Strategic Communication for Integrated Pest Management

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Abstract

Farmers and consumers in developing countries are too often faced with a serious dilemma: they must either sacrifice a significant share of their crops to pests or use highly toxic pesticides that can harm human health and the environment. If we can help solve this dilemma, we will be making a major contribution for the improvement of food security, eradication of starvation, and alleviating poverty in resource-poor countries throughout the world.

By recognizing the importance of agricultural inputs in food security and the reputation risk associated with the use of very toxic agricultural chemicals, the World Bank and other organizations are supporting integrated pest management (IPM) to ensure good practice in its projects.

IPM succeeded in developing environmentally sound practices, but struggled to communicate the value of information on the risks and benefits of IPM. The slow adoption of IPM is often attributed to the widespread gaps between farmers' knowledge and understanding of the complex and controversial issues surrounding pesticides and IPM.

This paper addresses IPM and risk assessment not only from the economic, environmental and public health perspectives, but also from a communication and consensus-building point of view. Communicating about IPM, pesticides and associated risks hinges on the ability to earn the public's confidence, raise its awareness and understanding and addressing their perceptions.

Risk communication, defined as an interactive process of exchanging information and opinions among individuals, groups and institutions (NRC, 1989), is a challenging task. It provides multiple messages about the nature of risk and other points which express concerns, opinions, or reactions to risk communication or risk management. It therefore implies a deep capacity to listen to different stakeholders in a systematic and scientific way, but also the creativity to develop multifaceted communications programs that can help bridge the gaps between knowledge, behaviors and practices.

Introduction

Historically, the use of pesticides has always been controversial in many societies. Whitford (2002) dates the history of public debate on pesticides back to the 1930s, when the first

[1] This paper is not intended to serve as a comprehensive treatment of Communication for IPM, but rather to encourage discussion on the topic. The views expressed are solely those of the authors and their views and this paper should not be attributed to the World Bank. This paper benefited greatly from valuable input from Marta Moreno Sanches da Gama.

commercial pesticides were used in agriculture. The banning of DDT in the United States in 1971, which was preceded and followed by several contentious discussions, dampened the initial enthusiasm towards pesticides and further intensified debates on the issue. As a result the role of risk communication and consensus building became more prominent. Moreover, as countries move towards IPM, the challenges of communication regarding pesticides are also increasing.

This paper tries to capture some of these challenges and identify the specific role of communication in IPM. It focuses on the main topics related to IPM and communication theory, and then considers the complex innovation systems that make up IPM approach, comparing them to present paradigms of innovation diffusion and those of communication for development. The paper then examines the different axes of strategic communication for sustainable development to demonstrate their relevance to the application of techniques. Bearing in mind the vast dimension of IPM-related concerns (which cut across geography, history, technology, policy and economy), it becomes clear that these issues have a large impact on the use of strategic communication in development projects. Therefore, it is hoped that this paper fosters debate among practitioners in the field of strategic communication for IPM.

IPM and Communication Theory

In order to understand the need for strategic communication (Santucci, 2003) in applying IPM techniques and the likely impact of a communication strategy on the overall process, it is important (Rogers 1983, Roeling 1991) to first analyze the IPM knowledge content and, consequently examine knowledge needs from stakeholders involved in the IPM diffusion. Only then will it be possible to define a strategy in which the different stakeholders can actively participate.

Unfortunately, **IPM cannot be considered one single innovation** because it "*ranges from chemically based systems that involve the targeted and judicious use of synthetic pesticides, to biologically intensive approaches that manage pests primarily or fully through non-chemical means*," (Sorby, Fleisher and Pehu, 2003). **Hence, it does not yet have a well-defined approach.**

It may even comprise innovations that are absolutely conflicting from a philosophical point of view, as are OGM and organic farming, for example. Clearly, this situation would be highly confusing for both farmers (Bradshaw, Parham and Croxford, 1996) and consumers.

In general terms, the most important concept about communication and innovations is the "distance" between what is already known and what is practiced by the target audiences. As a matter of fact, innovations are classified as either continuous, semi-continuous, or discontinuous:

- **Continuous innovations** are those that do not pose a challenge to adopters because they show continuity with what people already know and practice. Furthermore, there is no need to buy new tools or invest money. Clearly, this type of innovation is prepared and adopted more easily than other modifications.

