions, different "registers of justification" (Boltanski and Thévenot 2006). Five such dimensions will be taken into account in our study:

- a **financial dimension** that corresponds to the profitability of the service activity, that is, the ratio between the operating profit and the capital invested to implement the advisory activity;

- a **technical dimension** associated with the conception of productivity of the advisors' labour. This may be related to the number of clients assigned to each advisor, and to the rate of success of advisory operations;

- a **relational dimension** that concerns the front-office aspect of services and the quality of the client's engagement within the service (Hennig-Thurau et al. 2002);

- an **innovation dimension** that relates mostly to back-office activities and to the capability to supply the KIBS with new knowledge, including through service-specific R&D (Djellal et al. 2003);

- a **civic dimension** pertaining to the ability to address social issues such as environment, including occupational health and related regulation in the case of farm advice.

Consideration of these five dimensions should help us to understand the KIBS suppliers' performance rationale and how it affects back-office orientation and knowledge production. In this framework, client's engagement is not restricted to the individual perspective of their

satisfaction or to their access to a co-production of services. The patterns of clients' engagement are concretely embodied in the five dimensions of performance rationale and can impact both front- and back-office dimensions of services.

3. METHOD

This work is based on a case study approach in order to better define the effects related to context and those related to the studied mechanism (Yin 2003, Siggelkow 2007). The methodology of the analysis of the performance rationales in different types of KIBS providers draws on former research work in institutional service economics (Djellal and Gallouj 2008).

3.1. The case study

We chose to focus the analysis on a case study of KIBS operating in a specific sector of activity, the production of seed potato in France. This case study (Dhiab 2016) helped us to disentangle the internal determinants of the KIBS suppliers' performance rationales from a variety of contextual and historical elements: relations between suppliers and certain groups of farmers, public policies framing the nature of farm advisory services, etc.

We chose the seed potato production for two reasons. First, it is confronted with a variety of societal issues associated with the use of pesticides. On the one hand, production of high-quality, disease- and pest-free seed potatoes is essential, in order not only to protect seed producers' crops and to comply with international trade regulations within the supply-chain, but also to protect the final user of the seed: the farmers producing potatoes for food and non-food uses (e.g. starch, ethanol). On the other hand, seed potatoes are subject to strong pest pressures that can cause the entire crop to be lost. Seed producers therefore use high levels of pesticides to counter these risks (the "Treatment Frequency Index" is one of the highest of all

crops). As result: i) a reduction in the amount of pesticides used can generate specific production and marketing risks and thus specific demands for agricultural advice; and ii) the producers operates in a sensitive area as regards societal issues related to pesticides (environment, consumers' health and occupational health issues).

The second reason for choosing the seed potato production is that a wide range of actors are involved in providing advice (producer organisations, chambers of agriculture, pesticide firms, seed potato companies, private consultants, etc.). Yet, given that this supply chain is essentially small and well delimited, it was possible to identify the exhaustive list of advisory organisations.

3.2. The sample

In France, the seed potato production is concentred in three areas (the northern part of France, Brittany, and the "Centre" region). We first worked with key informants to identify the organisations playing a role in the provision of farm advisory services. For the purposes of our research, KIBS organisations were identified through an analysis of the supply chain and a snowball sampling technique (Atkinson and Flint 2001). The snowball methodology was required as there is no directory to identify ex-ante the KIBS actors active in that production. Intermediary results were presented to the actors of the supply chain to ensure that all types of advisory suppliers had been considered. The actors interviewed are presented in Table 1.

Table 1. General presentation of the organisations of the sample (2012 Data)

Organisations studied		*Turnover million €*	*Total staff*	*Number of advisors*	*Number of clients*	*Major activities*	*Status*	*Main sources of Financing*	*Type of KIBS*
Producers' Organisation with certification activities (PO)	PO1	[10-20[	[50-75]	[15-30[	[400-500[	**Control and certification;** *Agricultural advice*; Research and experimentation; Plant breeding	Association	Annual membership fees paid by producers; sales	CO-KIBS
	PO2	[1-5[	[25-50[	[15-30[	[200-300[				
	PO3	[1-5[	[10-25[	[1-3[	[100-200[				
Other Producers' Organisations (PO)	PO4	n≤1	[1-3[	[1-3[	n<100	***Agricultural advice*;** Research and experimentation; Plant breeding	Association	Subsidies (organic farming); sale of potato seeds	CO-KIBS
	PO5	n≤1	[1-3[	[1-3[	n<100			Membership fees	CO-KIBS
Potato seed company (CE)	CE1	[35-45[	[50-75]	[3-10[	[100-200[	**Production,** collection and dispatching of seed potatoes; *Agricultural advice*	Private	- Sale of seed potatoes - Royalties	IN-KIBS
	CE2	[35-45[	[10-25[	[3-10[	[100-200[				
	CE3	[35-45[	[25-50[	[3-10[	[100-200[				
	CE4	NA	[1-3[	[1-3[	n<100				
Pesticide firm (PF)	PF	[300-400[	[300-400[	[95-105[	NA[a]	**Production and commercialisation of crop protection products and seeds;** plant breeding, etc.; training advisors; *agricultural advice*	Private	- Sale of pesticides and seeds	IN-KIBS
Consultancy companies (CC)	CC1	n≤1	[1-3[	[1-3[	[200-300[	***Agricultural advice***	Private	Sale of advisory services	CC-KIBS
	CC2	[1-5[	[10-50[	[10-15[	n>3500				
Chambers of Agriculture Department (CA)	CA1	NA	[75-100]	[10-15[	[800-900[	***Agricultural advice***; R&D; Training	Parastatal	- Tax on unbuilt land, public subsidies; - Public funding of research projects - Sale of services	PS-KIBS
Chamber of Agriculture Region (CA)	CA2	NA	[10-50[	NA	NA	**Coordination** of **the *agricultural advice*** activities of the chambers of agriculture (*NUTS3* level); R&D; Training of advisors			

