

Hands off but strings attached: The contradictions of policy-induced demand-driven agricultural extension

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Abstract. Although many governments have privatized their agricultural extension services, there is widespread agreement that the public sector still needs to play a role in the “agricultural knowledge market” in order to prevent market failure and other undesirable phenomena. However, appropriate mechanisms for intervention in the agricultural knowledge market are still in their infancy. This article discusses the case of the Nutrient Management Support Service (NMSS), a government-funded support service in The Netherlands designed to optimize the fit between the demand and supply of “agricultural knowledge products” that reduce nutrient emissions into the environment. The activities of the support service were four-fold: (1) distributing vouchers to farmers, (2) establishing mechanisms for quality control, (3) facilitating the articulation of end-users’ needs, and (4) improving market transparency. We analyze the extent to which the NMSS has succeeded in supporting a demand-driven knowledge market for nutrient management issues. We question some of the conceptual and practical assumptions underlying this style of intervention. In addition, we argue that the notion of demand requires considerable refinement before it can be useful for guiding state involvement in demand-driven extension.

Key words: Demand-driven agricultural extension, Knowledge markets, Nutrient management, Privatization, Public interest, State intervention, The Netherlands

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Introduction

We begin this article by describing the thinking that underlies the current trend toward privatizing agricultural extension services. In so doing, we underscore the continuing need for state involvement in the “agricultural knowledge market” – a market that emerged as a consequence of extension service privatization – and specify several possible routes for relevant state intervention. Subsequently, we introduce the Nutrient Management Support Service (NMSS), which combines

several strategies for improving the functioning of the Dutch agricultural knowledge market. We then present a case study as a way to explore the dynamics of these strategies and assess the actual contribution of liaison services towards enhancing demand-driven extension service provisioning. The experiences documented through our case study expose several practical and conceptual tensions between public policy making in the Western European agricultural context and the idea of management support through a demand-driven agricultural knowledge market.

Privatization of extension: New roles for the state

Assumed benefits of privatization

Since the 1980s, political debate over the role of the state in the provisioning of goods has focused on the privatization of state services (Umali and Schwartz, 1994; Rivera, 2000; Kakabadse and Kakabadse, 2001; Kuhry et al., 2002). With privatization, certain goods formerly provided by the public sector are now delivered by the private sector, and the market, predominantly acts as the mechanism for coordinating and distributing these goods.¹ For many, privatization is seen as an improvement over the state system, which, they feel, suffers from excessive bureaucracy, rigidity, inefficiency, and low quality output. Public services, critics believe, need to be more flexible, responsive, de-regulated, re-engineered, and focused on quality of service (Kakabadse and Kakabadse, 2001). Advocates of privatization stress the considerable efficiencies that can be gained, stating that private ownership stimulates both greater allocation efficiency (i.e., when funds – including public funds – are channeled through private companies they are more likely to be used where they have the greatest impact) and greater cost efficiency (i.e., as little as possible is spent on organizational maintenance). They feel that competition between companies will ensure constant improvements in the quality and diversification of goods because attracting and maintaining clients is essential for maintaining a company's viability (Kuhry et al., 2002).

Over the past 20 years, privatization programs have considerably reduced the participation of public providers in national economies (Megginson and Netter, cited in Kuhry et al., 2002). This also applies to the financing and provisioning of agricultural extension services (Rivera, 1991; Feder et al., 1999; Anderson and Van Crowder, 2000; Rivera, 2000). Budgetary constraints, due to decreasing tax revenues, have reduced the role of the state in agricultural extension (Beynon et al., 1998; Katz and Barandun, 2002). Furthermore, general dissatisfaction with the efficiency and effectiveness of public extension services has led to a redefinition of the state's role in the provisioning of those services that could be provided through the marketplace as private or toll goods. Public agricultural extension, many felt, did not serve the needs of rural people and embodied paternalistic and unilateralist attitudes. Beynon et al. (1998) refer to this poor performance as "state failure." In Latin America, Berdegué (2002) found that state failure in public extension services was characterized by corruption, clientelism, and excessive bureaucracy. In industrialized countries, and in The Netherlands and Germany particularly, the increasing divergence between the interests of the state and those of farmers has caused tensions (Tacken, 1998; Leeuwis, 2000; Wielinga, 2000;

Hoffman et al., 2000). Extension workers were confronted with contradictory expectations from their employer, on the one hand, and from their clients, on the other. Privatization was expected to resolve this loyalty conflict. In addition to the increased efficiency in terms of both cost and allocation, the main benefits of a privatized extension service are said to be increased provider accountability, a demand-driven character, increased end-user participation, and an emphasis on benefits and results (Rivera, 2000; Berdegué, 2002; Katz and Barandun, 2002; Rivera et al., 2002).

Counteracting market failure

In systems where agricultural extension services have been privatized, farmers become clients, sponsors, and stakeholders rather than mere beneficiaries (Neuchâtel Group, 1999; Katz and Barandun, 2002). These systems, furthermore, are considered to function as agricultural knowledge markets, since extension service provisioning is involved with the exchange of (technical, economic, or social) knowledge (Leeuwis, 2000).² Through this shift to agricultural knowledge markets, it is felt that extension service provisioning has become demand or client-driven, as opposed to supply or provider-driven.

Yet, despite the fact that the shift to agricultural knowledge markets has had positive and desirable consequences (Rivera et al., 2002), as outlined in the previous section, advocates also agree that privatization should not be considered a panacea (Beynon et al., 1998; Katz and Barandun, 2002). Privatization may lead to underinvestment by agricultural research and extension in knowledge that serves the "public good" (Wolf et al., 2001; Hanson and Just, 2001). It has been observed, for example, that both resource-poor groups and public interests (e.g., environmental issues) tend to be insufficiently addressed by private extension service providers since the benefits are not easily appropriated (Bennett, 1996; Carney, 1998; Kidd et al., 2000; Rivera, 2000; Hanson and Just, 2001). Moreover, farmers are often unwilling to financially support public interest issues when they do not result in a direct and private benefit. Farmers, generally, are only willing to pay for services they feel add to their profitability (Tacken, 1998; Katz and Barandun, 2002). In addition to the risks of exclusion and substitution (i.e., weaker groups are excluded, and public interest themes are substituted by private themes), several authors have identified other risks with regard to the overall functioning of the agricultural knowledge or innovation system (Bennett, 1996; Bebbington and Sotomayor, 1998; Anderson and Van Crowder, 2000; Kidd et al., 2000; Leeuwis, 2000). These system risks include:

