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Private Innovation and Public Innovation: Who Leads and Who Follows?

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Abstract

This paper examines two models of interaction between private and public institutions in respect to the process of innovation. While private firms adopt proactive strategies and public institutions follow it is considered that, under certain conditions, public institutions are the innovator and private firms are the followers. The first part of the research is theoretical and formulates the two models and their implications. The second part presents a case study of Italian products which have Animal Welfare (AW) attributes, where production follows the second relationship model. The case study shows that AW friendly products are the result of EU legislation, which obliges the industry to adapt production, organisation, publicity, communication and promotion. This is the inverse of the traditional relationship where private firms take the initiative.

1. Introduction

Increasing "industrialisation" of food production has brought about important changes in process and product. Food products are increasingly a result of processing and manipulation of raw materials, and increasingly removed from these. (Byè and Fonte, 1992;). Many factors have brought about these changes; principally, resources have been made more productive in order to keep costs down, in response to the requirements of wider markets and higher levels of competition. The need to diversify product attributes is also important as demand is increasingly segmented and consumers now look for new ready-to-serve foods which can also be preserved and stored (Carbone, 2004).

The faster rate of technical progress has at the same time led to new management models in firms and new models of the relationship between private sector producers and public institutions. Research and development has improved aspects of company activity, from supply and logistics to communications and promotion of services and products, and made them more answerable to planning requirements. At the same time, public institutions (PIs) have had to regulate technological progress so rapid that it has often outstripped scientific study of effects on the environment and health. In the traditional relationship model, producer-firms invest human and financial resources in innovation and the legislator protects consumer interests. Private companies have a pro-active role and public institutions a reactive role. But an inverse model has been developing over the last few years where the legislator is requiring and even making product innovation compulsory and providing incentives for it. Producers firms have in this case to adapt management, communication and promotion models. They become reactive in the relationship while institutions are pro-active.

In this paper, we examine these two models and the interaction between private and public links along the supply chain. We also examine consequences for the firm production system, for organisation and communication and publicity to the end consumer.

The first part of the research is theoretical and formulates the two models and their implications. The second part presents case studies of Italian products which have Animal Welfare (AW) attributes, where production follows the second relationship model. The case studies show that AW friendly products are the result of EU legislation, which obliges the industry to adapt production, organisation, publicity, communication and promotion. This is the inverse of the traditional relationship where private firms took the initiative.

2. Innovation as a development factor: theoretical observations

Innovation is an important element for creation of value for new products launched on the market, and defines the degree of modernity of a sector and / or firm. It concerns both process and product linked by a mechanism of “action – reaction.” They are separate in some sectors, but in agri-food they are linked because the launch of a new product is often a result of process innovation.

Research and development are thus the result of an organised formalised activity by firms and other organisations aiming to innovate firms and the national economic and social system. R&D can be divided into three distinct phases (Antonelli, 1999; Malerba, 2000): basic research for the increase of scientific knowledge not aimed at obtaining any specific good, applied research aiming at new products and precise production processes, and development in effecting a particular product or process. The three phases follow a sequence but the differences are often blurred as the importance of each phase varies between sectors and firms.

Innovation is thus assimilated into a process of generating a new product or production process concerning four areas of the firm: research, development, production and marketing (Malerba 2000). A firm adopts a new production process with the aim of economic benefit, and is thus encouraged to invest in research and to keep production costs as low as possible. Another aim is to gain advantage over competitors and gain greater consumer trust which can be translated into better reputation and willingness to pay for the firm’s products. Firm level innovation is thus viable if development yields economic benefit in the form of consumer appreciation for the product and willingness to pay. In this model, the role of the firm is to innovate but also to predict where innovation should be directed. This advice is provided by departments apparently outside the innovation process such as consumer behaviour research, marketing and publicity as well as the production process itself. The firm is thus central to the process of innovation and the consequent economic change. It is the firm which learns, introduces new technologies, invests in innovation, coordinates the process internally and externally through different types of agreements, and thus obtains profits and growth. Firms however differ in terms of technical skills, organisational structure, behaviour and performance.

But firms are not the only social economic actors involved in innovation. Public Institutions (PIs) also play an important role in supporting firms by stimulating innovation and lowering the costs of basic research. Examples of this are the roles of universities in basic research and Public Research Institutes operating in different sectors in policy and research both nationally and internationally.