- **Semi-continuous innovations** begin to present difficulties both at the communication and adoption level. People need to learn something, they must partially change some behaviors, a few new skills are required, some new tools may be needed, and some minor investment may also be necessary.

- **Discontinuous innovations** represent a real break with the past and require completely new knowledge, new skills, new technology; often large investments are required and, in some cases, even new markets.

At this point, a question can be raised about which one of the three categories can be classified as an IPM technique.

IPM is a complex and difficult mix of innovations. Although IPM is largely seen as an endogenous innovation, mostly based on local knowledge, it must be clearly stated that such an assumption is superficial. To simplify the concept, we must imagine the two extreme situations where IPM has been (or can be) developed or applied:

- **Farming systems in developed or developing countries with over-simplified production systems**, often based on one single crop (cotton, for instance) or fruit tree (apples or bananas, for example), which have used pesticides and herbicides intensively for the last decades. In this case, farmers or farm workers have lost most of their local knowledge and are used to simply purchasing (or receiving) chemical products, often distributed according to a treatment calendar, without paying attention to the real "pest" presence. The relatively low cost of most chemical products has justified and keeps justifying this behavior.

- **Traditional farming systems in developing countries**, with limited or almost no use of chemical products due to either the "high" costs of external inputs or to their unavailability.

These two scenarios are obviously very different and represent different challenges. Yet, other aspects, such as the ones analyzed below, must also be taken into consideration.

Innovations should be economically sound. It is easy to say that innovations must bring in more income to their adopters, but this apparently simple statement hides several difficulties. Within the farming world, "profit" is not the producer's only goal. In this scenario, the "average net farm income" (= return to all internal factors of production) is what is generally used as their main indicator for decision-making. Consequently, family farmers' behavior, which relies on family members as labor force, is totally different from that of the landlords, who employ external labor for their farms. The key question is whether the IPM will increase the labor required at the farm or not, and who would pay for such change. Another aspect to take into consideration is that the concept of convenience is expressed by comparing the cost of IPM with the cost of chemical control. This opens a debate about the prices and taxation of pesticides, or the current existence of policies promoting or facilitating the diffusion of pesticides and herbicides (Poapongsakorn, Ruhs and Tangjitwisuth, 1998). Add that to the second scenario described above, and this comparison is no longer possible because what matters is the final yield in terms of self-consumption, or the final economic result regarding products for the market.

Innovations should not be risky or they should carry only a very limited amount of risk. The concept of risk itself is again very relative, depending largely on the decision makers' global assets and incomes versus the dimension of the proposed change. The sociology of innovation describes innovators as more inclined to take risks, with good or higher education, high-income and good exposure to information. Smallholders or subsistence farmers cannot risk losing all or a share of their output. Furthermore, taking into account what was written before, producers do not like fluctuations of income, and thus, generally adopt a strategy of risk minimization, to stabilize the net farm income, rather than a profit maximizing strategy, which by definition also implies a maximized risk.

In both cases, in order to convince farmers to introduce IPM techniques, several technical and economic issues must be analyzed: which pests affect the crops, their reproductive cycle, when is

their presence acceptable (very difficult economic concept), what are the consequences of such pests on yields and consequently on prices (which one moves with a reverse trend), costs and benefits of different IPM techniques (scenario analysis, again a very difficult subject). Furthermore, in most cases, the simple alternative "chemical treatments only" versus "integrated pest management" is not the most successful solution. In these cases several other modifications are required, such as new varieties, different cropping mixes, different rotations, the cultivation of insect-repellent plants surrounding the fields, or between rows of productive trees, etc.

If you add to all of the above observations the fact that **farmers are not environment friendly** (with some very small exceptions: organic farmers, for example), you will understand why the relationship between agricultural producers and their environment is one of perennial conflict. Producers tend to dominate the ecosystem, shape the landscape, control streams, eliminate "useless" shrubs and trees and kill as many forms of competitors as they can (weeds, rats, birds, monkeys, etc.). As a matter of fact, environment is a non-value for most agricultural producers and consequently the "environment" as such cannot be used (unfortunately) as a motivation for change.

