

INTERNATIONAL CO-OPERATION PATTERNS IN EC FUNDED PROJECTS

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Introduction

Most industrialized countries have created specialized institutions dedicated to channel resources for the development of research in Less Developed Countries (LDCs) (1). These institutions have developed over the years a number of mechanisms for promoting research in LDCs. Gaillard (1994) presents an up-to-date review of the policies, mechanisms and institutions that industrialized countries have developed for promoting research in LDCs over the past 30 years.

These mechanisms take the form of:

- human resource development and training;
- development of physical infrastructure;
- development of project or programme support, and diverse forms of inter-institutional cooperation including collaborative research partnerships and networks (Veldhuis, 1993).

It is accepted that most programmes which favour collaborative research partnerships between North and South have a double effect. On the one hand, collaborative partnerships contribute to the strengthening of LDCs' research capacities in selected areas of knowledge. Collaborative research also improves the research capacity of teams in industrialized countries as they generate knowledge about research problems and those of relevance to LDCs. However, one of the difficulties inherent in collaborative partnerships is the complementarity of the teams. The different knowledge structures of the partners involved and the conditions necessary for the development of harmonious international research partnerships are factors which have not always been sufficiently recognized in evaluation of programmes dedicated to building research capacity in LDCs (Hicks, 1993/1994).

Donor organizations that support programmes of cooperation amongst institutions stress the need of addressing the symmetry of the relationships between research partners from LDCs and developed countries (Veldhuis, 1994). The asymmetrical nature of the relationship can be examined from a theoretical perspective, such as the one proposed by the historian George Basalla (1967) who proposed a model to map the

power relations existing within a collaborative research environment. His model frames research collaboration within the context of intellectual dependence and/or deference to the authority from the periphery to the centre; although somewhat dated, this view is still influential as evidenced by Schott (1993) in his analysis of international collaboration patterns in research leading to a globalization of science.

The present research examines international collaboration within the context of centre-periphery between LDCs and their research partners from the European Community. Specifically, the study presents an analysis of the productivity, the authorship patterns and the publishing strategy of projects sponsored by the European Community Programme, Science and Technology for Development (STD2).

The STD programme started in 1983. It specializes in the areas of Agriculture, Health and Nutrition. Research institutions from Less Developed Countries and from the EEC are eligible for participation in the programme. Since its inception until 1991 it has 797 projects, and has been evaluated every four years. The evaluations have shown the level of success that the programme has had in attracting research teams within the EEC member countries to collaborate amongst themselves (Moed, Bruin and Straathof, 1990). This inter-collaboration is a direct result of EEC policy, since one of the criteria for project selection within the STD programme is the involvement of at least 2 research teams from different EEC countries. Subsequent evaluations (Waast et al 1992), showed the high level of participation between European research groups and LDC groups.

The programme has undergone three phases. In its present phase, (1991-1994) the programme is designed to promote scientific cooperation between EEC research teams and LDC research teams. The objectives of the programme include the strengthening of research capacities in developing countries in order to enable them to become full partners in the development of knowledge. It also aims to support the development of sustainable European capacity in tropical research areas, and to improve the development of European R&D initiatives in LDCs. Finally, it aims to increase the impact of research on development (Gaillard, 1994; Waast *et al.*, 1992).

The present research examines the bibliographic output generated from 32 research projects in the medical sciences funded in the second period of the STD programme. The output is analysed from a bibliometric perspective. The objective of the paper is to determine the type of output generated by those projects, the publishing strategy followed by the research groups, the degree of international cooperation involved per project, and the level of potential international recognition awarded to each research group. The specific bibliometric procedures followed are described in the second section of this paper. Results and data analysis are presented in the third section. Finally, conclusions are presented in the fourth and final section.

Methodology

Bibliographic Database.

The research was conceived as a pilot study to examine methodological issues concerning a bibliometric analysis of data previously generated for the report entitled: Indicators and Survey of the Researchers – Science and Technology for Development

(STD) – a European Research Programme, presented to the Commission of European Communities DGXII by Dr. R. Waast *et al.* (1992). As part of that report Dr. Waast *et al.* requested heads of funded research projects to submit an account of publication activity stemming from their funded research under the STD Programme. The submission of publication accounts was voluntary.