Nevertheless, the most widely held view is that the firm is the economic subject responsible for production and transforming input into output in order to reach its main objective, usually profit. This leads to the hypothesis that a firm is a rational entity in that it has available to it all relevant information for optimising performance (Malerba 2000). Assets are sometimes invested in R&D with the aim of influencing rival firm’s behaviour and competitors’ expectations or even the expectation of “*driven*” consumption models. In fact it is usually firms which put up barriers against entry and increase market share through innovation, it is firms which are market leaders and force rivals to quit as well as influence consumer behaviour by directing them towards new goods. In other words, it is firms which dictate competitive dynamics and modify markets. This

model sees the firm endogenous to market structure (Battaglion, 2000). The models also sees increasing know-how as endogenous, because the capacity to innovate depends directly on firm investment in research.

In other words, know-how or technology is not common to all firms; only some firms are able to use it, often only partially. So technology is not freely available and its spread follows different dynamics. This is of course unlike the neo-classical model which saw technical progress as exogenous and technology as a public good. .

What incentives are there for investing in research? According to Schumpeter and Arrow, firms in monopoly conditions have no incentive to innovate, while social planners have maximum incentive. Firms in competitive market conditions lie between these two extremes and follow research policies both cooperatively and non-cooperatively (Malerba, 2000). Schumpeter states as a central plank of his analysis that the “pure market” cannot alone give incentive for innovation sufficient to guarantee maximum social well-being. In other words, in relatively concentrated markets, there is under-investment in research which constitutes a failure on the part of the market to allocate the intangible resources of R&D, a failure which justifies public intervention in incentives for innovation.

In the context of a competitive market, firms may develop alternative and complex approaches covering all organisations involved in innovation; firms, university and research institutions, financial institutes and the government. The efficacy of interaction between these various organisations affects the effectiveness of development itself. There are two types of interaction; vertical, according the “*leader-follower model*” (Tirole, 1991; Salanié, 1994; Allain and Chambole, 2003) between client and supplier, and cooperative or competitive horizontal interaction (Montobbio, 2000).

Vertical interaction in according to the *leader-follower model* sees technical progress as a cumulative process involving the knowledge available to actors. In practice the solution of technical problems and mechanisms for creation of new products are linked to level of knowledge in sector firms. In these conditions, learning is often interactive, and is one of the ways firms introduce innovation into process and product and organise knowledge within the firm. In this model, a firm wishing to introduce new processes or products, in order to overcome uncertainty or limited information, finds it advantageous to develop stable relationships with suppliers. This triggers interactive learning and allows the transfer of knowledge and skills and optimisation of the production structure. Stable relationships allow common codes of communication and personal and informal networks which facilitate both upwards and downwards learning (Lundwall, 1992; Malerba, 1992). As well as reducing uncertainty, this lowers transaction costs. The more complex the system, the greater are the advantages for firms as levels of information becomes less asymmetric and opportunistic behaviour becomes less likely.

This model occurs mainly where voluntary or contractual networks of firms exist, or where clients’ requirements encourage suppliers to make specific innovations.

The second type of interaction between firms, horizontal, is subject to the role of technological cooperation in firm innovation levels. Institutional aspects are secondary in influencing competitive mechanisms and their impact on technological change. Where interaction is horizontal, strong institutional intervention, or alternatively strategic interest in bringing down research and patent costs, are necessary (Freeman, 1987).

This short analysis shows that firms follow different policies on the road to innovation through R&D, and different types of relationships are formed with firms and institutions. Both vertical and horizontal models see a role for firms and PIs. PIs have the job of promoting basic research and in certain circumstances developing vertical and horizontal cooperation between firms. PI action is particularly important in lowering the cost of private research in the name of private growth and development able to transfer wealth to society.

It is firms which put into practice basic research to improve production technology, but especially to generate new products and increase market competition.

