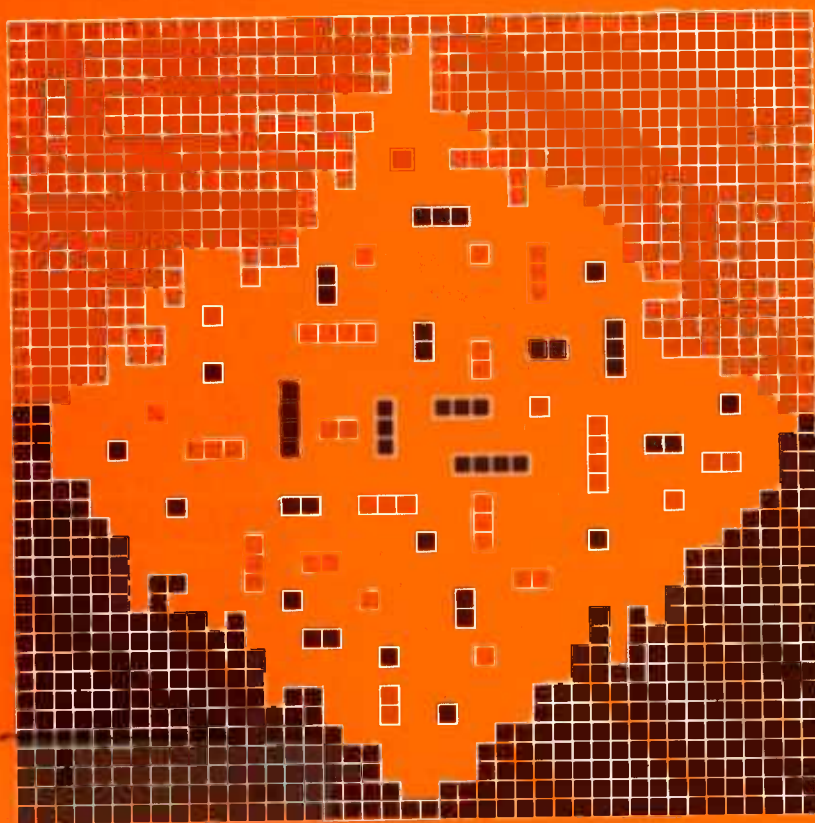

International Cooperative Information Systems

Proceedings of a seminar held in Vienna, Austria, 9-13 July 1979



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The Role of Specialized Information Services in Development

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The administration of technical and scientific information in the world has been a subject of frequent discussion. Two ideotypes in a centralization-decentralization continuum can be identified: the great monolithic centre that tries to collect, systematize, and deliver practically everything that is produced in a broad field of knowledge and, more recently, the decentralized network that includes highly specialized information centres that offer a wide spectrum of services and are linked together by fast and efficient communication means. It is the purpose of this paper to illustrate the latter — a specialized information network operating at the Centro Internacional de Agricultura Tropical.

The description that follows does not oppose larger information systems, such as AGRIS or AGRINTER; in fact, CIAT's commodity-specialized information centres participate in these schemes. However, the description does show that specialized information centres that are closely linked to research centres of excellence in a given commodity have a major role in promoting development not only as mere providers of needed information for research activities but also as means of building the basic human infrastructure in countries. The latter role permits scientific communities to behave as systems and not as unconnected and disorganized groups of elements.

First, a brief overview of the situation of technical information in Latin America.

Information: essential for research

Information-sharing is essential for successful research endeavours, not only to avoid duplication of efforts but also to obtain a multiplier effect sometimes called "a cross-fertilization of ideas."

Several communication and development models postulate three sub-processes to which distinct and sometimes institutionalized groups of people correspond. These are the generation of knowledge, its transformation and transmission, and its application and use. In the agricultural sector, for instance, knowledge is typically generated by scientists, usually in government or private research institutions; it is transformed and disseminated by "change agents" who belong to extension institutions or communication services; and it is applied and used by farmers.