Dr. Waast graciously facilitated access to these accounts of publication activity in order for the present research to take place. A total of 142 projects submitted publication accounts. Selection criteria were determined to select a purposive sample. The criteria were:

- project selected was in the health sector
- full publication account submission
- funded under the STD2 initiative.

Thirty-two research projects fulfilled the criteria and their publication activity was recorded in the database. Variables related to author productivity and research team productivity were operationalized. Likewise, variables related to the type of publication and status and visibility of the output were operationalized. Publications were coded according to type, status of the journal in which the article was published, number of authors involved, amount of contribution of each author, affiliation of authors and placement of authors within the published research.

Publications were classified according to eleven types: published articles, books, chapters in books, local conference presentations, international conference presentations, manuscripts, working reports, theses, guide-books, case studies, and videos.

Visibility of Disseminating Channels

The status of each journal in which articles were published was determined by examining its international visibility. The visibility of a journal has been related to the number of secondary sources that index it (Cano, 1993/1994). A journal-title search in the 1992 CD-ROM edition of *THE SERIALS DIRECTORY*, a reference source listing bibliographic characteristics of periodical publications produced the number and kind of secondary index and abstracting publications that indexed the journals selected for publication by STD funded authors. The assignation of journals to types is presented in table 1.

Journals of the highest visibility are those classified under Type 1. This classification is arrived at in a composite manner. In order to be classified as a Type 1, a journal has to be indexed by the Science Citation Index database (SCI). The inclusion of the journal in SCI alone qualifies it for assignation to type 1. However, SCI has been recognized as a database that is significantly biased in its inclusion policies in favour of English-language, US edited journals (Frame, 1977). Due to the predominantly European and international composition of the research teams it was important to include a mechanism capable of detecting publishing efforts in non-English language journals. Therefore, a journal was also classified as a type 1 journal if it was included in the database published by the U.S. National Library of Medicine (MEDLINE) or in *Excerpta Medica* published by a major European publisher. In addition, the journal had also to be included in Chemical

Table 1. Journal Status according to Visibility in Secondary Sources

Journal Type	Indexing & Abstracting Source
1	SCI or MEDLINE or EXCERPTA MEDICA in combination with CHEMICAL ABSTRACTS or BIOSIS
2	MEDLINE or EXCERPTA MEDICA or CHEMICAL ABSTRACTS or BIOSIS
3	ANY OTHER INDEXING & ABSTRACTING SOURCE
4	Not found in serials directory

Abstracts or Biological Abstracts (BIOSIS). In other words, journals that were not included in SCI, could also be classified as type 1 journals if they were indexed by MEDLINE or Excerpta Medica, as well as by Chemical Abstracts or BIOSIS.

MEDLINE and Excerpta Medica were selected as alternatives to SCI because they are both secondary reference sources spanning a representative portion of the world's output in medicine. In addition, each covers the medical field by nature of their respective publishers from a US and European perspective. The inclusion of Chemical Abstracts and BIOSIS is justified due to the inter-disciplinary topics of the funded projects where several were covering AIDS-related topics; although the reference sources favour to a certain extent epidemiological and clinical research. In addition, Chemical Abstracts has been recognized as a database whose coverage is more inclusive of the production of non-English language journals and in particular of journals from developing countries (Velho, 1987).

Country of Affiliation

The country of affiliation of the authors was determined by a combination of procedures:

1. examination of the information stated in the answered questionnaires;
2. bibliographic search;
3. procurement of the article.

The second and third procedures were necessary in cases where the author's affiliation could not be traced directly from information produced in response to the questionnaires. The databases used for the author searches were SCI, Medline or Biosis in their CD-ROM format. Finally, in some cases, a copy of the article had to be procured. The countries of affiliation were independently coded, but grouped for ease of analysis into 5 geographical regions: EEC member countries, USA, Latin America, Africa, Asia, and the Middle East. In the case of manuscripts, theses, or unpublished reports, only

the first two procedures were followed. Country of affiliation was inferred from previous publications in co-authorship with other members of the research team. Every possible effort was made to identify the country of affiliation where, due to the nature of the name of the author, (i.e. numerous homonym postings) this information proved uncertain. In such cases, country affiliation was determined by a combination of searches in biographical reference sources, and/or subject expert advice.

