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**Linkages Discussion Paper
No. 5e**

**Informal Linkage Mechanisms
and Technology Transfer:
The PACO Project
in Côte d'Ivoire**

by

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ISNAR

International Service for National Agricultural Research

INTRODUCTION TO THE ISNAR STUDY ON THE LINKS BETWEEN AGRICULTURAL RESEARCH AND TECHNOLOGY TRANSFER IN DEVELOPING COUNTRIES

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Study Leader

In 1987, the International Service for National Agricultural Research (ISNAR) initiated a major international comparative study on the links between agricultural research and technology transfer in developing countries. Like other ISNAR studies, this study was developed in response to requests from agricultural research managers for advice in this area. It is being carried out with the support of the Governments of Italy and the Federal Republic of Germany and the Rockefeller Foundation.

The objective of the study is to identify ways to strengthen the links between agricultural research and technology transfer systems in order to improve the following:

- (a) the relevance of research efforts through a better flow of information about farmers' needs for the research systems;
- (b) the transfer of technology to agricultural producers and other users of agricultural technologies.

Why the Study Was Initiated

Many sources have noted the problem of poor links between research and technology transfer in developing countries:

"Bridging the gap between research and extension is the most serious institutional problem in developing an effective research and extension system" (World Bank 1985).

"Weak linkages between the research and extension functions were identified as constraints to using the research in 16 (out of 20) of the projects evaluated" (United States Agency for International Development 1982).

"All the 12 countries (in which research projects were evaluated) had difficulties of communication between research institutions and extension agencies" (Food and Agriculture Organization 1984).

The serious consequences of this problem are effectively summed up by a leading expert in the field, Monteze Snyder: "The poor interorganizational relations between the extension agency and the research organization almost guarantee that research results will not reach farmers, and if they do, farmers will not be able to use them" (*A Framework for the Analysis of Agricultural Research Organization and Extension Linkages in West Africa*. PhD dissertation, George Washington University, 1986).

Despite this situation, no major international study has been dedicated specifically to this issue. While there are some good evaluation reports and academic studies in individual countries, much of what has been written on the issue has been general or anecdotal. The results of practical attempts made to improve links have been disappointing.

A systematic study is needed to provide a set of simple, but not simplistic, suggestions on how research-technology transfer links can be improved in different situations.

Operational Strategy and Products

The study is being conducted over a four-year period and has been divided into three stages. The first stage consists of a literature review, the development of a conceptual framework and case study guidelines, the production of 'theme papers' (see page iii), and pilot case study activities

in Colombia. The second stage involves carrying out case studies in six additional countries—Costa Rica, Côte d'Ivoire, the Dominican Republic, Nigeria, the Philippines and Tanzania. In each of these countries the studies will concentrate on specific subsets of the national research and

technology transfer systems. They will also document the links which were involved in the generation and transfer of a small number of specific new agricultural technologies. In the third stage, the various materials which have been developed will be synthesized into one set of concrete applicable guidelines.

Ultimately, four types of documents will be published as part of this special series of papers on research-technology transfer links:

1. *Theme papers* on key linkage-related topics. These have been written by specially commissioned international experts in the field
2. *Discussion papers* which analyze one or a few major issues emanating from the case studies. About 15 such papers are expected to be produced, written by the case study researchers. They will focus on the most outstanding features of the links observed in the cases

and draw clear conclusions about them for practical use by managers.

3. *Synthesis papers* which present the lessons emerging from the case studies. These are being written by ISNAR staff, together with selected study group members.
4. *Guidelines* on how to design and manage the links between agricultural research and technology transfer for policy makers and managers concerned with the two activities. These will also be written by ISNAR staff, with input from the case study researchers, managers of national systems, and others.

The theme papers were published in 1989 and most of the discussion papers will be published in 1990. The synthesis papers and guidelines will probably be published in early 1991. Copies of these papers will be available from ISNAR upon request, at the discretion of ISNAR.