2. Strategic communication for sustainable diffusion of IPM

Most studies regarding IPM and communication have focused only on two aspects of its relationship with farmers: **1)** communication for the generation of IPM techniques and **2)** communication for speeding up the diffusion of IPM techniques amongst the highest possible number of farmers (Singh, Singh and Kanojia 2002). However, in this paper, we suggest at least three other areas of action regarding communication issues, which should be developed and taken into consideration. We believe that these topics are needed in order to ensure a more generalized diffusion of IPM techniques: **3)** communication regarding IPM in contract farming, **4)** communication for policy design, and **5)** communication for market development.

Furthermore, since IPM techniques are not *per se* a solution to all development problems, but only a step into the right direction (Morse and Buhler 1997), their dissemination must be analyzed within the broader context of capacity building, institutional reforms and market development, which are particularly needed (and difficult) in developing economies.

Finally, it is important to keep in mind that a substantial part of communication in IPM belongs to a wider field of risk communication defined as an interactive process of exchanging information and opinions among individuals, groups, and institutions. While discussing communication in IPM it is imperative to remember that risk communication programs *per se* face several radical challenges. Even in the most advanced countries, for instance, IPM-related stakeholders are quite skeptical about messages on issues of environmental hazards, which are usually supported by contested scientific findings. These elements pose important obstacles to communication programs in IPM techniques, which must be taken into consideration.

2.1. Communication in IPM generation

IPM techniques cannot be proposed as a blanket recommendation (Dilts and Hate, 1996). They cannot be invented in Iowa and be sold in Argentina. IPM is based on a mix of local knowledge and modern scientific approach (Dreves 1996). This requires a location-specific approach, such as the Farmer Field Schools (FFS) promoted in the last decades by FAO. Farmers are involved in data gathering, discussions, analysis, and experimentation of solution. Obviously, this approach requires that field level personnel (extension agents[2]) be properly trained in the subject matter

[2] In this case, the role itself of the extension agent evolves into something that could be defined as "facilitator" or "change agent".

(IPM) and in interactive communication skills (adult participatory education, group handling, etc.). The implementation of IPM techniques requires several years of experiments, trials, repetitions and validations. It is an applied research procedure, which needs time in order to be validated in a given area for each given crop or cropping system. Sometimes, there are also high-tech inputs, some of which may be relatively expensive, like the traps with hormones and other similar devices.

This is a two-way communication situation, based on mutual respect, continuous feedback and common elaboration, where farmers, scientists and technicians share (or communicate to each other) what they think, see, and imagine. It is important to understand the real goals of the farmers (e.g. higher yields, better income, soil protection, fewer risks) and to develop solutions that meet such goals (Orr and Ritchie, 2004).

Such an approach could also lead to organizational and institutional consequences. The development of local knowledge could mean the decentralization of some institutions and their higher level of autonomy, locally, as suggested by Dilts (1999), or might even require a more multidisciplinary approach where the old style and mono-disciplinary structures are forced to restructure. As a matter of fact, Dabrowski (2000) points out the lack of cooperation among research, extension and production, which keep delaying the implementation of IPM techniques in Poland.

In China, Farmer Field Schools have been found to be a very effective approach (Mangan and Mangan, 1998) for achieving higher yields and better pest control in paddy rice, but they are not always successful, thus improvements in the methodology and in the organization are still needed (Feder, Murgai and Quizon, 2003).

2.2. Communication in IPM diffusion

Once a given IPM procedure, or a whole mix of procedures, has been proven to be effective by a small group of farmers, scientists and field-level agents, it then must be communicated to other farmers who live and work in similar agro-ecological situations.