3. Innovation in the food sector

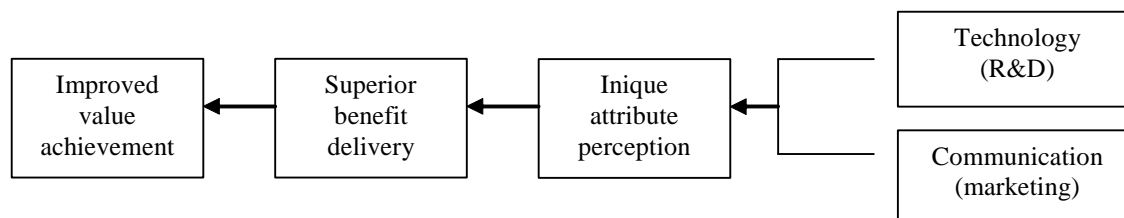
In the agri-food sector, R&D is mainly focused on *new product development* (NPD). The key determinant of NPD success is the degree of fit between the new product and consumer needs (Grunert and al. 1996, Grunert and al. 1997, Jongen and Meulenberg, 2001;). As a consequence, consumer needs represent the starting point for the NPD process (primary demand) and the product and production technology represents a derivative (Table 1) .

The left hand side of NPD model (Table 1) represent the consumers' reasons for product consumption. This reflect a thought basic to the New Consumer Theory , that is consumers do not value products per se, but the rather the benefits that these product provide upon consumption, and benefits are means for value achievement. (Audenaert and Steenkamp, 1997).

The new product is a bundle of concrete attributes offered by the company as a vehicle for superior benefit delivery. These more concrete attribute perceptions may be delivered through superior product technology as well superior marketing efforts (Hauser and Simmie, 1981).

The new product's superiority in benefit delivery is summarized in what is known as the "*Core Benefit Proposition*": the unique benefits that the products is to provide customers as well as those benefits required to meet and surpass competition (Urban and Hauser, 1993). This is considered the key stone to marketing efforts and the vision that underlies the engineering design of new product as it reflects the cooperation between a number of functional firm department: marketing consumer research, marketing manager, R&D, engineering and production.

Table 1. NPD and Improved value achievement in agrifood process



Source: Trijp and Steenkamp (2001)

4. A new role for PIs in the food sector?

In the above model, PIs appear to have a specific role that can be classified as "*reactive*".

The need for governments and the EU to ensure that technologically innovative products do not pose a risk to consumers means PI response is reactive. In this framework, the main objective of public institution is to guarantee food safety and transparency of the system. Recent rapid innovation in the food sector has in fact increased the level of risk to consumers¹. The European Food Safety Authority (EFSA) now monitors the sector and provides legislating bodies with food safety information aiming to ensure that consumers receive transparent and truthful information². Food firms have to comply with EU Regulations and Guidelines concerning raw materials and production processes. These procedures involve all food regulations and only

1. Production and sale of gamma ray treated products, preserving agents, GM products, heat treated cooked and frozen products are examples of innovations which may pose health risks.
2. H.A.C.C.P., beef traceability, global traceability, and GM labelling, and nutritional claims are examples of EU consumer protection.

superficially appear to hinder innovation. In fact for many firms, especially SMEs, they often constitute an element of innovation in that they create the conditions for firms to enhance product quality.

PIs have introduced norms which are, *de facto*, a sort of exogenous **process of innovation** for producers (Earle and Earle, 1997; Meulenberg, 1997). As not all producers are willing or able to introduce innovation, a selection process divides them into two categories: firms able to take up the economic market challenge, which thus remain on the market, and firms without this capacity, which thus quit.

On the other hand, PIs may play a different role adopting pro-active strategies according to which firms adapt processes and products. This occurred recently when the EU created and introduced a new category of products: “*credence*” or “*trust*” goods (Darby and Karni, 1973, Emons, 1997). The objective of this new category is to guarantee consumers with regard to certain product features like origin (PDO, PGI) or methods of production (organic products) or to introduce ethical aspects of the product (e.g. AW) .

PIs thus have the role of defining systems of certification, followed and paid for by firms willing to enter a new market segment. PIs inform consumers through quality signs or product publicity of the “credence” attribute, that have complex features so that is not always perceived by consumers. This is the reason why higher communication investment is needed (Lassaut and Sylvander, 1998)

In theory, credence goods could be produced by any firm for their basket of goods, but, in practice, not all the producers firms take this opportunity. As in the case of AW guidelines, firms are required to implement basic standards, but only some choose to inform consumers of their efforts. Also, in some cases (as Animal welfare friendly products), all the firms have to implement some basic standards, but only a few of them take the chance to inform the consumers of their efforts (Huges, 1997).