Methodological note. Interval limits were set in order to secure the confidentiality of the information collected during the interviews.

[a] NA = not available

The analysis presented here is based on interviews conducted with the use of a semi-structured questionnaire with representatives of 14 organisations (n = 16 interviews), as well as with key informants for the sector (n = 6 interviews). The 14 surveyed organisations included all the major farm advisory suppliers for seed potato production in France.

3.3. The survey

The interviews included questions pertaining to the general description of the organisation (date of establishment, status, membership numbers, etc.), a more specific description of the advisory service offer (number of advisors, service format and options, themes, number of clients, etc.), questions about the front-office organisation (frequency of visits, service format and options), and questions about the configuration of the organisation's back-office (back-office activities, team, themes, governance, etc.).

The interviews were transcribed in full and used to fill in an analytical grid that enabled us to apply the multi-criteria framework regarding the performance rationale of KIBS organisations, as presented in the previous section. The data were analysed through qualitative pattern matching (Miles & Huberman 2003). The framework was inspired by the work of Gallouj et al. (1999). As noted above, five dimensions of performance justification were considered (financial, technical, relational, innovation, civic). These five dimensions were translated into a set of indicators (see Table 2).

Table 2 – Analysis framework for advisory service performance

Registers	Indicators
Financial	***Profitability of the advisory service** - Added value of advisory services and how that value is generated
Technical	***Productivity of the advisory service in terms of time** -Ratio of farmers/advisor -Surface areas under crops/advisor -Quantity of seed potatoes sold/advisor ***Level of standardisation of services** - standardisation vs personalised message ***Rate of dysfunctions** - measurement of dysfunctions and recovery measures (service evaluation system)
Relational	**Relationship between the advisor and the farmer** ***Personalisation (quality of the relationship in order to identify and meet farmers' needs)** -Frequency of visits -Duration of visits ***Client loyalty** -Turnover of producers -Turnover of advisors ***Nature of the contract** (standard, personalised).
Innovation	**Back-office. Organisation's capacity to invest in knowledge acquisition, production and renewal** **Share of the total budget devoted to the back-office** ***Number of back-office staff** ***Back-office activities** -Experiments -Databases -Scientific monitoring -Training
Civic	**Organisation's capacity to integrate values of equity or other societal issues** *** Taking into account controversies over the use of pesticides** - Environment - Occupational health - Consumer health

These different dimensions of performance cannot be thought of independently; there are synergies and tensions among them. The relations between these dimensions draw patterns that make it possible to identify the performance rationale of various organisations.

4. RESULTS

4.1. A Typology of KIBS providers in the seed potato supply chain

Four types of advisory service could be identified: CO-KIBS (client-owned KIBS: producer organisations, and centres for agricultural studies), IN-KIBS (integrated KIBS: services proposed by seed or pesticides companies), CC-KIBS (private consultants), and PS-KIBS (parastatal KIBS, in this case chambers of agriculture). A summary of the typology is presented in Table 3 below.

1 **Table 3. Typology of KIBS**

Type of KIBS	Status	Activity (share of KIBS in the total activity)	Goal	Relations with clients	Nature of product sold (Miles 1995)
					P-KIBS / T-KIBS orientation
Client-owned advisory organisations (CO-KIBS)	*Farmers' association*	Services = 100% of the activity	- Solving problems of clients/ farmer-owners - Contributing to the individual (or collective) performance of farms	- Farmers pay a contribution (membership fee) that is pooled for front- and back-office activities; this fee is a pooled investment in advisory services (front- and back-office) - Additional services may be invoiced individually	- Service relationship and advisors' competences at the heart of the services (what is sold is above all the advisors' working time) (P-KIBS dominant) - A growing role of ICTs in the supply of services, with a number of decision support tools
Integrated services (IN-KIBS)	*Private firm or cooperative*	The delivery of advisory services are integrated with the supply of agricultural inputs or outputs	- Improving sales of goods (quantity, quality) by providing clients (farmers) with services - Trend towards considering advisory services as a revenue stream in their own right	- Services included in commercial contracts for inputs and outputs (farmers do not pay directly for services) - A new trend of charging clients directly for services; there is a tendency to separate the offer of these services from transactions on goods	- Service relationship and advisors' competences at the heart of the services (what is sold is above all the advisors' working time) (P-KIBS dominant) - A growing role of ICTs in the supply of services, with a number of decision support tools
Consultancy companies (CC-KIBS)	*Private company*	Service = 100% of the activity	- Making profits via the commercialisation of services	- Commercial and contractual relations between farmers and advisors (farmers buy services from the company)	- Service relationship and advisors' competencies at the heart of the services (what is sold is primarily the advisors' working time) (P-KIBS dominant) - Increasing role of ICTs and decision support tools in the supply of services
Parastate organisations (PS-KIBS)	*Chamber of agriculture*	Service = 100% of the activity	- Implementing public programs related to farm advice (including societal issues: health, environment) - Recovering costs via the commercialisation of services	A mixed delivery of services: - free delivery supported by public funds and public programs - commercial and contractual relations for other services	- Service relationship and advisors' competencies at the heart of the services (what is sold is primarily the advisors' working time) (P-KIBS dominant) - A growing role of ICTs and decision support tools in the supply of services

