

Impact of Extension Privatization on Formal or Informal Collective Procedures for the Accumulation of Knowledge: Lessons from a Comparison between South and North

Dr. Pierre Labarthe

INRA

UMR SAD-APT

16, rue Claude Bernard, 75231 PARIS cedex 05, FRANCE

Tel: 00.33.6.63.83.14.51

E-mail: pierre.labarthe@agroparistech.fr

Scuola Superiore Sant'anna

Laboratory of Economics and Management (LEM)

Piazza dello Martiri della Liberta

56127 Pisa, ITALIA

Tel: 00.39.050.52.000.36, Fax: 00.39.050.88.33.44

Dr. Ismail M. Moumouni

Rural Sociology Department

Humboldt-Universität zu Berlin

Luisenstr. 53, 10117 Berlin, Germany

Abstract

This paper addresses the consequences of the privatization of extension services on the collective procedures for the accumulation of technical knowledge in the agricultural sector. It is based on a comparison between North and South, thanks to the contributions from two disciplines: an economic institutional analysis of the agricultural knowledge system in the Netherlands, and a sociological study based on field investigations in Benin. They were focused on the contribution of extension services to the settlement and/or the dismantlement of collective actions amongst farmers or stakeholders for the production of knowledge. From a methodological point of view, we compared the outcomes of two historical analyses, based on empirical and secondary qualitative and quantitative data. Our study shows 1) that extension services played historically an important role in the settlement of collective procedures for the accumulation of knowledge; 2) that these procedures and their effectiveness highly depended on social context of rural areas and were negatively affected by the privatization of extension services. The comparison between Benin and the Netherlands highlights the fact that this deconstruction can affect the formal procedures for the accumulation of knowledge (investments in experiments, construction of data bases, etc.), as well as the informal ones (exchanges between farmers, etc.). In designing privatization reforms, it is worth planning mechanisms that could ensure such procedures, in North and South countries. In this process, it is important to take the social context specific to each country into consideration.

Key words: Extension services, privatization, collective procedures, knowledge, Benin, The Netherlands.

Introduction

Since the early 1990s, there has been a large worldwide decrease tendency of the public involvement in the financing and management of agricultural extension services. There are diverse strategies for the withdrawal of the state, from decentralisation of public services to full commercialization or privatization (Rivera 2000). The paths followed in these withdrawal strategies are also changing from one country to another, as well as the speed of change along these paths. The reasons driving toward these changes are not only financial. The commercialization and the privatization of extension are also expected to increase the effectiveness and the efficiency of these services, as they would be more demand-driven (Carney 1995, 1998, Katz 2002). Most of the evidences sustaining this idea are based on microeconomic short-term analyses at the individual farm scale (Dinar 1996). Nevertheless, other evidences from developing as well as industrialized countries have highlighted that privatization could impact on other levels than the individual farm (Berdégué and Escobar 2002, Kydd 2002, Castillo 1997, Agbamu 2000). The privatization of extension services may affect several broader factors such as the organization of extension suppliers and the integration of different stakeholders in the agricultural knowledge systems. Therefore, one may wonder what the effects of privatization are on collective procedures such as the construction of knowledge networks and databases between the stakeholders involved in the agricultural innovation processes (farmers, extension organizations, applied research institutes, input suppliers, etc.).

In this paper, we propose a review of different results of researches in the field of social sciences, in order (i) to understand the impacts of the privatization of extension services on the collective procedures that contributed to the accumulation of technical knowledge in the agricultural sector, and (ii) to compare these impacts in different national, socio-cultural and economical contexts. In that respect, the paper is mainly based on results from investigations in two countries: Benin and the Netherlands.

After a brief presentation of the reasons why addressing such a question (part b), the analytical frameworks applied in Benin and the Netherlands (part c), and some results are presented (part d). They are then discussed by putting them into a broader perspective through a review of the scientific literature in different countries, both in South and North countries (part e). Such a comparative study appears to be worthy because of the tendency to transfer institutional reforms from industrialised to developing countries (part f).

Purpose and Objective

The aim of this paper is to propose a review of researches about the consequences of privatization on collective procedures for the production of knowledge. This is all the more necessary as there are nowadays new issues associated to these collective actions that need to be addressed thanks to new analytical tools.

Indeed, why do collective procedures for the accumulation of knowledge matter today in the agricultural sector?

