

The changing public role in services to agriculture: the case of information

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Abstract

The paper analyzes the changes that have taken place in the nature of agriculture information and their consequences on the public role of related public services with specific regard to process undergoing in the European Union. Increased interest in food quality and food safety issues in a global consumer driven society, together with major attention to environmental and ethical issues related to food production, enlarge both the object of agricultural information and the audience of stakeholders in the food chain and in the general public. Information policy with regard to a multifunctional approach to agriculture, can be finalized to correct three main sources of market failures as access to information, quality and adverse selection and externalities and provision of public goods. The privatization of agricultural research and extension, although useful from the point of view of economic efficiency, poses a number of threats to the development of knowledge for sustainable agriculture. If the public sector decides to move away from the delivering of services, public action can still be relevant in orienting, targeting, regulating and funding in win-win solutions where the advantages of public extension, as open access and evaluation of social priorities, join efficiency and market orientation of the private sector.

Key words: information, public goods, food quality, externalities, public services, extension

1. Introduction

Post-industrial economic growth is characterized by the transition from the industrial economy of the early to mid-twentieth century to the services and information based economy that is emerging today in high income countries (Antle, 1999). Postmodern economic growth is more and more dependent on the available stock of knowledge on technology and markets. New information technologies improve the economic performance of agricultural and food markets primarily reducing transaction costs (Thompson, Sonka, 1997) and strengthen the relationships between buyers and sellers (Streeter, Sonka, Hudson, 1991). With increased information flow between producers and consumers, the market should better approximate the perfect competition and welfare gains should occur. Some studies (Williamson (1971), Hennessey (1996), Antle (1998) demonstrate that information costs determinate an incentive to vertical integration of firms and sometimes elimination of externalities associated to the

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presence of asymmetric information. The reduction of distances in the new “virtual” market makes economy more efficient but new skills are needed in order to operate on these new markets and new institutions are needed for guaranteeing markets to operate correctly.

In the mean time welfare is less measurable just in terms of pure income growth as consumers derive their utilities by non-price attributes of purchased goods and services as environmental and ethical characteristics.

Agriculture, intended in its multifunctional characterization, can contribute to increase welfare satisfying the demand of present and future generations of food products, non food products and environmental services. Considering multifunctionality in normative terms, markets should provide agricultural producers with correct information while externalities and public goods that derive from farming activities must be internalized in farmers’ choices.

The complexity of problems related to food safety and environmental protection requires growing cooperation in the agricultural knowledge system (AKS) and between AKS and the whole set of actors, from producers and consumers to policy makers. The risks connected to food safety and environmental protection are not any more regarded by the general public as “isolated” events but as consequences of specific production systems with negative effects on actual and future generations (Green, 2001). This increased perception determines higher levels of responsibility that public opinion attributes to producers and public authorities.

Objective of this paper its to analyze the changes that have taken place in the nature of agriculture information and therefore to discuss the consequences on the public role of related public services with specific regard to process undergoing in the European Union.