2

The first type is client-owned advisory organisations (CO-KIBS). These are farmers' associations (or companies belonging to farmers) created to provide services to solve clients' problems or improve the performance of members' farms, without seeking any other form of profit. The beneficiaries of these services belong to the association, to which they pay a membership fee. This contribution represents a collective investment by farmers in advisory activities (both front- and back-office). Additional services may be invoiced individually. Such organisations play a key role in the supply of services to farmers in many European countries (Knierim et al. 2017). In the seed potato industry in France, CO-KIBS include two sub-types: producers' organisations with certification activities, providing advisory service as an ancillary activity, and producers' organisations whose main goal is to provide advice. There are three major producer organisations (PO), to which all seed potato producers have to belong: one for producers in the Nord-Pas-de-Calais, Upper Normandy, Picardie, Champagne-Ardennes and Île de France regions; a second for producers in the Centre region; and a third for producers in Brittany. All three provide advisory services to members and are funded primarily by producers' membership fees. Other CO-KIBS active in the supply chain include the CETA (centres for agricultural studies), collective organisations (or 'clubs') funded by farmers to provide them with contextualised advisory services, or to deal with specific issues (e.g. organic farming).

The second type includes integrated services (IN-KIBS) providers developed primarily as a secondary service to accompany a commercial activity concerning a good: usually either the sale of inputs (seeds, chemical, fertilisers, machinery) or the marketing of agricultural commodities (cereals, wheat, meat, fruits and vegetables). The primary objective of these services is to improve the sale of goods (quantity and/or quality) by providing farmers with relevant services (Goulet and Le Velly 2013). The cost of services used to be systematically

included in commercial transactions with farmers for inputs or outputs (farmers did not pay directly for services), but advisory services are increasingly being charged to farmers directly. These KIBS services are grounded on the skill of advisors and direct interactions with them, and services based on new technologies. IN-KIBS include both private firms and cooperatives. Some are international. In the seed potato sector two major kinds of enterprise in this type where identified and investigated:

- Private seed potato companies producing and commercialising potato seeds. They sign contracts with the farmers who produce seed potatoes for them. They offer advisory services free of charge to these farmers in order to ensure that they use recommended practices to provide the quantity and quality of seed potatoes required.
- Private firms producing pesticides and fertilisers that combine advisory services (to extensionists and farmers) with the sale of their products.

The third type includes consultancy companies (CC-KIBS). Advisory organisations of this type are private firms whose activity consists exclusively in selling advice to farmers. They are for-profit organisations engaged in commercial and contractual relations with farmers (farmers buy services from the firm). Their activity is mainly based on service relationships and advisors' competencies. ICTs and decision support tools are nevertheless increasingly present in their activities, both front- and back-office. Former research has shown that they are more prevalent in some countries than in others, being common in the UK (Sutherland et al. 2013, Klerkx and Proctor 2013), Germany (Knuth und Knierim 2013), and the US (Knutson and Outlaw 1994), for example. Several small-scale private consultancy companies commercialising services to farmers could be identified in our case. Although they were providing advice to seed potato producers, most of their advice was targeted at other aspects of the production system.

The fourth type, parastatal organisations (PS-KIBS) comprises organisations owned by farmers but benefiting from public funding at the national or regional levels. Their core (and often exclusive) activity is to deliver services to farmers in accordance with public programs (often with goals related to societal issues: health, environment). They thus offer a mixed delivery of services combining free programs supported by public funding, with some commercial and contractual relations for other services. Service relationships and advisors' competencies are central, but ICTs are also used in providing decision support tools. The key example of such organisations is chambers of agriculture, which are active in the supply of farm advisory services for farmers in several EU countries (e.g. France, Austria, Germany, Hungary).

