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Developing Multinational Priority Setting for Agricultural Research in LAC: Issues, Experiences and Prospects

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DEVELOPING MULTINATIONAL PRIORITY SETTING FOR AGRICULTURAL RESEARCH IN LAC: ISSUES, EXPERIENCES AND PROSPECTS

I. INTRODUCTION: STRUCTURAL CHANGE IN THE SETTING FOR INVESTMENT IN RESEARCH

New winds are blowing change throughout agricultural research in Latin America and the Caribbean (LAC). Global and national transformation in agriculture and its context push research toward sharply rising complexity and more diverse goals and organization. To the traditional objective of growth--largely focused on yields, costs and pest/disease control--new and pressing concerns have been added. These relate to the growing interest of exploiting a wide range of new commodities and agroecological regions as well as with the mounting challenges of ensuring agricultural sustainability, managing national resources and addressing equity (distributional) consequences. Research allocation in the region is moving toward a scenario with complex issues of rapidly diversifying markets, growing interdependencies in agro industrial production, multiple commodity production systems, regional blocs, agroecological diversity, and multiple decision-making centers in research. It is not only the plurality of aspects but also their interaction that adds to complexity. Consequently, the region faces, and will increasingly do so in coming years, an explosion in its requirements for technology and knowledge to address the challenges.

Still, complexity is not the only aspect. The development and interlocking of markets, both domestic and international, are intensifying competitive pressures in all orders. Along with major transformations in science and technology, they stimulate an ongoing stream of change in products, production processes and related institutional configurations in which the life cycle of each additional modification tends to shorten successively.

With endogenous change, capabilities for systematic innovation become the core adaptive response of firms, industries, and countries. But innovation and innovating processes are themselves increasingly complex. Innovation refers, in addition to changes in products and production processes, to other related institutional, organizational and market changes. Designing and carrying out innovation involves a complex systemic process requiring a close interactive relationship among a wide number of actors involved or affected. These include not only formal sources that provide knowledge through research, i.e., science and technology organizations, but, also, other sources of complementary knowledge such as farmers, suppliers, industrial processors, regulators, policy makers, clients and consumers. Technology contributions, for innovation to actually take place, must fit interactively into a broad matrix of market, regulatory, and production constraints and opportunities often involving a large number of participants.

Nevertheless, formal science and technology, both domestic and foreign, remain the core supplier of major innovations for agriculture. Over the years, LAC has developed a large capability for research and international technology transfer. In the early eighties, according to ISNAR data, the region engaged around 9,000 agricultural researchers and spent 700 million 1980 dollars mostly located in its national agricultural research institutes (NARI). Ex post studies on returns (i.e., see for instance, Echeverria, 1990) show that research in the region has produced a number of important innovations. Yet, over the following decade, public sector financial support for agricultural research has declined substantially (Lindarte, 1993). The reasons for this seem quite diverse and reflect a decade of troubled economic performance, fiscal crisis, structural adjustment, and downsizing of the public sector. But they no doubt also include dissatisfaction, among foreign and domestic stakeholders, with the performance of the NARI (Sarles,1990:228-29).

Underlying the above is the simple fact that while the region has developed important capabilities for doing scientific and technical work, institutional constraints continue to undermine the effectiveness of their contribution. As one writer puts it:

> Many research projects or activities have been extraordinarily successful and have generated significant social benefits; however, sustaining a productive research system that generates a continuous flow of valuable new technology has proven to be difficult. Stated plainly, we know more about how to do research than about how to run agricultural research systems. (Horton, 1990:44).

Some of the weaknesses identified include administrative problems, unclear priorities, the disjunction between research and technology transfer activities, the inability to fully exploit international sources of technology, and the lack of responsiveness to user needs (Sarles, 1990:228-29).

All such difficulties we would add are compounded by the new requirements and challenges mentioned earlier. Furthermore, adjustment to this context is unlikely to occur by itself alone because major structural features of technology systems in the region block necessary change. Some of these were originally strengths but over time they have turned into liabilities. One, the NARI were structured around the idea of technology provision as a public sector responsibility, an appropriate assumption when they were created yet clearly inadequate for increasingly developed market economies with a growing diversity of technology requirements. The persistence of the conception has to some degree acted as a deterrent to a greater development of alternative institutional capabilities. Two, they were structured mainly along the lines of commodity-based research: an approach taken from, and far more suitable to, the specialized monoculture farming of relatively homogeneous temperate zones. Consequently, they underestimated the substantial agroecological, production system and socioeconomic variability and fragility of tropical areas. Three, they were nationally focused and inward looking. This not only implied a certain neglect of subnational variability but also duplication of efforts among countries as each separately addressed, while ignoring spillovers, similar challenges and problems.

As innovation processes become more complex, flexible and dynamic, the public NARI find it more and more difficult to help farmers achieve the adaptive responses required by increasingly demanding markets and social expectations. In the absence of a source of impetus, change in and by itself seems less likely than a prolonged agony. It is in this context that I take up the subject of priority setting for agricultural research.

First a few clarifying notes. Priority setting may be described as the identification and adoption of preferred choices for resource allocation to research. In a strict sense, priority setting should be distinguished from actual resource allocation. Nevertheless, since priority setting serves as a grounding for allocation they may be discussed relatedly.

Often priority setting is treated solely in technical terms relating to the strengths of methods and data. I propose taking a broader approach with a more sociological perspective. The overall evolution of priority setting and resource allocation may be regarded as a social process with a political in addition to a technical side. The political aspect refers to those conditions, processes and actions bearing on the acceptance and demand for priority setting which, broadly taken, fall in two categories. The first includes underlying structural conditions and processes, such as the trend cited above toward complexity, essentially long term and non tractable in nature. A second category, the perceptions and interests of concrete organizational and individual actors relevant to the process, does offer a specific focus for

strategies to raise acceptance and support for priority setting. Likewise, we may speak of technical progress in terms of the quality and relevance of priority setting outputs. Here the main considerations relate to capabilities for these: i.e., methods, data, organization and resources.

Taken together, both political and technical aspects determine progress in the quality, adoption, and impact of priorities and allocations to agricultural research. Such progress depends to an important degree on the nature of the reciprocal interaction between the political and technical dimensions--on their synergy--and not solely or mainly on their independent development. An important consequence is that strategies for the above should address both aspects.

Different models for priority setting and resource allocation are possible. The one I have in mind basically involves a process on two tiers. On the first tier a preferred targeting of research is chosen and then, to the inside of this domain, specific sets of research areas or options are identified and selected. The nature of the targeting may be quite diverse, e.g., commodities, disciplines, geographical areas, farmer groups, or natural resources, among others. On the second tier--involving resource allocation--specific proposals or projects for developing priority areas or parts of these are considered, evaluated, and supported or rejected. In some cases the allocation process may begin earlier as when identification of priority areas is followed by an overall distribution of available funding among them. Then at the project level, specific allocation takes place.

Here I suggest that priority setting and allocation processes for research need to move beyond the simple comparative consideration of net payoff from alternative options viewed from a demand perspective--that is in terms of the potential impact (utility) of changes resulting from the new technologies. A further step would transform allocation processes into an instrument for encouraging competitiveness through the development of research markets. This could set in motion major efforts to reengineer existing research organizations.