In order to design the most suitable communication strategy, the five-step adoption model proposed by Rogers (1983) is useful:

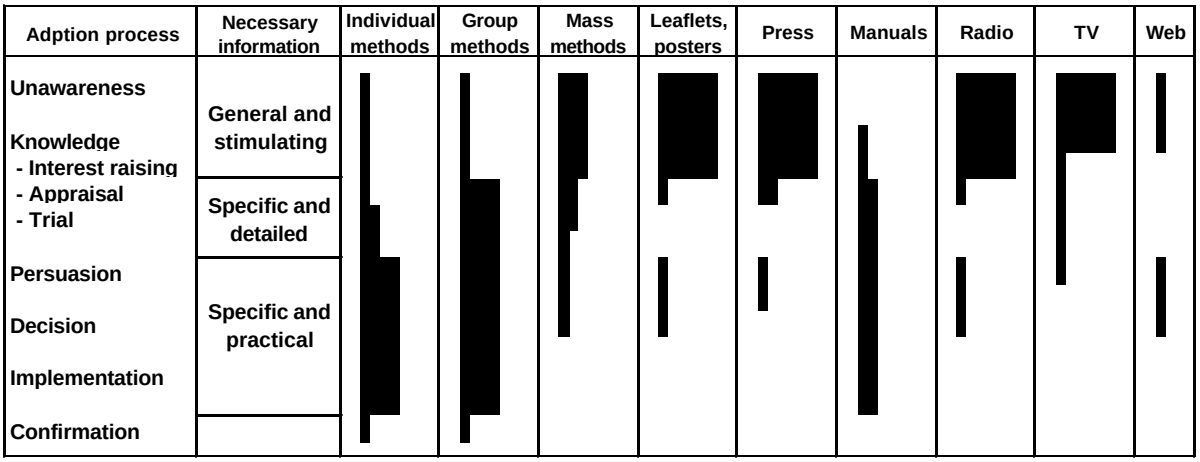
- **Knowledge**: individuals are exposed to innovation and get a first superficial idea that something might change.
- **Persuasion**: more information and experience determine that individuals develop a positive or negative attitude about the innovation itself.
- **Decision**: when individuals decide what to do or not to do. Decision can be not to adopt, or to wait some more time, looking at results obtained by somebody else.
- **Implementation** happens when the people decide to adopt, perhaps on small scale, the innovation. Sometimes the proposed change cannot be implemented as proposed and needs refinements and modifications. It is the so-called "re-invention".
- **Confirmation**: if the results are positive as expected, the innovation is definitively accepted, but the contrary can also happen and the rejection may occur.

At this point, the old paradigm of communication for diffusion could be usefully applied, with all its methods and media, with mass media and mass events to be used to raise awareness, followed by more labor-intensive methods (Santucci, 2003).

Pilot farmers, demonstration fields or whole demonstration farms, demonstration days, study tours, prizes for the best-performing producers, t-shirts, caps, leaflets, handbooks--the entire wealth of communication methods and media--can be used, according to the position of the stakeholders regarding the adoption process and according to the budget and the human resources available. In some of the situations developed, computer-aided models are used, allowing farmers to simulate different technical and economic scenarios (Trumble, 1998).

Since the implementation of an IPM package generally requires a relatively high level of knowledge and very sophisticated skills, it is even more difficult than the diffusion of difficult innovations, when adopters are required to simply buy a pesticide and spray it (sometimes without actually needing to do it). This means that farmers must be trained on several subjects, with short preparation courses and continuous support and guidance.

Figure 1 - Suggested use of methods and media for the diffusion of IPM



Awareness-raising campaigns are useful at the beginning of a project or program, in order to attract the attention of the majority of smallholders, with specific reference to the older and poorer ones, who otherwise could never be informed about the opportunities offered by IPM (Bhuyan, Bordoloi and Singha, 1995).

Mass media can be very effective, as demonstrated by a study about the diffusion of IPM in rice cultivation in the Philippines (supported by 12 programs aired in January – February 1986), with no gender difference (Stuart, 1988). But mass media communication alone is generally not sufficient (i.e., it does not have an effect on farmers' behavior), whereas a more labor-intensive communication strategy based on a group approach (meetings, workshops, demonstrations, etc.), is normally advisable to convince at least the early adopters, who will be followed by the majority in due time.

Well-trained agricultural extension workers, applying collaborative partnership and a group approach, have been quite successful in Thailand (Elsie and Sirichoti, 2001) where the Rogers

theory of diffusion[3] has been applied for introducing IPM techniques among durian fruit producers. By comparison, under-investment in applied research and inadequate extension activities are largely to be blamed for the insignificant diffusion of IMP techniques in Africa (Orr, 2003).