**LIST OF THEME PAPERS
IN THE SPECIAL ISNAR LINKAGE SERIES
(published in 1989)**

**A Conceptual Framework for Studying the Links between
Agricultural Research and Technology Transfer in
Developing Countries**

D. Kaimowitz, M. Snyder and P. Engel

**The Agricultural Research-Technology Transfer Interface:
A Knowledge Systems Perspective**

N. Röling

**Private Sector Agricultural Research and Technology
Transfer Links in Developing Countries**

C. Pray and R. Echeverría

**The Political Economy of the Development and Transfer of
Agricultural Technologies**

H. Sims and D. Leoncrod

**The Implications of On-Farm Client-Oriented Research for
the Relationships between Research and Extension**

P. Ewell

**Intergroup Relationships in Institutional Agricultural
Technology Systems**

P. Bennell

**The Effect of Changes in State Policy and Organization on
Agricultural Research and Extension Links: A Latin
American Perspective**

R. Martínez Nogueira

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Informal Linkage Mechanisms and Technology Transfer: The PACO Project in Côte d'Ivoire

Summary

The experience of the Projet Agricole du Centre-Ouest (PACO) in Côte d'Ivoire shows that informal, personal relationships between the staff of different institutes can be vital for technology transfer. By building a sense of task interdependence and a commitment to shared goals, such relationships can

help solve problems not addressed through formal linkage mechanisms. However, their contribution is limited by their short duration, and to situations in which the technology to be transferred is relatively simple. Informal links can thus complement, but not substitute for, formal ones.

INTRODUCTION

For decades there has been debate on the type of links needed between research and development and the mechanisms required for efficient technology transfer. African countries have witnessed many shifts from one kind of link or mechanism to another.

In discussing links, the literature tends to emphasize formal relationships, ignoring the importance of informal ones. Farming systems research, as a way of linking research with its clients, has recently been in fashion in most countries. In West Africa, there is a trend towards greater institutionalization of on-farm research and, therefore, towards more formal linkage mechanisms.

Yet informal relations can be efficient in transferring technology under certain circumstances. This was demonstrated by the experience of the PACO project in Côte d'Ivoire. The object of this paper is to describe and analyze this experience.

The paper has four sections: the first gives the background to the PACO experience; the second analyzes the record in technology transfer over three different periods; the third discusses the reasons for success during the second period, the conditions under which informal relationships can be effective, and the limitations of informal relations; and the fourth section draws a few conclusions.

BACKGROUND

The project is located in central-west Côte d'Ivoire. The region is characterized by fairly uniform physical and agroclimatic conditions, but there is some cultural and ethnic diversity, resulting from a heavy influx of people from northern Côte d'Ivoire and from Sahelian countries. These people traditionally grew cereals, while those indigenous to the project area grow mainly upland rice. The majority of farmers grow cash crops — coffee and cocoa — on units varying in size from less than 1 hectare to some tens of hectares, the average plot size being about 7 ha. Immigrants grow their crops only in lowland and irrigated fields, as they have difficulty in obtaining upland fields.

Both the indigenous inhabitants and the immigrants attach considerable importance to their coffee and cocoa crops, which grow well with upland rice, maize, plantain, cassava, yam and cocoyam — their staple foods.

Land shortage is not yet a major constraint to production. However, it may soon become one, because of high immigration and the current land management practices, based on slash-and-burn cultivation with intervening fallow periods. In an attempt to find solutions, the government has made stabilizing the cropping system a major priority for the region. This is now the main focus of the research and development projects operating there.

Apart from PACO itself, the main parties which have been involved on the development side at different periods are the Société d'Assistance Technique pour la Modernisation de l'Agriculture en Côte d'Ivoire (SATMACI), and the Office des Semences et Plantes (OSP). The Institut des

Savanes (IDESSA) has been the main research institution concerned.

Established in 1978, IDESSA took over the research functions of the Institut de Recherche en Agriculture Tropicale (IRAT) in 1982. This French institute had a mandate to increase food crop production, in particular cereals, through plant breeding, improved cultural practices and crop protection. On the basis of IRAT's previous research, IDESSA has developed several improved varieties of rice and maize. These varieties have been bred mainly in response to requests from development projects for material suited to the savannah region which, until recently, has been IDESSA's main area of focus. IDESSA varieties are tested at the institute's main station at Bouaké and at three regional stations at Ferkéssédougou in the north, Man in the west and Gagnoa in the centre-west.

