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IN

SOUTHERN AFRICA

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RECENT EFFORTS FOR AN IMPROVEMENT OF THE TRANSFER OF AGRICULTURAL TECHNOLOGY IN AFRICA

P von Blanckenburg

INTRODUCTION

The awareness of the central function of innovation processes in agriculture has grown everywhere in the world. Within the group of developing countries, African governments have started relatively late to draw conclusions from the insight that, without dynamic technological and economic restructuring, the problems of agricultural development cannot be solved. One of the major problems of agricultural development in Africa is that the small-farm sector has responded much less to the supply of new technology than the medium and large-scale subsectors. This is noticeable also in comparison to most Asian agricultural systems where small farmers have reacted more positively to new technological opportunities. Some of the reasons for this phenomenon are to be found in the land tenure system, in the structure of the rural societies and in the educational system. Another factor is certainly that efforts to improve the agricultural innovation system have started late and were, at least in the first phases, not strong enough.

Major corrections have been made recently, at least in the larger African countries. National agricultural research has been strengthened substantially and has received increasing support from the international agricultural research system. The resulting slowly increasing supply of new technologies has favoured much less the small and ecologically underprivileged farmers than farmers working under more favourable ecological and economic conditions. There are, indeed, tremendous difficulties in generating innovative knowledge specifically suitable for these groups.

The extension systems have contributed to the improvement of the innovation systems. The number of extension personnel has been increased considerably for the majority of African extension services (Von Blanckenburg, 1984:23). According to a recent study by the FAO (1989a:3) a surprisingly high proportion of extension organizations have been established or reorganized in the seventies and eighties (worldwide 53% of 169 organizations observed). The FAO sees a renewed interest in agricultural extension in many countries. This is not fully reflected, however, in the spending on extension. Measured as a percentage of Ministry of Agriculture expenditures, the extension expenditure in 15 African countries has decreased between 1980 and 1988 from 25,6 to 16,6%. The latter proportion is, however, still much higher than in the other developing regions (FAO, 1989a:30).

THE CONCEPT OF AN AGRICULTURAL KNOWLEDGE SYSTEM

In the following sections I shall concentrate on one of the many elements crucial for improving the effectiveness of the innovation system: the flow of information and the organizational links between the members of the agricultural innovation system. The most appropriate concept for such an analysis is that of the agricultural knowledge system, as proposed by Nagel (1980). This consists of three subsystems as shown in Figure 1:

- Knowledge generation
- Knowledge dissemination
- Knowledge use.

The knowledge generation subsystem consists mainly of agricultural research. It must, however, not be overlooked that new knowledge is generated also by others such as farmers and other practitioners (cf. the "multiple source model" of Biggs, 1988:8 ff). The second subsystem is that of knowledge dissemination, whose tasks are mainly taken care of by the extension organization. Knowledge is spread, moreover, by other institutions: staff of other rural development agencies, salesmen of agro-industries, formal training institutions and, not the least, by knowledgeable farmers. The farmers form the third subsystem, but some farmers are part of the other subsystems too.

The figure shows four models: Model a) represents a direct flow of information from research to users. It is found today, if at all, first in a commodity-specialized research/large produce context. Model b), with a one-way communication flow, prevailed earlier. It has largely been replaced by model c), showing a two-way communication, in which the top-down flow is stronger than the upward flow from farmers to research. Model c) is dominant in Africa at present. Model d) is the ideal solution with equally strong links between all subsystems. It is nowhere fully realized, not even in the developed countries. Studies of innovation processes, published recently, tend to concentrate on one subsystem only, i.e. on agricultural research or on extension in its interaction with farmers. Even if such an approach is followed, the total system connection should not be forgotten. In the following sections I shall focus on research-extension links and on the task of making extension more functional with respect to technology transfer, and review a few new approaches, emphasising improvement of linkages within the innovation system, management and participation of farmers.