- A decrease in the information openly exchanged on a free-of-charge basis among various actors within the (national) agricultural knowledge system
- An increase in discontinuity and a lack of concerted action by the various interested players in the knowledge system as a result of short-term contracts and competition
- Domination by wealthier farmers or commissioners (e.g., government or agri-industry) in determining extension services
- The system may become accountable to large commissioners of contracts rather than end-users
- Little room for maneuvering or space for learning within rigid output-oriented contracts
- High transaction costs for realizing desirable interventions and services
- An increase in the opportunities for corruption and patronage
- Information may be biased in favor of certain agricultural inputs
- A tendency towards “package deals” whereby the delivery of different kinds of services by a single provider may endanger the provision of independent advice
- A focus on ad hoc individual advice and technology transfer instead of on long-term support and instruction on improved agricultural practices
- A focus on ready-made, easily applicable, and modifiable “knowledge products,” rather than space for the articulation of needs and knowledge development

To counteract such exclusion, substitution, and system risks, many critics deem continued state involvement in the provisioning, financing, and/or regulation of extension services necessary and justified (Bennett, 1996; Barnes, 2001; Hanson and Just, 2001). The state must decide on the public interests for which it will continue to be responsible (i.e., it must determine the social relevance of the provisioning of goods).³ An issue of public interest arises in situations where the state is concerned that certain interests are insufficiently addressed without state intervention (WRR, 2000). The state must consider whether a particular good can be distributed satisfactorily through the market or whether the provisioning of the good through the market causes a market failure that demands continued intervention. Such market failures may include underinvestment, negative externalities, information asymmetry, unequal access, and high transaction costs (for detailed analyses in the case of extension service provisioning see Beynon et al., 1998; Carney, 1998; Hanson and Just, 2001).⁴

The present thinking is that extension service provisioning should be pluralistic with mixed funding and undertaken by both public and private parties.⁵ In this way, a complete and complementary range of extension services can emerge (Carney, 1998; Neuchâtel Group,

1999; Katz and Barandun, 2002; Rivera et al., 2002) in order to address the needs of an increasingly diversified agricultural sector (Smits, 2002). Within such a pluralistic system, state intervention can be aimed at promoting the public interest and assuring social welfare by ensuring the delivery of specific services to specific audiences (Carney, 1998; WRR, 2000; Katz and Barandun, 2002; Garforth et al., 2003), by exercising control over the quality of private extension service provisioning (Currell et al., 2002), or both. In many instances, the state still funds some extension activities on a “public funding, private delivery” basis (Zijp, 1998; Garforth et al., 2003). This essentially means that the state becomes a client in the agricultural knowledge market (Leeuwis, 2000; Wielinga, 2000). At the same time, the state can resort to other “safeguarding instruments” in order to exert influence on the nature and quality of services delivered by private extension organizations. Three such safeguarding instruments exist: (1) promoting competition between different providers, (2) setting legal rules and contracts, and (3) promoting institutional responsibility and product quality (WRR, 2000). These new roles may incur substantial (transaction) costs, which may, initially at least, downplay the assumed cost reduction benefits of privatization (Feder et al., 1999; De A. David et al., 2000; Rivera et al., 2002).

Supply-side funding versus demand-side financing through voucher systems

Several authors have examined various combinations of public and private funding and/or extension service provisioning (also referred to as delivery), considering the objectives for which certain combinations are most suitable (see for example, Beynon et al., 1998; Carney, 1998; Feder et al., 1999; Katz and Barandun, 2002). For the purposes of this article, we look at the combination of public funding and private provisioning. Public funds for extension service provisioning can be channeled to end-users either indirectly or directly (Katz and Barandun, 2002).

The indirect approach – supply-side financing – consists of outsourcing or contracting-out service provisioning to private companies who execute a service mandate for the state. Rivera et al., (2002) advocate contracting-out extension service provisioning. They anticipate the main benefits to be threefold: (1) increased operational efficiency and cost effectiveness, (2) increased provider plurality, and (3) increased provider accountability. Pre-conditions for the proper functioning of contracting-out mechanisms include: training and capacity building of extension providers, active farmer involvement, and clear-cut procedures and conditions. It has been argued, however, that such supply-side mechanisms can be especially sensitive to the system risks mentioned in the previous

section (Bebbington and Sotomayor, 1998; Leeuwis, 2000; Kakabadse and Kakabadse, 2001).

The direct approach – demand-side financing – consists of giving funds directly to the end-users of extension services, either in the form of vouchers that represent a certain monetary value or through the reimbursement of investments after proof of the transaction (between the extension service provider and client) has been provided. In this way, the state remains at a relative distance. Voucher systems display a number of strengths and weaknesses (Bebbington and Sotomayor, 1998; Gibson, 1999; Kidd et al., 2000; Berdegué and Marchant, 2002; Katz and Barandun, 2002). A key strength is that they can be used for market development, since users can try out a service without any risk. Vouchers may also create access to goods or services for people who previously did not have sufficient purchasing power. Voucher systems facilitate a relationship of accountability between the service provider and the client. Because demand-side financing creates an incentive for the client to analyze his/her situation and articulate his/her own needs, the client is thereby empowered. Demand-side financing, furthermore, encourages competition between different service providers, and this can increase the need to innovate in service provisioning.

For the voucher system to work properly, certain pre-conditions are required to counter the weaknesses found in the system. The literature identifies the following pre-conditions in relation to users and providers: potential users of services must learn to identify and articulate their needs, negotiate with service providers, and judge and control service quality; and service providers, on the other hand, must have the right skills and knowledge to provide the required services. This requires capacity building on both sides. The possibility of having a competitive market is ruled out if there are insufficient private extension service providers (Bebbington and Sotomayor, 1998). In order to ensure the longevity of demand-side, financed extension systems, a financial contribution from the end-user is required. Making a financial contribution implies a willingness to pay, but this is usually only the case for advisory services that are highly personalized and in the private interest (Beynon et al., 1998; Groot, 1998; Tacken, 1998; Hanson and Just, 2001). When services provided through a voucher scheme are predominantly in the public interest, it is unlikely that they will be privately funded when the public funding ends. Newly formed institutions may collapse after the voucher scheme is withdrawn (cf. Gibson, 1999). The administration of publicly funded, demand-side financed extension systems may be complex and costly. Monitoring and control are necessary in order to prevent fraud (see for example, Bebbington and Sotomayor, 1998; Berdegué and Marchant, 2002). Criteria for selecting goods that may be purchased

with vouchers must be transparent and situation-specific, and there must be well-established, clear rules and procedures for use of the vouchers.