This paper focuses on improving priority setting in the LAC region, first in Chapter II in the general sense outlined above and then in Chapter III, in terms of the specific contribution and potential of the subregional cooperative programs or networks, called the PROCIs. Chapter IV summarizes and integrates the discussion.

II. GENERAL ISSUES AND CONSIDERATIONS ON IMPROVING PRIORITY-SETTING FOR RESEARCH IN THE REGION

IMPROVING THE TECHNICAL BASE OF PRIORITY SETTING

Methodology

Treatment of the Future. A number of priority models tend to be past oriented in that they draw upon present and past values of variables in their results as a guide to the future. Thus, for example, scoring models often use historical trends in production and trade for grounding decisions that will affect future research outputs. Let me hasten to add that this is not an intrinsic or necessary feature of most models--except, perhaps congruency ones--but rather a conventional practice whereby past values, in the absence of better information, are felt to provide the most realistic guide to the future.

The basic problem here of course concerns the inherent risk and uncertainty of prospective analysis. Since change in all orders of life is accelerating, however, this makes the past an unreliable guide to the future when the consequences of research allocation decisions made today will influence the next decade and a half. Therefore, we need to incorporate a prospective outlook in ex ante analyses so as to increasingly address priority setting for research with likely future trends, discontinuities and opportunities in mind.

> **Agroecological Zoning.** The term "agroecological zone" is commonly used to designate .... a geographical area that is homogeneous with respect to its environment and natural resources, e.g., climate, land form, soils, and water bodies. Most importantly, for our purposes, an AEZ is also expected to display a broadly uniform *physical* response to the application of agricultural production technologies. These responses may be in the form of productivity changes or environmental impacts. (Wood and Pardey, 1993:3)

As Wood and Pardey add, an AEZ identifies a geographical area which is physically homogeneous in supporting one or more agroecosystems (or production systems).

Behind agroecological zoning, environmental differences give rise to variable production potential, degradation risks, or specific constraints of production systems, depending on the natural adaptability range of the commodities involved. In addition, technologies differ in the extent to which their performance is site specific, i.e., affected by variable environmental conditions. Agroecological zoning seeks to map homogeneous areas for which technologies can be developed or targeted in the expectation of obtaining a physically uniform response. This would allow for a potentially precise estimate of technology impacts. Such zoning would also be useful for other purposes such as planning for production and degradation.

Yet the above is still far too simple. Because different commodities have different adaptability ranges and because different technologies have different degrees of site specificity, a technology developed for a given site will often have effects (spillover) beyond it[1]. Thus a consideration of total benefits from a given technological innovation calls for aggregating its impact across zones (i.e., direct impact plus spillover). A further problem arises because impact and geographical spillover do not depend solely on the compatibility of a given innovation with the physical endowment of a new area but also and notably on the social groups and infrastructural, market, institutional and cultural conditions which determine adoption potential. Due to this AEZs are sometimes overlaid with additional physical and socio economic information in order to determine combined "ecologic-economic" zones within which both physical compatibility and adoption likelihood may be assessed. This of course adds substantially to the complexity involved.

Agroecological and ecologic-economic zoning are both of key importance to priority setting for research in LAC due to the great environmental and socioeconomic variability of the region. Adequate information here would prove essential to the ex ante analyses on which priority setting is grounded. Zoning possibilities are changing rapidly with geographical information systems and remote sensing technologies. In particular, the cost effective development of computer capabilities for handling large volumes of data allows detailed spatially related information now to be stored directly--eliminating the earlier need for previously reducing its content through the application of fixed classifications. This means different criteria for classification can then be introduced at a later time for output presentation purposes only, thus defining dynamic zones according to need. The region has its share of classification

systems and zoning studies originating from both international and national organizations (Wood and Pardey, 1993).

Still, however, no overall very suitable results are as yet available and deriving them would require a major project as Wood and Pardey propose. At IICA we attempted last year to use an existing classification, that of the nine CGIAR ecoregions based on agroclimatic variables, to assess physical production potential in the region for a list of commodities[2]. We asked scientists to rate this potential by ecoregions and found that they unable to do so or else arrived at differing results, thus corroborating Wood and Pardey's view that

> Certainly these zones cannot pretend to define tolerably homogeneous production areas in terms of the productivity enhancing prospects of a particular line of research on a particular commodity, nor the impact of that research on the environmental consequences of agricultural production (ibid, 39).

In my view, a major challenge to developing and maintaining useful zoning will derive from the rapidly accelerating diversification of the production structure in the region, both in terms of production and ecological impacts of technologies. It is one thing to deal with a relatively limited commodity structure of some twenty to fifty major products and another to do so in the face of seeking to deal with hundreds or more.

Priority Setting Models. Despite important progress in recent years the growing complexity of requirements still outstrips developments. Major categories of instruments available for analysis still include congruency, scoring and weighting, and ex ante economic surplus models. Congruency models are much too limited conceptually to be more than a starting point. Scoring/weighting models offer major advantages of flexibility, ease and low cost in conceptual, operational and measurement terms. Yet the scoring/weighting model ultimately cannot avoid the well known problem of adding together apples and pears, that is, it simply provides a scaling device and algorithm for aggregating heterogeneous concepts. What substantive meaning does a final priority score generated by such a model have? Simply a numerical output from aggregating widely divergent criteria made artificially compatible through a change of scale of measurement. At bottom the virtues of scoring/weighting models are political. Because they allow for prior agreement and the inclusion of numerous and different variables and weights, reflecting a plurality of values and beliefs, decision makers included in the process tend to invest results with a legitimacy otherwise difficult to achieve. Certainly this is no mean achievement and one that certainly justifies their use as a desirable first step.

Ultimately, however, one would want a priority assessment methodology to say something about the comparative order of net benefits deriving from its conclusions. For this we need a different approach, i.e., economic surplus models. Still here major problems remain. The standard concept of surplus remains unsatisfactory, particularly in complex models including consumers and other parties in addition to farmers. Other difficulties involve measurement problems and an excessive commodity orientation. For instance, I am not entirely sure how well can surplus models capture the benefits of the new ecoregional research aimed at reinforcing both sustainability and growth. It is clear of course that degradation, as well as environmental improvement or conservation through natural resource management, reduces or increases the future flow of economic benefits flowing from natural resources or "the land" and as such can be modelled through analysis. Still and all the entire issue of sustainability remains one of the most undeveloped, to my knowledge, in ex ante models.

This all points to the growing complexity of the empirical and policy worlds to be modelled. To multiple goals--growth, sustainability, and equity--add the consideration of multiple markets, multiple farm constituencies, multiple commodities and production systems, the new linkages between on farm and off farm activities, spillover (across disciplines and applications as well as across geographical areas), future uncertainty and one has an increasingly complex agenda for which fully developed models still seem to be lacking.In part, the absence of progress here arises from the high degree of spillover of such models: any specific region shouldering the burden of developing them will be unable to capture most of their benefits. This should point to a clear mandate for ISNAR on the basic and strategic research for developing new approaches and models.

