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## **Training as an Innovation Device: Experiences in Dealing with Limitations of Conventional Technological Transfer**

### **Abstract**

Designing and running training schemes for farmers are critical steps to support a global strategy to foster sound cooperation between research centres and rural entrepreneurs to improve overall competitiveness of a rural area. This paper outlines the problematic environment of planning and implementing these schemes with a specific emphasis on the great number of difficulties and critical knots hampering the effectiveness of these initiatives: a “paradigm shift”, and updated approaches and tools, are required firstly to convince decision makers to adopt a renewed and a more participatory approach in training to improve and increase impacts of these schemes and make the involved public and private investments more effective and efficient.

**Keywords:** *training, innovation, rural development, knowledge flows, learning*

### **1. Introduction**

During the last decade many principles and organization models of agricultural policy and rural development in general have been revised. Conventional approaches to research, development and extension in improving the welfare of rural communities, not only those in marginal and resource-poor areas, but also those affected by stagnant conditions and resistance to innovation are frequently under meticulous scrutiny. In literature, the underlying concepts of the Technology of Transfer model are likely to be increasingly criticized as well as the conventional model of implementation in practice through the Training & Visit system (Abadi

Ghadim *et al.* 2005, Hagmann, Chuma and Gundani 1997, Hagmann, Chuma and Murwira, 1997, Merrill-Sands and Collion 1994, Norton *et al.* 1999, Röling and de Jong, 1998, Visser *et al.* 1998, Waage 1996). Active participation (as opposed to summary consultation) of farmers and other rural entrepreneurs has acquired increasing importance in problem diagnosis in their specific production systems, and in organizing, testing and evaluating strategies, methods and practices presented and possible results and impacts in collaboration with research and extension agencies in both public and private sectors.

The need to empower rural areas, also those close to regions characterized by industrial decline and unemployment, transforming local agents (farmers, rural entrepreneurs, local administrations, associations, etc.) in active subjects within the innovative processes involved directed to identify renewed economic opportunities on environmental and social sustainable bases, implies a wider approach replacing their conventional role as passive recipients of information, subsidies and other inputs. Doing business in rural areas requires today more intensive management, better global skills and much more time in administration and many farmers find mounting difficulties to take on these extra burdens. Rural business, not only for export markets but also for a correct use of local resources and the definition of alternative economic activities, has become much more complicated than in the past, requiring farmers and entrepreneurs to have a better understanding of not only agronomic factors and up-to-date price information but, increasingly, of processing, marketing, importer and consumer requirements, changing domestic and international trading systems, environmental regulations, clients' needs, service improvement, etc. These observations are particularly relevant for smallholder farmers also in consideration of the reductions in price support and other forms of protectionism. Rural entrepreneurs are required to be more business-oriented, planning well and understanding market needs, in order to add value to their produce/service and to acquire a more robust position towards distribution. Better knowledge of marketing strategies and supply chains is essential to protect farmers' profitability because market messages are getting lost before they reach producers. Further challenges derive from the proliferation of environmental, ethical codes of practice (i.e. in retailing) and the increasingly stringent requirements of the European Union (EU) legislation on hygienic, phytosanitary and livestock production standards. These continuing changes in production technologies, in input and output markets, in pest management strategies, including the use of approaches to organic agriculture, etc. imply concrete adaptation pushes with relevant consequences in management research, technology development and rural entrepreneur training.

This scenario is likely to be applicable in the areas characterized by high incidence of elder population and scarce presence of younger entrepreneurs because the innovative processes of developing new management skills and a more business-minded enterprise to allow or keep a rural area competitive under globalizing pressures, may lead to changes seen, especially by smallholders and family farmers, as too drastic. Hence, how can a rural area and its firms acquire a substantial “territorial competitiveness” not only in economic terms, but also in terms of improvement of quality of life of the communities involved? What do these changes mean and imply for these communities? How can these changes be managed and what might be the consequences deriving from these changes? This paper attempts to assess some of these issues for Knowledge and Innovation Management (KIM) in rural areas in particular in the context of research, rural Small and Medium Enterprises (SMEs) and entrepreneur training.

The considerations presented in this paper have been developed within the research activities of the project “Development Dynamics and Increases in Competitiveness of Rural Areas” (DICRA) resulting from an agreement between the Institute of Chemical Methods (I.M.C.) of the National Research Council of Italy (C.N.R.) and the Municipality of Vitorchiano (a village with 4000 inhabitants in the province of Viterbo, about 100 km north of Rome in Central Italy). The DICRA Project has been designed to act as a funnel for the creation of constantly updated relation networks composed of expertise, know how, experience and capabilities coming from different subjects (agents) placed in very different dimensions and showing different nature (individuals, families, communities, firms, public agencies and institutions, research centres, associations, other public and private subjects, etc.) but all acting within a given rural area. The main scope in creating these networks consists in the possibility: a) to explore, evaluate and interpret *in vivo* those mechanisms on the basis of rural development processes, their success margins and, their failures and obstacles and b) to create complex systems within which knowledge can become more productive, in a wider extent, transforming *Knowledge Centres* (SMEs, research centres, local development institutions, innovation supporting agencies, etc.) into *Knowledge Networks* through the improvement of the interconnections (edges of the system) among these different local nodes (vertices of the system) of expertise.

The rural area in which the project is presently operating is characterized by traditional agricultural and rural activities, small scale industries and mining activities and is at present exposed to sudden and consistent migration flows from urban centres (Viterbo, 55.000 inhab. distance: 7 km - Rome 4m. inhab. distance: 100 km) with consequent specific residential problems and coexistence of consolidated agricultural vocations with new semi-urban activities, needs and issues.