The nutrient management support service as an attempt to foster publicly financed demand-driven extension service provisioning

This section introduces the Nutrient Management Support Service (*Steunpunt Mineralen* in Dutch) and the policy context in which it emerged. The NMSS combined a range of strategies designed to enhance demand-driven extension on the topic of nutrient management, including simultaneous supply-side and demand-side financing (by way of vouchers), activities geared towards establishing mechanisms for quality control, facilitation of the articulation of needs, and the improvement of market transparency.

Nutrient management as a theme of public interest

Nutrient management surfaced as a public interest theme in the 1980s after it became clear that the Dutch agricultural policy of ever-increasing production, promoted by public extension since the 1950s, was having detrimental effects on the environment (Kessels and Proost, 1995). Nutrient management can be conceptualized as a bookkeeping system that records nutrient flows on the farm. The quantity of certain nutrients – nitrogen, phosphorus, and potassium – that enter the farm in manure, fertilizer, and feeds is compared with the quantity leaving the farm as products or residues. By means of a calculation, the quantities of nutrients remaining in the farming system and those emitted into the environment can be determined. Nutrient management can be approached in two ways – as a management tool and as a regulating mechanism (Stolzenbach and Leeuwis, 1996).⁶ Since 1984, the reduction of nutrient emissions has been a principal policy concern of the Ministry of Agriculture (LNV), and in 1988 LNV introduced nutrient management as a regulating mechanism (RIVM, 2002; CBS, 2002). This meant that farmers would have to pay a fine if their nutrient balance showed a level of nutrient emission surpassing the norms. Even before its launch in 1988, the Nutrient Management Administration System (known as MINAS) was the subject of contentious debate. Farmers did not share the ideas upon which the system was based, and the system was perceived as a showcase of vagueness and inconsistency (Kessels and Proost, 1995; RIVM, 2002). The policy goal of MINAS was not, however, to collect fines, but rather to encourage farmers to improve their nutrient management so that emission surpluses would decrease and fines would not have to be paid at all (RIVM, 2002).

From the policy viewpoint, MINAS was intended to serve both public interests (better groundwater quality) and private interests (cost savings through better nutrient management). MINAS set the goals and, in the main, left implementation to the farmer.⁷

In order to advance knowledge development and exchange on the topic of nutrient management, the Dutch government spent about €68 million of European Union funds on the so-called “nitrate projects.”⁸ These nitrate projects, which were contracted-out to various research and extension organizations, studied learning tools that might integrate nutrient management into overall farm management as an essential component. Interactive research projects, demonstration projects, and extension pilot studies were carried out. NMSS had the specific task of disseminating the insights gained in these nitrate projects to all farmers obliged to calculate their nutrient balances.

The aims and methods of the NMSS

The two principal aims of the NMSS were to improve the nutrient management knowledge of individual farmers and to stimulate demand-driven extension service provisioning. In order to operationalize their approach, NMSS sought to facilitate various learning paths and forms of knowledge exchange (i.e., farmer study groups with a peer discussion leader, individual farmers’ purchase and application of products such as books and computer programs, and farmers’ use of a personal advisor). Furthermore, NMSS aspired to promote a clearer division of roles between different actors in the agricultural knowledge and information system – research projects, the government, farmers’ organizations, environmental lobby organizations, extension service providers, and clients (NMSS, 2001).

The NMSS formula consisted of four elements: (1) vouchers, (2) a quality system to judge and select so-called knowledge products (encompassing various forms of extension service provisioning),⁹ (3) study groups, and (4) a website that could be used for comparison and selection of extension service providers (“knowledge providers” in the terminology of the project)¹⁰ and their knowledge products. These elements became operational in January 2002.

The voucher system designed to create an incentive for farmers to purchase knowledge about nutrient management

Each voucher represented a value of €250. They were distributed, regardless of the gravity of the nutrient management problem, to approximately 65,000 farmers who were obliged to comply with the nutrient emission norms. Farmers first received an application form upon the completion and submission of which they obtained a

voucher from NMSS. The voucher could be used to purchase a knowledge product that was approved by NMSS. Each farmer had to pay 15% of the purchase price him/herself. Knowledge providers sent the vouchers to LASER, a quasi-autonomous executive agency of the Ministry of Agriculture responsible for paying out subsidies in order to get payment for the goods or services delivered (Kickert, 2001).

The quality certification system designed to improve product quality

The quality certification system was intended to have a catalyzing effect on the market for knowledge products about nutrient management. Experts made an inventory and selected knowledge products on the basis of several criteria.¹¹ The overarching criterion was that knowledge products should go beyond merely advising farmers on how to comply with the nutrient emission norms; they should enlarge and develop knowledge on the subject. Furthermore, products that sold 25 times or more were assessed in terms of client satisfaction. The quality of products was judged on criteria such as: compliance with expectations, innovativeness and applicability of the product, and long-term effect on farm management. It was intended that the results of both the expert and client quality assessments would be used to select “preferred products,” to give potential users insight into the differences in product quality. This latter was directly related to NMSS’s aim of promoting a transparent knowledge market and thus preventing market failure in the form of information asymmetry and adverse selection (cf. Beynon et al., 1998).

The study groups designed to facilitate the articulation of needs

Study groups are a form of horizontal knowledge exchange in which farmers can share problems and solutions with each other (Leeuwis and Van den Ban, 2004). NMSS’s budget made provision for 200 study groups. NMSS attributed an important role to these groups in the articulation of needs. Because it ensured that farmers defined relevant questions before approaching an advisor or buying a product, they spent their vouchers more efficiently (sometimes jointly). Study group leaders were recruited from among the farmers themselves and were trained in managing group dynamics and needs identification processes.

The website designed to improve market transparency

The fourth element was the creation of a web-based databank containing descriptions of all the knowledge products that could be purchased with a voucher. Because

the farmer could easily access this web-based “store” to look for a suitable product, it was therefore an instrument to increase market supply transparency. Knowledge products were categorized by NMSS according to the sector for which they were created (dairy farming, pig raising, arable farming, horticulture, etc.) and type of product (written course material, personal advice, computer software, books, lectures, etc.). To facilitate farmers who did not have recourse to the Internet, a leaflet was also produced. This, however, was done in the initial stages of the project when very few products had been certified, and it was not updated.

In summary, we see that the Nutrient Management Support Service initiative in The Netherlands combined two mechanisms of public financing and private delivery of extension. Contracting-out (supply-side financing) was used to administer the NMSS project as a whole, and a voucher scheme (demand-side financing) was used to provide end-users with the means to purchase goods and/or services. In addition, the NMSS made use of several safeguarding instruments (e.g., promoting competition, quality control, information) in order to further enhance the functioning of the knowledge market.