We need to identify the main determinants differentiating the firm behaviour, and the main consequences of public policy in terms of food chain organization, marketing strategies and economic viability of firms.

It is important to note that the success of innovation is often a reflection of the firm or institution's capacity to inform consumers of product characteristics and its benefits. That is why spending on publicity is included in the innovation process (Gregori e Garlatti, 1997; Ward 1997) and can determine failure or success.

The main determinant of firm behaviour in entering the scheme of credence goods is the economic advantage. This is obtained if profits from sales of credence goods (CG) are higher than the costs of organising the process, Certification Cost and communication and promotion costs (1).

$$(1) \text{Profit}_{CG} = \text{Supply Organization Cost}_{CG} + \text{Certification Cost}_{CG} \\ + \text{Communication and Promotion Cost}_{CG}$$

While costs of supply chain organisation and production of the credence good are totally borne by the firm, communication and promotion costs are usually borne by private companies selling goods under brands and trademarks or by Consortia using public finance for communication and promotion (Gregori and Garlatti, 1997; Gregori 2000). Clearly, if the value promoted is intangible and transversal across goods, as is the case with credence goods, individual firms do not create value for their own brand and have less incentive to invest (Falvey, 1989). Because brand product and own label firms have no incentive to invest in publicity, this role should be played by PIs.

There are however two different scenarios. In the first, the consumer does not identify with the advantages of credence goods, so that communication and promotion is costly. In the absence of PI intervention, the product may fail. In the second scenario, the consumer identifies with the advantages of credence goods, and firms may not feel the need to invest in publicity for a potentially wider market as the message is already getting across. It may even happen that firms enhance their own brand by creating (or reinventing) new products (Treager, 2003) or putting additional restrictions on the supply chain and offering consumers product guarantees even higher than those required by PI standards.

5. An empirical evidence on Animal Welfare strategies¹ in Italy

One clear example of product innovation driven by PIs is provided by COOP retailer in Italy, that is the most important retailer in the Italian market. It has 163 separate cooperatives, 1261 retail points with an overall surface area of 131.900 square metres and more than 52.000 employees. The sales network is divided into supermarkets and hypermarkets.

5.1 *The Coop beef chain (diagram 1)*

COOP handles 25% of meat in Italy. 100% of beef sold in the chain's stores under the commercial brand "COOP", is sourced from controlled COOP branded chains. As these products are in a branded chain, clearly the negotiating power lies with the head of the chain, and therefore with the COOP.. The commercial relations among the various operators and the consumer must therefore respect ethical behaviour and transparent, collaborative management in all operational phases. For this reason COOP is SA 8000-certified and its suppliers have all undersigned an ethical code of conduct.

Meat is supplied only from qualified farms included in the COOP selected list of suppliers. Farms are selected according to farming methods that respect the environment and animal welfare and assure high hygiene standards.

Suppliers of Coop-branded goods are assessed at entry through the documentary requirements and inspections carried out at farms and production centres. The suppliers are also monitored during supply through regular controls and inspections.

Wholesalers importing beef from France sign contracts in which they undertake to purchase from qualified farmers and to sell only animals that comply with the COOP specifications, including the respect for the traceability requirements for the sold animals, and the filing of the sales documentation for at least 2 years. Audits and controls (by COOP and CSQA²) are carried out at all levels of the COOP chain: feed mills, farms, slaughterhouses, suppliers, platforms, transporters, sales points. The chain controls include more than 310,000 heads/year, for 1.4 million €/year.

The suppliers who undersign and abide by the COOP regulations are then qualified and undergo predefinition at the sales point by the associates. COOP doesn't impose only a specific code of practice but implement a relationship with farmers which final goal is also to improve technical capacities, developing their skills according to market needs.