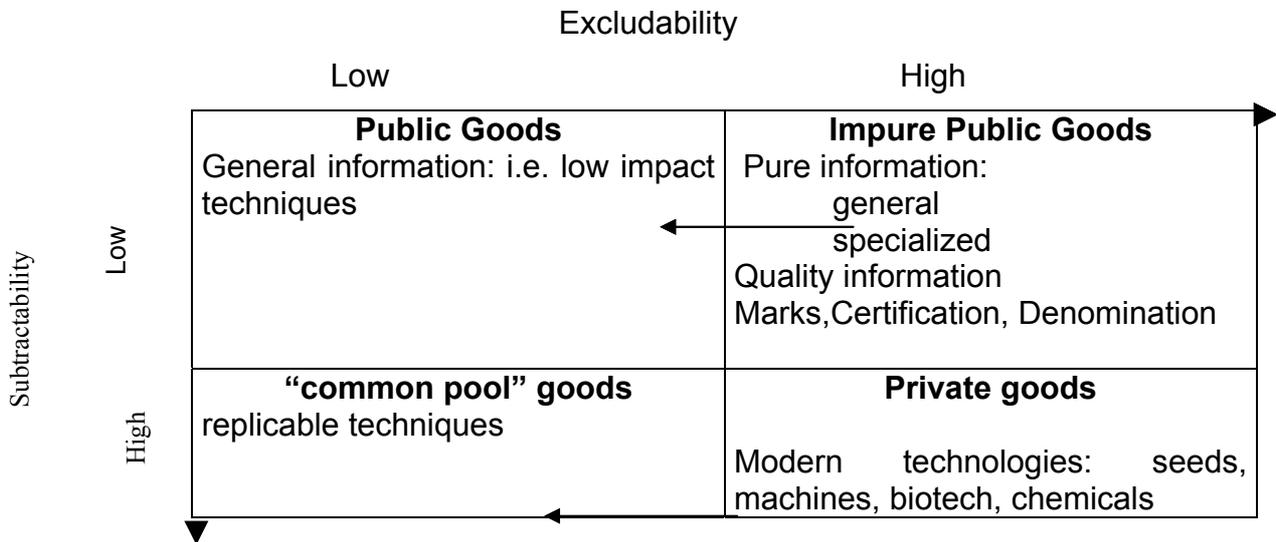
2. *The theoretical framework*

Provision of information has traditionally been object of public services because of the nature of public good of information. The market failure paradigm, which has its theoretic foundations in the welfare economics, is at the basis of US technology policy (Bozeman, 2000). According to this paradigm, the free market is the most efficient allocator of good and services and it will lead to optimal rate of science production, technical change and economic growth. Economic theory recognizes that there might be a place for government intervention whereas market fail to develop or produces suboptimal results. This happens if there are externalities and the benefits cannot be captured in the market, if transaction costs are too high or if information is not available or distorted. In these cases rather than engaging directly in the provision of goods or services, the best solution for the public sector should be to remove the constraints or provide incentives from market creation (Carney, 1995).

Many services, which are information-based, can be defined as public goods. The distinction between public and private good relies upon the two proprieties of excludability and subtractibility. In general, according to economic theory, only goods or services that are both excludable and subtractable are candidate for private, fully market driven supply (Carney, 1995). Analysis of the nature and content of agriculture information is needed in order to establish its characteristics as public or private good. This is not an easy task as results relay on several aspects, mutable over time and space,

that determine if and how market mechanisms can work. Umali and Schwartz (1994) have classified agriculture information that is transmitted to farmers in four main typologies according to the key characteristics of excludability and subtractability. The scheme can be adapted in order to include agriculture information that is transmitted to consumers.

Figure 1: Economic Classification of agricultural information



Source: Adaptation of Umali D.L.- Schwartz L. (1994):

Pure agriculture information refers to any information that can be used without the acquisition of specific physical technology as some production techniques, farm management, marketing and processing information and community development. Pure information can be defined as *general* when is designed to improve existing production practices, farm management or marketing and processing activities by means of traditional extension approaches. It has the characteristics of a public good but it can act as an impure (or toll) public good in the short period when constrains in facilities or infrastructures can reduce the availability of the same information to others. In the long term, the diffusive nature of information transforms it into a public good. *Specialized* information is situation-specific as the result of a soil test or the identification of a new market. This kind of information may or not be useful to other firms but one firm can keep it for its exclusive use limiting the diffusion process. In this case information act as a toll good and the market can have enough incentive to supply it at optimal levels.

Information that is *incorporate* in physical innovations is not separable by the acquisition of a specific input and is a private good. Common pool goods represent an exception: it is the case of technologies that are highly subtractable but, because of the easy by which they can be replicated, exclusion is difficult and costly.

Product quality information, usually regarded as a public good, could be considered a toll good that is non rival in consumption but excludable because of the costs associated to the acquisition and the use of information that limit the access to it (Antle, 1999). This case will be better analyzes in session 3.

Traditionally information policy in agriculture, and then the role of public services in providing information, has been justified by the opportunity of increasing the access of farmers to new technologies in order to enhance the efficiency of production, both with regard to dissemination of new techniques and to better utilization of the existing ones.

Increased interest in food quality and food safety issues in a global consumer driven society, together with major attention to environmental and ethical issues related to food production, enlarge both the object of agricultural information and the audience of stakeholders in the food chain and in the general public. This requires enhanced communication between AKS and a wide range of its clients (OCSE, 2000).