Experiences with the nutrient management support service

This section reports on a study that was carried out to assess the contribution of the NMSS approach to demand-driven extension provisioning (De Grip et al., 2003). The purpose of this study was not to determine the extent to which nutrient management policy objectives were realized, but rather to understand the dynamics that emerged in association with the various elements of the NMSS approach and to derive lessons for future interventions. Thus, NMSS provides the context for a discussion on the benefits and limitations of publicly financed and privately delivered extension service provisioning.

Research approach and methods

The main question that guided our inquiry was the extent to which the four elements of the NMSS contributed to supporting a demand-driven agricultural knowledge market in relation to the public interest theme of nutrient management. First, we conducted 8 open interviews with actors directly involved in the NMSS project and 16 semi-structured, in-depth interviews with more distant actors (three knowledge providers, four policy makers, two study group leaders, and seven farmers). The interviews were geared towards identifying respondent practices, perceptions, and evaluations regarding the NMSS experiment. Second, we engaged in participant observa-

tion at seven NMSS-related meetings. Third, we conducted a semi-structured telephone survey, based on insights from the previous qualitative round, using 57 respondents (18 knowledge providers, 8 study group leaders [farmers themselves] and 31 farmers from across the country). The 39 farmers were randomly selected from project lists derived from a grouping process that created four categories according to whether or not, and how, they used the voucher.¹² The survey was used to further validate or reject preliminary findings from the first round of interviews and to fill in gaps in our understanding. It was not designed to arrive at general statements. Additionally, to support our analysis we made use of the results of other preparatory and evaluative studies related to the NMSS project (De Wit et al., 2001; De Wit and Van Diepen, 2002; Oerlemans et al., 2002; Jacobs and De Wit, 2003; Geerling-Eiff et al., 2004).

Main findings regarding the four elements of the NMSS formula

The voucher system designed to encourage farmers to actively acquire knowledge on nutrient management

In March 2003, when the application procedure closed, 35,440 farmers of the eligible 65,000 had applied for and received a voucher (NMSS, 2003). On closure of the project in December 2003, 24,946 vouchers had been redeemed (Geerling-Eiff et al., 2004). The farmers’ main motivation in applying for the voucher appeared to be the financial benefit (a “gift” or “discount” of €250 from the normal price of the product). This finding is confirmed by a more comprehensive survey ($n = 1228$), commissioned by NMSS, focusing on client satisfaction in which 86% perceived the voucher as a gift or discount (Jacobs and De Wit, 2003). Most farmers said they did not have a nutrient management problem on their farm (85%, $n = 39$) and consequently felt no need to purchase knowledge on the topic of nutrient management. Jacobs and De Wit’s (2003) survey shows that 70% of farmers were confident that they complied with the MINAS norms, and 75% claimed to have acquired knowledge on nutrient management ($n = 1228$). This finding is supported by other studies (e.g., Oerlemans et al., 2002)¹³ and stands in sharp contrast to the government’s view that most farmers have serious nutrient emission problems. An additional finding was that knowledge providers were encouraged by the possibility of obtaining vouchers. All knowledge providers indicated that they had actively informed their network of clients about the voucher application so that the vouchers could be spent on the services offered by them. Farmers spent vouchers mostly on personal advice (76%, $n = 39$) and in existing client-service provider relationships (81%, $n = 38$). Jacobs and De Wit’s (2003) survey supports this finding,

stating that 72% of farmers ($n = 1228$) spent their vouchers within established relationships.

The quality certification system designed to improve product quality

A total of 350 knowledge products were eventually offered through NMSS by April 2003. With respect to the influence of the quality certification system on product development and quality, 29% of the knowledge providers ($n = 18$) indicated that all the services they offered through NMSS were new. An equal number of providers offered only services that they already provided, while 37% indicated that they offered both new and existing products. In addition, 35% of the providers were of the opinion that the quality of their products had improved as a result of the efforts made to comply with the certification criteria. The same percentage argued that the quality of their products was already good and that no adaptation was necessary. Almost all knowledge providers (16 out of 18) agreed that it was not difficult to get their products accepted by NMSS. A client satisfaction assessment regarding specific products did take place (Jacobs and De Wit, 2003) but, due to time constraints, did not result in the communication of a preferred products list for farmers. However, the idea of making client evaluations of specific products available to other farmers through some kind of "consumer test" was welcomed by 34% of the respondents in the categories "knowledge provider" and "farmer" (from both the in-depth interview and the telephone survey round, $n=69$). By contrast, 36% did not expect such a test to be useful. The more critical respondents argued that such a system would involve a lot of bureaucracy and that market dynamics and internal company procedures already provided sufficient mechanisms for evaluating quality and improving product quality. According to our own findings, farmers, on average, were satisfied with the knowledge product they purchased (evaluated as 6.9 on a scale of 1 to 10, $n = 16$) and said that it fit fairly well with their individual situations (evaluated as 6.8 on a scale from 1 to 10, $n = 16$). There was no difference in this respect between those who spent the voucher individually or in a group. Jacobs and De Wit's (2003) study shows even higher satisfaction rates (7.5 on a scale from 1 to 10, $n = 1,228$).

The study groups designed to improve the articulation of needs

The NMSS study groups (161 by December 2003) were organized and facilitated by peer farmers. Of the group leaders interviewed (a total of 10, two in the in-depth interview round and eight in the telephone survey round), seven indicated that they were members of an existing

study group and that they had informed other members about the possibility of forming an NMSS study group. From interviews and participant observation, it became apparent that group leaders found participant recruitment from outside their existing network rather difficult. According to the respondents, key advantages of the free-of-charge study groups were that the accumulation of group members' vouchers resulted in a greater budget for the purchase of knowledge products and that farmers in groups were able to learn a lot from one another. Some knowledge providers indicated, however, that, in general, less exchange of farm-specific data occurred in groups as compared to individual advisory meetings. Study group leaders indicated that study group meetings were not used to articulate questions and needs. On the contrary, a hired advisor was already present and his time paid for by voucher from the first study group meeting onward in the case of 6 of the 10 groups in the study. Only three study group leaders mentioned that they had consulted the group about the choice of an advisor beforehand; often it was the group leader who made the choice (thereby drawing predominantly from his/her own networks). Although the main thrust of the program was designed beforehand, the majority of group leaders (70%, $n = 8$) and participating farmers (60%, $n = 31$) indicated that there was sufficient flexibility to adapt the content to reflect the desires and questions of participants. Participant observation and interviews suggest that meetings took the form of "interactive lectures," with an average of four sessions per study group. Participants greatly appreciated having a peer farmer as study group leader because of the limited distance in personal and/or cultural terms between themselves and the group leader.