A striking fact is that all these **different types of KIBS organisations differ radically in how they engage farmers within their organisational structure.** All provide services that mix professional features (where the key factor is advisors' specific competencies) with technological ones (investments in ICTs and the development of decision support tools). They may provide advice on similar topics and may be in competition with one another for providing services to farmers (e.g. Compagnone et Golé 2011). However, some have exclusively commercial relationships with farmers, selling services to them (CC-KIBS) or services together with inputs (IN-KIBS), whereas others are directly governed by farmers, either partly (PS-KIBS, which are also under the control of public actors) or fully (CO-KIBS). Some authors argue that the ability to interact and coproduce knowledge with clients has become a key factor in the competition to provide services (Lusch et al. 2007); and there is a growing consensus that clients contribute to the co-creation of the value of services (Gadrey 2000). Yet little is known about how clients' engagement in turn affects the KIBS back-office

or how it may alter the orientation of knowledge production and further technological choices at that level. An analysis of the performance rationale of each type of KIBS provides insights into this issue.

4.2. The diversity of performance rationales

4.2.1. Client-Owned KIBS' performance rationale (producer organisations)

The high sanitary quality of seed potatoes is a competitive advantage for the French producers. Seed potato farmers have created special producers' organisations (PO) to meet this challenge. These organisations provide them with technical support via specific advisory services. The POs are funded through annual membership fees. They also receive some support from the State. Farmers assess the profitability of this collective investment against the contribution of these advisory services to secure their income, by guaranteeing them healthy crops, from sowing to the storage and certification stage. This is their main aim.

POs' strategy is essentially based on the relational and innovation dimensions. The number of producers per advisor is low (18 in the case of PO1). The frequency of front-office interactions is high compared to figures reported in other research (Prager et al. 2016). Face-to-face relationship between advisor and producer (front-office) is central. The service is therefore highly personalised. This strategy is in some respects similar to that of consultancy companies, as described by Labarthe et al. (2013).

In the case of CO-KIBS, the membership fee is pooled into a collective investment. The aim is to develop any and all advisory activities (front- and back-office) relevant to the purpose of the whole association. Thus, the added value of the services is not conceived only at the individual level of the interactions between a farmer and an advisor, as might be the case for small consultancy companies. The assessment of advisors' activity takes into account both

front- and back-office activities; the two types of activity complement each other. Direct interactions with clients feed back-office activities by better specifying the producers' problems.

The innovation dimension likewise occupies a central place in the POs' strategies. Their back-office activities are many: R&D, experimentation, monitoring of scientific and regulatory developments, training, and so on. They devote significant financial and human resources to them. They have a wide range of research activities, including major investments for testing new varieties in experimental plots, development of new methods of pest control, genetic improvement of resistance to pests, agronomic practices (fertilisation, production techniques), and economic and regulatory aspects (particularly with regard to new pesticides). They are also part of formal and informal networks involving public and private research institutes. This allows them to up-date their knowledge base. The advisors also take part in training, both in-house and when organised by the research institutes.

The POs' advisory services' performance rationale is thus centred on the relational and innovation dimensions. It is based on joint investments in front- and back-office activities. The advisor-farmer relationship orientates the back-office investments. The outcome of these investments is in turn at the heart of the solutions proposed to farmers.

4.2.2. Integrated-KIBS' performance rationale (seed and pesticide companies)

The core business of seed potato companies is to create new varieties and/or to commercialise them. They therefore need a regular production of seed potatoes of high sanitary quality. To this end they propose advisory services to farmers, based on a standardisation rationale. These companies' strategy is to reduce front-office expenditures and to invest in back-office work to produce technical references and standards. Their justification is thus formulated in technical

rather than relational terms. Unlike the POs, the role of quantitative outputs is important in the assessment of advisors' activities. Both the content and the form of services are standardised (standardised technical forms to fill in, software, decision support tools, technical message service, standard service package, etc.). To some extent, this standardisation of front-office activities frees up financial and human resources for back-office activities (science monitoring, R&D, creation of databases, training), even though the ability to have direct interaction with farmers remains strategic. Justification in terms of innovation is also important. Standardised technical references are the main products disseminated by advisors, and additionally play a significant commercial role for these companies. They include profitability objectives per se, which may not correspond to the expectations of farmers receiving the services but will be useful for other purposes. These technical references serve to describe the agronomic potential of new seeds and to characterise optimal modes of production for these varieties. This knowledge is then used by these firms in their business to commercialise the varieties and to conquer new markets and new areas of application (crisps, chips, etc.).

The case of the pesticide firm is different. Rather than offering advisory services to farmers, it caters to PO technicians who act as intermediaries between the company and many farmers, especially by organising training sessions for farmers. Back-office work is oriented towards testing the effectiveness of pesticides in order to produce and disseminate knowledge to maximise pesticide sales. This approach also corresponds to a rationale of standardisation, but through the formatting of knowledge on the effectiveness of pesticides.

For all these companies, the performance of their advisory services depends on their ability to standardise their offer by producing technical references enabling them to reduce the front-office expenses and maximise the profit of their core activity by meeting the companies' overall marketing objectives.

4.2.3. CC-KIBS' performance rationale (consultancy companies)

CC-KIBS suppliers are independent consultancy companies whose aim is to develop and sell advice to farmers. They supply services in the form of software, a decision support tool, a recommended technique, and so on.