Information policy with regard to a multifunctional approach, can be finalized to correct three main sources of market failures as:

- access to information;
- quality and adverse selection;
- externalities and provision of public goods.

These above mentioned are different forms of transaction costs that arise primarily as costs of information and information processing and implicit welfare losses subsequent to sub-optimal exchanges.

In any of the above cases lack of information and asymmetric information reduce market efficiency: producers are not situated on the technological frontier and cannot fairly compete; markets do not efficiently provide products with the qualitative attributes the consumers would like to buy; cost and benefits associated to externalities are not internalized in farmers' choices and goods with positive externalities tend to be undersupplied while goods with negative externalities tend to be oversupplied.

3. Access to information

Traditionally information policy in agriculture, and then the role of public services in providing information, has been justified by the opportunity of increasing the access of farmers to new technologies in order to enhance the efficiency of production, both with regard to dissemination of new techniques and to better utilization of the existing ones.

Several factors make information in agriculture highly imperfect. They go from spatial dispersion of production, presence of a large number of small producers, prices and quantities fluctuations. Constrains to information diffusion are also represented by lack of infrastructures and incomplete factor markets. Traders might not find worthwhile to purchase in remote areas or farmers in rural areas may not have the skills that are needed to access to existing information. A EU Commission study (1980) assesses that when the costs of accession to information are too high farmers tend to substitute information by capital or labor and this can make them to regress on the innovation and development path. Instead, where accession costs to information are lower farmers substitute information to capital and labor, posing themselves in a logic of innovation that permits them to make progress.

The nature of public good of agriculture information has been for decades the justification of government intervention in extension finalized to increase the productive capacity of agriculture. An FAO survey of agricultural extension services in 1988-1989, including 207 institutions in 113 countries, shows in those years the highly dominant

role of the public sector: about the 81% of the extension work through the world was conducted by some public institution (FAO, 1990).

The nineties have been years of deep rethinking of the role of the public sector in the economy with gradual but constant affirmation of the neo-liberist paradigm. Trends in resource availability and the primacy of efficiency have pushed this process with the objective of increasing social welfare by raising the effectiveness of service provision. The central idea is that government should withdraw from direct service provision in areas where competitive markets do or could exist. This global ideology, together with the changing nature of agriculture information, has strongly affected extension institutions worldwide.

Technical modernization of agriculture on one side and changes in information technologies on the other side have increased the marketability of information as commodity. Knowledge as a product for sale has begun to revolutionize both public sector extension and the business of private sector technology transfer (Rivera, 2000; Buttel, 1991). Both in high-income countries as in developing countries public sector extension has undergone policy-driven major changes. Market-based privatization and non-market based reforms generally have been directed towards the enhancement of subgovernment responsibility for extension and commercial orientation of activity. The commodification of agricultural extension follows the process of commodification of agricultural research started with the development of hybrid corn (Buttel, 1991). Knowledge becomes a property to be protected through intellectual property rights with the products to be sold only to clients.

Advantages associated with the privatization of agricultural extension are, of course, higher attention to cost-effectiveness and creation of a demand driven system. In the mean time, other issues as equity implications, food security and safety, sustainable use of natural resources must be considered.

Some authors (Fafchamps- de Janvry - Sadoulet, 1995) consider the withdrawal of the State as one of the main limiting factor to successful rural development because of the institutional gap that it has created. A large number of smallholders and family farms is left without institutions to give them access to markets, credit, information and technology. The existence of a significant relationship between education and “cultural” consumption can lead over time to progressive social, cultural and economic marginalization of poor farmers.

The central role of human capital in the development process makes education and knowledge strategic for reaching the objectives of a better social cohesion and higher level of equity. Fast development in information and communication technologies has created a growing attention in the debate going on globalization to the opportunities and challenges of information technologies for rural development. Very low incomes, low education levels, lack of infrastructures determinate that people are not able to adopt the new information technologies giving raise to what has been indicated as *e-marginalization* (Zappacosta, 2001). Current extension debate recognize the importance of situation specificity and emphasizes the relevance of factors such pluralism, decentralization, participation and local knowledge systems (Haug, 1999). Availability and utilization of information are as well horizontal issues in Agenda 21 by which international community has recognized the objective of sustainable development (UN, 1992).