In Texas, a survey conducted in 1990 (Thomas, Ladewig and McIntosh, 1990) found that cotton producers could rely on several sources of information for different aspects of IPM. This situation favored the adoption of three IPM practices, leading to higher yields.

2.3. Communication about IPM in contract farming

In some cases, particularly with contract farming, the implementation of IPM is not fully left in the hands of individual farmers, but it remains totally or partially in the hands of specialized field personnel (employed by the government, or by a cooperative, or by the trader who will purchase the output), who have a good level of education in IPM, dispose of several "stations" scattered all over their area, with traps and meteorological devices.

Once these personnel (or their back-up services) establish that it is time to implement a given measure, such as to release an insect predator or to hang traps with hormones, they spread the message, as quickly as possible, to all interested producers who belong to their network. Clearly, such a situation again falls within the old communication paradigm, a behavior that is diffused with a very top-down approach. Telephones, farm visits, radios and E-mail are used to communicate what to do as quickly as possible to all interested farmers.

2.4. Communication for policy design and implementation

In order to have a real diffusion of IPM techniques, not limited to single projects or to the willingness of a few motivated farmers and scientists, the most important area of action for communication for development is very likely at national or sub-national political level. This includes elaborating coherent legislation with measures favoring IPM and eliminating any

[3] The innovation diffusion model divides individuals into four categories, with respect to the moment they decide to adapt an innovation: the **innovators** include a very tiny minority of people (about 2-3 percent of the population), who by education, economic situation and personal psychological attitude are not averse to risk. They like to try new things and do not fear failure, or their economic situation is such that they can even risk a partial loss of income. The innovators normally are even more advanced than the average local advisors or change agents. They introduce innovations into their farms, households, or lifestyles, even before the institutions begin to consider such changes. The communication behavior of the innovators is quite open: they travel extensively, have direct relationships with other innovators, read foreign journals, and participate in fairs and exhibits. Because of their status and their behavior, they are a bit insulated from the local community; they tend to have few social relationships and most other people think they are extravagant. The **early adopters** have more or less the same characteristics: good education, good economic status, but fear the risk of failure a bit more than the innovators. They represent about 10-15 percent of the population and look at the innovators, but also want to have the support of some local advisors. They think twice before experimenting with an innovation, but are open to change. They have good relationship with most other people living in the area, or working in the same sector. To some extent, they could be considered informal leaders because they enjoy the respect of their peers and their behavior is taken as example by the majority. The **majority**, by definition, includes almost all people concerned with the proposed change. They generally make up about two-thirds of the population and by comparison are more averse to risk than early adopters. They have a lower level of education, they read less than the previous categories or participate less in meetings, wait to see the results achieved by others to be assured that almost no risk is linked with the proposed change, and slowly adopt the new behavior. The **laggards** are again a small minority of individuals, generally with limited or no formal education, small income and few resources, sometimes old, scarcely informed or totally uninformed, and economically marginal. They fear change and have almost given up any hope in the future. This group has contacts almost only with people of the same group and even refuse to expose themselves to new ideas.

conflicting measures supporting hard conventional agriculture (Larguier, 1997; Nicholls and Altieri, 1997; Williamson, 2003).

"*Establishing a policy provides a focus for agreeing social goals, or agreeing suitable compensation for groups with alternative goals to those of the dominant group*" (Ramirez and Mumford, 1995, p. 565).

Political support is needed for several purposes: to have budget for applied research on IPM techniques; for subject-matter specialists and field-level advisors; and for the farmers willing to try, or simply to have the normative framework that will allow the producers to get a premium price in the market (certification).

Political support could also be needed to introduce measures limiting the use of pesticides and herbicides or to make them less attractive (taxes, time limitations, licenses, etc.).

In this case, a proper communication audit (Calabrese, Grenna and Santucci, 2003) should be developed to define all stakeholders (for and against the diffusion of IPM) within the public sector, the private sector and civil society, and to determine the best way to achieve a political agreement about the necessary legislation. Consequently, there will likely be all the communication activities needed to achieve the production of the legislative framework: study groups, workshops, seminars, consultations, study tours within the country and abroad, and articles in the print and electronic media.