Data

This still remains a problem in overall terms for research evaluation but mostly on the institutional side. Production estimates for major crops are generated at the country level by most Ministries of Agriculture, despite their continuing decline which may pose a problem toward the future, as well as by FAO on a worldwide basis. Also, improved remote sensing technologies should allow eventually for better subnational disaggregation of estimates. Likewise, the availability of price data and other related information appears to be improving through both national and international sources. As one moves, however, from the major commodities to others, data availability drops substantially.

On the other hand, paucity of information on research inputs, outputs and costs continues to pose serious difficulties. In 1993, within the framework of an ICA/IDB project on priorities, we collected data on over 75 research organizations in the region, an effort scheduled to continue in 1994 and 1995. While offering an important reference to analyses, this still does not address the more structural problem of periodically generating necessary basic data for evaluating performance at multiple--i.e., organizational, thematic, and project or activity-- levels. A good part of the difficulty arises from the ongoing diversification of research organizations which now include universities--for which reliable data is difficult to collect--and a diversity of private organizations, in addition to the international centers. At the national level, the financial decline of the NARI has more than counteracted the improvement of cost efficient computer data storage, management and knowhow on the subject. On the other hand the virtual disappearance or fragmentation of public extension agencies and the gradual emergence of other institutional services for increasingly differentiated users makes the collection of reliable and valid data on technology transfer and adoption extremely difficult and costly and one for which no good arrangement exists.

The improvement of information systems remains essential. The subregional cooperative programs or PROCIs, which I discuss in the next chapter, offer a convenient starting point for promoting and supporting such efforts, beginning with the NARI and perhaps extending to other agencies. IICA could provide a consolidating function. This would require funding and commitments, however, which at present and despite interest are not entirely in place.

Expertise

In our 1993 survey of agricultural research organizations in the region we requested a listing of staff considered qualified to participate in priority analyses. The 56 organizations that answered the question provided 453 names, 98 of which held a Ph.D., and another 191 held a masters degree. They also provided a listing of 164 publications dealing with priority issues. In running through the titles of

publications it becomes evident, however, that most of these refer to official documents or reports, very few of which would seem to correspond to actual technical priority analyses.

On the other hand, our knowledge of the region suggests that expertise for technical analyses of priority issues remains mostly concentrated at a few of the major NARI, particularly their planning units. The region does have a small core of experts which could be used for training purposes to increase the critical mass available. Doing this and improving the networking among them would appear essential to ensure technical capabilities for analyses and the growth of a pertinent regional scientific or "technical" community in the field.

Priority Identification and Resource Allocating Structures

This subject provides a natural interface with the demand side. Institutional spaces for decision making touch on the possibility of establishing priorities while simultaneously depending on the demand for such analyses.

In LAC most national priority and resource allocation to agricultural research takes place at the internal NARI level. In some countries, national councils for science and technology allocate funding to agricultural research groups and organizations on the basis of competitive bidding in relation to previously identified priority areas. This has amounted, however, to only a minor share of funding and universities have probably been the major beneficiaries. At the multinational level, the main actors in this regard are the specific commodity and thematic networks and, particularly, the PROCIs, discussed in the next chapter.

At present no overall mechanism deals with broad priority identification (and resource allocation) for the region as a whole. IDB has shown interest in sponsoring such a mechanism mainly with reference to its own allocations to the international centers. So has IICA, but viewing it in a broader sense as a capability for articulating and aggregating endogenous common interests. In our exploration of country reactions to such a proposal we found interest but also a certain reluctance toward the possible emergence of a powerful, distant and independent decision-making center. Prevailing views favored an alternative strategy of first building capacities and consensus on priority setting at the subregional level before moving to a regional aggregation.

POLITICAL CONSIDERATIONS

The various components of a technical capacity for identifying priorities will mean little if not coupled to broad political interest and support for linking them to the improvement of resource allocation processes.

Networking

Interorganizational and international networking in research areas tends to be positively associated with the emergence of common priority definitions. Not only are networks often established for this purpose. They also tend to encourage the formation of "epistemic communities", i.e., groups of experts sharing beliefs, values and notions of validity and holding a claim to expertise, competence and policy-defining authority in a particular area (Jönsson, 1993:467; Haas, 1992). In addition they help build the necessary climate of trust for participation among members that Alter and Hage (1993:17) call "the

culture of cooperation". A large number of networks have been established in the region over the past decades, a process still underway (Gastal, 1988; Claveran, 1992) in addition to the PROCIs.

Inclusiveness

New and rising demands in the region, which emerge out of the ongoing critique of current decision-making patterns, call for a greater participation of diverse stakeholders in research decisions. This is seen as not simply a question of ensuring adequate information for decisionmaking but rather an ethical issue regarding the legitimate rights and interests of the multiple parties involved.

Funtowicz and Ravetz (1993) have made the case for the need of extended peer reviews as one moves away from they call core science (basic and fundamental, i.e., curiosity motivated) to applied science, to professional consultancy, to what they designate as "post-normal science". The latter comprises areas or issues where the decision stakes of the research (its costs, benefits and value commitments involved for the various stakeholders) and its system uncertainties (problems not concerned with the discovery of a particular fact, but with the comprehension or management of an inherently complex reality) are high. As uncertainties in knowledge and ethics blur the traditional distinction between facts and values, and as rising stakes affect new stakeholders such as future generations, the planetary environment and other species, new socially extended forms of review for policy and priorities become necessary[3].

> Only a dialogue between all sides, in which scientific expertise takes its place at the table with local and environmental concerns, can achieve creative solutions to such problems, which can then be implemented and enforced (Funtowicz and Ravetz, 1993:751).

The authors stress that post normal science is complementary to and not a replacement for traditional forms of science. It does not question scientific and technological claims in their legitimate contexts. What it questions is the quality of work in areas raising high uncertainties and risks concerning their potential environmental, social and ethical impacts and therefore requiring a much broader review process for necessary control and legitimacy.

More and more, much of agricultural research would appear to be falling within this category. To the extent that research decisions raise differential uncertainties and impact risks for different stakeholders, the priority setting process will need to reflect their preferences and views. For it to happen, they will need appropriate representation if decision making is to be legitimate. This should not be confused as an argument in favor of political as opposed to scientific or technical priority determination. Ultimately, all resource allocation decisions are political decisions. They may differ, however, in the role and degree that scientific knowledge plays in them. The latter can help show the consequences that alternative values would have on outcomes from the decision making process. It is a necessary aid, and not a shortcut or substitute, to an intelligent discussion on the subject. The challenge lies in having the conceptual tools, data and expertise to provide a timely support for such a broadened discussion. When this is the case, technical capacities for doing so will be viewed as legitimate and relevant and receive support.

Developing Research Markets

Research allocation and research performance while different are frequently integrated within the same organizational setting. This can and often does contaminate both. Priority identification may be

unduly influenced by current internal interests and capabilities. On the other hand, once priorities have been selected actual project preparation may follow as a routine activity, essentially oriented to scientific merit but lacking an institutionally grounded competitive sense of the effectiveness and efficiency of its impact. To make this clear, I return to the two tier model mentioned in the first chapter.