4. Lack of information and adverse selection: the case of food quality

Quality can be represented as a set of non-price attributes from which consumers derive utility such as nutritional content, safety, environmental or ethical attributes of the production process as i.e. the use of GMO's. In a world of quality differentiated products and perfect information a continuum of demanders and suppliers of quality differentiated products gives rise to a continuum of price-quantities equilibria (Antle, 1999). Analysis of markets with asymmetric information or imperfect quality information shows that markets for quality differentiated products can function efficiently only if quality information is transmitted to consumers in some way. When consumers are unable to judge the value of the good at the same time of purchase, a market failure occurs, named as adverse selection (Akerlof, 1970). The result is that sellers have an incentive to provide quality-inferior goods and services.

Some quality attributes can be discerned at low cost through search and inspection (the case of *search goods*), while in other cases it can only be found out after purchase through use (*experience goods*). In the case of *credence goods* quality cannot easily be assessed even after purchase. Quality attributes can regard the good itself as the one related to health problems (*intrinsic quality*) or the production process such effects on the environment, on animal welfare or social implications (*extrinsic quality*).

In order to avoid the effects of asymmetric information several mechanisms can be thought: the demand for quality differentiated goods creates the demand for product quality information (Antle, 1999). As information is costly, the cost of acquiring and using information limit access to it. Analyzing the market for information and deciding who must pay its costs requires evaluation of which attributes consumers are interested and their characteristics in terms of the distinction between public and private goods. When quality attribute are strictly private goods, the cost on product quality information should be paid by the consumers. When product quality is a public good the attribution of these costs is much less clear. In many cases information behaves as a club good as it is non-rival in consumption but is excludable, as suppliers of information can impose restrictions on its use. In this case the appropriate role for government is to create the legal framework in order to develop the supply of information on quality.

Policy designated to enhance the amount of product quality information can regard truth-in-advertising laws and regulation requiring certain information be provided through labels. Other policy actions can increase consumers' ability to obtain and use information as educational campaigns.

Information-based actions have, *inter alia*, the objective to reduce the distance between producers and consumers, increasing market efficiency. The efficiency of information-based mechanisms depends on the cost of producing and disseminating information. This can be low when a raw product is marketed directly but it can be very high when there are many stages in the market chain. *Traceability* makes possible to add to the product a new quality factor that is recognized by consumers, allowing the monitoring of the product along the productive chain together with the determination of responsibilities in the case of activities which could damage the product. This is particularly important if supply is highly fragmented as for horticulture and fruiticulture, fishery, meat production. Much different is the case of products that are identified by a brand where consumers can attribute responsibilities to the firm who owns the label (Green, 2001). Spreading traceability procedures requires association

between agricultural firms with partners specialized in information and communication technologies. Besides an adequate farm structure is needed. For small producers who operate in proximity markets the investment might not be justified (Green, 2001). It is then evident the role for public services for promoting the needed farmer education and technological modernization. Implementation of traceability requires not only information management but also associate quality strategies to traceability techniques.

Another example of information-based policy can be the EU regulation on organic products through which consumers are guaranteed on the production processed adopted by the agricultural firm. Even the institution of product of designated origin or regional specialties (PDO or PGI) can be considered an action of the same kind. Products having a geographic name have several characteristics of public goods. Their name make reference to a geographic space that does not belong to a single firm. The know-how linked to the products makes reference to community practices, based on experience established historically (Barjolle, 1998).

Farm animal welfare can be regarded as a case of credence good that refers to the ethical characteristics of the productive process. Producers might be willing to sell products conforming to animal welfare principles but consumers could not be able to distinguish the quality according to this criterion. Blanford and Fulponi (1999) analyze the implications of alternative domestic policy options as labeling and regulation with regard to animal welfare (Blanford e Fulponi, 1999). In the case of labeling, the role for the public sector is identified in establishing criteria for the certification and services for inspection and monitoring in order to be sure that standards advertised through the label are respected. This is an example of co-operative approach between the public and the private sector that allows that consumers demand is better satisfied. At the same time it is not trade distorting as products that have different standards may be freely imported. While this system seems to work in a close economy certification and individuation of standards at the international level constitutes is highly complex. The Marine Stewardship Council is an example of international voluntary approach promoted by Unilever and WWF, that certifies fish sold come from sustainable managed fisheries. Alternatively a regulatory approach is possible as in the case of the UE directive on animal welfare² that imposes a minimal standard for farm animals. Standards appear to be difficult to identify and raise many issues at international level when considered as non-tariff barriers to trade like in the EU-US beef hormone dispute. Some authors (Runge, 1998; Bureau e Marette, 1999) have suggested the possibility that Codex Alimentarius could include standards based on ethic and cultural arguments that are important for consumers and society at large.