This structural model also fits the more restricted system of scientific development. The one *sui generis* characteristic of this subsystem is that one group of people — scientists — assume the various roles of knowledge-generators, transmitters, and users. Where does information fit into this broad, structural scheme? Information is not an end in itself but an indispensable means to connect the elements of the scientific research system and make it work as a system and not as a heap of unconnected and disorganized parts.

Consequently, it is surprising that information and communication services are often totally divorced from research activities. If researchers have sometimes been criticized for creating “ivory towers,” perhaps librarians and documentalists are also guilty of creating “paper towers” because of a failure to recognize this cycle of knowledge as one single process.

Certainly, very valuable research results are produced, but they remain in the laboratories, the scientists’ offices, or secretaries’ files. Diffusion is minimal.

The Latin American scientist as information producer

Very little research has been done to determine how much information Latin American scientists produce, but the production of technical and scientific literature is recognized as low. A first study carried out by Rheineck and Diaz-Bordenave (1967) analyzed 34 scientists at La Molina University in Lima, Peru, in terms of certain institutional and personal variables that could have a bearing on their literature production. The results indicated that motivation seemed to play an important role in their publication rates. Personal motivation was low and, in turn, appeared to be based on a lack of perceived institutional incentives to publish. A majority of the scientists were not aware of the existence of any reward whatsoever for the effort of publishing an article.

In a follow-up study carried out by Diaz-Bordenave (1968) on a more international sample of 88 scientists attending a meeting of the Asociación Latinoamericana de Ciencias Agrícolas (ALCA), similar results were obtained. Based on this information, the author notes that the lack of motivation emanates from the scientist (interest) as well as the institution (incentives). Of the 88 scientists, 66 stated either that publishing is not necessary or that publishing makes a contribution but is not really necessary. The author concludes that certainly in Latin America no “publish-or-perish” ethic exists.

Publication infrastructure

In 1962 the Scientific Development Division of the Pan American Union and the Centro de Documentación Científica y Técnica de México, through a grant, supported a study of Latin American journals of science and technology. Despite the time lapse, the results of this study are still applicable (Pan American Union 1962): “Typically, scientific and technical journals published in Latin America are short of personnel. Selection and edition of articles, as well as other editorial functions, are usually carried out by scientists and professors in their free time, frequently free of charge. Budgets are usually small and printing and distribution costs are subject to unpredictable raises due to inflation. Runs are small and the reduced numbers of subscribers limit the income that would come from subscriptions and advertisements....It was found that around one-third of the journals did not have a regular frequency of appearance, and if they did, it was

seldom met in practice....It was also found that most journals had a low periodicity, quarterly at best, they were frequently irregular and of a reduced size (three out of every ten journals had less than 50 pages per issue)."

Ten years later, Gorbitz (1972) confirmed these results at a meeting of a group of technical editors in Puerto Rico. In addition, he noted the uneven quality of the contents, a high percentage of journals having a short life cycle and poor international distribution.

In spite of all these problems, six Latin American journals appeared in Lawani's list (1972) of the 50 most frequently cited journals in the tropical and subtropical literature. The list was later published in a more complete form (Brennan 1974). Because of the fundamental lack of motivation for scientists to publish, most Latin American technical and scientific journals are weak and constantly menaced. The infrastructure of technical and scientific publishing in Latin America is an illustration of the vicious circle of underdevelopment; it challenges Latin American documentalists to develop innovative systems adapted to the real situation to reach the appropriate audiences with pertinent information at the time it is needed.

The Latin American scientist as information consumer

The other side of the production/consumption equation is also low. Latin American scientists exhibit a low level of information-seeking behaviour, and in a study in 1967, I found out why: ease of access to pertinent information was the most important variable in the use made of libraries by a group of Colombian scientists (Monge 1967). My findings have since been confirmed by the success of the cassava information centre at CIAT. Thus, ease of access has become a guiding principle in our programme. Latin American scientists are eager to receive information in their fields of research, but the generally poor services offered constitute a barrier that produces a sense of futility.