The territory is thus coping with a complex transformation process affecting economic, human and environmental resources with specific changes in landscape, employment, planning and administrative management.

The paper starts with the role of training as a component of a wider strategy directed to overcome territorial inertia and create stricter links between research and local economic and social tissue, followed by a description of empirical observations concerning the limitations of conventional technology transfer and extension methodology in adapting new knowledge and skills that changing markets require from local rural economies. The last Section is devoted to the evolving approaches in training and knowledge spreading to make them more beneficial in economic, social and environmental terms for local agents and to the outline of the training, institutional and policy needs for integrating production aspects into robust and flexible livelihood strategies.

## **2. Inertia and resistance to innovation**

The role of the interrelations between innovation and processes of change is widely analyzed and discussed in literature (Antonelli 2003, Geels 2004, McAdam 2004, Ottosson and Björk 2004). Nonetheless, routine always represents an easier path, in economic, technological, management and psychological terms, when compared to unknown consequences of innovation. Empirical observation can confirm that static scenarios and difficulties in activating innovative cycles at a local level are more frequent than it seems even in advanced economies or in contexts where technologies are easily accessible. Resistance to innovation in development processes, at different scale (Table 1), is a physiological factor to cope with requiring, for its realistic solution, highly convincing actions to a) break down static trends biasing resources in investments for innovation and b) stimulate induction and imitation (innovation clusters) contributing to impulses for next innovation clusters.

**Table 1: Classification of resistance**

Level	Scenario	Possible Strategies
Level 1 Opposition and information	People lack adequate information and expertise about innovative actions	Provide correct information. Deliver basic training
Level 2 Opposition and Utility	People believe that innovation and training are useless	Deliver practical convincing training based on successful examples.

Level	Scenario	Possible Strategies
Level 3 Opposition and Culture	Consolidated practices prevail systematically over innovation	Cultivate innovation. Deliver convincing training mainly directed to young people to re-create innovation humus.

Simple positive models and examples are essential elements to ignite imitative chains capable of supporting many operative initiatives in the case of pushes towards isolation (at the economic, social and psychological level) and particularly static behaviours and attitudes but overcoming resistance to innovation is to some extent territorial-specific: positive models cannot be easily transferred and the experiences gathered in one rural territory could be worthless in the context of another.

In the case study rural area, an analysis of the context highlighted a global weakness of the agents to recognize and receive benefits and opportunities from innovation due to the action of some structural factors such as:

- demographic factors – high incidence of elderly population and rapid ageing of farmers
- job structure – scarce presence of young farmers
- productive transition – economic and social decline of agriculture
- residential flows – de-urbanization and re-settlement of rural areas for residential use.

After decades, an excess of supply of workers in this area turned during these years into an acute shortage of new entrants in agriculture and other rural sectors as entrepreneurs. The widespread presence of older farmers is currently a source of serious pressure towards routine, static and repetitive conditions which represent an actual and potential cause of opposition to innovation whose role is particularly important in the light of an increasingly competitive and integrated international economic environment.

Sources of territorial inertia in advanced economies can be found in a wide range of mechanisms linked to:

- local economy – degree of openness of economic agents;
- local institutions – degree of sensibility of administrative agents to stimulate and support innovation;
- technologies – the modalities through which technologies are passively/actively adopted by local agents;
- infrastructures – quality and quantity of facilities hampering/easing the circulation of individuals, goods/services, ideas, etc.
- culture – historical and social factors, relations with public institutions, social relations, social exclusion/cohesion, frustrations and expectations, humiliations and gratifications, etc.

These factors make territorial inertia a multidimensional phenomenon contributing to generating a psychological environment encouraging an erosion of widespread responsibility and social inertia also among the younger generation, who are unlikely to be engaged in innovative processes, in training and, in general, in activities requiring investments in personal intellectual capital. In particular, this psychological environment is based on three key elements: sunk costs, uncertainty, potential conflict.

### *Sunk costs*

Innovation and change involve high initial set up costs because agents must learn modified rules, practices, codes, etc. They need new skills, competencies and they have to establish new relational contacts and these assets require time, money and efforts. Given these premises, it is often rational to confide to routine and familiar standards even after potentially better alternatives have become available.

### *Uncertainty*

Knowledge about innovation is generally incomplete, its impact and consequences are more difficult to predict than the effects of status quo. It is unclear how innovation will perform, when it will be fully operative and how it will affect the relative agents' positions. Any changeover from old to new involves uncertainty, risk and psychological discomfort: resistance to innovation is thus linked to some *risk aversion degree* shared by agents.

### *Potential conflict*

Innovative processes imply more benefits and advantages for some agents than for others. The beneficiaries of status quo can support a widespread culture of inertia and innovators have to mobilize and convince followers and settle disputes through costly, time consuming and not necessarily successful actions which can generate dissatisfaction and tensions.

These key elements fuel concretely territorial conservatism and reduce attractiveness of potential alternatives acting as a barrier against innovation and change. Agents become locked in inertia and laziness being recalcitrant to radical and less radical breaks (according to the peculiarities of the situation). An analysis of the problem of inertia in advanced economies is not the aim of this study but this factor is often seen as an advantage in the short run because it helps to avoid sunk costs and mitigate transition problems towards changed conditions. These short term benefits can, however, become disadvantages in the long run and the minimization of short term costs may preclude the maximization of long term returns

(Atran 2001, Boyer 1999, Hannan and Freeman 1984, Henrich and Boyd 1998, Henrich and White 2001, Henrich 2001, Levinthal and March 1993, Tykocinski *et al.* 1995). A sort of everyday surviving, based on reliability rather than variability, may stimulate inertia preventing changes from occurring, which may involve a loss of stability and outcomes too far from the neighbourhood of the status quo. The sample area is of course an open reality in which a great number of variables influence these conditions backing, however, inertia which occurs when an innovation opportunity is to some extent “worth” substantially less than inaction. All this can dramatically affect the modalities through which scientific research can get in contact with a local reality potentially contributing to the improvement of the overall quality of life of the area at economic, social, environmental and political levels.