Activities on the first tier address broad priority areas or problems. This requires the comparative assessment of the social utility of progress in each area leading at minimum to an ordinal, or higher level, scaling of these whether individually or in groups. Ideally, although this is often not done, the assessment should be a net one in the sense of being adjusted by an estimate of the general likelihood and cost of achieving progress. While some fields (for instance cancer research) may claim a very high gross priority, the difficulty of progress reduces the claim.

Activities on the second tier concern resource allocation. The process may or not begin with a distribution of total funding by areas or problems. Regardless, the key activity will be to identify a portfolio of projects (proposals) for addressing the priority areas or problems. These in turn will need to be reviewed in relation to three categories of considerations: a) the anticipated impacts (utility) of the specific proposed results; b) the adequacy and soundness of the scientific and methodological proposal for achieving them; and c) their institutional effectiveness and efficiency.

By the third category I mean two things. Institutional effectiveness refers to being able to produce the right result for success. This concept of effectiveness goes beyond the conventional understanding of "being able to do what is attempted" to include notions of responsiveness in two ways, i,e., doing the right (desirable) thing and doing it the right way e,g, ensuring that the product actually meshes, in its attributes and specifications, with the needs and requirements of clients. In mission-oriented, applied and adaptive research which produce technological results, success will depend critically on being able to specify results in ways not often identifiable in advance but that require a close interaction process with potential users and other stakeholders to determine. The strategy or process for doing so, however, is amenable to planning and can be built into the proposal where necessary. The second point, bearing on efficiency, is that the allocation process should not be grounded solely in utility considerations but also in comparative and competitive success and cost estimates.

I would argue here that, when resource allocation and performance are both performed to the inside of the same organization, effectiveness and efficiency incentives will tend to be weak and inadequate. The absence of user control tends to hamper effectiveness. Likewise, in the absence of competitive bidding, cost controls and standards are hard to implement. Making funding and research performance institutionally separate functions, can stimulate both research effectiveness and efficiency as well as their comparative assessment. The development of research markets would focus on competitive bidding among institutions and institutional consortiums or joint ventures. From an innovation perspective an important option would involve public-private joint ventures. Another important consideration would involve transcending the country or national framework to ensure large enough markets on the one hand and to stimulate cross national ventures on the other.

To the extent that decisions on priority setting and resource allocation were to take place in the framework of an open research market, demands and expectations for allocative transparency, accountability and rationality would tend to be higher than if all three aspects took place in an internal setting. This happens as research organizations would be induced to greater specificity and competition, the two key incentives that Israel (1987) identified as conducive to good performance in his study of 159 Third World organizations funded by the World Bank. It would encourage improved ex ante assessment,

competitive alternative proposals, and a degree of ex post evaluation. A research market will not only induce competition among proposals but also among actual delivery or performance results since control is exercised not only through administrative monitoring but also through the reputations and goodwill of research performers. All have the effect of raising demands for pertinent expertise and data.

Openness

In addition to inclusiveness, another structural condition bearing upon the acceptance and lasting effect of priority setting decisions is their openness. By it we refer here to the absence of pre-existing constraints or of external restrictions to open decisionmaking deriving from external power imbalances among participants. To the extent that priorities can be discussed openly and decisions freely arrived at without the constraint of external interests, their legitimacy and institutionalization will tend to be greater[4].

It is here, in my judgement, where the weakness of some existing individual networks appears. While no doubt making important contributions to technology transfer and research in the region, often these networks must depend on external funding or leadership. To the extent that their priority assessments are donor or lead agency driven this reduces their legitimacy and prospects for institutionalization in the region.

III. LATIN AMERICAN EXPERIENCES IN MULTINATIONAL PRIORITY SETTING: THE PROCIs

The region has a number of multinational settings for prioritizing agricultural research. I will discuss here a set of these, the subregional cooperative programs or master networks of research organizations often called the PROCIs (i.e., PROCISUR, PROCIANDINO, PRIAG and PROCITROPICOS). It is important to bear in mind that these are not the only settings for multinational priority setting. Others include a number of more specific networks, the international centers operating in the region, and the particular case of CARDI in the Caribbean. The PROCIs, however, are key actors at the subregional level in the sense that they offer permanent mechanisms not tied to single commodity networks but to broader areas for shared action. I will grant the most attention to PROCISUR, the oldest and best established cooperative program. Since the PROCIs share a mostly common framework and goals, the remaining instances can be discussed more briefly[5].

Cooperative Program for Agricultural Technology Development in the Southern Cone (PROCISUR)

PROCISUR started out as a largely informal technology exchange network among southern cone countries (Argentina, Brazil, Chile, Paraguay and Uruguay, with Bolivia later joining) established by IICA in the late sixties. On the basis of a grant from IDB in 1980, it became more formally structured into a Cooperative Program with a specific focus on maize, wheat, soybeans and cattle. Its activities encompassed document and publication exchange, joint training, technical exchange, and the development of a production systems approach. From 1984 through 1990, and with a new grant from IDB plus counterpart country contributions, the Program was broadened to summer and winter cereals, oily crops and cattle and a formal technology transfer subprogram was added.

Program governance takes place through a Steering Committee of NARI directors who act as voting members, along with CIMMYT, CIAT FAO, IICA, IDB and other representatives as invited non-voting members. An Executive Secretary is responsible for technical and administrative management. Each subprogram has a general coordinator with country or institutional level counterpart coordinators, giving rise to specific networks.

During the eighties, and for each agreement period, PROCISUR formulated an Indicative Plan with the help of scientists from the member NARI. This provided a general priority framework within which Annual Operating Plans were then drawn up for each specific area (commodity or subprogram). The methodology used started out with a meeting among the responsible leaders for each area (national coordinators and the subprogram or international coordinator). The subprogram coordinator would then consolidate and adjust the proposed activities. It is important to stress that during this period PROCISUR primarily engaged in cooperative and exchange activities, other than joint research, such as training, technical consulting and assistance, and germplasm exchange.

Over the years the affected research activities of the member organizations moved to a complementary approach with a de facto division of labor among them. Another effect was improved coordination with the international centers, i.e., CIMMYT and CIAT. Major impacts from PROCISUR include the development of soybean production in Argentina, largely drawing on Brazilian varieties and technology from EMBRAPA, and, conversely, wheat in Brazil drawing on technology from Argentina. Other impacts relate to maize and cattle and, more generally, the subregion has moved to a common technology base in these four commodities. Results relating to these and other commodities and subjects appear in 34 volumes of the PROCISUR technical series, 89 bulletins and 174 other miscellaneous publications (PROCISUR, 1993:2). Most significantly, through more than 2,046 activities --technical cooperation, advisory services and training-- carried out between 1980-1992 and involving close to 8,500 participants (PROCISUR, 1993:3-4) PROCISUR has developed a climate of trust among its members essential to cooperation as Alter and Hage (1993:16-17) emphasize.

The Program was reviewed in 1981 and 1984, and then evaluated favorably in 1987 (Segura y Blasco, 1981; Convenio IICA-Cono Sur/BID, 1984; PROCISUR, 1987; Gastal, 1989). Evenson and Cruz (1989) carried out a study of economic impact whereby they estimated rates of return of 191%, 110%, and 179% for maize, wheat and soybean in PROCISUR. While the results were very high, it is worth noting, however, that the methodology used (productivity decomposition) did not separate PROCISUR's contribution from that of the international centers.