In countries such as the United States, \$1 of every \$5 spent on goods, services, construction, and new machinery is allocated to information services; in contrast, in Latin America, libraries are few and are usually located in major cities, their collections are poor and outdated, their services are of the traditional type — the "cafeteria approach" to information management where the librarian or documentalist's function is to display materials for users to choose.

In summary, only a low percentage of the information produced in the developing countries ever reaches conventional publication channels, and only a low percentage of the information generated in the developed countries ever reaches the libraries and documentation centres of developing countries; the result is that Latin American scientists are minimally informed in their respective fields.

Consequently, the tasks facing the scientist's counterpart, the documentalist, are first to collect the so-called fugitive material, i.e., internal reports, mimeographed papers, etc., which contain valuable and up-to-date information, and second to link the vast amount of information produced and collected in the developed countries with users in the developing countries in such a way that the users are not bogged down with nonpertinent information. Finally, the documentalist must process, group, and disseminate information in such a way that it reaches the user directly at the appropriate time.

Consolidated information: a holistic approach

The CIAT approach to the task is through the concept of consolidated information, which not only includes the analysis of information but also the synthesis of the latest scientific and technical developments. The process of consolidating information includes an evaluative phase in which an expert *selects and analyzes* information for reliability and quality and then *condenses and fuses* the information in publications such as monographs, state-of-the-art reports, field manuals, etc.

This model is illustrated by the services offered by the cassava information centre at CIAT:

- *Monographs* on specific topics (for instance, *Cassava pests and their control* by A. Bellotti and A. van Schoonhoven) are prepared from the pertinent literature provided by the centre's abstracting service; these give the user a critical analysis of the subject by world experts.

- *Field manuals* are produced about practical problems such as diseases, pests, nutritional deficiencies, etc.; these are written in simple language and include colour illustrations so that they will be useful not only to the researcher but also to the farmer and to the extension agent.

- *Reproductions of published articles* are distributed; these are of articles that because of their importance deserve a wider distribution in Latin America than is usually accomplished by the journals. The reproductions are frequently Spanish translations.

- *Newsletters*, such as the *Cassava Newsletter*, are published about research in progress and other news in the field; in general, these promote cohesion through communication among researchers working on a specific commodity.

- *Directories* are compiled so that people can find out who is doing what and where, not only to identify consultants in specific areas but also to prevent duplication of research efforts.

- *Contents Pages*, a current awareness publication, is produced monthly; it lists the tables of contents of selected journals in animal sciences (covering 350 journals), plant sciences (covering 300 journals), and social sciences (covering 99 journals); it is distributed to some 2000 scientists in Latin America, who select articles of interest and request photocopies when the journals are not available in their local libraries. Although initially *Contents Pages* was distributed directly to individual subscribers, the documentation services unit is encouraging national institutions to act as distributing agencies within their countries. The hope is that the national institutions will become aware of the importance of disseminating information directly to users. At present, nine countries are distributing *Contents Pages* and are finding the results rewarding; for instance, the school of agronomy library at Universidad de Buenos Aires has almost doubled its output of photocopies since the CIAT *Contents Pages* were first distributed among Argentinian agricultural scientists as a service of the country's national information system.

- *Abstracting services* are also provided; scientific articles (published in journals or as manuals, research bulletins, internal reports, mimeographed papers, etc.) are analyzed in depth and summarized. Key words or subject-matter descriptors are chosen to be used for selective retrieval of the information later. Cards containing the bibliographic citation, key words, and abstract are distributed 10 times a year to more than 2000 scientists all over the world. On the

basis of these abstract cards, scientists can request photocopies of the complete articles. The documentation services cover four areas: cassava, in which the centre has the only known complete collection of everything published on this crop; field beans, limited to literature applicable to tropical environments; tropical pastures; and Latin American agricultural economics and rural development. The cassava and bean abstracts are published simultaneously in English and Spanish, whereas the others are published only in Spanish. Although the documentalists working in these areas are professionals in their respective fields, they have the collaboration of the scientists in the various research programs at CIAT. This symbiosis produces a beneficial effect for both the scientists who are supported by a rapid and complete literature service and the documentalists who can count on a consulting body of specialists to make an accurate analysis of the information.