### **3. Bridging research and local SMEs: the role of training**

A partnership between research and a socioeconomic tissue, with its circulation, negotiation and appropriation processes, can stimulate innovative processes (Lemon and Sahota 2004, Feldman and Desrochers 2003, Varga 1998) capable of generating impacts or paths by which knowledge circulates which can be translated for the agents into “change” and substantial innovation, interruption of routines and circular repetitions and activation of innovative cycles (Rinne 2004). The understanding of those mechanisms able to “qualify” such interrelations in determining positive results and impacts of the interventions adopted within a stable and long term framework, still remains a difficult and problematic task. Empirical evidence often confirms that the availability of financial resources is unlikely to be a sufficient condition to stimulate innovation spreading and the solution of static economic and social conditions (Asthana and Halliday 2004).

Knowledge flows are in fact influenced by a large number of quantifiable/not quantifiable and tangible/intangible factors generating a complex network, among the agents involved, composed of multilateral feedback chains and stimulating (or hampering) the circulation of information, know how, experience and innovation. The resulting system shows a double complementary and interacting problematic facet, the former being characterized by techniques, methods, technologies, etc. and by the corresponding organizational and social relations (engineering dimension). The latter is rather linked to behaviours, mentalities, actions and reactions, expectations etc. where the idea of *positive psychological result* plays a critical role (cultural dimension). Both dimensions simultaneously contribute to the creation, identification and development of such a dynamic cohesive system among agents

in a rural area linked to those specific peculiarities which characterize, for example, nature and mentalities of the agents involved, the territory where they operate, role and action of local administrative institutions, interrelations among agents and local resources and factors, the output resulting from their interrelations, the expectation/frustration balance, imitations and external contacts, trust/mistrust balances, etc. (Von Zedtwitz *et al.* 2003, Lundstedt and Moss 1989, Holt 2002).

The possibilities to create these links are likely to derive from a generic “interest in innovation”, which can highly vary in time and from agent to agent: this interest can acquire different and variable forms and intensities to which different innovation needs can correspond (Rothwell and Zegveld 1982, Del Monte and Papagni 2003, Galende and de la Fuente 2003, Drucker 1999).

This interest in innovation has to cope with the problem of injecting changes within a realistic context defined as *already existing mentalities, behaviours, attitudes, approaches and practices in a consolidated environment*: innovation hence does not grow in a “ground zero” condition. Each concrete innovation process lies on former innovative processes and each innovation process thus creates pre-conditions for the following one (Cannarella and Piccioni 2003, Antoniou and Ansoff 2004). The necessary flexibility requested from the system to cope with unavoidable risks and uncertainty caused by innovation depends on the following key factors:

- **individuation** – capability of the involved agents to identify those elements on the basis of the context, characteristics and relevance of the subjects involved, stimulating, at the same time, their own capability to recognize presence and dynamics of territorial resources (human, environmental and economic capital) as specific peculiarities of the area;
- **involvement** – capability of the system to stimulate, support and improve agents’ inclination to be engaged in the system and to engage further agents;
- **integration** – capability of the system to stimulate and support agents to be functionally and effectively structured within the system;
- **cooperation** – capability of the system to stimulate and support agents to work together and concretely operate within the system.

Good models and convincing examples are not enough because of the role of *learning* for introduction and diffusion of knowledge and innovation and solution of condition of inertia and resistance. Knowledge flows, awareness and behaviour of agents are essential for innovation: development of knowledge and this awareness are results of learning. The learning processes have been explained as *learning-by-doing* – experiences from production and design of goods (Arrow 1962, Garud 1997), *learning-by-using* (Rosenberg 1982) and *learning by-interacting* (Lundvall 1992). Learning-by-doing is dependent of the process of learning by-



using. On the other hand, the process of learning-by-using depends on the production and design of the product. Therefore, these two processes of learning are improved by interaction or learning-by-interacting.

These activities are at the root of the *capacity building* processes directed to transfer innovative know-how, enhance skills and expertise of the agents involved in the network and improve the condensation potentials of certain subjects (cooperatives, producers' associations, etc.). The definition of *ad hoc* training schemes has played and plays a critical role as an operational tool, within a holistic approach, capable, by generating and disseminating knowledge and innovation, of enhancing, thanks to continuing knowledge flows among the subjects involved, the related research systems, facilitating commitment and enhancing the capacity of the agents involved to properly select options and choices and make well-informed decisions (Braun, Thiele and Fernández. 2000, Edwards and Eggers 2004, Hall *et al.* 2001).

The predisposition of training schemes for farmers, rural entrepreneurs, individuals, etc. becomes a critical factor within a global strategy directed to: a) stimulate cooperation as a basis for future integrative systems among different agents operating in the area (research groups, local administrators, firms and farms, etc.); b) improve investment efficiency and effectiveness to support these initiatives, optimize the result impact and make innovation supply and demand collimate and c) define, facilitate and develop operative territorial systems based on sound links between scientific research, society and politics. In particular, these training schemes should contribute to: 1) reconstruct an interest in innovation (technological and non-technological) on the basis of a "culture of innovation"; 2) involve entrepreneurs in innovative processes for the development of an entrepreneurship culture based on creativity and spirit of initiative; 3) introduction to the recent paradigms in rural development; 4) update on recent advances in managing innovation and technologies; 5) create cultural pre-conditions to improve subjects' capacity in preparation and implementation of joint plans (research-SMEs) and 6) increase the presence of young farmers and rural entrepreneurs.