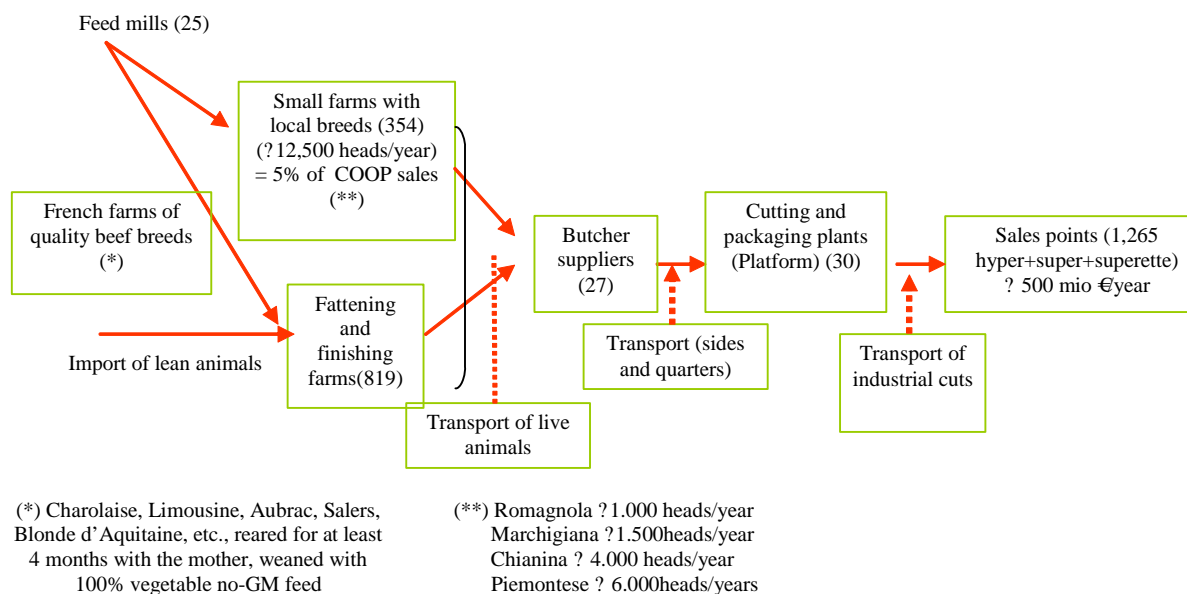
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1. This outcome is part of the Welfare Quality research project co-financed by the European Commission, within the 6th Framework Programme, contract No. FOOD-CT-2004-506508. The text represents the authors' views and does not necessarily represent a position of the Commission, which is not liable for the use made of such information.
 2. CSQA is an Italian certification body.

5.2. Level of attention paid to animal welfare as ethical component and as tool for quality

The COOP strategy for farmers is multidisciplinary and includes requirements on farm management (as environmental requirements, check lists on farm management and attention to production costs) and beef production as quality, safety and application of AW standards. Also, in compliance with Universities and Public research centres, COOP finances research projects specific on AW with the aim of identifying and assessing parameters of AW that can be applied to Italian beef production.

COOP AW requirements for its suppliers are that they respect legal standards and follow the ethical code in the guidelines as well as structural and management requirements (Diagram 2 and Table 2). The COOP production protocols pay close attention to animal welfare in the farms, with particular attention to feed, hygiene and the health and psychological conditions of the animals, as well as the transport and slaughtering conditions.