- 1) First, because the agricultural sector is characterized by high production costs (inputs and labour), and at the same time by relatively small production units, mainly family farms in many countries, both in South and North countries. Thus, the validation and the diffusion of innovations may imply collective actions among farmers for costs and risks sharing. In that respect, the contribution of extension services to such collective mechanisms was early demonstrated (van den Ban 1984).

- 2) Second, the integration of innovations at farm level implies in many situations to combine tacit knowledge (farmers' knowledge about their fields, their practices) and codified knowledge (scientific knowledge in the fields of agronomy, soil sciences, etc.). Following the classification of Nonaka (1994) and Nonaka and Takeushi (1995), producing new knowledge on the basis of these different categories can imply activities of codification of knowledge (from tacit to codified), of contextualisation (from codified to tacit) and even activities with strong interpersonal relations (from tacit to tacit). Today, the need for taking different goals at farm level (production, preservation of environmental resources, etc.) into consideration often requires the combination of these different categories of knowledge. In such conditions, collective procedures, involving a diversity of stakeholders (farmers, researchers, advisers) are necessary for the operations of contextualisation or codification of knowledge.
- 3) Third, collective procedures can be a major vector of innovations. Recent developments in the field of research on innovation have highlighted the fact that firms do not innovate separately, but in the context of a system (Smits and Kuhlman 2004). Some authors have even demonstrated that the density and the quality of the tuning of the relations between organizations within a sector or a sub sector of production have an impact on the rate of innovations (Sunberg 2005).

This paper analyses the impact of privatization of extension services on collective procedures in the agricultural sector, in order to put the question of the effectiveness of privatization under a new spotlight. There are few research works dealing with this question (Leeuwis 2000). Compared to such studies, our paper proposes three new perspectives.

- 1) There are already some researches about the technical effects of the privatization of extension services on innovation networks within the agricultural sector (Neeuwenhuis 2002). Nevertheless, some authors argue that these impacts can not be analysed from a strict technical perspective only (Labarthe, forthcoming). These relations are also the results of institutional compromises between diverse stakeholders (the State, farmers' unions, agro-industries, etc.). Our aim is to understand what the consequences of the privatization of extension services are on both technical and institutional dimensions of the innovation systems.
- 2) The relations between stakeholders within extension systems can be classified in two categories: formal relations (materialised in joint investments, contracts, etc.) or informal relations. We analysed the consequences of the privatization of extension on both of these dimensions.
- 3) Our paper is a first attempt to discuss the question of the impact of privatization in countries from South and from North.

Analytical Framework and Methodology

This paper is based (i) on the comparison of the outcomes of two researches about agricultural extension and (ii) on the discussion of these outcomes based on a review of the literature in the field of agricultural extension. A sociological and an economical analytical framework have been combined. The two researches compared are PhD dissertations achieved in the period 2003-2007. The first one is an institutional analysis of the trajectories and of the performance of extension services in three European countries: France, Germany and the Netherlands (Labarthe 2006). The second one is a sociological research on the motivation of farmers in financing agricultural research and extension in Benin (Moumouni 2007). Both studies produced outcomes and results about the impact of the privatization of extension services on the settlement and/or the dismantlement of collective actions amongst farmers and between farmers and R&D organizations, for the accumulation of knowledge.

From a methodological point of view, they are two major common points between these two analytical frameworks.

- 1) They are empirical analysis, combining field investigations and interviews, and secondary statistical analysis of qualitative and quantitative data;
- 2) They are built on an historical perspective.

They enable a comparison between different contexts: the one of European countries and the one of African countries. The differences between these countries do not concern their agricultural innovation systems only. There are also differences in the regulations in which evolved these systems. In the Netherlands as well as in other European countries, extension services are now a tool of the Agricultural Common Policy (CAP). In Benin, the institutional evolution of these services is largely influenced by the international development cooperation and by donors' policies.

Our purpose is not to carry a comparison term to term between the extension services and the agricultural knowledge systems of the two countries. Benin and the Netherlands are much too different cases and differ according to too many variables (social, technical, and economical). The idea is more to compare the coherence or the contradiction specific to each situation (Theret 1997, Maurice 1989). Such a comparison makes it possible to produce knowledge of higher level of generality, and to avoid the trap of the specificity of situations.