Since the end in 1990 of the second agreement for non reimbursable funding from IDB, the Program has continued on a more restricted scale with funding from the countries and IICA. Following a transition period in 1990-91, PROCISUR shifted its focus and goals in 1992. The interest in moving from exchange activities to the development of joint cooperative or integrated research projects was given a higher and more explicit priority, especially among the larger countries, i.e., Argentina and Brazil. In addition, the Program dropped its commodity-centered focus in favor of a more flexible arrangement (PROCISUR, 1993). On the basis of a study approved by both the Advisory Council for Agricultural Cooperation Among Southern Cone Countries (CONASUR) and PROCISUR, five new subprograms were defined in place of the older ones: i.e., biotechnology, genetic resources, natural resources and agricultural sustainability, agroindustry, and institutional development. For each subprogram, "coordination/planning" meetings of the responsible team (national coordinators, the international or subprogram coordinator, and other invited researchers) were organized to identify more specific priorities. These were then followed by joint projects, developed in 1993, covering such specific activities as

technical cooperation and advisory support, training, studies and analysis, and joint research (PROCISUR, 1993:23). For this, researchers from the member organizations, following specific guidelines for PROCISUR, first drafted proposals then reviewed at new "coordination/planning" meetings, acting as technical committees. Those proposals accepted went to PROCISUR's Executive Secretariat, to be checked for financial and technical soundness, followed by their submission for final approval by the Steering Committee. Aside from scientific and methodological considerations, PROCISUR emphasizes that its projects should be of interest to all member countries. This does not imply that every country needs to participate in each Project, but rather that its results be deemed useful or of interest to all (ibid).

Several major points emerge from PROCISUR's experience. First, priority decisions were already present in the initial definition and later changes of the design and mandate of PROCISUR. These priorities addressed areas of shared interest among the research organizations. A related assumption was that, since the member NARI tended to be large and complex, the most appropriate framework for cooperation would be one allowing for the exchange and sharing of germplasm, information, technology, training and similar activities. Decisions regarding the performance of actual research, however, were viewed as a sovereign activity best left to each country, ever though information sharing could in practice and indirectly help to integrate efforts. Consequently, direct priority setting for research in the subregion was never until most recently a very explicit focus, and planning mostly addressed other activities within the restricted domain of common interest.

The above has been changing. In the face of escalating demands and shrinking funds all members have come to recognize that cooperation has definite advantages, while also recognizing that their unequal capabilities (e.g., Argentina and Brazil versus Bolivia and Paraguay) make for an unequal distribution of benefits. Consequently, the focus for cooperation has progressively broadened over time from a few specific commodities, to commodity groups, to broader and more flexible thematic areas recently. Another change has also involved a steadily expanding interest in cooperative research projects as reflected most clearly in planning efforts since 1992. The current fiscal and financial difficulties in the countries, as well as the decline of external donor funding, however, have had the effect of restricting their implementation. More recently, CONASUR has also assigned PROCISUR the responsibility of formulating an agricultural technology development strategy for the subregion.

With a broadened mandate, expanded interest in joint cooperative research and declining funding, priority setting has become more critical. The methodologies for this have had procedural and technical aspects. Procedurally they spell out who participates (coordinators and other scientists) and the process involved (meetings, consolidation of results, and reviews). Regarding the actual technical methodologies used for priority identification, these have for the most not been very formalized. Rather they have tended to rely basically on consensus from the gradual pooling, analysis and discussion of two sets of data and information: one relating to existing productive and economic interests in technology development, as perceived by the researchers, and the other relating to research efforts historically and currently being carried out in the region (e.g., PROCISUR, 1988). As a general trend, decision processes appear to have become progressively information intensive over time. The recent establishment of an institutional development subprogram, as yet in the planning stage, should help increase technical capabilities for priority identification. This may help overcome the rather weak role social scientists have played in decision-making processes and related policy work. The strongest exception in this regard has been EMBRAPA, with its sizeable group of qualified social scientists in policy, institutional and planning matters. In recent years, INTA has been moving in a similar direction.

Cooperative Agricultural Research and Technology Transfer Program for the Andean Subregion (PROCIANDINO)

Its framework was established in 1986 by a four-year agreement among the governments of Bolivia, Colombia, Ecuador, Peru and Venezuela through their national agricultural research institutes, IICA and IDB. The latter provided donation funding with counterpart contributions by IICA and the countries. Agreement objectives specified three main kinds of results: i) institutionalizing a mechanism for technical cooperation with regard to available technology and natural resources; ii) linking national research with the outputs from CGIAR centers in the region; and iii) building/strengthening national research capabilities through technology transfer. From the beginning, the second objective of linking national research with the international centers was central in determining initial priorities. This was reflected in the commodity subprograms established: edible grain legumes (CIAT), maize (CIMMYT) and potatoes (CIP) to which were added oily crops for human nutrition[6]. However, the specific objectives of PROCIANDINO also mention assisting national research institutions in developing analytic capabilities for identifying research priorities related to food supply and nutritional needs.

Within the above commodity selection, a second level of decision making addressed thematic priorities for different activities, including cooperative research. PROCIANDINO established this through a three-year indicative plan for 1987-1990, later extended to 1991, specified in more detail in annual operating plans (PROCIANDINO, n.d.a). No formalized methodology was described for this; the agreement among the countries, IICA and IDB mentioned that the indicative plan should take into consideration existing funding, staffing, equipment, past experience and ongoing activities in the countries. The indicative plan was drawn up interactively by PROCIANDINO's executive secretary, the international and national coordinators, associated coordinators from the international centers, and then debated and approved by PROCIANDINO's Steering Committee. After this it was reviewed by IICA and IDB and adjustments introduced (*ibid*: ii). Towards the end of the period a diagnostic study, carried out for each subprogram by its technical team, identified and compared the state of production and research in each country[7].

Unlike PROCISUR, the idea of cooperative research among the countries was from the start more of a desirable goal and possibility for PROCIANDINO on the grounds that the smaller size and research capabilities of the countries involved justified it. During the early years, however, actual joint research seems to have been if at all minor perhaps reflecting the difficulties of organizing these among NARI that only then were starting to become acquainted with each other.

In 1989, a priority study (Gomez, 1989) sought to identify crop and animal research priorities, on the one hand, and major research fields on the other. The study proposed a number of criteria for each but neither these, nor their associated variables and indicators, were weighted, in addition to which some were not operationalized and measured[8]. Consequently, no global scoring was established nor any grounded overall conclusion resulted from the exercise. In 1991, PROCIANDINO sponsored an external study of its economic impact (Cruz and Avila, 1989) for the 1987-2002 period using an input accounting or producer surplus approach. It must be noted that the study was essentially *ex ante* in nature--although it drew upon actual costs for 1988-1990--given that program benefits were only beginning that same year--i.e., 1991, for which they were estimated--and projected from then on through the rest of the period. The results, which do not include indirect economic benefits, showed an internal rate of return of 23.51%.