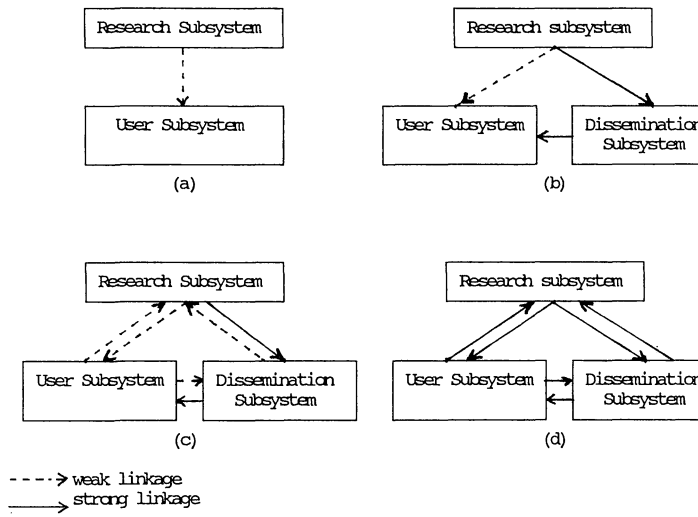

Figure 1: Flow of knowledge between subsystems

A KEY ISSUE: THE LINK BETWEEN RESEARCH AND EXTENSION

Compared to other world regions the research/extension linkage in African countries leaves much to desire. According to the FAO-study (1989a:13) only 39% of a total of 40 extension directors in Africa rated this linkage as strong, compared to 54% in the total services included. In Asia and the Pacific 75% of the directors characterized their linkage as strong. The situation in Africa is thus rather unfavourable.

Let us examine a few approaches which try to bring about substantial changes in the communication between subsystems. In many African countries efforts have been made to improve the effectiveness of the innovation system by creating better framework conditions, such as:

- higher budget allocation to research and extension,
- more incentives to research and extension officers,
- better training for the staff in research and extension organizations.

In other cases, new institutional solutions have been tried for an improved linkage, particularly via liaison units. Examples are the Sudanese "contact unit" in the Agricultural Research Corporation, the liaison office in the Kenyan Ministry of Agriculture, the research-liaison officers, provided for each Province in Zambia (Von Blanckenburg, 1984:21). Although no evaluations are at hand, it seems that such efforts have, at best, led to gradual improvements, but not to a substantially new technology transfer.

THE NIGERIAN AGRICULTURAL EXTENSION/RESEARCH LIAISON SERVICE

A basic institutional change has been tried in Nigeria with the Agricultural Extension/ Research Liaison Service (AERLS) (Idowu, 1988). It was first developed in the sixties by the then Northern Nigeria government at Samaru and became operational as AERLS in 1975. Some more AERLS units were established in the southern states of Nigeria. "The main functions of the AERLS units are to identify farmers' problems, interpret research findings, field-test them under farmers' conditions and train extension agents in how to use them ... The units are expected to cooperate and to coordinate their activities" (Idowu, 1988:91). The AERLS are part of the various national research institutes and have to look for close cooperation with the extension organization. They have various departments, for instance the Samaru unit has a department for agronomy, crop protection, livestock and agricultural economics respectively.

The functions of interpreting research results and relaying the feed-back from farmers to research are undoubtedly better fulfilled by the AERLS than the former structure. The AERLS seems not to have made much headway in the training of extension staff, nor has the approach led to significantly better participation by farmers.

TRAINING AND VISIT SYSTEM

The second approach which deserves attention is the Training and Visit System in extension (T&V), introduced on the initiative of the World Bank in the late seventies. It is largely oriented toward the better management of extension and an improved flow of knowledge from research to farmers and back from farmers to extension and research. Support for adaptive research, the contact farmer system, the strengthened role of subject matter specialists (SMS), the schedule of extension officers' regular visits to farmer groups and continuing in-service training of extension staff under supervision of researchers and SMS play a prominent role.