Co-Authorship

Placement and Collaboration Counts. First authors and secondary authors were separately identified. The placement of authors within the authorship line was determined following the same procedures as for country of affiliation. The individual productivity, or amount of collaboration per author was noted by two procedures:

- a count of the number of times each author's name appeared in the author line of any document produced by the project(s). This procedure yielded the number of co-operations per author,
- the assignment of a fraction of a publication to each co-author. The assignment of a fraction is endorsed by Narin (1976) when discussing reasonable ways of accounting for the contributions of authors in co-authored papers.

Results

Geographic Composition of the Research Teams

Research teams from every geographic region participated in the projects studied. A total of 482 individual researchers from 62 countries participated. However, the regional level of participation in the projects is unequal both in terms of project involvement and in terms of collaboration in the production of documents. There is a predominance of European teams both in terms of project involvement and in terms of collaborative manpower involved in the production of documents.

European teams participated in 31 of the 32 projects studied and contributed 68% of the total collaborative manpower force (N = 1252 collaborative authors). North American teams participated in 13 of the projects and contributed 4% of the manpower. African teams participated in 12 projects, and contributed 8% of the manpower. Asian teams participated in 10 projects and contributed 4% of the manpower. Latin American teams participated in 9 projects and contributed 11% of the manpower. Finally research teams from the Middle East participated in 3 projects and contributed 2% of the manpower. The distribution of the authors by geographic region is presented in table 4.

Publishing Strategy and International Visibility

The publishing strategy of the STD2 funded projects studied is clearly directed towards the production of journal articles, which are 56% of the output. This is followed by conference presentations, which jointly amount to 23% in its local and international modality. Manuscripts, working papers and reports amount jointly to 10% of the production. The distribution of documents in their respective types is presented in table 2. Articles are predominantly published in journals of the highest international

Table 2. Distribution of Types of Documents

Type of Document	Number	%
Articles	170	55.92
Books	4	1.32
Chapters In Books	18	5.92
Int. Conferences	46	15.13
Local Conferences	24	7.89
Case Studies / Videos	3	0.99
Manuscripts / Working Papers	31	10.20
Theses	8	2.63
Total	304	100.00

Table 3. Distribution of Articles over Type of Journal

Type of journal	Number of articles	%
1	125	74
2	21	12
3	3	2
4	21	12
TOTAL	170	100

Table 4. Distribution of Collaborations by Geographic Region

Country	Number	%
EEC	853	68.13
Usa	48	3.83
Africa	97	7.75
Asia	54	4.31
Latin America	139	11.10
Middle East	26	2.08
Not Identified	35	2.80
Total	1252	100.00

Table 5. Frequency of Collaboration per Author

Number of Collaborations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	19	23
Number of Authors	261	95	57	24	20	6	5	5	6	1	3	4	2	3	2	1	2	1

visibility, (i.e. type 1 journals). This type of journal attracts 74% of the article production. Type 2 journals account only for 12%. The distribution of articles over types of journals is presented in table 3.

3.3. Frequency of Collaboration

There were 498 researchers involved in the production of the bibliographic output of the 32 projects studied. On average, 4 authors were listed per document, however this average does not reflect the frequency distribution of collaboration of individual researchers in the production of the documents, as not all researchers contributed equally or were equally productive. The distribution of the collaboration per author is highly skewed. The majority of researchers 52% (261) collaborated only once to the production of a document whilst others exhibit multiple contributions in the production of several papers. In fact 41 authors, (8.23%) collaborated 6 times or more, in the production of documents. The involvement of a few individuals in the production of large number of documents is indicative of the density of network linkages of some scientists. The density of the linkages will be further explored in the discussion section. The frequency of collaboration of authors is presented in table 5.