Results and Conclusions

The privatization of extension services occurred in the early 1990s in the Netherlands and in Benin. Our study shows that 1) extension services have played historically an important role in the settlement of collective procedures for the accumulation of knowledge; 2) these procedures and their effectiveness highly depended on social context of rural areas, 3) they were negatively affected by the trend of privatization; 4) the assessment of the effects of this reform may take both formal and informal interrelations within extension systems into account.

The Netherlands: Privatization and the Deconstruction of Collective Procedures for Innovations

Before the 1990s, extension services were provided in the Netherlands to groups of farmers who shared and exchanged lots of knowledge. Farmers, extension services and applied research institutes, supported by the state, made collective investments for the implementation of

experiments that allowed accumulating data and knowledge. These investments were the results of negotiations over extension services between the state and different farmers' unions representing various social groups of farmers. A few examples can be given to illustrate such collective procedures.

- 1) The co-management of experimental stations by farmers, advisers, and researchers had enabled the identification of the problems to be solved, and the validation of possible solutions for the intensification and specialisation of the production systems at farm level.
- 2) The large number of joint publications between advisers and researchers aimed at disseminating results of experiments about agronomic problems (and about solutions adapted to local contexts of production) contributed to the accumulation of technical and codified knowledge.
- 3) The exchanges between farmers, research and extension services were facilitated by a specific national institution dedicated to this purpose: the "*liaison office*" (Wielinga 1988).

These procedures were applied locally, but conceived at the national scale thanks to negotiations between the state and farmers' unions. These discussions took place within a specific institution, the *Landbouwschap*, which included different farmers' unions, but also agriculture workers' unions.

The Netherlands are nowadays an emblematic country of the commercialization of agricultural services. There has been a strong decrease of public investments in agricultural R&D between 1990 and 2000. As a consequence, a diversity of suppliers, mainly private firms, proposes and provides services to farmers. This has led to an individualisation of investments in agricultural sector at different levels.

At farmers' level, there has been a strong decline of the investments of farmers in local groups of exchange. In the Netherlands, these groups or clubs of farmers were the basis of the beneficiaries of extension. They were organised in each sub-sector of agricultural production, and involved a lot of farmers. Since privatization, the number of these groups has sharply decreased. More generally, some researches have highlighted the fact that the privatization of extension services had a direct impact on the exchanges between farmers. It has weakened and decreased those links.

At the level of extension suppliers, there has also been a total decrease of the investments in collective R&D activities. For instance, in many cases, commercial extension companies did invest neither time nor money in agronomic experiments aimed at evaluating locally the efficacy of agricultural techniques or production systems (Labarthe 2006).

At the national level, there has been a shift from a national planning of the contribution of extension, toward a policy of punctual communication over specific points of regulation through mass media tools (Laurent *et al.* 2006).

It is important to notice that this deconstruction of the linkages between extension services and other organizations of the agricultural knowledge innovation systems has occurred at the time of a crisis of the representation of farmers into farmers' unions and of the discussions between farmers and the State. The privatization of extension has contributed to the deconstruction of collective procedures for the consolidation of a shared knowledge base. There are less and less moments and places of discussions that allow the identification of common problems, the conception, the validation and the sharing of solutions.

Some authors have highlighted the fact that the individualisation of services has led to a decrease in the quantity of produced and exchanged knowledge in the agricultural sector. They made the hypothesis that such a tendency could lead to failures in the integration of different functions at farm level (Leeuwis 2000), thanks to the validation of systemic innovations.

Nevertheless, there are some inertia and some elasticity in the impact of privatization on the decrease in the linkage mechanisms. These inertia and elasticity could be linked to the informal relations that exist between the members of the different agricultural R&D organizations. For instance, some managers of new private companies were formerly members of the public agricultural extension service department, or of the public applied research institutes. Thus, strong informal interpersonal relations continue to exist between these people and researchers of agronomic universities or of technical institutes. This still allows exchanges of information between them, although there is no formal procedures anymore between their organizations (joint investments in experiments, management and development of shared data base, etc.).