Diagram 1. The COOP beef chain in figures

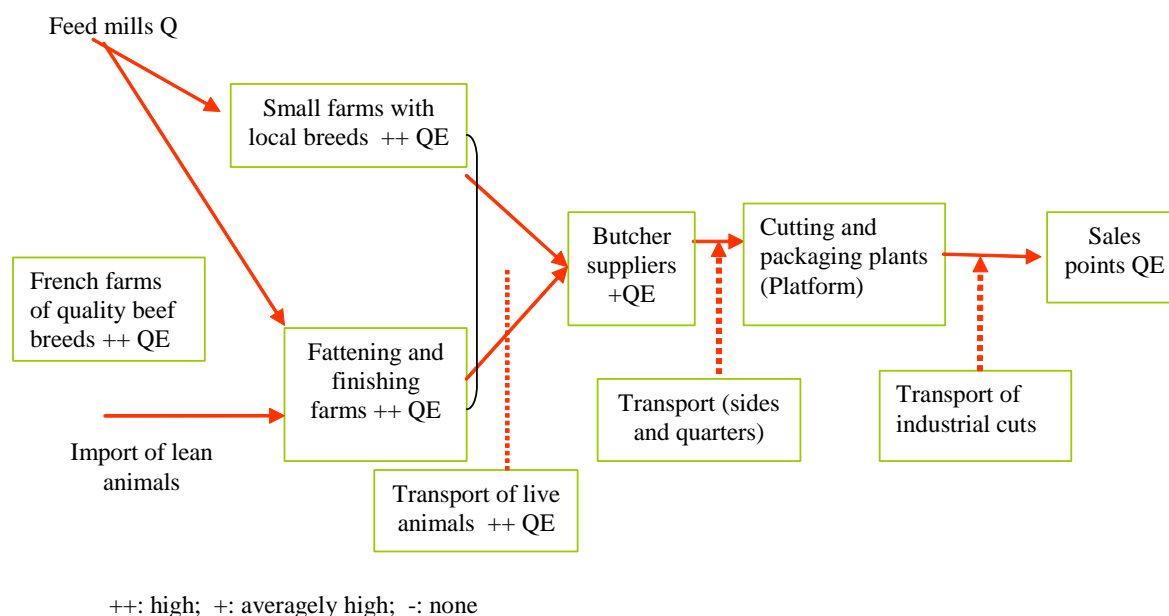


Source our elaboration

The importance placed by COOP on the issue of AW in all the relevant zootechnical aspects of the beef supply chain is geared at safeguarding the consumer from the potential risks of uncontrolled zootechnical production the sole aim of which is to produce the greatest possible quantities.

According to COOP policy, the welfare of productive animals is therefore a quality and ethical responsibility requirement of the company. The ethical approach of COOP is an important aspect in the creation of the enterprise's global value, a value that ensures a long-term competitive advantage. In the light of the above, in addition to hygiene-health controls, COOP also guarantees control of the critical aspects of breeding, in addition to guaranteeing transparency and information to the consumer.

Diagram 2. The COOP beef chain: level of attention paid to animal welfare during operations as ethical component or tool for quality



Source: our elaboration

Table 2. COOP AW requirements for its suppliers

| Actors of the food chain | Requirements |
|-----------------------------------|---|
| Feed mills | “no GM” feed chains, no animal flour and no added animal fats. |
| Farms | < multiple stalls; |
| | < health and hygiene conditions of the animals and the environment; |
| | < feed: rations suited to the various farming phases according to weight and age; |
| | < adoption of natural farming methods. |
| Transport and slaughtering | (animals slaughtered at less than 22 months) avoid stress for the animals |
| Sales points | the meat for sale comes exclusively from predefined suppliers/farms. |

Source: our elaborations

5.3 Saleability of the concept of animal welfare

Despite an high commitment in the improvement of AW standards in COOP beef chain, COOP does not develop “ad hoc” “brand policy” or publicity for AW, because it does not consider AW a marketing tool. As there is no public AW promotional strategy at national level, COOP believes that specific information on AW is not sufficient to stimulate sales and also that make information only on AW is too expensive. In turn, AW is considered by COOP managers one important issue that, with others, contribute to define and reach the expected quality and safety standard for meat (Table 3). The conclusion is that in COOP product, AW attribute is implemented according to stricter rules than legal requirements but, this attribute is not communicate.

Table 3. COOP website information on fresh meats

COOP QUALITY SAFETY

COOP brand fresh meats are produced following exclusive rules:

- 1 Selection of best breeds for meat quality and flavour.
2. Animals are carefully fed:
 - no added animal fats or proteins once the animal is weaned;
 - no GM – this is checked by an advanced system.
3. Careful selection of farms and slaughterhouses, which are bound by contract to precise specifications.
4. Rigorous inspection of supply chain on top of legal minimum requirements.

6. Conclusions

The process of innovation in the food sector is generating new production processes and making available products containing higher levels of customer service. It is also enriching the market with credence goods, through the agency of PIs. PIs in fact no longer play their traditional role as regulators; but they are themselves proactive innovators, as legislation encourages firms to produce goods with new quality attributes, AW products for example.

This policy of innovation alone is not always successful in attracting consumer interest in credence products or making them willing to pay for them. The main reason that firms are not involved is that communication and promotion costs for this innovation are high, and firms tend to see adequate market returns as unlikely.

Our case study shows that although AW products are on the market thanks to public initiative, no promotional investment is made in them in Italy, mainly because consumers are not currently aware of AW aspects, either ethically or regarding production. Even if individual firms are innovative, they mainly find it too costly to raise consumer awareness, and tend to include AW product characteristics in the set of quality variable.

It is therefore essential for PIs to go beyond the definition of new product categories; they must also proceed with detailed and far-reaching consumer publicity campaigns on the advantages of AW products and their benefits for consumers and citizens.

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