Training thus contributes to improvements in skills and know-how in:

- *applying* knowledge
- *using* scientific approaches
- *improving* understanding
- *practising* innovations and technologies
- *determining* processes and factors that influence decisions.

Training and its problematic dimension are here analyzed according to "demand" and "supply" both concretely affecting: a) business capacity of the entrepreneurs involved; b) the overall skills and capabilities of the rural area concerned due to

imitation processes; c) knowledge flows between firms and research centres and d) the effectiveness of public investments in the related initiatives and programmes. The experiences described in this paper have been ignited by the critical question involving the capability of conventional approaches in designing and implementing these initiatives in producing positive impacts in terms of improvements in the welfare of farming and rural communities, especially those in marginal areas or interesting diverse agroecosystems. These experiences empirically confirmed the existence of severe limits and, in some circumstances, their potential in generating perverse negative implications. These observations thus highlighted the need for new approaches to activate forms of active participation of farmers and other rural entrepreneurs firstly in correctly assessing their real productive, economic and environmental needs and issues.

#### **4. The “demand” aspect of the issue in the case-study: what is going wrong?**

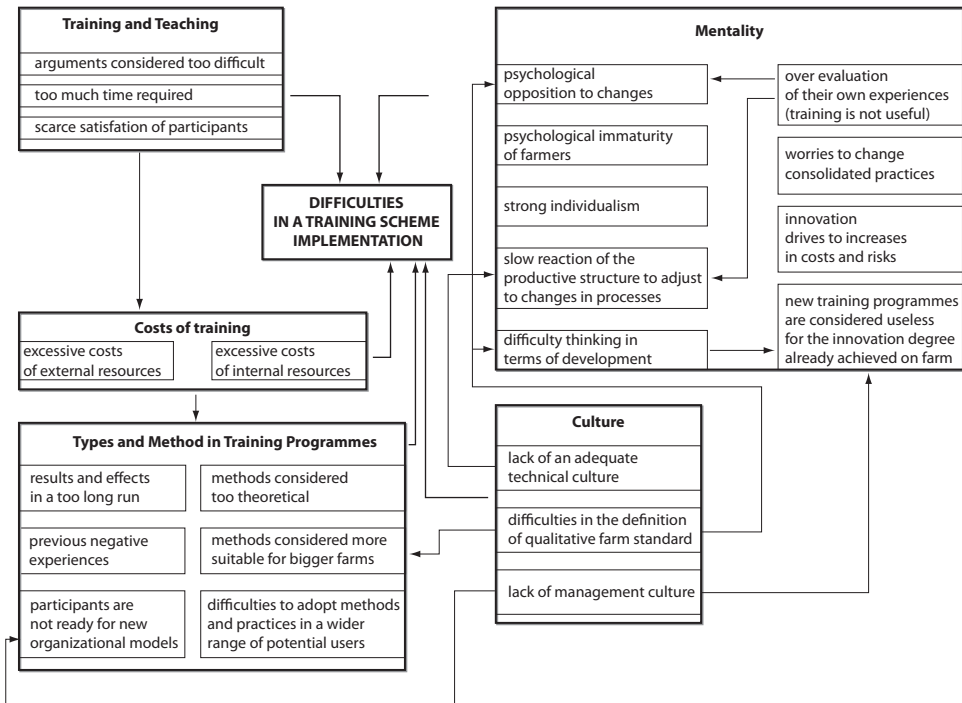
At the beginning of DICRA activities the first set of seminars were launched on the basis of the rather optimistic assumption that innovation supply and demand could have easily and automatically met through training; on the contrary, these seminars were characterized by a generally low interest and scarce participation even in the case of practical, simple and no cost events. These seminars have been also designed in cooperation with producers’ associations to better reach the potential scheme participants. In the sample rural area, many production organizations play a key role in the achievement of many relevant results for rural development and in delivering services and substantial benefits for their farmer members. The representatives of these associations, while conveying on the opportunities and possibilities offered by this stricter cooperation with research centres, have expressed, however, some forms of resistance. Despite good statements in principle, there emerged difficulties in some ethos and operational relations with these organizations: while they widely acknowledged the need for farmer participatory research and training based on closer and more equitable dialogue between farmers, extensionists and researchers, these organizations are likely to lag behind. Causes and sources of the resistance could be found in ossified institutional attitudes, procedures and behaviour which make these organizations rather slow and unwilling to address farmers’ effective concerns and realities.

The problem of “involvement” became a subject of further investigations for its implications in influencing the potential opportunities to develop and strengthen the interactions between research and local agents. A survey was launched, referred

to a rather restricted group of individuals (50 units) composed of farmers, post-graduate students, teachers, local administration staff and rural entrepreneurs, to identify causes and motivations of respondents about the utility of attending seminars and training courses. Short questionnaires and brief interviews were submitted to the participants but, above all, we had frequent informal talks with them to obtain more independent information about these topics. During such talks, when interviewers mostly listen, respondents have the possibility to more easily reveal causes and motivations of their dissatisfaction. Certainly, this approach is likely to be affected by a certain degree of subjectivity but in the identification and organization of causes and factors nourishing this environment of mistrust and resistance (also to create an information base to be used to develop and implement possible solutions) individual and collective prejudices can play a not secondary role compared to the more conventional factors of the issue. Given the very limited dimension of our sample-group of respondents, a statistical approach to the resulting information was not adopted rather using these data to articulate some pragmatic and empirical observations.