Benin: Dismantlement of Public Extension Services and Deconstruction of Agricultural Knowledge Systems

In Benin, a public extension organization was in charge of providing farmers with advisory services until the 1990s. The training and visits system promoted by the World Bank in the 1980s was used to restructure these services, and has been for a long time the core component of the public extension organization. This system promotes a close relationships, collaboration and feedbacks between the major stakeholders (research, extension and farmers) for collective action and for the co-production and dissemination of innovations. Researchers were in charge of training specialists of matters such as crop and vegetable production, animal husbandry, food processing and nutrition, forestry, etc. These matter specialists trained in return extension field workers. The latter were supposed to train farmers. Moreover, they collaborated with researchers for field experimentations and established the links and feedbacks between them and farmers.

At farmers' level, the members of so-called contact groups were directly provided with extension services through experimentation, training sessions and field visits. Through knowledge exchanges and networking with peers, they were expected to disseminate technologies within farmer communities. The aggregated nature of large families and the coordination activities of the leaders of farmers' organizations facilitated collective actions and procedures for the generation and the dissemination of technologies, and their improvement and transmission over generations as well.

However the whole success of the training and visits is questionable, partnerships and interactions between actors of the innovation system were promoted. Farmers, researchers and extension workers could exchange multidirectional flows of information about farmers' concerns, socio-economical or environmental constraints, endogenous or local knowledge, possible solutions of farmers' problems, advices, etc. The institutional and organizational environment enabled the co-production and diffusion of innovations.

The privatization reforms of the 1990s impacted the practice of agricultural extension in Benin. First, this resulted in the dismantlement of the public extension organization, which was a central stakeholder connecting other actors such as farmers and researchers. For instance, public agricultural extension personal decreased to 40% between 1993 and 1999. The several NGOs, which are involved in the extension system, are unfortunately not technically qualified enough to

fill the gap. Thus, the extension coverage rate decreased and the number of farmers disconnected from the extension system increased considerably. The lack of extension field workers broke the formal interactions between stakeholders and the chain of transfer of technology in all the districts. Furthermore, many contact groups disappeared, reducing the inputs required for the functioning of the informal information and knowledge systems. Therefore, the deconstruction of public services weakened formal as well as informal procedures for the management of knowledge.

Second, the privatization of extension promoted cash crops such as cotton to the detriment of food crops. Profit seeking and misunderstandings led to the dismemberment of households and to the development of conflicts within farmer organizations. Such conflicts strongly damaged the collective generation, the sharing and circulation of agricultural information and knowledge (Moumouni 2006a). The privatized delivery system led to: (i) an unfair access to information and knowledge because the diffusion was limited to local extension workers and their close friends; and (ii) a change in the relationships between farmers and service providers, by altering the mutual trust environment (Moumouni 2006b). Therefore, the privatization has damaged informal collective procedures of generation, accumulation and sharing of information and knowledge.

In summary, extension services have contributed to collective procedures that appeared to be effective for the accumulation of knowledge in both contexts. The privatization of extension services tends to deconstruct these network and exchange systems of agricultural knowledge, both in the Netherlands and in Benin. The comparison between North and South highlights that this deconstruction can affect differently formal procedures for the accumulation of knowledge (investments in experiments, construction of data bases, etc.), and informal ones (exchanges between farmers, etc.).

Discussion

In Benin and in the Netherlands, the privatization of extension services has weakened collective actions for the production of knowledge, in a context of crisis of the representation of farmers and of the institutional arrangements between groups of farmers and the state. Nevertheless, one may argue that Benin and the Netherlands stand for extreme cases regarding situations respectively in South and North countries.

The Netherlands are a very specific situation among Northern countries. They are the emblematic country of the commercialization of agricultural extension services. Nevertheless, other countries are embedded in the same kind of trajectory. This is for instance the case of German Länder formerly part of the German Democratic Republic (GDR), of England, and also of Denmark. These countries are also some of the most extreme situations of decrease of the involvement of the state in the financing and the management of extension services and applied research institutes. As a consequence, the changes in the collective procedures identified in the Netherlands may be as well more important than in other European countries. Nevertheless, same mechanisms occur in different countries, such as France, or Spain and Greece, where a lack of collective actions involving farmers, extension services, and applied research institutes has also been identified (Laurent *et al.* 2006). In such countries, the problems and gaps within extension services have appeared more clearly since the agricultural and rural policies intended to promote a multifunctional agriculture. The individualisation of services and the lack of collective actions and investments are a limitation to the emergence and to the validation of innovative production systems enabling to match different functions at farm level (Nagel *et al.* 2002).