A second agreement among the countries and IICA but without IDB funding, was signed in 1991 to consolidate and institutionalize the framework up through 1996. The new agreement explicitly made place for joint research projects to be funded independently and implemented through annual operating plans. After a transitional period, four new subprograms, in addition to the four original ones were added, i.e., soil conservation and management; export fruits and vegetables; highland andean crops and cattle; and technology policy, management and institutional building--the latter still in the process of being developed (PROCIANDINO, 1994). Cooperative research was also explicitly targeted in addition to technical cooperation. Within each major area or subprogram, project proposals were developed for problems perceived as involving a shared interest; a new three year indicative plan for 1993-95 contains 15 proposals (PROCIANDINO, n.d.b). This has amounted to a change from the earlier plan which only specified activities. Here again as with PROCISUR, the absence of donor funding at a time of fiscal and financial restriction for the NARI and countries, has limited their implementation.

The latest proposals for PROCIANDINO are similar to those for PROCISUR--and would give the Program a role in proposing agricultural technology policy and related institutional change in the context of economic and market integration in the subregion.

In sum, priority setting for PROCIANDINO has involved a two level process. At the top the selection of subprograms (crops, animals, broad fields) has proceeded on the basis of a negotiated consensus regarding shared interests and capabilities among the countries and sponsors. Within each of these areas a somewhat similar but more grounded process has taken place. In general and despite some variation, the overall trend has been toward a procedural methodology for generating consensus rather than a formalized evaluation methodology for identifying priority areas. Likewise as with PROCISUR, however, the decision-making process has gradually become more information intensive. No doubt, the absence up to now, although currently under design, of an institutional building subprogram or of its functional equivalent--as a means of drawing upon social science expertise in the network--helps explain the limited development and application of more formalized decision-supporting methodologies.

Cooperative Program for Research and Technology Transfer for the South American Tropics (PROCITROPICOS)

The South American Tropics make up a region the size of a continent, holding great potential in terms of agriculture and forestry, as well as offering a rich and diverse flora, fauna, climate, water and soil resources all of which are currently misused and mismanaged. This region covers three main ecosystems (the Amazon humid tropics with 72.5% of the region, the Andean foothills, and the savannahs--both of the latter advantageously located in relation to human settlements) which extend over close to a billion hectares in eight countries. Despite agricultural progress in the affected countries, specific technologies suited to these three ecosystems are lacking at present. In addition, natural resource degradation is accelerating in them, the solutions for which are at least in part technological. To this end, the NARI of the eight member countries involved (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela) joined with IICA to sign a cooperation agreement in August 1991 establishing PROCITROPICOS for the purposes of engaging in cooperative projects of technology transfer, research, and training dealing with sustainable agriculture and natural resource management. These are carried out within the framework of four subprograms, i.e., agroecological resources, production systems, genetic resources and information systems.

PROCITROPICOS began by considering that the challenge of sustainability in its domain had to take into account six major existing land use systems: native extractivism, forestry-logging extractivism,

itinerant settler agriculture, extensive and semi intensive cattle ranching, mechanized annual crop agriculture and traditional and specialized Amazon perennial crop agriculture. A set of key problem areas was identified, i.e., savannah soil degradation, forest degradation, plagues and diseases of perennials, low productivity of areas affected by flooding, and poor communication among researchers of the PROCITROPICOS network. The key problems were crossed with the land use systems, and then ranked by low, medium and high importance with regard to environmental, social and economic impact; technological availability; institutional research capability; and regional priority. On the basis of the above, four joint projects were identified and selected as of the highest initial priority. These are the following: 1) Regeneration and sustainable management of degraded savannah soils; 2) Preservation of the Amazon project through stabilizing migratory agriculture and sustainable forest management, 3) Retrieval, preservation, and management of Amazon genetic resources; and 4) Support to the development of informatics, documentation and communications for the savannahs, forests and genetic resources. These and other projects, however, remain at present at the proposal stage; PROCITROPICOS has been unable so far to begin implementing them, notwithstanding their urgency and priority, due to the current sharp decline in donor founding.

In the interim, activities have concentrated on information sharing, identifying common interests, developing understandings and agreements among the countries, and refining priority identification for the major working areas. In 1993, for example, PROCITROPICOS carried out 19 joint meetings and seminars with technical staff from its member countries.

The sources and procedures used cover multiple yet not particularly formalized processes. They include policy definitions, guidelines and precedent of the countries, conceptual frameworks elaborated by different participants and agencies, reports commissioned from specific consultants, technical planning meetings among researchers from the participating organizations, and decisions taken at the meetings of its Steering Committee--integrated by the heads of the member technology organizations, the Amazon Cooperation Treaty Secretariat, and IICA. One must fully recognize the innovative nature of PROCITROPICOS as a cooperative program grounded in issues and only secondarily in commodities, although as noted earlier both PROCISUR and PROCIANDINO have been moving in the same direction, away from an exclusively commodity focus. The non traditional nature and subject of PROCITROPICOS, in addition to current gaps of information and knowledge on these complex problems, admittedly pose difficulties in using technical priority -setting methods at present, other than scoring models.

Regional Program to Upgrade Agricultural Research on Staple Grains in Central America and Panama (PRIAG)

PRIAG was established in 1989 through an agreement signed between the European Economic Community (EEC) and IICA. Its general objective is to improve the efficiency of technical institutions of the Central American Isthmus (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama) involved in agricultural research and technology transfer, through strengthening activities related to staple grains (corn, beans, rice and sorghum). Activities are structured in three subprograms that seek the following: 1.- to coordinate and streamline research activities on basic grains in the Central American Isthmus; 2.- to strengthen linkages between agricultural research and technology transfer subsystems; and 3.- to promote agricultural research, conduct experiments and transfer technology for small-scale grain producers in ten zones of the Isthmus.

Unlike the other PROCIs at present, PRIAG does provide donor funding for its activities including research.

PRIAG is more complex in organizational terms than the preceding cooperative programs, reflecting its extension, in addition to research, component and a community, in addition to subregional and national, levels of action. Operationally it is managed by a central team of four coordinators, two of which are European, appointed by the EEC, and two are Central American, appointed by the countries through IICA. It also has four governance and technical coordination bodies, i.e, an ad hoc Committee made up by the six vice ministers of agriculture; a regional committee for research coordination; a regional committee on research-extension linkages; a scientific council; and national research-extension linkage councils.

Priority setting involves several levels-- national and community levels in addition to the multinational thematic one. I will refer here only to the latter. The beginning point is its mission. PRIAG does not cover plant breeding which amounts to around 70% of the research on basic grains in the subregion but which has been channeled largely through the international centers (CIAT on beans and rice and CIMMYT on corn). It focuses instead on agronomical research in a broad sense within two specific categories--agronomy and fertility.

During its first active year (1991), PRIAG did not fund research activities and concentrated instead on priority identification. Two working groups were established, one on agronomy and the other on fertility, each made up of three representatives per country, i.e., a senior researcher, an adaptive researcher or in some cases an extension agent, and a university researcher. Each working group of 18 members was given the mandate of reviewing research activities for its category over the preceding 10-15 years and using for this published results and existing records. General guidelines for the review were established by the working groups early on and then applied by each country team. During the process each working group met four times.