- *Specific topic searches* are accomplished through a mechanized system based on specific descriptors. Searches are performed in an average 15–20 minutes, making it possible to answer queries the same days they are received. This service is widely used by scientists around the world. Requests received by cable from subscribers are answered immediately, by return cable, giving the numbers of the pertinent documents because subscribers have the entire collection of abstract cards at their disposal. In this manner, the CIAT collection of documents is being used for retrospective searches by users in distant countries with practically the same speed as if they were at CIAT.

- *Cumulative volumes* are prepared at the end of the year; the centre classifies the abstract cards into broad categories and publishes cumulative abstract volumes, which are distributed free to subscribers and sold to non-subscribers. To date, four volumes have been published on cassava, three on beans, three on Latin American agricultural economics, and one on tropical pastures.

Building infrastructures: scientific communities

As pointed out by Zaltman (1974), the so-called invisible colleges “function chiefly to provide additional, and very significant, informal channels of communication. They may also function to link powerful organizations and serve as an important mechanism for coordinating the allocation of resources in the field.” Zaltman also noted: “While social structures such as informal groups tend to emerge initially around existing channels of communication, they also react back upon the communication process. Invisible colleges appear to have a direct influence on the dissemination and utilization of scientific information and thereby indirectly influence the discovery of new knowledge.”

This, of course, describes the phenomenon observed mostly in developed countries where the formal infrastructure of scientific communications media is highly developed. In the developing countries, however, where formal channels of technical communications are generally weak (Gorbitz 1972; Pan American Union 1962), measures can be taken to foster the formation of scientific communities through a holistic approach of providing leadership in research as well as improving the communications infrastructure by fast, efficient information services.

Data that illustrate this point on the world scientific community of cassava workers have been reported elsewhere by my colleagues and me (Monge et al. 1979) (Fig. 1 and 2). Judging by the number of new publications and new authors

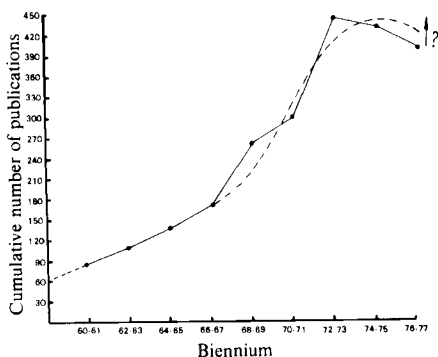


Fig. 1. Cumulative number of new publications on cassava, 1960-77.

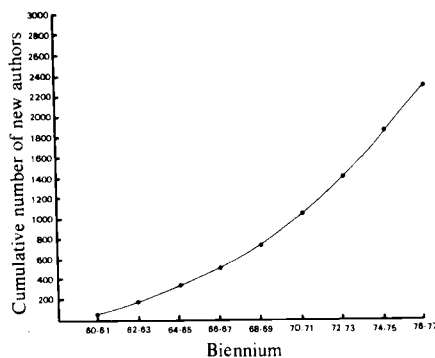


Fig. 2. Cumulative number of new authors publishing in the field of cassava, 1960-77.

appearing in the field of cassava, we stated that the cassava technical community is likely to have entered a stage of development in which increasing specialization occurs and most general problems are being solved (Crane 1972).

Furthermore, we believed: "Although it is obvious that no causal relationship can be inferred from these data as to the relative impact of CIAT's and IITA's cassava research programs and of CIAT's information activities in this crop, it is interesting to note that the major impetus of these curves parallels the chronological development of these programs. It is our interpretation that the growth of the cassava international community has been increasingly influenced by the emphasis given by international donor agencies such as IDRC; the leadership provided by the International Centers' research programs; and related informational activities such as documentation services, technical meetings and symposia, and publications all of which provide a sense of identity to the community" (Monge et al. 1979).