The impacts of the privatization on the generation and the management of agricultural knowledge in Benin are similar to other developing countries. Privatized systems were introduced in many countries through the financial contribution of farmers to extension. Many reports mentioned that this reform improved the management skills of farmers in terms of fund management, knowledge on costs of different services, contracting and supervising capacities. However, some negative impacts of privatization on the collective agricultural innovation systems were identified in other countries than Benin. For instance, conversely to what was expected, local communities would have not been able to develop innovative proposals in Madagascar and to formulate demand for good quality extension services in South Africa (Katz 2002). The fostering of private extension organizations in Mali for instance resulted into competition between stakeholders such as NGOs and public extension organizations (Etienne 2001). According to Katz (2002), the farmer financial privatization would have affected negatively the trust that farmers had in extension workers in Tanzania. Disturbances of (i) service trade-off between farmers and service organizations, (for the expression of farmers' needs and for the generation of solutions), (ii) role distribution and complementarity between service providers and (iii) trust relationships between field workers and farmers might damage collective procedures for the generation and the management of agricultural extension.

In summary, the tendency of the deconstruction of collective procedures is broader than the cases of Benin and the Netherlands. Why does this matter? Because it can not be assessed only in the line of sector-based issues. In Europe, this tendency can be in contradiction with some new requirements of the European Common Agricultural Policy. Thus, this policy implies for farmers to integrate different functions at farm level (production, environment, etc.). In Africa too, the roles of agriculture go beyond providing income. Agriculture plays important functions such as food security, environment preservation and social cohesion, that may be integrated. The integration of such diverse goals may imply the production of new appropriate knowledge and the validation of relevant innovations in the practices and production systems of farmers. Some collective procedures may be needed in such a process.

Firstly, because the integration of the different functions at farm level implies to take both tacit and codified knowledge into consideration. The operations of codification and of contextualisation of knowledge can not be done only at the individual level of interactions between a farmer and an adviser, but rather need to be embedded in collective actions and investments.

Secondly, because of a specificity of service relations that can induce cumulative effects. The relations between farmers and advisers are not only relations between demand and supply (Gadrey 1994). They are part of the process of knowledge production and of selection of innovations itself. As a result, there is a tendency to get a specific inertia in service activities: the longer some groups of farmers are excluded from extension services, the less the generic knowledge produced by these services is relevant for the excluded farmers. The fact that privatization does not enable collective procedures could thus induce some lock-in: the innovation would be selected and validated only at an individual scale. This would not only limit the generality of the solutions designed, but also prevent the extension systems to incorporate a diversity of situations that could enable to promote original innovations regarding new goals associated to agriculture (environment protection, rural development, etc.).

In this process, there can be some cumulative effects of some inertia effects between the informal and formal dimensions of the relations within extension systems. If the nature of the

incidences between formal and informal relations within these systems on the consequences of privatisation differs according to the countries, the comparison between Benin and the Netherlands makes it possible to identify some more general mechanisms. At farm level, the settlement of informal relations between farmers, or between farmers and advisers could induce cumulative effects in the exclusion of some groups of farmers to the access of collective mechanisms for the production of knowledge. At the global level of the agricultural knowledge systems, informal relations tend on the contrary to slow down the effects of privatization on the deconstruction of procedures for networks innovations, and on the accumulation of knowledge.

Recommendations and Implications

Collective procedures for knowledge accumulation play a key role in the processes of validation and selection of agricultural innovation. Privatization deconstructed formal relations at national and local levels. Informal relations were also affected, but they still exist and could decrease the speed of change and the impact of the deconstruction of collective procedures. In designing privatization reforms, it is worth planning mechanisms that could secure or ensure such procedures, in North and South countries. In such process, it is important to take the specific social context of each country into account, as some ineffectiveness of extension could arise due to failure to consider the impact of these contexts on procedures - formal or informal - for the accumulation of knowledge.