No other recent extension approach has been discussed so animatedly and so controversially as T&V, with positive reaction from circles close to the World Bank and many researchers, but rather critical statements from other scientists working in the field of extension research (cf. the papers in Roberts, 1989, as an example). As a matter of fact, T&V has gained a remarkably strong position in the extension structures of developing countries. As the FAO states (1989a:5): "The predominant approach to extension being pursued around the world today is the T&V system of extension".

Out of 63 extension organizations in Africa observed in the FAO study, 37 or almost 60% were categorized as Ministry of Agriculture services with T&V being the predominant approach. This figure appears to be surprisingly high. Perhaps the classification means that certain important components of the system have been taken over, but not that T&V, as proposed by Benor and others (1984), has been fully adopted.

The realization of the full T&V programme is indeed difficult under the conditions prevailing in most African countries. It is a very intensive approach with correspondingly high costs. Of course, the cost factor should not be considered in isolation. The benefit aspect, i.e. the impact reached, is as important. However, cost-effectiveness is crucial. T&V will only pay if there is a major output of research systems, and this is not guaranteed in the face of the weak African research systems. The suitability of T&V is also often diminished by poor road and transport conditions and by wide distances to be covered by extension staff when visiting the farmers regularly.

Certainly T&V must not be adopted in full. If certain promising components are introduced, for instance the fortnightly training of staff and a regular, controlled visit system, albeit at greater intervals, the effectiveness of the extension service will benefit.

The research/extension linkage is improved by the strong position of SMS and their own and researchers' involvement in training. On the whole, the management of extension work is more systematic in T&V. Finally, if the contact farmer approach is practised, farmers have, through the feed-back mechanism, also more chance of participation. Axinn's assertion (1988:75) of a lack of actual two-way communication in T&V cannot be generally accepted.

THE FARMING SYSTEMS APPROACH

Finally, a look at another recent approach, the farming systems and on-farm research concept (FSR). The difficulties, experienced everywhere, of basing extension recommendations on research station results led to appeals from the seventies onwards to make research more farmer-oriented and carry out on-farm research, connected with a systematic identification of farmers' potential and needs. The elements of a farming systems approach are: "the whole farm perspective, identification of immediate bottlenecks as perceived by farmers, use of a multidisciplinary investigative team, willingness to employ rapid reconnaissance methods, the identification of recommendation domains and a stratification of packages to suit varying resource and managerial levels" (Moris, 1989:81).

Major efforts have been made to institutionalize FSR in Africa, also with assistance of international research institutes. FSR's advantage is certainly that it adds a practice-oriented component to agricultural research and that the participation of farmers is increased. Research has come closer to the users' subsystem and has brought about an improvement of the linkage. But it is neither possible to realize a fast spread of the approach nor has the impact on the innovation system been strong. There are several reasons for its limited

success (cf. Okigbo, 1989:66). A congenital defect has been that, in the beginning, not much thought was given to the question of how to integrate the extension system into the approach. It has largely been a two-subsystems, but not a three-subsystems, concept. Only recently corrections have been initiated to incorporate extension and make it a "farming systems research and extension approach" (Moris, 1989:81).

CONCLUSION

There are a number of possibilities for improving linkages within the innovation system:

- The awareness of the importance of such linkages, which makes the technology transfer easier, and of the organizational consequences has to be increased, particularly among politicians, high-level administrators and researchers.
- Researchers and SMS should regularly be involved in the training of extension staff. There are lessons to be learned from Asian countries, particularly from their respective approaches within the T&V practice.
- It would help the flow of communication if the differences in financial and psychological status between researchers and extension officers were diminished.
- Farmers capable of participating in the planning of innovation processes should be selected systematically and also be trained for this task.
- New concepts must be developed for overcoming a structural deficiency existing in South African countries with a dualistic agrarian structure. Normally no major efforts are undertaken to make use of the knowledge and superior technology applied in the large farm sector for the benefit of the small farm sector. The significant potential existing here is tapped only marginally. As far as ideological and conceptual barriers play a role, it should be possible to overcome them to a large extent.

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