In a recent investigation of Latin American scientists with more diverse commodity interests, Kramer (1979) concluded: "What we are witnessing, then, is a situation wherein the critical elements for successful agricultural development are present...with the exception of a fully operational information infrastructure that allows for the integration of the various elements into one coherent effort."

The experience acquired with the cassava international community shows a successful attempt to provide a bonding element in the system.

John Woolston's (1977) proposal for AGRIS Tropical also points in the same direction and contains an organizational scheme that deserves careful consideration. After stating the emphases of AGRIS level one as being placed on obtaining a comprehensive inventory of new agricultural information and on speed of reporting, without including abstracts nor any deep indexing, he subdivides level two into two categories: level 2-A, illustrated typically by the Commonwealth Agricultural Bureaux documentation services in which the basic aim is to have a data base, usually computerized, and the publication of one or more abstract journals; and level 2-B "exemplified by the information services offered from the Cassava Information Centre at Cali, Colombia, the Tropical Grain Legumes Information Centre at Ibadan, Nigeria, the International Irrigation Information Centre at Bet Dagan, Israel, and the International Rice Research Institute at Los Baños, Philippines; and also by the data services to be offered by the International Network of Feed Information Centres."

Woolston's characterization of these "information analysis" centres parallels our model of consolidated information:

Each such centre is located where there is also a considerable research activity within the same subject scope as the information service, so that the products can reflect, not only what is found in the literature, but also the very up-to-date information and judgement that can only be obtained by interaction with research scientists. This combination of research activity and an information activity builds a true "centre of excellence" within the designated subject field.

A most important and interesting point in his proposal, however, is the idea of a coordinating body:

My proposal, therefore, is that FAO should follow something like the CGIAR-TAC [Consultative Group on International Agricultural Research-Technical Advisory Committee] pattern in providing a mechanism for the coordination of investments in specialized agricultural information services.... At the Annual Consultation of AGRIS Tropical, there would be present: (a) an independent chairman; (b) representatives of donor organizations investing at least \$ 250,000/year to improve information services in support of tropical agriculture; (c) one or two liaison persons designated by TAC from among its members or its Secretariat; (d) a number of information specialists from tropical countries (the number to be at least equal to the number of donor organizations represented); and (e) appropriate members of the staff of the AGRIS Coordinating Centre and such other individuals as they may designate to ensure adequate liaison with relevant cooperative activities at Level Two-A.

Accomplishments and future trends

The basic accomplishment of the cassava information centre at CIAT may be the introduction of a pragmatic approach to the handling of technical information in the Third World. Emphasis is placed on satisfying the scientists' needs rather than on the techniques for doing so, which at times may be more complicated than necessary. The consolidated information model for collecting and disseminating information on a commodity-specialization basis and producing services that reach the users promptly is being adopted at both national and international levels. It has attracted the interest of larger international systems such as AGRIS (FAO) and AGRINTER (Instituto Interamericano de Ciencias Agrícolas), and it may be considered a pilot model for coordinated information services for other agricultural commodities in the developing countries.

Because of the wide acceptance of these services, present activities are being directed increasingly toward training personnel for national documentation services, networking the documentation activities of the international agricultural research centres and other national and international organizations, and increasing the coverage of literature within the four selected areas.

In summary, it appears that experience and recent research on the topic of information and communication among agricultural scientists in the tropical belt are pointing toward the networking of research activities by means of strengthening the information infrastructure to produce rather tightly knit commodity-oriented research communities. The international centres have an important role in coordinating these networks, as has been illustrated by the work of the inter-

national cassava research community. All these efforts could, nevertheless, be better coordinated by an efficient mechanism of priority review and resource allocation similar to the CGIAR-TAC model.

At present, the trend toward highly specialized information centres seems to be the most viable solution to the information explosion, offering the best possibilities of reaching users rapidly.

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