These consultants' profitability depends on the sale of technical solutions to farmers. To ensure this profitability, CC-KIBS grant importance to back-office activities. They invest in the acquisition of new technical references enabling them to broaden their network of service sales. To this end, they develop various R&D activities: experimental field trials, science and regulations monitoring, databases creation, software development and so on. This back-office work includes several themes: e.g. testing of the pesticide treatment programmes, fertilisation programmes, and soil-management techniques. In one particular case (CC1), farmers are provided with Internet access to technical and regulatory databases. They also receive a technical manual distributed by the advisors at the beginning of the agricultural year. Another company (CC2) develops software and decision support tools for managing fertilisation and irrigation.

This variety of activities and topics enables them to enlarge their service offer.

Investment in knowledge production is a priority for these firms, but the cost is high. This has impacts for the technical and relational dimensions, with the former given priority over the latter. Technical results are considered very important (125 farmers per advisor in the case of CC1). The direct face-to-face advisor-farmer relationship is not central: advice is either collective or delivered remotely via information technology tools. This makes it possible to reduce front-office expenses. Saved time and resources can be invested in back-office.

The performance rationale of these CC-KIBS is based on the innovation and technical dimensions. It is driven by back-office work to create new references and to sell solutions to farmers. This rationale has similarities with the service quality issues experienced by service companies employing virtual channels, as described by Sousa and Voss (2006). Nevertheless, keeping direct personal relations with farmers remain very important for these consultancy firms, both for upgrading their tools and for benefiting from the externalities of farmers' networks.

4.2.4. PS-KIBS performance rationale (chambers of agriculture)

We classify French chambers of agriculture as parastatal organisations (PS-KIBS): farmers' representatives cooperate with the public authorities in promoting agricultural development. Their main goal is to provide advice to farmers. They assist farmers in several respects: technical, economic, and regulatory.

The performance strategy of these PP-KIBS lies at the interface between the innovation and the technical dimensions. However, the innovation dimension is at the heart of their agreement with the State. Back-office work is the core activity of the chambers of agriculture surveyed in our case study.

Over the past two decades public funding of farm advisory services has gradually been reduced (Laurent et al. 2006). This has had an impact on front office operations, with an increasing marketing of the advice provision that farmers used to receive free of charge (Petit et al. 2011).). The chambers of agriculture in our survey have sought to develop other sources of funding, along with a commercial range of standardised services (standard packages). These services are now delivered for a fee. They are based on collective advice via Internet messaging, with limited direct interaction with farmers. As front-office running costs are

reduced accordingly, the chambers of agriculture can carry on investing in back-office activities.

In collaboration with “technical institutes” (national technical associations financed by public and private funds in addition to farmers' contributions), they implement various types of activities (experimentation, science monitoring, training, etc.). These activities include several topics, in particular research on new pest and disease control techniques and development and monitoring of decision tools. This research is undertaken under national or local programmes in partnership with public institutions (Ministry of Agriculture, French National Institute for Agronomic Research, regional authorities, etc.). The main purpose is to produce agronomic knowledge, often in the line with societal issues.

The back-office activities of the chambers of agriculture enable them to meet national and regional objectives, and to inform the front-office activity. But maintaining these back-office activities has been to the detriment of the front-office. Front-office work is increasingly standardised to save financial and human resources, and technical direct interactions between farmers and advisors are very much reduced.

4.2.5. Divergences between the objectives of KIBS suppliers

Advisory providers' performance rationales vary considerably depending on the type of actor and the choice between standardisation or particularisation of services (Tether et al. 2001). They have a strong impact on back-office investment choices. The Client-Owned KIBS orientate their investments towards knowledge acquisition to ensure that competitive advantages are sustained at the national level (in the French seed potato supply chain) and to guarantee the quality of both the seed potatoes and the soil. On the other hand, back-office investment choices of Integrated KIBS' are determined above all by the objective of moving into new markets, including internationally, by creating new varieties for which there is a

demand. In the case of Consultancy Companies, the performance rationale is designed to produce new solutions and to increase the number of clients. In the case of Parastatal KIBS, it is the institutional arrangement with the State that guides back-office investment choices, orientating them towards investment in R&D projects to achieve national or regional policy goals. On the other hand, no matter how standardised the front office and how much emphasis is placed on the back office, none of the KIBS in the survey plans to no longer co-produce solutions with them.

4.3. Types of KIBS, performances rationales and societal issues

The reduction of pesticide harm on human health and the environment is becoming an important societal issue in many countries. Pesticide contaminations (in food, the air, the soil and the water) are denounced. Excessive exposure of farm labour to pesticides, and the adverse health effects, is reported in various arenas in France (Jouzel and Prete 2014, Inserm 2013, Laurent et al. 2016). These concerns are taken into account in different ways, depending on the type of KIBS and its performance strategy (Table 4).