There is evidence that information policies play an important role in reducing asymmetric information between producers and consumers and related phenomena of adverse selection and moral hazard. OECD Conference on AKS (OECD, 2000) has assessed in its final recommendations the role of OECD and others international fora in setting international rules which ought to consistent with scientifically proofed risks for human health and environment and in disseminating public information that must be transparent.

² Council Directive 98/58/EC, 1998, July 20th

5. Externalities and public goods provision

The last form of market failure with regard to information considered in this paper concerns the presence of externalities and the provision of public goods.

Public and collective action can contribute to spread the message of sustainability. The debate on sustainable development has recognized the importance to provide farmers with the right system of signals or incentives that makes farmers able to incorporate in their decisions the effects of spillovers of their activity.

Normally farmers are interested in maintaining the integrity of the ecosystems: recycle of nutrients, protection of useful insects and predators, soil fertility. Helping farmers in understanding these biological or physical equilibria can facilitate the adoption of eco-compatible techniques. This process often requires complex modification in agricultural practices not linked to the acquisition of new inputs while commercial innovations can be described as add-on technologies (Vanclay and Lawrence, 1994). Furthermore consumers may desire particular non-commodity outputs such as habitats for populations of wild birds but they may have little knowledge of what changes of agricultural practices would be needed. Besides it would be difficult for consumers to communicate to producers.

In order to have access to information and to translate it into consistent behaviors farmers must have an adequate level of education. Education and dissemination of information are key factors in promoting sustainable development. Several studies have demonstrate this close relationship with regard to water quality (Ribaud, Horan, Smith, 1999) or soil quality (Gould, Saupe, Klemme, 1989). Other studies have illustrated the role of public extension services in disseminating environmental innovations that based on resource management more than in increasing productivity and where costs are sustained by the farmer while benefit spread on the collectivity (Vanclay - Lawrence, 1994; Falconer, 2000). An example is the institution of the Organic Advisory Service in 1986 in Great Britain that should have encouraged the diffusion of organic method of production. In Italy research (Casieri - Marotta - Povellato 1998, Povellato - Bortolozzo, 1996) has revealed higher adoption to EU agro-environmental measure where advisory service are already active on the same issues.

Knowledge and technology for sustainable agriculture must be tailored to local ecological conditions. The generation of such knowledge requires forms of research and extension in which farmers are seen as full collaborators, recognizing the value of local knowledge and the capacity of farmers as experimenters (Haug, 1999).

Collective action can also contribute to transfer to farmers society demand for environmental inputs. This could explain the increasing rate on people enrollment in environmental organizations and in some cases their action toward farmers. An example is given by the Royal Society for Bird Protection in Great Britain that provides farmers with information on how changes in agricultural practices could contribute to creation of specific habitats (Dwyer e Hodge, 1996).

6. Conclusions

In the last two decades public sector extension services had gone through substantial renewal in many countries in an effort to make the sector more efficient and effective. This process has lead to reduction of the role of the public sector, privatization,

decentralization and sharing of responsibilities between central and local government and private users.

In the European Union public extension services have traditionally had the main task of increasing productive capacity and competitiveness of agricultural farms specially in marginal areas where it was lower the interest of the industrial sector. Public services at national or regional level have received strong financial support by the European Union since the enforcement of Regulation 797/85 followed by Regulation 2052/88 while before policy objectives had been set by the structural Directives of 1972. In Italy a specific regulation (270/79) had supported the organization of the public extension service. Nevertheless the organization of public extension services is very different among EU Member States.