These factors, mainly resulting from verbal expressions, have been organized, structured and correlated in the diagram of Figure 1.

**Figure 1. Causes and motivation in the difficulties to implement training schemes**



The main source of farmers' opposition to these training schemes emerging from this survey was essentially caused by a lack of trust which underlies the entire scenario resulting from the diagram in Figure 1. The analysis of the action of this key factor and its role in the creation and evolution of the related trust environment required further investigation which outlined a three level problematic dimension. The **first level** involves the identification and quantification of the role of some *trust-keys* such as previous negative/positive experiences of training course attendees and opinions and visions provided by others (Positive Word of Mouth - PWOM/Negative Word of Mouth - NWOM). Effect and impact of NWOM/PWOM focused major attention: in particular we learn, from marketing research, that NWOM is more influential than a positive one and its spread occurs on a faster time scale than the direct contact, for example, with a seminar. NWOM is more informative than a positive word of mouth, and thus may have a stronger effect, and it may be contagious and spread independently of exposure to the good/service (Herr, Kardes and Kim 1991, Marquis and Filiatrault 2002). If an agent is in contact with an organization and the quality of the training course is equal or higher than the agent's expectations, then the organization's interaction "strength" and trust are enhanced by a PWOM which "percolated" successfully through the network and, empirically, by an increase in the size of the service's adoption cluster (Solomon *et al.* 2000). If the organization fails to meet the user's expectations and standards, not only the agent will tend to ignore the organization's goods/services (i.e. further training events) but the related information will be passed to the agent's neighbours: a sense of "disappointment" will be at the root of NWOM and disappointment casts a "cloud" of NWOM around it. Increase of resistance and mistrust happens instantly, before any further exposures of new agents to the organization's service are considered: if the agent experiences negative relations with an organization, its disappointment is immediately cast upon all its non-adopting neighbours because NWOM propagation requires just one conversation with one friend while a contact with an organization is an unavoidably slower process. To be effective, an organization involved in training and extensions has to continually gain trust among its users both through its capability to meet its obligations (the organization does what it publicly affirms to do) and from the idea of "integrity" perceived by the individuals resulting from the procedures' and operational activities' transparency.

The **second level** involves the role of **reputation** also as the first source of information useful to establish the degree to which similar future options will be made (erosion/consolidation of reputation). For the aim of this study, three types of trust have been identified:

- personal trust – deriving from direct knowledge of a specific person in the organization based on individual reputation and informal norms;

- collective trust – deriving from direct knowledge of a group of individuals in the organization based on staff reputation and shared conventions;
- institutional trust – deriving from direct/indirect knowledge of the organization considered as an anonymous source of information based on definite norms, regulations, roles and procedures.

These forms of trust operate within three interrelated problematic dimensions:

- a macro-level – the global context composed of political, juridical, legal, economic, social and cultural elements;
- an intermediate level – groups and associations, trade unions, etc.;
- a micro-level – personal behaviour and values

These dimensions and forms of trust contribute contemporaneously and dynamically to determining attitudes and behaviours of the economic and institutional agents, individuals, communities and, above all, their potentials in developing local relation networks on the basis of stable information: for instance, in the case of inefficient norms and regulations, personal and collective trust can compensate at a micro or intermediate level a lack of institutional trust or a syndrome of “institutional mistrust” at a macro level.

The **third level** involves the quantification of a perceived trust degree in the area which could be identified as a “low trust level context” when agents perceive, for example, a sense of restriction, a sense of “partiality”, problems of politicization of public affairs, a lack of neutrality by public organizations due to the development of privileged contacts, poor management of public goods: on the contrary, a “high trust level context” should be considered an opposite environment.

Respondents were asked to give “weight” to these trust factors through a scale ranging from 1 (very low) to 10 (very high) and the averaged information collected in the survey has been shown in the diagrams of **Figure 2** and **Figure 3**.

The data obtained from this survey highlighted some critical elements:

- The personnel involved in the organization and implementation of the training schemes was not well known by local community: this condition produced a limited personal and collective trust degree
- The research institution which we are affiliated to (National Research Council of Italy - CNR) was scarcely known or completely unknown to local people: this condition led to a limited institutional trust degree
- Ineffectiveness of previous training activities
- A particularly relevant NWOM due to the limited dimension of the selected rural area
- Local context detains a rather mid-range trust environment with critical peaks for a widespread sense of politicization of public affairs.

Figure 2. Trust keys and their weight (in the average respondents)