In the early 1980s, Côte d'Ivoire opted in favor of integrated regional development projects. Four projects were considered, including one for the centre-west region. Because of poor economic conditions, only two of them were actually started, namely those for the centre-west (PACO) and for the north-eastern regions. Project implementation was entrusted to the regional development bodies already operating in each region, namely SATMACI in the centre-west and the Compagnie Ivoirienne pour le Développement des Textiles (CIDT) in the north-east. In both cases, the regional director for agricultural development was appointed project leader. Their relationship with their respective head offices remained unchanged, but they benefited from increased resources.

THE EXPERIENCE

First Period: Formal Links Prove Insufficient

The IDESSA-SATMACI period began in 1978/79 and lasted until 1982, the year in which the PACO project was launched. SATMACI requested assistance from IDESSA in developing food crops, in particular rice and maize, in the centre-west region of the country. IDESSA accepted responsibility for testing new varieties and improving cultural practices, particularly intercropping, in on-farm trials. A Memorandum of Agreement was signed by the two organizations.

IDESSA had developed a rice or maize/perennial crops intercropping system some years earlier. A number of its

rice and maize varieties had been successfully tested for use in this intercropping system at the Gagnoa experiment station, located in the central part of the project area. Among them were the CJB maize variety, and the Bouaké 189 rice varieties. These varieties were now tested on-farm.

All attempts which were made to extend varieties to farmers in the centre-west region failed. The few on-farm trials conducted by IDESSA scientists (two agronomists), in collaboration with staff from SATMACI, were the only activity.

Second Period: Technology Transfer Occurs

The second period began in 1982, when PACO was established, and lasted until 1985. PACO, staffed largely by SATMACI employees, had more resources than SATMACI. It inherited the latter's mandate to ensure sustainable crop production and raise the income of rural populations.

PACO had a combined research and development (R&D) unit managed by an expatriate agronomist. The unit posted extension workers and enumerators to a number of villages. Their task was to assist the unit's scientists and other senior staff in conducting on-farm trials and demonstrations.

Meanwhile, IDESSA was intensifying its on-farm activities. An expatriate agronomist was put in charge of the

research program. The institute was under pressure to show some tangible results to its donors.

Following in SATMACI's footsteps, PACO signed a Memorandum of Agreement with IDESSA for the continuation of trials and demonstrations in the project area. PACO agreed to changes in the memorandum which committed it to contributing to IDESSA's operating costs.

Several rice varieties, including Bouaké 189, and one maize variety, CJB, were widely adopted during this period. Adoption rates would have been still higher if OSP, the seed multiplication service, had fully taken part in the technology transfer process. CJB and Bouaké 189 were among those varieties which had not been extended to farmers during the first period.

Third Period: Personal Contact Ceases

The expatriate supervisor of on-farm trials is still at IDESSA. However, the expatriate who headed PACO's R&D unit left the project in 1985. He was replaced by a national *ingénieur agronome*, who now maintains only formal relations with IDESSA. No new technology has been transferred, despite adequate formal relations — that is, the Memorandum of Agreement and the joint trials in rural areas, both of which continue.

PACO wishes to replace the CJB maize variety with another variety because of difficulties in maintaining

varietal purity. Over the past 3 years, IDESSA has been attempting to introduce new rice varieties suitable for upland, irrigated and flooded conditions. Research is carried out every year in the project area. However, it appears that PACO's R&D unit lacks the energy and enthusiasm which characterized it during the second period.

This puts the clock back to before 1982. Although formal mechanisms for integration are still in place, the informal links that made them work have been severed.

DISCUSSION

Reasons for Success during the Second Period

The difference in performance between the first and second periods is not due to structural changes in the two organizations concerned. IDESSA's Département des Cultures Vivrières had exactly the same staff as its predecessor, IRAT. The research program and its management remained unchanged. Again, with the exception of a few support staff, PACO's directors and employees were from SATMACI. An R&D unit had already existed at SATMACI, although under a different and less explicit name. The operational procedures, mandate and priorities of the two units were identical, although external pressures became stronger once the project started.