3.4. Distribution of Authors within the Authorship-Line

In this section we examine the order in which authors are presented in the authorship line. There were 1252 authorship contributions. As mentioned on the previous section, there are on average 4 authors per document. However, the placement of the author's name is crucial in the determination of the credit assigned to each contributor. The position of first-authorship is particularly significant since the assignment of future citations will be given to that author, irrespective of the number of other co-authors listed in the authorship line. There is a predominance of European authors in first-authorships. In fact, European authors achieve first-authorship status in slightly over 69% of the cases. Latin American authors achieve the highest first-authorship status for the LDCs with 15%. African researchers achieve first-authorships in 6.5% of the cases, and Asian authors achieve it in 5% of the cases. These distributions are presented in tables 6 and 7.

Table 6. Distribution of First-Authorship per Geographic Region

Geographic Region	First Authorship	Secondary Authorship	Number
EEC	209	644	853
USA	5	43	48
Africa	20	77	97
Asia	15	39	54
Latin America	46	93	139
Middle East	5	21	26
Not Identified	4	31	35
Total	304	948	1252

Table 7. Percentage of First & Secondary Authors

Geographic Region	% First Authorship	% Second Authorship
EEC	68.75	67.93
USA	1.64	4.53
Africa	6.57	8.12
Asia	4.93	4.11
Latin America	15.13	9.81
Middle East	1.64	2.21
Not Identified	1.31	3.27
Total	99.97	99.98

Discussion of Results

The purpose of this paper was to analyse the type of bibliographic output produced by research projects financed under the European Community sponsored programme STD (2). Specifically, this paper sought to determine the extent to which European research teams and research teams from LDCs negotiated and achieved recognition for their contribution for the production of the output. The bibliographic output of 32 research projects was analysed. The variables identified were: type of publication, number of authors per document, nationality of the authors, visibility of the outlet chosen for publication, and placement of the authors within the authorship line. The data was analysed from a bibliometric perspective. In this section, the bibliometric analysis of the data will be discussed from the context of network development between researchers. A network is defined as a set of social actors and their relationships (Shrum and Mullins, 1988). Specifically, a research network is defined by Woolgar (1976: 234) as a "relatively high concentration of interest ties". Collaborative research implies the negotiation and agreement on a number of topics, namely, area of research, problem definition, methodology, division of labour, provision and management of funds, access to equipment, access to data and information resources, mode of dissemination of results, and award of recognition. It is in the interest of all teams involved in collaborative research to negotiate and reach satisfactory agreement on those areas if they expect to continue their collaboration in the future.

Leadership and Geopolitical Composition

On the basis of the data analyzed for this study, European research teams participated in over 96% of the 32 projects analyzed, and accounted for 68% of the collaborative manpower force. This in itself is hardly surprising since one of the criteria for project selection by the STD2 programme is indeed the active involvement of European teams. In fact European teams achieve a very high ratio of project leadership (94%); only two projects were headed by non-European scientists. The high involvement in project leadership is corroborated by Waast *et al.* (1992) in their larger analysis of the geopolitical composition of the teams participating in funded STD2 research. They report that European teams achieve the leadership of the projects in 90% of the cases. Again,

in this case, this figure is to be expected since the funding source is the EEC and one of the specific aims of the STD2 programme is to build-up European research competency in "tropicalist" research areas. In this respect the programme is indeed successful.

The projects show a very high acceptance rate (74%) of papers in journals of the highest visibility. This acceptance is in itself an indirect indicator of the quality of the research presented, and theoretically increases the international visibility of all the participating authors. However, the citations that such research accumulates will be assigned to the first author of the paper, therefore the position of first-author is of primary importance in receiving academic recognition. European authors achieve first authorship status in 69% of the cases and aim to publish their results in journals of the highest visibility since they published 86 articles (51%) in journals of the highest international visibility (type 1 journals) and only 13 articles (7.6%) in type 2 journals. Latin American first-authors published 20 articles (12%) whilst African first authors published 8 articles (5%) at the same level of international visibility. Nonetheless, European authors achieve the majority of first authorships in every category of journal. These results are presented in table 8. There might be a direct relationship between procurement/management of finances with first authorship positions. This relationship might seem plausible when one considers the very low level of project leadership exhibited by scientists from LDC. This hypothesized relationship is however not presently explored in this paper.

Rate of Return for Man-Power Involvement

Since to a certain extent, the allocation of first authorship might be an artefact of the selection criteria of the funding programme, it was interesting to examine the proportion of first-authorships achieved by LDCs in relation to their total collaborative man-power involvement. It must be noted that man-power involvement is probably the only variable that LDC researchers can indeed negotiate and control. The results are presented in figure 1.