The website designed to improve market transparency

With respect to the website, the fourth element of the NMSS formula, it became clear that it was not used widely for the selection of knowledge products, despite having had 25,992 hits by March 2003 (Jacobs and De Wit, 2003). Of the 19 farmers questioned, only four respondents (remarkably none of whom had spent the voucher) had looked at the website, whereas the remaining 15 had not. The four respondents who visited the site had only a vague memory of it and were unable to recall anything specific. Jacobs and De Wit's study also showed that more than half of the farmers (54%, $n = 1228$) did not use the website. In addition, a large majority of our farmer respondents ($n = 39$) recalled having seen the leaflet prepared for farmers who did not have access to the Internet, but again had only vague memories of it. Only two respondents could recall specific details. None had chosen a product on the basis of the leaflet.

Reflective observations on the functioning of the NMSS

In this section we present some additional analytical observations regarding the NMSS approach, emphasizing striking experiences, strengths, and weaknesses.

Creating incentives for knowledge providers in particular

Contrary to project expectations, an initial observation was that the NMSS approach encouraged knowledge providers, rather than farmers, to act. According to the philosophy of the project, the voucher was primarily designed to make involvement in the sphere of nutrient management more attractive to farmers and to stimulate demand-driven extension. Eventually, 24,946 farmers spent the voucher, and a considerable percentage reported a “learning impact” (in terms of problem perception, motivation, and new insights), so one can conclude that farmers did indeed become encouraged to some degree (though whether or not the impact was sufficient is debatable). It is notable that the motivation of farmers to purchase knowledge products on nutrient management was in many instances indirect. Most farmers indicated that the services eligible for voucher purchase were offered within an existing client-provider relationship. Knowledge providers made considerable efforts to design and adapt knowledge products on nutrient management and were very active in informing their clients about the possibility of applying for the voucher and spending it with them. In retrospect, this is quite understandable since knowledge providers had a clear financial incentive – they would be paid for the services delivered. This is consistent with earlier experiences elsewhere that document the suitability of voucher systems for market development (Gibson, 1999). In the context of the public interest theme of nutrient management in The Netherlands, the fact that knowledge providers became motivated to act can be seen as a significant achievement, especially given that several earlier studies found that the service provisioning network surrounding farmers (including private consultants, accountants, and veterinarians among others) did little to encourage farmers to take nutrient management seriously (Ketelaars and Leeuwis, 2002; Oerlemans et al., 2002).

Existing relationships versus spot market transactions

Despite NMSS’s considerable efforts to create a transparent knowledge market, we see that the large majority of vouchers were spent in familiar networks, including both study groups and existing advisor/client relationships. Clearly, farmers did not act as “critical con-

sumers” – that is to say, they did not undertake extensive product, price, and provider comparisons (e.g., on the NMSS website) – before engaging in a transaction. Explanations for this may include: the fact that knowledge providers often took the initiative, farmers’ preferred media use (see Wolf et al., 2001; Gielen et al., 2003), the (lack of) awareness of the website, the short time horizon of the project, and the fact that the list of preferred products based on client satisfaction measurements never materialized. Furthermore, a knowledge product can be seen as a service good in the sense that it is intangible and thus implies difficulties in *ex ante* evaluation (i.e., prior to consumption) (King and Hill, 1997; Coulter and Coulter, 2003). This difficulty with an *ex ante* evaluation of knowledge products was indicated by 80% of the farmers in the 2003 survey of Jacobs and De Wit ($n = 1228$). Furthermore, we feel that an overriding factor in this respect is the nature of advising activities – that simply switching to another knowledge provider entails considerable transaction costs. More generally, Havila and Wilkinson (2002) argue that business relationships have a tendency to be long lasting, and that over the long term the involved parties adapt to one another and invest in the relationship, leading to increased commitment (see also Iacobucci and Howard, 1999). Bendapudi and Berry (1997, citing Williamson, 1981) refer to “relation specific investments,” which “are investments the partner makes in the relationship that are not easily portable to other relationships”. This implies that breaking off an existing relationship may destroy capital, whereas in the case of new relationships considerable investment is needed. Agricultural advisors and their clients generally need to invest a lot of time and effort in order to become familiar with each others’ context, personal characteristics, preferences, beliefs, aspirations, and competencies and to develop the relationship of trust that, according to Van den Ban and Hawkins (1996), is essential to advisory relationships. In view of such transaction costs, it is not surprising that farmers spent vouchers in existing relationships.

Another relevant observation in this context is that both the NMSS project itself and its chief executing agency were new players in the agricultural domain and had not yet established a credible position in the agricultural knowledge network. A study by De Wit and Diepen (2002) tellingly pointed out that a considerable number of farmers had thrown away the voucher application form because they thought it was advertising from an unknown sender. Given the relatively short timeline of the project and the fact that NMSS was time-bound as opposed to a permanent facilitator of the knowledge market, it is highly questionable whether the goal of establishing a credible position in the knowledge market was attained.

The influence of the politicized context

As was indicated briefly, the government's nutrient management policy was a contested and politically sensitive issue. It is beyond the scope of this article to explain the historical intricacies and sensitivities. Suffice it to say that, at the time of the NMSS project, there was a profound distrust between the farming sector and the Ministry of Agriculture. This distrust went beyond the nutrient management policy to include the way in which recent crises (e.g., swine fever, foot and mouth disease) had been dealt with, the enormous administrative duties forced on farmers, contradictory policies, and the overall (lack of) vision for the future of Dutch agriculture. The study by Oerlemans et al., (2002), for example, showed that dairy farmers' trust in the Ministry was extremely low. Of a representative sample ($n = 153$) of dairy farmers, 93% indicated that they did not trust the intentions of the government, while 67% responded that they did not agree with the aims of the nutrient management policy. The same study showed that nutrient management ranked ninth in a list of ten themes farmers found to be of more than average interest,¹⁴ illustrating that it was not of high importance. The baseline study upon which the NMSS strategy was based showed that 89% of a sample of 2260 farmers indicated that the government did not consider farmers' interests in setting MINAS norms (De Wit et al., 2001). From a communications point of view, NMSS's exclusive focus on and identification with nutrient management was to some extent a barrier to farmers becoming motivated to act since: (a) the term "nutrient management" had negative connotations for many farmers; (b) relationships between the government and farmers were damaged, particularly on the nutrient management issue; and (c) it was unclear whether the policy would stand in the European court (eventually it did not). At the same time, there were other themes that farmers did find interesting (such as pasture management, animal feeding, etc.) that could have served as an entry point for discussing nutrient management issues in a broader context.