The increased technical and financial autonomy and additional financial support enjoyed by PACO was the only major change that occurred between the first and second periods. Other minor differences between the former regional office of SATMACI and the project lay in the evaluation process that the latter was to undergo in its final stage, and the fact that project activities were monitored more closely.

Increased technical and financial autonomy, additional financial resources, greater external pressures and closer monitoring of activities also characterized the third period.

Yet no technology was successfully transferred during this period. Therefore, the success of the second period did not reside in structural changes.

Nor can failure during the third period be explained by the cycle of technology development, or in other words by a lack of suitably adapted new crop varieties. Real constraints still needed to be addressed in the project region, particularly with respect to upland rice and maize. Some of the new crop varieties that could have been used to tackle these constraints were adopted in other areas, especially in the north. These varieties have the same wide adaptability and palatability which characterized the technologies adopted during the second period. They were even tested in the project region during the third period, yet were not transferred there.

The only significant difference between the second and third periods lies in the informal links that existed between the heads of the two programs, and between extension workers and farmers. These informal links made coordination between the two institutions a reality. The absence of such links during the first and third periods meant that the two institutes merely co-existed, rather than working together, in spite of formal agreements governing their relationship.

During the second period, the head of PACO's R&D unit provided a detailed description of his technical requirements to his counterpart in the research institute through informal channels. The latter responded, again informally, with IDESSA varieties, which were then jointly evaluated and tested on farmer's fields. These efforts were never mentioned in any report or discussed at meetings of the two institutions' directors or of their scientific committees. Indeed, the director of IDESSA learned of the success of some of the technologies developed by his institute only some 2 years later. Some of IDESSA's plant breeders are still unaware of their varieties' performance in the PACO region.

Personal contacts between the R&D head and the researcher led them to go beyond their formal responsibilities during the second period. The formal responsibility of the head of R&D was to inform the research institute of the development constraints identified by his supervisors at PACO; that of the researcher was to select appropriate technologies in consultation with other IDESSA scientists, and to conduct trials. In other words, their responsibilities were to put into effect the Memorandum of Agreement binding the two institutions — and indeed they did just that during the first and third periods.

During the second period, however, they overstepped the memorandum when, at PACO's request, IDESSA started producing seeds for farmers although seed production was not its mandate but rather that of OSP. The memorandum

makes no mention of IDESSA producing seeds. The two friends considered IDESSA's involvement only when they realized that seed availability was a major constraint to the adoption of the new technology. Their decision that IDESSA would produce seeds was made informally and was not part of any agreement signed by the two institutions. Personal relationships solved a problem that the formal arrangements simply did not cover.

Again because of these informal links, on-farm trials in the project area continued despite PACO's non-payment of bills submitted by IDESSA in accordance with changes to the memorandum. Officially, the memorandum was rendered null and void by PACO's failure to meet its financial commitments.

Both individuals acted as if, quite apart from the memorandum, they were bound together by some kind of pact, as if they had set themselves a common goal or considered their missions as interdependent.

Contacts between the two individuals were probably made easier by their similar training and experience. Both of them had been trained as agronomists; both could have worked either in research or in development. The head of PACO's R&D unit had had some experience as a researcher and saw himself more as a researcher than as an extensionist; the IDESSA researcher had had a lot of experience in on-farm research, which helped him to better understand farmers' needs. The two agronomists' similar training and practical experience certainly contributed to their sense of interdependence and their consensus over goals and domains. Such conditions did not prevail during the first and third periods.

Informal links between farmers and extension workers also played a role in the transfer of technology during the second period. The transfer process did not follow the conventional pattern of trials, demonstrations, release and adoption. Instead, the testing stage was immediately followed by adoption. Release took place only at the request of farmers, after the technology had already been quite widely adopted. It was precisely because of this reversed pattern that IDESSA had to produce and multiply seeds on behalf of OSP.

Some farmers, especially immigrant ones, maintained personal relationships with PACO staff. Through these relationships they not only heard about the development of new technologies but also received preferential treatment when agricultural inputs were distributed. PACO employees also derived various benefits from these relationships. For example, they were able to take immediate action to distribute seeds on a limited scale as soon as they heard that some farmers had successfully tested them, instead of waiting for formal instruction to this effect from PACO.