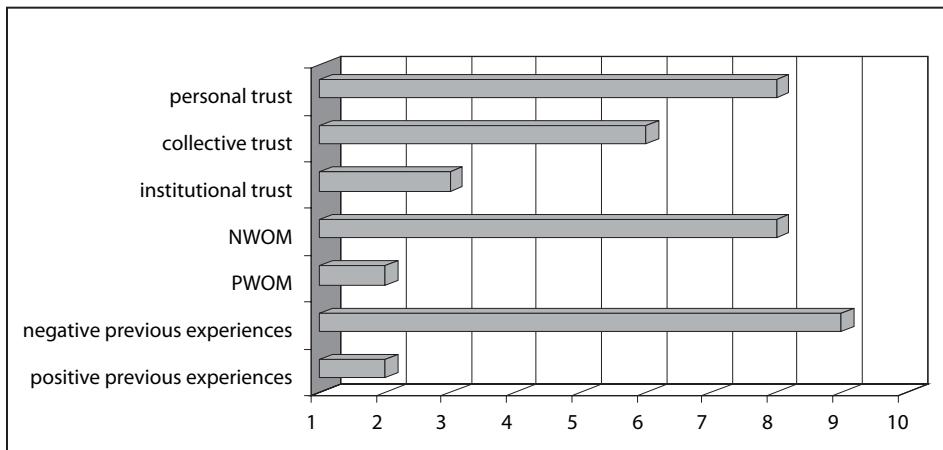
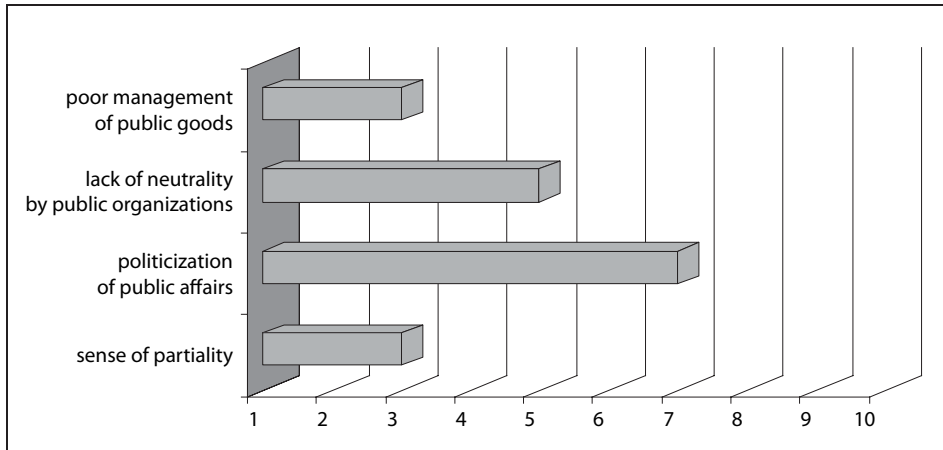


Figure 3. Perceived sense of trust within the context (in the average respondents)

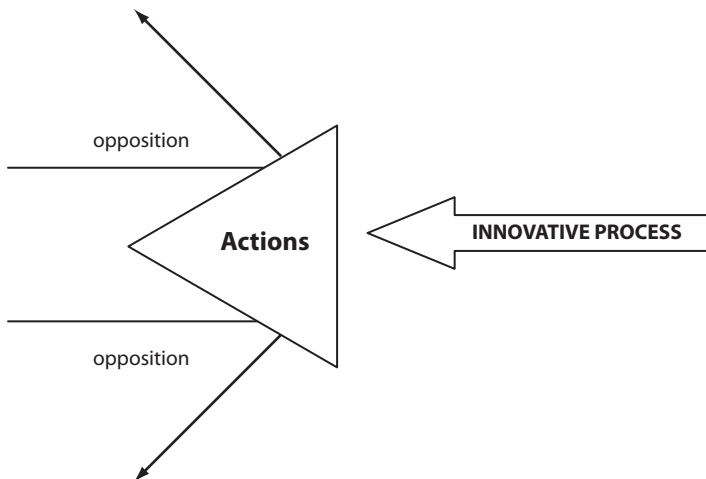


The mixed action of these factors produced that cold response and the related economic/non economic costs reported at the beginning of this experiment: the higher the mistrust levels, the bigger the related costs in terms of time, trust reconstruction and failure margins. In addition, failure costs are multidimensional because mistrust spreads not only within the relations directly involved but it will also contaminate even extremely far relational levels thanks to NWOM.

### 5. Re-gaining trust

In order to gain trust among local farmers, operational approaches and methods adopted have to be critically examined in their potential to determine certain visions and opinions in final service users. The respondents frequently cited that those seminars were affairs for specialists, too focused on new technologies, whose implementation could potentially involve the demolition of consolidated methods and processes. These visions draw an image of a “hammer” approach in innovation introduction (Figure 4) considered not suitable for the local context also for the rather high concentration of elder farmers.

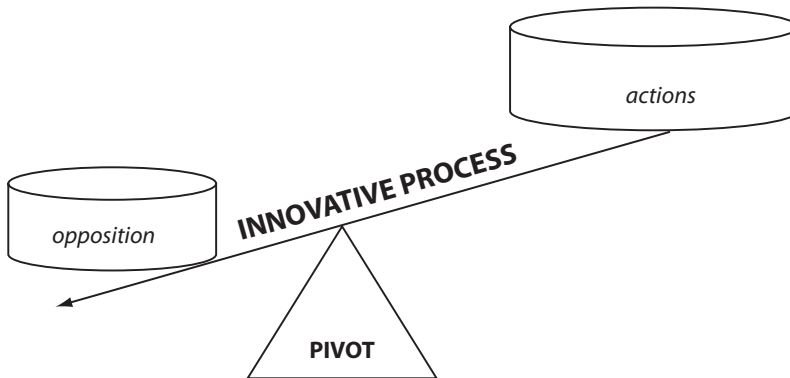
Figure 4. The “hammer” approach in innovation introduction



Thus the survey suggested the opportunity for a different approach mainly based on slow and gradual changes with the involvement of large groups of human capital, improving the existing resources and the conventional know-how. The problem is how to ignite this kind of approach: a possible solution can derive from the identification of some pivotal individuals, with whom more collaborative contacts can be agreed, who show interest in innovation and a will to establish relations with researchers even on the basis of a not well-defined need to realistically inject changes within their firm/farm. These pivots have to be directly engaged in the seminar planning, design and implementation and better informed about the research institutions involved, also to stimulate PWOM processes among less confident farmers (Figure 5). These pivots, even if rarely share the same visions about the same issue, know better the evolving problems of the local context than

“experts” and they also understand what motivates people and, fundamentally, have the power to make solutions work or fail.