Clearly, since the introduction of IPM techniques very often collides with the supporters of hard technologies--and there will be lobbies resisting this change--there will be debates and opposing information that must be foreseen and neutralized with data about the positive environmental and socio-economic impact of IPM techniques.

2.5. Communication for market development of IPM products

This is probably the most important area of action, at least in countries with higher purchasing power. Since the best motivation for producers remains the market,[4] one more area for strategic communication is to convince consumers, or at least a portion of them, that the products coming from IPM processes are good or even better than those from conventional farming, and that such products deserve a premium price.

On one side, this means information and education for doctors and opinion leaders, for traders and journalists, with all usual communication methods (meetings, conferences, seminars, etc.) and media in order to stimulate the domestic consumers' demand for such products, although the main obstacle remains in clearly defining, in a non-technical manner, what "IPM" really means (Anderson *et al.*, 1996). Another major obstacle is the resistance of the agricultural establishment (policy makers, unions, scientists, food companies, food distributors) to a market differentiation that implicitly assumes that all other products could have residues, or could be harmful to nature, or dangerous for human health.

On the other side, it means helping the producers to organize themselves to better market their output, even in foreign markets (Hillocks, 2002) with proper packaging, labeling and with appropriate marketing channels, etc. This is the communication component of a marketing

[4] Although a limited number of farmers could be motivated by philosophical, religious, ethical, environmental and health-related motivations, the most important driving force remains the perspective of economic benefits (Vartdal and Loes, 1994).

strategy, but it is again a communication for development situation where the action for empowering the producers is very much labor intensive, based on a group approach, where people have to elaborate their own strategy to achieve the best results.

3. Conclusions

The diffusion of IPM techniques, either within the paradigm of conventional agriculture, or within that of organic farming, requires a holistic approach, which should consider not only the technical and ecological aspects, but also the much broader socio-economic ones. IPM techniques might have very difficult and complex contents and they might require new knowledge and new skills.

Wide-spread adoption of IPM relies on several institutional, technical, economic and socio-psychological factors, such as a favorable policy framework, awareness raising with mass media, situation analysis, confidence building, common perception of problems by researchers and farmers, interactive extension, group approach, motivation for both farmers and field advisors, and practical education of advisors (Schmidt, Stiefel and Huerlimann, 1977).

Consequently, a strategic communication approach that includes all five areas as described in this paper and summarized in Table 1 could greatly enhance the likelihood of faster elaboration of new IPM methodologies and their sustainable, market-oriented diffusion in developed and developing countries alike.

Table 1 - Synoptic view of various aspects of strategic communication for and about IPM

Where the action begins	Source of information	Contents	Stakeholders	Methods or media
1. IPM Generation				
Scientists, progressive farmers, development agency	All three categories	Biology, agronomy, entomology, farm management	Scientists, advisors and selected farmers	Very intensive and participatory approach, based on group methods: meetings, workshops, study tours, demonstrations, etc.
2. IPM Diffusion to other farmers				
It could be the MoA, or a development agency, or a CSO, or a trader	IPM research	as above	Advisors and all farmers	Both participatory and top-down approaches, using all methods and media, according to difficulty of technical contents, media availability, number and typology of stakeholders, budget availlable.
3. Communication about IPM in contract farming				
The buyer of output	IPM research	as above, with lower intensity	Advisors and farmers with production contract	Generally a top down approach, with meetings for general introduction to basic knowledge about IPM
4. Communication for policy elaboration				
The interested party: it could be the MoA, or the MoE, or a CSO	IPM research, medical research,market research	as above, but with less technicalities, plus information about environment, nutrition and health	The Government and the Parliament. Several Ministries, Civil Society Organizations, Traders of inputs, Agricultural Research Institutions	Both participatory and top-down approaches, using all methods and media, according to difficulty of technical contents, media availability, number and typology of stakeholders, budget availlable.
5. Communication for market development				
The MoA or the interested party, very often an interested trader	as above	as above	CSOs, opinion makers, consumers	Mostly top down approach, based on a continuous flow of information, through events and mass media.
Development agency	market research	organization of producers associations or cooperatives	interested groups of farmers	Very participatory, with meetings, study tour, training, continuous advice

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