A lack of knowledge on nutrient management?

The previous point indicates that for emotive reasons many farmers did not have a positive or active interest in nutrient management (see also Stolzenbach and Leeuwis, 1996). In addition, our interviews showed that most farmers thought they did not have a nutrient management problem. One year earlier, a larger study (Oerlemans et al., 2002) with a representative sample ($n = 153$) found that 76% of dairy farmers did not consider themselves as having a problem with nutrient management. In the same study, the great majority of dairy farmers (80%) indicated that they already knew how to

meet the norms, and 75% were confident that they would indeed meet the norms in 2003 (Oerlemans et al., 2002). The NMSS baseline study showed that 82% of the farmers ($n = 2260$) said that they did not need knowledge on nutrient management (De Wit et al., 2001). As indicated earlier, this contrasts sharply with the view of the government. On the basis of all this, we can conclude that there was very little active demand for knowledge about nutrient management. We can also question the validity of the prevailing policy assumption that a lack of technical and managerial knowledge was a key obstacle to achieving compliance with the nutrient management policies. Farmers seem to be downplaying or perhaps denying nutrient management problems. At the same time, they seem to be confident that they have sufficient knowledge and capacities to deal with any nutrient management problem they might have. Even if it is assumed that many farmers have a nutrient management problem (as defined by the government), the evidence indicates that there is widespread unwillingness among farmers to actively consider improving nutrient management and/or to apply available knowledge in the near future. In this connection, it is relevant to note that, in 2001, 58% of dairy farmers ($n = 153$) were of the opinion that nutrient management policies and norms would continue to change, indicating that many farmers were postponing their efforts (Oerlemans et al., 2002). All in all, it is not the lack of knowledge that seems to be a key obstacle, but rather the lack of certainty and agreement regarding the policy, tense relationships, and lack of trust between the government and farmers that together result in negative attitudes towards nutrient management.

The limited learning capacity of the project

It is interesting to note that in the course of the NMSS project the implementers developed a good understanding of some of the key difficulties encountered. Shortly after receiving the project grant, for example, the NMSS organization commissioned a baseline study from which they concluded that a lack of knowledge on nutrient management was not the key problem and that farmers had developed, metaphorically speaking, an allergy to nutrient management and MINAS because of the perceived vagueness of the system (De Wit et al., 2001). At several stages, NMSS made proposals to change the focus and strategy of the project. However, the Ministry was not in favor of making fundamental changes to the project and, according to the implementers, emphasized the necessity of concentrating on the original goals and targets. This limited capacity to learn and change direction is reflected in the risks mentioned in connection with the privatization of extension and was aggravated in this case by the short timeline of the project (i.e., 2 years).

Indeed, it would have been difficult in practical terms to change the direction of the project, even if the contract or the paymaster (i.e., the government) had allowed for it.

Conceptual reflections on publicly funded demand-driven extension

We have seen how the Dutch Ministry of Agriculture attempted by various means to steer the agricultural knowledge market so as to foster demand-driven service delivery with respect of nutrient management. In this section, we draw some overall conceptual and practical lessons with regard to this endeavor.

The need to unpack the notion of demand

The wish to make publicly funded research and extension more demand-driven is an important element in general policy discourses about privatization, and it was a key objective of NMSS. In most literature (including NMSS project documents), “demand-driven” refers to finding a good fit between the knowledge and information desired by farmers and the services delivered by extension service providers. It is often contrasted with top-down approaches. In the case of the NMSS, however, it was quite clear that most of the farmers involved did not at the time have an active desire to learn more about nutrient management. Despite the demand-driven rhetoric, the NMSS project in many ways resembled a classic attempt to realize government policy, and it would be inaccurate to suggest that the project was based on farmer needs. One could argue that the notion of demand-driven is altogether misleading and misplaced in the context of publicly funded extension in present-day Western European agriculture, since there is generally friction between the interests of the government and those of the farmers. Nowadays, Western European governments are focusing on reaching societal goals with respect to ecology and the environment, which often run counter, at least in part, to the immediate economic interests of individual farmers. Thus, one could say that governments are inclined almost by definition to fund extension activities only for issues in which farmers do not have an autonomous interest. It is worth noting here that the extension service providers’ loyalty is torn between serving the client and serving the government. This dilemma was expected to be resolved through privatization, but it has at best only been partially resolved, since many extension service providers (e.g., those involved in NMSS) still end up being paid by both farmers and the government.

In discussions about privatized extension and also in the case of NMSS, we believe that two meanings of demand have been confused. The first meaning is demand in the economic sense – whether or not there is

sufficient purchasing power to obtain certain services as a condition for creating an interaction between market players. The second meaning is substantive – the interest that clients have in certain services and in the contents of these services and the questions that clients pose. In the NMSS project discourse, for example, it was suggested that farmers’ “substantive needs” should be the driving force for formulating their “economic demand.” We found that such substantive needs clearly did not exist and, consequently, the most important measure of the project (vouchers) was primarily about stimulating economic demand and not about articulating substantive needs.

In view of this confusion, the notions of demand and demand-driven need to be refined. On the basis of the NMSS experience, we suggest that four aspects need to be distinguished in any consideration of demand-driven extension with respect to public interest themes:

1. *Catalyzing farmers and the extension service or knowledge providers to act through the stimulation of economic demand.* In essence, the idea is to create incentives for people to engage in activities that otherwise would not be undertaken. This study found that NMSS was able to create incentives for knowledge providers and, to a lesser extent, farmers. Even though a considerable number of farmers spent the voucher, evidence suggests that only a minority of them engaged in activities that they would not otherwise have undertaken.
2. *Awareness building regarding a public issue.* Participation in “new” activities may or may not lead to increased awareness and acceptance of public issues and to defining an existing situation as problematic. Much extension literature suggests that actual experience of a problem is a crucial condition for becoming actively involved in learning and problem solving. Moreover, it is clear that policy instruments other than extension (e.g., laws, subsidies, fines) may contribute to the creation of problem awareness (Leeuwis and Van den Ban, 2004). An evaluative study of all nitrate projects indicated that it was legislation more than any other factor that catalyzed farmers to tackle the nutrient management issue (Geerling-Eiff et al., 2004). However, since the legislation was not clear, farmers had difficulty assessing what problems had to be solved in order to comply with the norms.
3. *Articulation of substantive needs regarding a public issue.* It is more likely that people will search for underlying processes and gaps in understanding and formulate substantive needs if they are actually experiencing a problem. The case of the NMSS and the experience of study groups designed to facilitate the articulation of needs, in particular, suggests that needs articulation requires interaction between service

providers and farmers (see also Van den Ban and Hawkins, 1996). In other words, supply and demand cannot be seen as totally independent categories in discussions about extension goods or knowledge products.