In general, certain LDC regions achieve very satisfactory rates of return for their collaborative involvement. Latin American authors achieve the highest rate of first authorships (33%) in relation to their collaborative man-power involvement. There was a total of 139 Latin American collaborative authors and first-authorship status was achieved

Table 8. Distribution of Countries of First Authors over Types of Journals

Geographic Region	Type 1 JRL	Type 2 JRL	Type 3 JRL	Type 4 JRL	Total
EEC	86	13	3	16	118
USA	3	0	0	0	3
Africa	8	1	0	1	10
Asia	4	2	0	1	7
Latin America	20	5	0	3	28
Middle East	3	0	0	0	3
Not Identified	1	0	0	0	1
Total	25	21	3	21	170

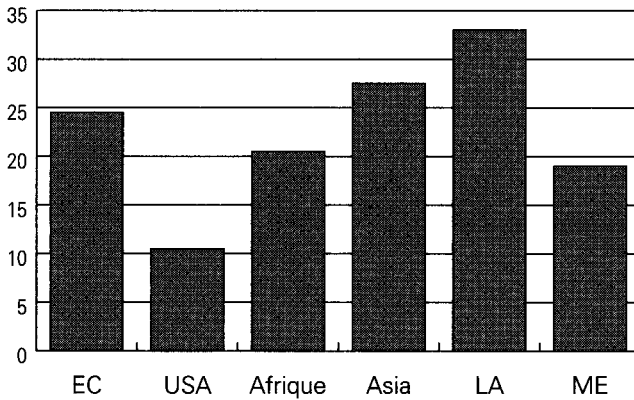


Figure 1. Proportion of First Authorship Relative to Collaborative Man-Power

in 46 cases. Significantly, Latin American authors were the only 2 scientists from LDCs that achieved a project leadership status. Asian authors follow closely behind with 29% first authorships in relation to their total collaborative manpower. Both these geographical regions show higher rates of return than those achieved by European authors, who reached first-authorship status slightly over 25% in relation to their total collaborative manpower.

These results show that at least in the health sciences, the negotiating skills and positioning within the research network of certain researchers in Asia and Latin America has achieved levels that warrant the visibility and international recognition of their work. The relatively high proportion of Latin American first-authorships in the health sciences might be attributed to three factors:

- (a) traditional interest for research in the bio-medical area reported by Krauskopf, Pessot and Vicuña (1986) and increased governmental support to research;
- (b) increased regional and international visibility of bibliographic output due to the development of regional databases such as LILACS, developed since 1987 by the Panamerican Health Organization. This database, distributed in *CD-ROM* format stores the bibliographic output of Latin American research in the health sciences and insures access to primary documents throughout the region (Brito, 1987). The availability of a regional database, disseminating health sciences research within the region should increase the visibility of research groups, and of the research itself, although this direct relationship has not been statistically determined;
- (c) increased collaboration of Latin Americans with other research partners. Narvaez-Berthelemot *et al.* (1992) have documented increasing levels of research collaboration with developed countries since 1981, notably the United States, France, Great Britain, Germany, Canada, Italy and Spain, in that order.

Network Nodes

Another aspect that was considered important to examine was the productivity of authors who collaborated in the production of six or more documents. These authors did not always achieve first-authorship status, but participated actively in the production of documents. These are authors who might be considered the "nodes" or the "stars" within their research groups and networks, by virtue of their collaborative involvement. The results are presented in table 9. Thirty-two European authors belong to this category. In most cases it seems that European "star" authors exhibit a collaborative behaviour and a deferment of direct academic credit in favour of other members of the research team. This behaviour seems in accordance with the "noblesse oblige" behaviour of established scientists (Ben-David, 1971). Only in 2 instances, did European "star" authors insist majoritarily on positions of first-authorship, (see authors 4, and 34 in table 9). These two scientists insist on being first-authors over 70% of the time.

Scientists from Latin American constitute the largest LDC group of "star authors". Five authors belong to this category, and their behaviour is evenly spread between first and secondary authorship. Three authors from the African region are included in this category. Their behaviour, however, is mostly associated with a deferment of first-authorship positions.