Figure 5. A “pivotal” approach to innovation introduction



This strategy, with its higher participatory degree even showing less evident immediate results, seems able to: a) fuel more direct personal commitment and organizers’ motivation; b) identify and interpret nature and levels of resistance and c) consequently redirect training schemes towards innovations linked to small improvements, simple methods easily accessible to a large number of potential users, new practices to be immediately incorporated in commonly shared usual procedures, low cost and highly convincing initiatives. In this way, a training scheme is likely to generate positive impacts satisfying three key criteria in local development:

- Persuasion - modifying perceptions and opinions
- Negotiation – modifying priorities, generating incentives and/or removing disincentives
- Attenuation – making opposition acceptable or not relevant

## **6. The “supply” aspect of the issue: putting knowledge into action**

The solution of mistrust, opposition and resistance to training schemes can concretely contribute to putting knowledge into action directly within a rural area (Hellin and Higman, 2001, Lipsey and Carlaw 2004). *Knowledge* is generally assumed to act as a key-factor both in terms of *explicit knowledge* (direct know-how) and *tacit knowledge* (hidden know-how). The issue poses many critical



questions: the focal problem is not how to generate an increase in knowledge volume through rural training and extension, but rather how to make *knowledge productive*, through the identification of relevant agents and innovation needs, development of operative relation systems among agents, etc. Furthermore, empirical evidence confirms that knowledge, information, training, extension, relevant agents' identification and relation networks creation are not enough to make knowledge productive because putting knowledge into practice is linked to an optimum in quantity and quality of knowledge flows to be funnelled in a rural area. A rural area can suffer in fact a condition of a lack of information which acts as a bottleneck in business and in overall development but uncontrolled, not appropriate or mismanaged knowledge flows can generate opposite conditions or an "information overload" which can confuse and discourage the involved agents and generate new forms of bottlenecks (Franklyn 2003, Fritsch 2003, Hearn, Rooney and Mandeville 2003, Knudson *et al.* 2004).

The experience in this case study highlighted that the presence of experts and scientists to be involved as trainers within these schemes is not sufficient to grant *per se* the success of the initiative because some experts can be more communicative than others: for this reason, it is essential to select and engage trainers among the less academic experts. These considerations are fundamental to replace a commonly shared vision of pouring doses of technical facts and messages towards ignorant/backward farmers (Pretty and Chambers, 1994). This vision emerges when research activities are seen as a separate world without any relevant involvement of entrepreneurs, particularly from SMEs, at any stage of the R&D cycle apart from some evaluations in applied technologies. These are *de facto* the foundations of conventional approaches to technology and innovation transfer which tend to ignore some farmers' valuable experiences, traditional practices and insights contributing to generating gaps between researchers/trainers and entrepreneurs/attendees. A pure technological transfer does not make use of farmers' experience with excessive emphasis in training and extension on solutions to problems only generated by formal research, with scarce or no consideration about the context characteristics and the inner nature of these problems (Pretty 1995, Reardon and Barrett 2000).

This causes training schemes to provide unrealistic or uneconomic extension messages, which fail to take a holistic, farmer-centred perspective. Scientists too often do not consider that their work shares a different concept of "utility" compared to "economics". Innovations are generally aimed at improving production but economic reality does not push them to their logical conclusion and in a technologically perfect way; it submits their implementation to an economic point of view. Best economic and technical combinations not always coincide and the

opposition of an entrepreneur to innovations is not simply due to ignorance or indolence but because sometimes technologically inferior methods can be better adapted to given conditions.

Linking research centres and a rural area through training schemes, as essential tools to put knowledge into concrete action, is not an easy task also because it means that knowledge is thus tested thanks to adaptation processes in which it is discussed, criticized and eventually transformed and potentially improved. Scientists not always welcome this. The possibilities to create these bridges therefore depend on scientists' and researchers' attitudes towards "getting their hands dirty" with local entrepreneurs or how they should spend their time or on a solving problem approach eventually available within research institutions and centres. These considerations open the way to a further problematic dimension. The possibilities to properly select the necessary information to adequately develop efficient and effective knowledge flows are linked to dialogue capabilities and synergies among subjects founded on reciprocal trust. Even in this case, collaborative actions must be convincing: the more trust is enhanced, the easier it is to engage dialogues, the more likely that it will achieve synergies. These dialogues and synergies should always take into consideration the different agents' nature and visions. A too rigid demarcation between research and the outside world and the tendency to treat innovation, knowledge management, rural development and its implication (in agricultural and non-agricultural activities) as purely technical issues to be solved by technical arguments can result in very restricted visions and limited impacts. A better understanding of the social, economic, institutional and organizational linkages and tensions operating within the area could be transmitted to training and innovation adaptation (Scott 2003).