As the process advanced, certain results became evident. Previous and existing research was discontinuous in its treatment of problems, characterized by duplications among countries, and largely unrelated to emerging perceptions in the groups regarding user needs. This was the first conclusion at which both groups arrived.

The next step involved a field assessment. Following discussions on the subject the groups decided to test their preliminary results at the 10 areas chosen for PRIAG field activities. This was carried out by the research teams, and although it involved some farmer survey and consultation, still essentially remained a technology supply review. After analyzing the results with help from two european experts, the working groups attempted to set priorities.

A source of tension for team members derived from the perceived contradiction between conclusions drawn while acting as regional experts and the consequences these conclusions entailed for their own specific personal and institutional interests. Implementing the conclusions would lead to their being deprived of access to funding because of the gap between emerging priorities and their experience and activities. Another source of tension experienced by members derived from the perceived lack of correspondence between past and ongoing research and what was now viewed as necessary, a difficulty further compounded by their own growing awareness that they lacked necessary expertise and capacity for change. Within this context the groups generated non ordered listings of research priority areas.

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PRIAG was unable to use these results in time for its project selection in 1992. For that year it requested the submission of project proposals from the research organizations of the countries. These were revised by a special 24 member project committee--four per country. Acceptance or rejection were determined using a set of formal criteria referring to proposal quality but not involving priorities.

For 1993, the earlier results were taken up again by the central team and classified into 15 research areas in two priority levels. In conjunction with quality considerations, these were used in grading project proposals. The project committee was revamped and structured to include a single member from each country plus a member each from CIMMYT, CIAT, and CATIE. The latter members also checked projects in relation to their own funding in order to weed out multiple funding instances. The central team acted upon the recommendations from the project committee in terms of funding decisions. Like the other PROCIs, PRIAG, acting upon request of its member countries, has broadened its activities to projects in vegetables and fruits, not covered at present by any existing networking arrangement in the subregion.

IV. DISCUSSION AND CONCLUSIONS

Latin America and the Caribbean are facing a huge diversification along many dimensions and variables touching upon its current and future agricultural research activities. These include rising numbers of potentially marketable commodities, new production systems and agroecological zones in use, and expanding agro-industrial linkages. Others derive from agricultural sustainability and natural resource management challenges, equity and distributional issues, as well as from critical new international developments such as biotechnology, informatics, telecommunications, and new materials. Furthermore, the institutional diversity of funding sources and organizations dealing with research and technology issues has increased, albeit at a slower rate than requirements. All these concerns, additionally, are becoming more urgent and critical with the rising scale of impacts and as the time cycle for developing new needed technologies, determined by changing market requirements or heightened environmental concerns, has shortened considerably. In the face of all this, however, available funds, in the region for research in real terms appear to be declining.

This changing and complex context poses new constraints, conditions, and incentives for countries and research organizations. First, the traditional country-based institutional model for agricultural technology provision, initially the public NARI, later extended to its connection with the international CGIAR centers, is no longer able to offer a suitable answer in coping with the new needs. Second, neither can autonomous country-focused approaches continue to neglect potential externalities and savings from spillovers. Third, since no organization or country can continue to "go it alone", conditions have been opening up for collaboration across organizations and across countries. That is, networking, both formal and informal, has expanded substantially and most likely will continue to do so in coming years[10]. Fourth, external donor fatigue and the above make it imperative to attract new endogenous sources of funding for research, in particular, enhanced user contributions.

The above clearly raises the visibility and utility of priority considerations and analyses. On the one hand, the new interorganizational and international focuses are raising the issues of how best to divide efforts and establish complementary collaboration. This is stimulating discussions on perceived needs (utility and impacts) and research capabilities. On the other hand, attracting new funding partners and making research relevant to needs will call for an expanded inclusion of stakeholders in priority-setting decision processes. At the same time the growing complexity of both of these aspects will raise new questions about the rationality of existing priority-identification processes in terms of improving their transparency and objectivity, and of removing the influence of external coercive influences. It is in the light of these considerations that technical priority assessment can make an important contribution.

Notwithstanding the above, the use of technical methods in priority assessment has remained quite limited and unsystematic. A number of NARI at different points in time have used or tried scoring/weighting or congruency models. More advanced models have also been used at a few major NARI and regional universities. Outsiders to the region, either by themselves or with regional collaborators, have also introduced new methodologies. ISNAR and IICA have aided, supported or sponsored a number of such efforts. However, the use of such models appears to be mostly discontinuous and unsystematic and their impact on actual resource allocation decisions unclear. At the international level within the PROCIs their use appears to be negligible.

The sources of weakness in technical priority assessment are multiple. They comprise on the one hand the limitations of current available methods, the absence of key and necessary institutional and agroecological data for grounding analyses, and the shortage and concentration of expertise for technical assessment. On the other hand they point to the limitations and weaknesses of current existing structures for multinational priority setting and their relationship to resource allocation and research performance.

Notwithstanding such technical limitations, the PROCIs have played the leading role in LAC in bringing together and integrating research efforts among the NARI at the subregional level. The contributions of the PROCIs to priority setting have been twofold. First they have helped identify common domains of shared interest in technology among countries. A common trend emerges, i.e., the transition from a narrow and specific commodity focus to commodity groups to even broader disciplinary and thematic categories as with PROCISUR and PROCIANDINO. More recently, all have moved towards incorporating a focus on sustainable agriculture and natural resource management. The latter has proved difficult, however, because of its differences from traditional production oriented research and, also, because in most countries natural resource management lies outside of the institutional domain of the Ministries of Agriculture. Another development has been the concern with technology and policy development and which broadens the Programs from an exclusively biophysical focus to a socioeconomic one. In addition, an expanding interest in joint research, as opposed to exchange activities, suggests a more general and growing process of integration among the NARI in each subregion. Last but not least, the PROCIs have played a key role in terms of improving NARI linkages with outside agencies and international organizations.

Second, within the given domains of common interest, more specific processes of priority identification have taken place through the discussion of needs, impacts and interests. Highly formalized assessment methodologies have been used to a rather limited extent, but the decision processes involved have become progressively information intensive over time. Furthermore, as participating researchers come to know and interact with each other and share their results, a blending of efforts, a tendency toward complementarity, has been emerging. In other words a common social grounding for larger scientific and technological communities has been established.

The limits to priority setting in the PROCIs are easily detectable. They have not extended beyond the NARI to any great extent at a time when the number and importance of other national research organizations have been rising. Within the NARI as noted earlier, the influence of the PROCIs has been limited to a restricted although expanding domain of shared interests. Their development of joint research is still incipient. A different focus in earlier years, added to funding restrictions more recently have translated into little progress along this line. Consequently, the PROCIs have not been able to play the role of funding agency in ways that might enhance competition among research organizations.

Looking forward, if the PROCIs intend to play a major role in articulating and aggregating research priorities at the subregional level they will need to expand their mandate and scope in two ways. First they will need to use their established frameworks to develop an extended agricultural research community through strategic fora that could assist in grounding more inclusive and participatory processes of priority identification. This would mean incorporating universities as well as a host of other private sector and non profit organizations into the discussions.