Table 4- Specific actions taken in the Back-office of the KIBS regarding pesticides reduction and societal implications

Type of KIBS		**Occupational Health (1)**	**Pesticide residues (1)**	**Environmental issues (1)**	**Experiments to determine crop protection strategies' effectiveness**	**Anticipating future product restrictions**
CO- KIBS Producer organisations	PO1	NO	NO	YES (1)	YES	YES
	PO2	NO	NO	YES (1)	YES	NO
	PO3	NO	NO	YES (1)	NO	NO
	PO4	YES	YES (3.1)	YES (3.1))	NO	YES
	PO5	YES (2)	YES	NO	YES	YES
IN-KIBS Potato Seed companies	CE1	NO	YES	NO	NO	NO
	CE2	NO	YES (3.2)	YES (3.2)	YES	YES
	CE3	NO	NO	NO	NO	NO
	CE4	NO	NO	NO	NO	NO
IN-KIBS Phyto-sanitary firm	FP	YES (2) (4)	YES (4)	YES (4)	YES(4)	YES (4)
CC-KIBS Consultancy firm	CC1	NO	NO	NO	YES	YES
	CC2	NO	NO	NO	NO	NO
PS-KIBS. Chambers of agriculture	*CA1*	YES (5)	NO	YES (5)	NA	YES
	CA2	YES (5)	YES	YES	YES	YES

Methodological note: In France, it is mandatory for every advisory organisation selling pesticides or advising about their use to provide advisors with a compulsory 2-day training called Certiphyto (that includes half a day on occupational health). Complying with this compulsory training is not considered here as a specific action of the studied organisations. Nor is complying with the regulation to reduce CMR products.

(1) E.g. seeking alternative methods to reduce pesticide use such as mechanical weeding.

(2) E.g. delivering general recommendations on pesticide formulation (to favour liquid against powder formulation).

(3) Developing organic production (3.1) or trials of organic production (3.2).

(4) Farmers' occupational health mentioned as part of a comprehensive corporate social responsibility plan that is presented during interviews and in reports.

(5) Developing R&D to decrease adverse effects of pesticide use (Ecophyto projects).

The results vary for client-owned KIBS. All of them mention pesticide reduction issues in their back-office investments, but the issue is tackled in very different ways. For four of them (n=4/5), environmental issues are included in the objectives of their in-house R&D projects and their projects with outside partners. They aim at decreasing the level of pesticide use. They conduct research on new disease control techniques, on the creation of new disease-resistant varieties, and so on. However, only one of them (PO4) develops organic farming technical itineraries. Substitution by new pesticides is also tested in partnership with the pesticides producers, in order to comply with regulations and anticipate product bans. The integration of these issues into their back-office strategies is justified by their relations with plant producers and with the entire supply chain, as guarantors of the sanitary (disease-free) quality of both the soil and the seeds. These KIBS are financed by producers and they are not compelled to show profits or to have any objectives other than devoting their resources to R&D and seeking solutions to producers' problems; the volume of these investments depends on the size of the organisation.

Note however that occupational health seems to be absent from the strategies of the organisations focussing on control and certification (PO1, PO2, PO3: Table 1). They do not mention concerns about workers' health, although the health of their members might be directly concerned, and although the relative proportion of salaried workers on French farms is steadily increasing (Depeyrot et al. 2019), they could be held accountable as employers. The situation is different with the two POs whose main activity of farm advisory services. PO4 aims at developing organic farming, and both mention the need to reduce occupational exposure to pesticides, and to protect the environment. Both have specific actions related to this issue.

The seed potato companies (IN-KIBS, CE1,2,3,4) do not either present societal pesticide-reduction issues as a major concern for their strategies. They prioritise commercial objectives and invest in the creation and testing of new varieties to meet the different needs of various segments of the market. When specifically asked about safety at work and the use of pesticides, only one of them mentions specific actions to reduce the use of the more dangerous substances (those classified as carcinogenic, mutagenic or toxic for reproduction – CMR). However, this is a legal obligation; it cannot be considered as significant progress. The situation is different in the case of the pesticide producer (IN-KIBS, FP), which emphasises its investments in research to develop new products that are less dangerous for human health (for instance, replacing powders with liquid products). These investments are fully integrated into its commercial strategy and serve as sales arguments to counter criticism and controversy over pesticide use.

The CC-KIBS invest very little in developing services integrating the issue of the pesticide use reduction, as they do not foresee a potential for the commercial development of such services. Thus, as pesticide reduction is not a priority for them or their clients, they instead dedicate their resources to issues more directly related to the profitability of their clients' farms. Regarding safety at work, this lack of monitoring of the adverse effects of pesticides results in statements that are quite concerning when they reflect misleading assessments of the risk and may generate inappropriate advice. For instance, one advisor stated that "*Regarding the protection of pesticides users, we don't have more recommendations for one product or another. Anyhow, whatever the operation with a product, the user's protection is always the same"*. This contradicts the current recommendations concerning the use of crop protection products. In particular, the regulation specifies that the protection (including personal

protective equipment) has to be chosen according to the category of product and its level of toxicity (Garrigou et al. 2020).

Chambers of agriculture (PS-KIBS) prioritise investments in the production of agronomic references to reduce pesticide use. This is justified mainly for environmental reasons, but occupational health issues are also driving these strategies. The investments are part of the institutional arrangements between the chambers of agriculture and the State. They are made in the framework of national or local research projects, in partnership with institutions in both the public sector (the Ministry of Agriculture, the public research institutes, etc.) and the private sector.