4. *Demand-driven service delivery in the substantive sense.* When substantive needs have become clear, they may or may not result in a demand-driven delivery of services. The extent to which this happens is primarily dependent on the transparency of the service market, and/or on the empathy, flexibility, and expertise of a chosen service provider. Since demand-driven in the substantive sense depends greatly on the quality of interaction between the service provider and client, it is notoriously difficult to assess and control. In the case of NMSS, we have only a crude indication of quality in the sense that most farmers were generally satisfied with the services delivered. This indicates that providers act in a responsible way regarding the quality of their services.

In essence, we argue that fostering demand-driven extension with respect to public interest themes requires the concerted support of all four aspects. With each, a range of different strategies and methods may be relevant (see for example, Leeuwis and Van den Ban, 2004). In the literature, much attention has been given to the transition to demand-driven extension by means of contracting-out and channeling funds into the hands of the end-users. However, this addresses only the first aspect mentioned above. Much more conceptual and practical attention should be dedicated to the process of formulating and meeting substantive needs. It is clear that this may create considerable complexities and contradictions when there are tensions between public interests, as defined by a government, and the private interests of farmers. However, even in cases where no such tension is apparent (e.g., when both farmers and government give priority to increased production), we think that critical reflection on the quality of the needs articulation process may be justified.

Moving beyond classic knowledge products

In the case study presented, we see that the knowledge products offered through NMSS are classic extension services such as individual technical advice and group meetings designed to facilitate horizontal knowledge exchange. This situation is not unique to The Netherlands (see for example, Bebbington and Sotomayor, 1998; see also Katz and Barandun, 2002 for an extensive review of several case studies). Although such services can be of use when the purpose is to stimulate change, it is significant to note that recent insights from innovation studies suggest that different forms of interventions,

designed to communicate new concepts or policies, might also be needed in order to support innovation. These studies have found that successful innovations appeared to be based on the effective integration of problem perceptions, knowledge, and experiences of scientists, clients, intermediaries, and other parties involved. This has led to considerable critiques on the prevailing linear model of innovation. The linear model of innovation mistakenly assumes that innovations are developed by scientists, disseminated through extension, and then put into practice by farmers (Kline and Rosenberg, 1986; Röling, 1994; Rip, 1995). Moreover, innovations are no longer looked on as consisting only of new technical arrangements, but also of new social and organizational arrangements, such as new rules, perceptions, agreements, and social relationships (Smits, 2000; Geels, 2002; Leeuwis and Van den Ban, 2004). This implies that there are always many different stakeholders involved and that innovation is a collective phenomenon in which social dilemmas and tensions are likely to come to the fore. In line with these conceptual changes, many authors have emphasized that additional services are required in order to foster new forms of coordinated action among stakeholders, including services such as the facilitation of interactive design trajectories, network building, social learning, organization building, and conflict management (see for example, Röling and Wagemakers, 1998; Ison and Russell, 2000; Leeuwis and Van den Ban, 2004). In this light, it is relevant to note that a principal finding from our case study – that lack of technical knowledge is a minor part of the problem – calls into question the relevance of classic extension services. At the same time, there seems to be a clear need for the improvement of social relationships, greater mutual understanding, and the design of more acceptable policy measures. However, the facilitation services required for this are not addressed by the knowledge market created through NMSS, but are clearly relevant from an innovation perspective. More generally, we may conclude that the idea of creating a knowledge market focuses attention, albeit unintentionally, on the delivery of knowledge and information products that can be marketed to individuals and small groups, rather than alternative kinds of services. Paradoxically, such a focus reinforces the linear model of innovation and once again suggests a clear separation between those who supply knowledge and those who demand it. As has been argued elsewhere, this is perhaps effective in a case of already tested and available advice and innovations that coincide with private interests and possess sufficient private good characteristics (i.e., high excludability and subtractability).¹⁵ It is not effective in a situation where policy and/or technological innovations are contested and/or must be (re-)designed (Leeuwis, 2000). Most importantly, the idea of an agricultural knowledge market suggests,

incorrectly, that innovation depends primarily on the distribution of knowledge. In view of new, more recent innovation theories, it can be said instead that the primary process is fostering integration and agreement in a network of actors.

The functioning of the knowledge market

The NMSS experience suggests that the creation of a knowledge market that will work without some form of market failure presents a considerable challenge. Even when we assume an articulated substantive need for knowledge products, adequate economic demand (financial resources and willingness to pay), sufficient competitors and supply of services, and a high degree of market transparency, both our case study and the literature on the nature of extension and consultancy work indicate that considerable transaction costs need to be overcome when switching from one service provider to another. Thus, it is an illusion to think that the knowledge market would start to function “properly” (i.e., like a spot market) if only farmers could get used to their new role as critical consumers (see for example, Rivera et al., 2002; Katz and Barandun, 2002) or if the supply were clearly understood through a website or other media.

Conclusion: The role of the state in a privatized extension system

On the assumption that privatization as a phenomenon is here to stay, the question of how governments can optimize their role as a client, a supervisor, or both, in the agricultural knowledge market remains relevant. At this point, we can draw conclusions regarding the role of NMSS-like institutions, combining both demand-side funding (the voucher scheme) and the supply-side contracting-out of safeguarding instruments designed to improve the functioning of the market by means of quality control, articulation of needs, and transparency.

A first conclusion based on this case study is that, when the purpose is to encourage individual farmers to act on a public interest issue through a voucher system, a clear and relatively stable public policy is very important. Obvious as this may seem, neither condition was met in this case – there was neither a clear nor a stable policy. In our view, vouchers may be especially relevant when farmers cannot be easily motivated by other means, such as regulations, subsidies, and fines (i.e., when a public interest issue cannot be brought in line with private incentives or disincentives), or when such conventional policy instruments are so complex that they cannot be made effective without extension services (see Van Woerkum, 1990). Additional lessons derived from the case are that a government voucher system is not likely

to be successful if the policy is highly contested and controversial and/or if the relationship between the government (sender) and the prospective audience (receiver) is damaged to such an extent that any communication is likely to fail. The exception would be if the voucher system were to address the relationship itself and had the objective of restoring it. In such situations, problems other than lack of knowledge and availability of services need to be addressed and resolved.