Some countries as France or Denmark represent examples of very early decentralization of responsibilities from the public to the private sector where the majority of the costs is sustained by farmers through a mixed system based on a fixed contribution and fees for services. In Denmark the extension service is constituted by the Danish Agricultural Advisory Centre (DAAC) and by 75 local advisory centres that handle direct advice to the farmers. DAAC is owned and run by the two farmers unions, the Danish Farmers' Unions (two thirds) and the Danish Family Farmers' Association (one third). In the last years government contribution to the budget of the all system has been below 10%.

Other countries as the Netherlands or Ireland represent examples of semi-public organizations. In Ireland, Teagasc provides integrated research, advisory and training services for the agriculture and food industry. It is a client-based organization that operates in partnership with all sectors of the agriculture and food industry and with rural development agencies. Teagasc's budget comprises of 44% State grant, 33% EU structural funds and 23% generated at home. Advisory expenses are covered by fee charging for about 27%.

Spain and Italy are instead examples of public organization of extension services although a high variety of situation can be found at regional level. In Italy, Northern Regions as Veneto or Emilia Romagna have started a partial process of transfer of responsibilities and funding from the public to the private sector, mainly in field activities of extension services, while research services and coordination services between research and extension remain under the regional authorities control. In other cases, specially in Objective 1 Regions as Campania or Sicilia, extension services are still fully managed by the public sector. On one hand, these are regions whose development is lagging behind and therefore justifications of the public structure of development services lays upon equity considerations linked to the lack of incentives for the private sector to operate in marginal areas. On the other hand, strong financial support from EU structural funds could have slowed down the process of market-oriented reform that has prevailed in the nineties in many developed countries.

The new financial framework of EAGGF Guarantee and Guidance section makes evident the withdrawal of the EU in sustaining the costs of extension services. Strong implications for national policies derive also by EU rules on State Aids. Therefore analysis of implications of the new rules on structural funds for the future organization of extension services is needed as the present organization does not appear to be sustainable anymore.

Noting that we are now entering the "knowledge society", the European Commission has proposed in Agenda 2000 to make the policies which drive that society (innovation, research, education and training) one of the four fundamental pillars of the Union's internal policies. This process is directly linked to the aim of developing lifelong learning which the Union has set itself and which has been incorporated into the Amsterdam Treaty, expressing the determination of the Union to promote the highest level of knowledge for its people through broad access to education and its permanent updating. The new rural development policy by not allowing financing of extension activities with the only exception of training implies some rethinking of the many public structures that today, specially in Objective 1 regions, are dealing with agricultural extension. There is a high risk of fragmentation between research, education and extension activities that are financed with European funds but under different programs.

The changing nature of agricultural information both for what concerns its content and the means used for its diffusion – as it has been analyzed in the previous sections of this paper- has been representing a big challenge to the organization of public information services for agriculture. The relevance of the new objectives linked to the multifunctional character of agriculture and to the implementation of a new alliance between agriculture and the general public with regard food safety, environmental protection and ethical behavior, requires a new co-operative approach inside the AKS and between the whole set of actors from producers, consumers, policy makers, tax payers enlarging the arena of potential clients of public services. The second OECD Conference on Agricultural Knowledge Systems (AKS) has noted that the high priority given by all countries to food safety and agri-environmental issues was not matched by an increased level of public fund for the AKS to deal with these subjects (OECD, 2000)

The privatization of agricultural research and extension, although useful from the point of view of economic efficiency, poses a number of threats to the development of knowledge for sustainable agriculture. The idea of "knowledge market", implying a "demand side" of users and a "supply side" of developers and transmitters of knowledge, with a clear division of tasks remind us the linear innovation process that has been highly criticized as not adequate for sustainable development. Strict adherence to the principles of demand and supply could be an obstacle to the interactive process that would benefit sustainable agriculture. Having in mind the existence of failures in the market for information with regard to aspects like food quality and environmental externalities that are important for consumers, the solution cannot be found in the creation of two separate knowledge networks, public and private, that with different objectives compete in the agricultural information market (Leeuwis, 2000), with the consequent risks of duplication of research. Therefore new institutional arrangements are needed looking at partnerships between the public and the private sector, semipublic services and hybrid systems (Haug, 1999). If the public sector decides to move away from the delivering of services, public action can still be relevant in orienting, targeting, regulating and funding in win-win solutions where the advantages of public extension, as open access and evaluation of social priorities, join efficiency and market orientation of the private sector.

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