The experience in this case study confirms that poor linkages between research, extension and farmers decrease even the possibility to directly engage farmers at the training scheme implementation stage. Involving farmers in the innovation management and transfer process in these programmes could be seen as a problem by scientists, since it implies risks and complications: yet, excluding farmers from the process may not alter the formal course of the programmes but it unavoidably will undermine their substantial effectiveness. The lack of farmer involvement and understanding rural development processes will severely reduce the impact of introduced initiatives and actions in the rural system and erode the possibility for future activities. These experiences highlighted also that, after considerable efforts to increase participants' number, conventional mode of 'top-down' recommendations, with scarce consideration and awareness of rural areas' real problems and perceptions did not produce any significant result, frequently failed to generate an impact and, on the contrary, contributed to stimulate NWOM (Starbird 2003). Moreover, many elements implemented in farmer participatory approaches should

be extended to other relevant subjects of the system. Important contributions to improve training effectiveness could derive from more involvement of local administrators in the planning of these schemes in order to better meet rural subjects' needs and key constraints. The opportunity to gain a better understanding of farmers' responses to research, the reason for their behaviours and attitudes and possible sources of resistance and opposition should be considered a critical factor for both researchers and public administrators also to improve a rural area potential in the context of globalization, to make appropriate management decisions, even in the case of niche or organic productions, and to identify efficient selling strategies to conventional or innovative channels.

## 7. Conclusions and possible suggestions

Mistrust towards training schemes should be considered as an unavoidable outcome of particularly inappropriate mechanisms in dialoguing with farmers about the management complexities. If research and extension operators too often continue to use scientific terminology and academic approaches with attendees, they fail to create communication links useful to update attitudes and practices. Dissatisfaction, translated into scarce attendance and a consequent poor rate of adoption of innovation developed by scientists, has ignited our questioning about the validity of the approach to training initially adopted forcing us to consider and experiment alternative models with particular attention to participatory methods. **Table 2** lists some of the constraints on effective activation and implementation of knowledge flows and the related training schemes, compiled mainly from the authors' experiences.

**Table 2** Main constraints and effects in training scheme implementation

Effects on farmers, extension and research	Constraint
A) <i>Lack of farmers' confidence in training, extension and innovation</i>	1. Ineffectiveness of local producers' associations
	2. Bureaucracy slowness
	3. Approaches and language considered too academic and theoretical
B) <i>Disengagement of smallholders, poor adoption of innovation and research results</i>	1. Research agenda does not address smallholders' needs
	2. "Lab to Field" approach
	3. Unidirectional flows of information
	4. Judgment of farmers ignored
	5. Overemphasis on technical aspects
	6. No active experimentations with farmers

Effects on farmers, extension and research	Constraint
C) <i>Ineffective communication of useful information, poor attendance and scarce participation</i>	1. Outdated, top-down extension methods
D) <i>Weak impact, low morale</i>	1. Badly financed and managed training schemes
E) <i>Lack of system approach</i>	1. Key socio-economic issues ignored
	2. Farmers' expertise undervalued or ignored

From marketing research we learn that by involving the customer or end-user in the planning, design, testing and evaluation of innovations, the innovations developed have a much higher probability of being purchased by consumers, or adopted (Merrill-Sands and Collion, 1994). The same philosophy seems to be suitable for the training schemes' design as well. A participatory methodology plays a critical role not only to create more robust links between farmers and scientists to produce innovations collimating farmers' local knowledge and scientists' know-how, but also to individuate paths and strategies to stimulate positive knowledge flows within a relation network and critical PWOM useful to support future initiatives and nourish trust. Alternative local rural training approaches require non-academic methodologies and participatory appraisal techniques stimulating group discussions, visualization of processes, joint problem diagnosis and problem-solving. (Hagmann *et al.* 1997). A more participatory approach to training can positively influence also rural development institutions, as a critical tool to concretely improve farmers' and other rural entrepreneurs' role in rural development contributing to new job opportunities in rural areas, to make agriculture more sustainable, to safeguard rural landscapes, to promote local human, economic, environmental and cultural resources, to improve the overall quality of life of local communities. Promoting farmers' participation acts as a prerequisite for success of any training and rural development programme. Critical attention should be paid to the possibility to give farmers and other rural entrepreneurs and agents the opportunity to learn about principles and visions, together with specific techniques.

**Table 3 Suggestions for improving training and farmers' participation**

✓	Actively involve those farmers already used to managing innovation and experimenting research products in training planning and on farm activities
✓	Coordinate the design and implementation of seminars and training schemes with contributions from researchers, extensionists, farmers and local administrators working as a team
✓	Target seminars to farmers' specific context

✓	Support a participatory approach to training
✓	Develop a parallel structure to evaluate impacts and effectiveness
✓	Build inter-institutional partnerships and networking
✓	Create participatory working groups
✓	Create informal spaces for dialogue between agents interested in innovation and research
✓	Disseminate useful information via non-academic channels
✓	Promote stricter links between research, local administrators and entrepreneurs.

The first results obtained so far, increasing farmers' participation and converting particularly negative premises, sketch out some encouraging conclusions even if cases of apparently "inexplicable oppositions" are still reported: there are no evident reasons to contrast innovation, these individuals agree on the benefits of innovation or to attend a seminar but the innovative process cannot start and they keep missing the seminars. Future agenda for investigations is focused on the analysis of this kind of inertia and on a deeper evaluation of the impact of such experiences in terms of not only output (knowledge acquired, changes in farming practice and farm income) but also processes (learning and decision making processes, training and action research methodologies, institutional and policy changes).

In our experience, when involved in training programme design, researchers are too often concentrated on solving specific technical issues, while methods for combining technical and production points of view and very flexible strategies appropriate for a specific rural context are poorly understood and rarely studied. Models are useful tools for analyzing and describing this context and the related scenarios "on paper" dealing with farmers and rural entrepreneurs provide the best ways of testing and refining approaches and strategies in the real world and to motivate these agents towards innovation. Rather than "crude" technical aspects, it is thus essential to focus these training schemes on that wider set of issues and needs which actually constrains innovation diffusion to be considered in any programme aiming at achieving positive impacts.

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