Thus, clients' control of the performance rationale of advisory organisations does not necessarily result in a type of advice that would better protect farm labour health. Yet, one might imagine that the Client-Owned KIBS would develop specific actions to better guarantee producers' health, by seeking to reduce risks of exposure to toxic products during treatments or during re-entry phases. This is not the case, however, of organisations whose primary activity is focussed on certification. In fact, only KIBS that are both farmer-owned and whose main activity is farm advisory services integrate these concerns.

This result is logical. In these organisations it is legitimate to deal with non-economic aspects of the farming operation, as it will not directly compete with the profitability objectives of other activities. In addition, all these KIBS are developing important back-office activities that make it possible to address new societal issues. But such KIBS represent only a small proportion of the total offer of farm advice in this sector. They have a small number of advisors (Table 1). This result also stresses that the functions performed by different types of

KIBS are not at all similar. In other words, the findings on farmer-based organisations specialised in advisory services delivery cannot be extrapolated to all types of KIBS.

5. Discussion: Plurality of KIBS organisations in agriculture and generation of knowledge for addressing societal issues

The fact that there is a plurality of organisations involved in farm advisory services is not new. It has been well documented following the privatization movement that has transformed this area of activity since the 1990s (Faure et al. 2012). The results produced through the methodology used to describe all KIBS providers involved in a supply chain corroborate the findings of these studies and complement them. In addition, an analysis of the performance rationales allows us to go further. It allows a systematic study of all organisations involved in agricultural advisory services in the supply chain, and provides a better understanding of how societal issues are considered in farm advisory services.

5.1. Variety of KIBS and overarching economic objectives

Financial, relational and technical dimensions have a high visibility and are often taken into account (though with other theoretical stand points) in analyses of farm advisory services. The innovation dimension, on the other hand, is seldom analysed. Yet the investments made to support innovation generate a large part of advisors' back-office work (scientific monitoring, R&D, databases, etc.). This has two important analytical consequences.

First, back-office investments focus on areas that differ from one KIBS provider to another, according to the overall performance goal of the organisation. Each gives priority to building up high-level evidence that is relevant to its own profitability objectives. In their societal dimension, these objectives may be contradictory, depending on the market segment targeted:

for example, the effectiveness of certain pesticides *versus* the effectiveness of organic farming practices.

Second, a knowledge base is a resource whose cost is as crucial for organizations as the cost of any other factor of production. Yet, as researchers have been pointing out for many years, organisations have very unequal capitalisation logics and investment capacities (e.g. Knuth and Knierim 2013). Thus, for a large part of their activity, small enterprises can either rely on peer-to-peer networks (Klerkx and Proctor 2013, Prager et al. 2016), on freely available knowledge or enter the sphere of influence of a larger organisation, for example by supervising effectiveness trials for new pesticides or new seed varieties.

Advisors' work is therefore oriented by their assigned area of intervention, based on the performance rationale of the KIBS employing them and the knowledge base available to them. Some studies emphasise the personal qualities expected of advisors, in particular the skills required to steer the sustainable transition of agriculture (Ingram and Morris 2007, Sutherland et al. 2013). An analysis of the performance rationale of the KIBS providers produces complementary information and makes it possible to specify the framework within which the advisors' activities take place. It provides information on the broad objectives to be achieved through their interventions and the resources available to them, irrespective of their personal qualities, their level of competence and the type of interpersonal relationship they have with the farmers with whom they work.

The analysis of performance rationales also helps to avoid misleading shortcuts, for the priority objectives that frame the activity of advisors cannot be directly deduced from the type of KIBS provider that employs them. For instance, some KIBS-owned clients do integrate the issue of occupational health into their performance rationale, but not all of them do, contrary to an initial intuition. Another case is consultancy companies (CC-KIBS): while former research stressed their focus on front-office, to the detriment of back-office (Prager et al.

2016), we found organisations that opted for a performance logic based on the idea of giving access, on a commercial basis, to part of their back-office to clubs of farmers.

5.2. Knowledge resources for farmers

In theory everyone is in favour of a sustainable agriculture without health effects on the farm labour force. In some limited areas of advice where information is public and free, a new type of independent advisory service may emerge, for example to better advise about occupational health and safety regulations (Nettle et al. 2018). But such situations remain limited. In practice, the various KIBS providers attach very different degrees of importance to the creation of knowledge that can be used for advice taking full account of societal objectives. This confirms the difficulties of embedded advisors in providing adequate sustainable farm management advice (Klerkx, Jansen 2010). Moreover, certain shortcuts designed to reduce the costs of advisory activities can work against these objectives. This is the case when technical references drawn up for seed potato production with high pesticide use are used for advice on consumption potato production where the sanitary standards of the supply chain no longer justify such a level of inputs. Such results are convergent with findings of Vanloqueren and Baret (2008) about the role of advice in the lock-in of resistance seeds in the wheat supply chain in Belgium.