References

- Agbamu, J. U. (2000). Agricultural research/extension linkage systems: an international perspective. *AgREN Network Papers*, 106a.
- Berdégué, J. & G. Escobar. (2002). Rural diversity, innovation policies and poverty alienation. *AgREN Network paper*, 122.
- Carney, D. (1995). The changing public role in services to agriculture: a framework for analysis. *Food Policy*:20, pp. 521-28.
- Carney, D. (1998). *Changing public and private roles in agricultural services provision*. London: Overseas Development Institute.
- Castillo, G.T. (1997). Research partnerships: Issues, lessons, results and dreams for sustainable development. *AgREN Network paper*, 71.
- Dinar, A. (1996). Extension commercialization: how much to charge for extension services. *American Journal of agricultural economics*, 78, pp. 1-12.
- Etienne, C. (2001). Recent experiences with financial participation in the HELVETAS-Mali Support Programme for Farmer Initiatives (PAIP). *BeraterInnen News* 1/2001, Swiss Centre for Agricultural Extension and Rural Development.
- Gadrey, J. (1994). Les relations de service dans le secteur marchand. In J. De Bandt, & J. et Gadrey (Eds.), *Relations de service, marchés de service*. Paris: CNRS, pp. 23-42.
- Katz, E. (2002). *Innovative approaches to financing extension for agriculture and natural resource management*. Eschikon: LBL
- Kydd, J. (2002). Agriculture and rural livelihoods: Is globalisation opening or blocking paths out of rural poverty? *AgREN Network paper*, 121.
- Labarthe, P. (2006). *La privatisation du conseil agricole en question. Evolutions institutionnelles et performances des services de conseil dans trois pays européens* (Allemagne, France, Pays-Bas). University of Marne-la-Vallée: Paris.
- Labarthe, P. (forthcoming). Extension services and multifunctional agriculture. Lessons learnt from the French and Dutch contexts and approaches. *Urban and landscape planning*.

- Laurent, C., M. Cerf, & Labarthe, P. (2006). Agricultural extension services and market regulation: learning from a comparison of six EU countries. *European Journal of Agricultural education and extension.*, 12:1, pp. 5-16.
- Leeuwis, Cees. (2000). Learning to be sustainable, does the Dutch agrarian knowledge market fail? *Journal of agricultural extension and education*, 7:2, pp. 79-92.
- Maurice, M. (1989). Méthode comparative et analyse sociale. Les implications théoriques des comparaisons internationales. *Sociologie du travail.*, 31 (2), pp. 175-192.
- Moumouni, M.I. (2006a). Impacts of the liberalisation of agricultural research and extension on multi-functional agriculture in Banikoara, *Proceedings Deutscher Tropentag 2006: Prosperity and Poverty in a Globalized World - Challenges for Agricultural Research on October 12, 2006 at Bonn (Germany)*.
- Moumouni, M.I. (2006b). Impacts of Privatization of Advisory Services on Agricultural Knowledge and Information Systems: Some Evidences from “LEC” Knowledge Management in Banikoara, Benin. *IAALD Quarterly Bulletin*, Vol. LI, n°3/4.
- Moumouni, M.I. (2007). *Motivation of farmers in financing agricultural research and extension in Benin*. PhD dissertation, Humboldt-Universität zu Berlin: Berlin.
- Nagel, U.-J., Heiden, K.v.d., & Siebert, R. (2002). *Public goods and privatised extension - the rocky road towards agro-environmental extension*.
- Neeuwenhuis, L. F. M. (2002). Innovation and learning in agriculture. *Journal of European Industrial Training.*, 26(6), 283-291.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization sciences*, 5.
- Nonaka, I. & H. Takeuchi. (1995). *The knowledge creating company*. New York: Oxford University Press.
- Rivera, W.R. (2000). “Confronting global market: public sector agricultural extension reconsidered.” *Journal of extension systems*, 16, pp. 33-54.
- Smits, R., & Kuhlman, S., (2004). The rise of systemic instruments in innovation policy. *Int. J. For. Inn. Pol.* 1(1 et 2): 4-30.
- Sundberg, J., (2005). Systems of innovation theory and the changing architecture of agricultural research in Africa. *Food Policy.*, 30(1), 21-41.
- Théret, B. (1997). Méthodologie des comparaisons internationales, approches de l’effet sociétal et de la régulation: fondements pour une lecture structuraliste des systèmes nationaux de la protection sociale. In A. R. E. RÉGULATION (Ed.), *L’année de la régulation*. Paris: La Découverte, pp. 163-228.
- Van den Ban, A.W. (1984). Les courants de pensées en matières de théories de la diffusion des innovations. *Economie rurale*, 159, pp. 31-36. Wielinga, H. E. 1988. *The agricultural extension system in the Netherlands*. Den Haag: Ministry of agriculture and fisheries.