Second, although from a theoretical point of view NMSS-like institutions may play useful public interest roles (something that was – albeit with reservations – recognized by most respondents), it is clear from the NMSS experience that for a one time project with a limited life span it may be difficult to gain the trust and respect of actors in the agricultural knowledge network. More time is also needed for experimenting with and improving the various elements necessary to facilitate the development of the knowledge market. This was also observed by Berdegué and Marchant (2002) who stated that, after 25 years of experimentation with privatized extension systems in Chile, much still needed to be learned. Given the ongoing need to address old and new public interest issues, it may be more effective and efficient for governments to build more permanent institutions to facilitate the development of the agricultural knowledge market.

A third conclusion is that an NMSS-like institution will often need to have a broader focus than that of distributing technical knowledge to farmers. As outlined in the previous section, innovation is likely to require new kinds of facilitation services, involving a broader range of stakeholders (e.g., intermediaries, agri-industry, policy makers). Therefore, an NMSS-like institution will have to flexibly define its services and activities in relation to a specific public interest issue, depending on a careful diagnosis of both the problematic situation and the landscape of services already available.

Fourth, we have seen that creating incentives, awareness building, and the articulation of needs are important pre-requisites for achieving demand-driven extension (in the substantive sense) on public interest issues. NMSS-like institutions will have to pay considerable attention to developing models, strategies, and support activities. In line with Bebbington and Sotomayor’s (1998) observations, we concur that subsidized demand-driven extension does not always reflect farmer needs.

Finally, we question whether it is useful to improve product quality and market transparency through the certification of clearly described products and the subsequent distribution of detailed product information (as was done in this case) when we take into account the following factors: (a) specific substantive needs are likely to be diverse, (b) the meeting of such needs depends to a large extent on the quality of the interaction between

client and provider, and (c) relational aspects play an important role in extension service provider-farmer contacts. The kind of dynamics and mechanisms needed to guarantee satisfaction cannot be easily captured in (and may well conflict with) a predefined and anonymous written product description. As an alternative, it may make more sense to develop mechanisms through which specific persons can be certified or to improve market transparency through price comparisons and information about client satisfaction with regard to specific service providers, or both.

Notes

1. The definition of goods as employed in this article encompasses not only physically tangible goods, but also services.
2. Note that in this article the concept of knowledge is not more thoroughly discussed. The focus of this article is on the provisioning of services in which the purposeful exchange of knowledge is an essential feature.
3. This applies not only to the provisioning of public goods, which due to their low excludability and subtractability are unlikely to provide sufficient incentives for private provision, but also to toll and private goods, in line with the "merit good" argument. This means that the state should safeguard the provisioning of goods that are in the public interest, despite their possible private or toll good character. The merit good argument is the basis for the political discussion on the need for continued state involvement in extension service provision.
4. See Beynon et al., (1998: 22–24) and Carney (1998: 44–45) for elaborate descriptions of market failure specifically related to "extension goods."
5. Agricultural extension systems provided by a government service have traditionally been financed to a large degree through public funding (e.g., general taxes, specific taxes or levies on agricultural produce, donor country grants, and multilateral institution grants) (Beynon et al., 1998; Carney, 1998; Van den Ban, 2000; Katz and Barandun, 2002). Private funding sources for extension service provisioning include: farmers' personal resources, producer organizations, processing, marketing and export enterprises (in agricultural chains or in a regime of contract growing), and agricultural input supply companies (though often the farmer pays indirectly, since advice is included in the price of the input). Extension services are also provided by diverse organizations, both public and private, for-profit as well as not-for-profit (Katz and Barandun, 2002). Public institutions include national extension organizations, local extension units, commodity boards, public universities and research institutions, and international development organizations. Private, profit-oriented actors include consultancy companies, processing and marketing enterprises, input supply firms, traders, and private universities and research institutions. Private, not-for-profit organizations include NGOs and religious organizations. Producer organizations such as farmer associations and unions, commodity grower associations, and community and village organizations also provide extension services.
6. For a more extensive description of mineral balance as a nutrient management and learning tool, see Kessels and Proost (1995) and Stolzenbach and Leeuwis (1996).
7. The MINAS system collapsed towards the end of 2003 (some 6 months after completion of our research) when the European court decided that it was not in line with European nitrate regulations.
8. These projects were driven by the idea that there was a lack of knowledge and an insufficient flow of knowledge in the agricultural knowledge system, making it difficult for farmers to comply with MINAS standards.
9. The term "knowledge product" was part of NMSS project jargon and indicates various forms of extension service provisioning, in which the purposeful exchange of knowledge is an essential feature.
10. The terms "knowledge provider" and "extension service provider" both refer to those involved in providing extension services in which the purposeful exchange of knowledge is an essential feature.
11. The knowledge product should lead to an improvement in nutrient management, should include an advisory trajectory that goes beyond indicating merely how one can comply with MINAS norms and should be correctly described according to the standards of NMSS. Therefore, for example, the analysis of soil samples was not included on the list of approved knowledge products.
12. The sample consisted of seven farmers who did not apply for the voucher, eight farmers who applied for it but had not yet spent it at the point of selection (two had spent it by the time they were interviewed), eight farmers who applied for the voucher and spent the voucher individually, and eight farmers who spent the voucher in an NMSS study group. The study group leaders and knowledge providers were also randomly selected, the latter having been pre-divided into four categories in order to maximize diversity: advisory organizations (such as the privatized extension service, DLV (which stands for Dienst Landbouw Voorlichting – meaning Agricultural Extension Service)), product-related knowledge providers (such as feed industry advisors), accountancy-related knowledge providers, and nitrate projects (research projects).
13. Oerlemans et al. (2002: 29) found that, of a representative sample of dairy farmers ($n = 153$), 76% indicated that they did not have a nutrient emission problem on their farm, while 73% were confident that they would meet the nutrient emission norms set for 2003.
14. In the "great interest" category the scores were: animal health (79%), milking (72%), feeding of dairy cattle (68%), grassland management (67%), economics and administration (38%), labor planning (37%), breeding and animal administration (31%), nutrient management (22%), and machinery set-up (13%).
15. See Carney (1998), Beynon et al. (1998), and Hanson and Just (2001) for an analysis of extension as an economic good.

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