Interestingly, the PACO extension workers who distributed the seeds were not those involved in the adaptive trials. They received the seeds from other extension workers or from the farmers who had taken part in the trials. In addition, farmers occasionally gave small quantities of seeds to their relatives or friends. At one point it was estimated that less than a third of the farmers using IDESSA technologies had obtained them directly from the

project. Whenever seeds were not available, farmers brought pressure to bear on extension workers, who would pass on their complaints to PACO's management. In turn, PACO would formally notify OSP. PACO had no way, either formal or informal, of influencing decision-making at OSP. Each time OSP was unable to meet requirements, PACO would unofficially turn to IDESSA for help in overcoming the constraint.

Conditions Determining the Effectiveness of Informal Links

Informal relations proved effective because the following four conditions were met: (1) there was both institutional and personal consensus over a common objective; (2) responsibilities were perceived more broadly than they were officially stated; (3) operations were decentralized; and (4) strong institutional flexibility prevailed.

SATMACI and IDESSA had recognized their common objective and signed a Memorandum of Agreement as early as 1978. They had been prompted to do so by external pressures from the government and from donors. OSP had not faced the same problem and had therefore remained aloof from these formal arrangements.

However, as we have seen, formal institutional agreements did not suffice. Personal agreements between staff were also required. These resulted in a broader interpretation of roles: the staff concerned no longer saw their mission as

being to implement the memorandum but rather to transfer technologies. Once the mission was seen in this way, the field of activity had to be broadened to encompass a vital missing task. The decentralized nature of both PACO and IDESSA enabled this to take place: in a centralized system, the decision would have been referred to people more senior in the hierarchy. Finally, institutional flexibility allowed IDESSA's staff to find the time to produce seeds although this was not part of their official duties.

The strong recognition of their interdependence led the two friends to merge the mandates of their separate institutes, stepping beyond the narrow limits prescribed by formal agreements. The extension workers too felt they were accomplishing a broader mission than that defined in formal documents: they felt that they *had* to help the farmers obtain new technologies, no matter what the official procedures should have been.

Limitations of Informal Links

Informal relations may sometimes be very effective, but they also have their limitations.

The first limitation concerns the kind of technology which is being transferred. We are dealing in this instance with a simple technology — new crop varieties — that can be multiplied and distributed to farmers relatively easily. Farmers were familiar with this type of technology, and extension agents therefore did not have to provide much assistance or new information. If more complex technologies had been involved — even if the new varieties had been hybrids — informal production and distribution would not have been possible. For example, informal transfer would certainly not have taken place had it implied the major involvement of extension workers in setting up demonstrations in farmers' fields.

The second limitation also concerns the technology, which must be highly relevant if it is to be transferred informally. The varieties transferred were in popular demand because of their palatability and wide adaptability. They were especially useful to farmers facing land shortages. The CJB maize variety generated income for farmers who had had to cut back their coffee plants.

Finally, the major limitation of informal links as a mechanism for technology transfer lies in their short duration. Informal links rely on people. The removal of just one person from the chain may have the effect of disrupting the whole linkage process, as there is no guarantee that that person's successor will play the same role. In the PACO case, the chain broke with the departure of the R&D unit head.

CONCLUSIONS

Formal relations are not always enough to ensure effective links between research and development. Effectiveness depends not only on structural interdependence (collaborative projects) but also on goal consensus. If informal relations are fostered simultaneously at both decision-making and operational levels, they will create consensus and activate the formal links defined through such mechanisms as memoranda of agreement. The development of informal relations should therefore be encouraged by supervisors, who should not look upon them with suspicion, as is so often the case in African institutions.

The interdependence of those involved in research and development must be recognized. This recognition would bring about a marked improvement in the performance of national systems. It could be encouraged by offering

similar training to researchers and technology transfer workers and helping them to better understand each other's roles.

Operational decentralization increases the potential for effective informal relations. The concentration of decision making in the hands of a few senior managers results in delayed decisions and reduced flexibility. It hinders the establishment of informal relations at lower levels and prevents field staff from developing a broader understanding of their role. It thereby reduces the degree to which the institute fulfils its mandate.

Finally, high staff turnover prevents the development of informal relations, further mitigating against the fulfilment of the institutional mandate.

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