A second expansion of mandate and scope would require going beyond research communities to include other stakeholders in the activity, such as farmers, industrial processors, and environmentalists. This would ultimately be necessary to ensure broader legitimacy and claims to funding. The new role toward which PROCISUR and PROCIANDINO appear headed, that of assisting the development of coordinated technology policies and institutional reform in their subregions, would ensure an extended mandate for priority identification, articulation and aggregation across constituencies and countries.

In practical terms, however, the cost and difficulties of organizing consultations across constituencies and countries remain substantial. This makes it desirable to add a prior phase to the process: one dealing with priority identification, articulation and aggregation at the country level (Tourinho, 1993). The national agricultural councils established in a number of countries could presumably perform these functions, the results of which the PROCI would then proceed to aggregate subregionally. Where non existent, such councils, even if initially only of an ad hoc sort, might be encouraged. Again the possibilities and feasibility of doing this appear uncertain; they would seem to depend largely upon the political and technical leadership of the NARI in each country.

If priority setting is viewed as proceeding in two phases corresponding respectively to the national and subregional levels, what mechanism would address the overall regional level? Its responsibility would seem to encompass the aggregation of shared priorities of the broadest nature affecting more than one subregion. With regard to allocation, it could provide a representation for the region vis a vis external donors. At a joint meeting, the PROCIs recently carried out an extended discussion on the role and potential nature of such an overall mechanism. The preferred option as emerged from the discussion was that of an inter-PROCI mechanism. Its establishment still remains an open question, although it may be noted that a joint meeting of the PROCIs every couple of years could be a starting point. IICA has already proceeded in this direction through encouraging the already mentioned joint meeting last November in Santa Cruz, Bolivia.

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1. Another form of spillover occurs in terms of applications as when a technology developed for a given commodity--as, for example, a new method of plant breeding--is applicable with or without adjustment to another commodity.

2. We were attempting to specify a proposed "future opportunities factor" to add to the TAC priority setting model as adjusted for the region. This included variables related to anticipated future demand and regional production potential for each commodity, i.e., (Medina, 1993).

3. In a somewhat different context the case for extended review and succussion has also been made by MacRae (1987) in terms of "technical communities" and by Mathisen (1990) in terms of "problem-solving communities."

4. Readers here may recognize the conceptual influence of the model of communicative rationality developed by Habermas (1984; 1987).

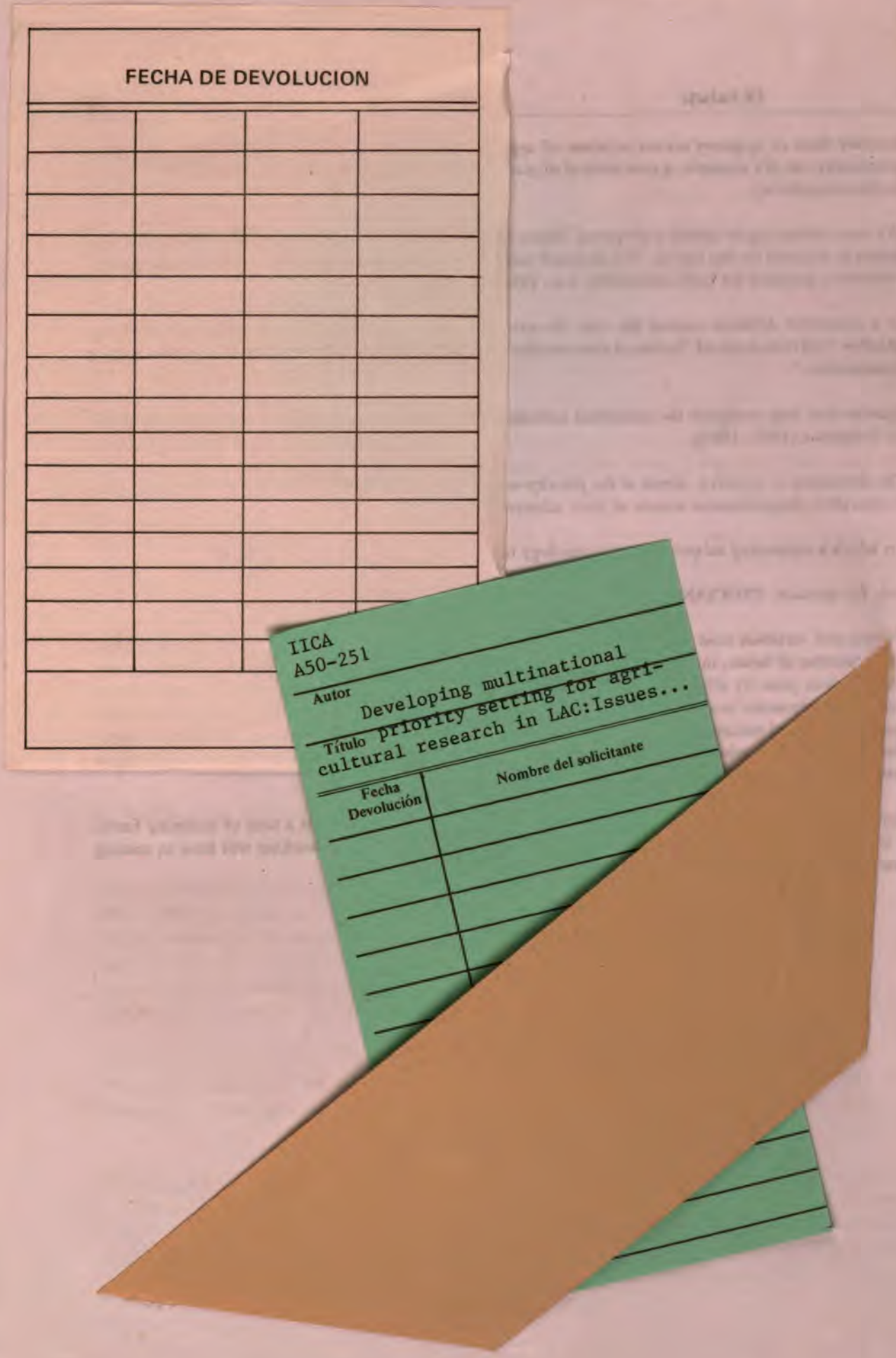
5. The discussion is selective, aimed at the priority-setting features of the PROCIs, and in no way intended to provide a comprehensive review of their achievements.

6. To which a supporting subprogram of technology transfer and communication was added.

7. See, for instance, PROCIANDINO (1989a and 1989b).

8. Criteria and variables used for crops/animals were the following: 1) product importance--i.e, production value, number of farms, import values, and nutritional content--2) equity--i.e.,demand price elasticity, self consumption, jobs--3) efficiency--i.e.,current research investment, relation to research by international centers, private sector incentives, future demand, relation with international prices--4) success probabilities--i.e.,yield gap and perceived success probabilities. Criteria for research fields were the following: resource abundance, problem relevance, current research expenditure, relation to international research, and success probabilities.

9. Limited of course by the costs of networking which remain high and critical at a time of declining funds. It is yet too early to assess the full impact in this regard that electronic networking will have in coming years but it may anticipated to be substantial.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