Farmers, on the other hand, are faced with a very heterogeneous range of advice, the quality of which is practically impossible to control. There is nothing such as a perfect market for farm advice, with a free interplay of supply and demand, and a perfect knowledge of all the players in all the issues that frame the activity of advisors (Hanson and Just 2001). Instead, farmers are confronted with a kind of "market menagerie" (Srinivas 2012) in which divergent economic interests and performance rationales, complex regulatory issues, information asymmetries and power relationship between one segment of the industry and another are intertwined.

Therefore, there is no reason why the observed plurality of KIBS should generate advice that best meets the environmental or health goals of public policy when these goals are distinct from the performance objectives of the same KIBS.

5.3. Public policies

Public intervention therefore seems necessary to secure the course of an overall economic development that respects the environment and occupational health.

The analytical dichotomy between "public goods" and "private goods", and its political-administrative use (Lataste 2014), are now commonplace to address such issues. In this logic, the knowledge and profits associated with the production of varieties requiring the use of pesticides would fall under "private goods". They can be appropriated by a limited group of people and should benefit from advice on how to maximize this impact. On the other hand, the costs associated with the adverse effects of this production for society (environmental and health impacts and advice on these issues) should be borne by all because they are "public goods". But the analysis of the performance rationale of KIBS shows that it is also at the very level of the design of the innovation, upstream of production, that the issue of adverse effects should be addressed. Thus, it is impossible to consider that public action should be confined to action on "public goods": its efficiency presupposes that its objectives are integrated in the very design of the KIBS performance rationales, particularly in the innovation register.

The results show however that several elements would be jointly necessary for efficient public policies in this area:

- A coherent multi-stakeholder institutional arrangement which sets out rules but also carries out controls and sanctions so that the cost of possible adverse effects is internalised from the conception of the innovation. Control institutions are a key component to frame the renewal of skills in an economy or a sector, based on arrangements between public and private actors

as emphasised by Thelen (2004). In France, such a system, which would be necessary for the emergence of a genuine collective action (Commons 1950), remains to be built.

- An independent knowledge base, providing relevant evidence to inform public decision-making and the public (including farmers and advisors) in this policy area. In Quebec, tools for such a system have been invented. For example, the public authorities have financed an independent, open-access database, "Sage Pesticide" (CRAAQ 2020), which allows farmers and advisors to compare the dangerousness for the environment and for workers of various crop protection treatment solutions for a given production segment. In France, the path taken so far is rather the opposite, since plant health monitoring bulletins that assess regional phytosanitary risks and prescribe treatments that were previously drawn up by the Ministry of Agriculture are now drafted with the participation of various partners, including pesticide manufacturers (Compagnone, Simon 2018).

- A team of advisors receiving their instructions from the public authorities and employed by a KIBS organisation whose objective would be to support public policies in this area. However, following the wave of privatization that began in the 1990s, the number of advisers with no link to the commercial interests of actors in the agricultural sectors has been considerably reduced. Consequently, in order to implement advice on the use of pesticides, the idea explored in France is to prescribe a legal disconnection (in term of control of the capital of advisory organisation) between the provision of strategic advice on this use on the one hand, and commercial operations (particularly pesticide sales) on the other. However, observation of the performance rationales of KIBS providers shows that the advisors act within a framework shaped by the economic objectives of their employer, on the basis of the knowledge they make available to them. In the French case, the nature of these employers and their degree of dependence on parent companies remains a matter of debate.

6. Conclusion

This research focused on a limited case study demonstrates the heuristic value of analysing the performance rationale of KIBS providers in order to understand and try to overcome the difficulties currently faced by the farm advisory services.

New societal expectations vis-à-vis agriculture are being confirmed and reinforced. Logically they should lead to more integrated forms of advice, taking into account the environmental and health dimensions of production. In the immediate future, however, the frameworks for action of agricultural advisers will not necessarily converge towards such a pattern.

"Farm advisory service provision" is not a sector of activity as defined by institutional economics, that is, a set of actors who share the same productive goals. The concept of such a sector, driven mainly by the objectives of disseminating knowledge to farmers, based on the logic of the public mechanisms of the 1970s, is both erroneous and misleading. In the case study country, as in many other geographical contexts, advisors with no commercial link to economic actors have become a very small minority. It is the economic interests of the actors in the supply chain employing advisors that are most prevalent.

Services provided by farmers' organisations closely connected to up- and down-stream industries tend to play an important role. This is partly related to their ability to benefit from a high level of client engagement, with an emphasis on the relational dimension. Such engagement is supposed to give clients more say in the orientation of back-office activities. However, when the core activity of these organisations is production and not farm advice, this pattern does not lead to better control of the hazards linked to pesticide use. There is no reason why farmers' organisations should be more virtuous than other companies in environmental and social terms since the shared objective is above all economic. Farmers' participation cannot in and of itself be a guarantee that the civic dimension will be better taken into account.

Therefore, there is no reason why the observed plurality of KIBS should generate advice that best meets the environmental or health goals of public policy, when these goals are distinct from the performance objectives of the same KIBS. This is a logical reason why, as our study shows, only KIBS providers specialised in agricultural advisory services that receive public financial support and are accountable for their actions in relation to these societal issues, are committed to this approach.

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