Concluding Remarks

On the basis of the data studied for this pilot project one can conclude that the STD2 programme is successful in eliciting collaboration and manpower involvement of European researchers in "tropicalist" research. The funded research groups (predominantly European-based) publish their results in highly visible journals, and their authors are strategically placed to receive international visibility and academic credit.

Gaillard (1991) has noted that one of the recognized ways of encouraging the development of an LDC academic community is to foster the interaction of some of its academic members with scientists from the centre. The interaction can take the form of postgraduate studies abroad, bilateral sabbaticals abroad, conference attendance at international meetings, and cooperative research and publishing. The STD2 programme clearly offers the possibility for cooperative research and publishing interactions to take place. There is undoubtedly a bilateral learning experience involved in any cooperative research endeavour. In that sense STD2 does contribute to the development of an academic infrastructure in LDCs.

However, this learning experience enters the realm of tacit knowledge for the researchers involved and remains unaccounted for, and difficult to operationalize and quantify. According to scientific and technical statistical sources based on national counts compiled by UNESCO and other international organizations, trained technical and scientific personnel in LDCs is scarce (Unesco, 1993). This scarcity means that although certain scientists from LDCs, (possibly the research team leaders) might be able to interact and cooperate with their European counterparts on equal terms, the other members of the LDC research team might not.

Unfortunately bibliometric methods do not allow for the possibility of addressing the issue of the task allocation and direct level of research performed by individual

Table 9. Productivity of "Star Authors"

Author	Country	Region	Sec. Author	First Author	N. Docts.	% of First Authorship
1	ZAI	3	10	6	16	37.5
2	RCA	3	10	1	11	9.09
3	RCA	3	9	1	10	10
4	BRA	5	7	0	7	0
5	VEN	5	3	4	7	57.14
6	VEN	5	9	3	12	25
7	VEN	5	5	2	7	28.57
8	VEN	5	5	1	6	16.67
9	FRA	1	13	1	14	7.14
10	BEL	1	5	1	6	16.67
11	GER	1	4	13	17	76.47
12	BEL	1	5	1	6	16.67
13	BEL	1	7	2	9	22.22
14	BEL	1	9	0	9	0
15	FRA	1	11	1	12	8.33
16	UK	1	4	2	6	33.33
17	NL	1	6	0	6	0
18	BEL	1	21	2	23	8.7
19	NL	1	12	4	16	25
20	FRA	1	0	14	14	100
21	NL	1	10	3	13	23.08
22	NL	1	8	0	8	0
23	FRA	1	6	2	8	25
24	UK	1	9	4	13	30.77
25	UK	1	8	1	9	11.11
26	NL	1	6	2	8	25
27	UK	1	7	0	7	0
28	GER	1	9	2	11	18.18
29	UK	1	11	0	11	0
30	FRA	1	9	0	9	0
31	GER	1	8	4	12	33.33
32	UK	1	4	5	9	55.56
33	BEL	1	2	5	7	71.43
34	FRA	1	8	0	8	0
35	UK	1	17	2	19	10.53
36	GER	1	5	4	9	44.44
37	UK	1	3	3	6	50
38	NL	1	12	2	14	14.29
39	FRA	1	5	3	8	37.5
40	ISR	6	11	1	12	8.33

research teams. Bibliometric methods have the tacit assumption that the hierarchy expressed by the authorship line is a reflection of the level of research involvement; however, this is an assumption that can only be corroborated with in-depth case-study qualitative research. It is therefore not possible to assert on the basis of the data analysed whether the involvement of the LDC contributing groups was essential to the development of the research, or whether it was marginal, and a product of tokenism. This is an area where future research is needed, although Waast *et al.* (1992) have presented pioneering research in this area (2).

Extrapolating from the data of this pilot project, the STD2 programme favours the involvement of "elite" scientists from LDCs capable of contributing to output published in highly recognized, commercially produced journals. However, there seems to be no concerted effort to make the information produced available within the geographical region of the LDC partners. There is very little effort channelled to publications printed in LDCs, or to the dissemination of results in peripheral publications, or in non-traditional media. This is illustrated by the fact that in an output of 3040 documents there were 8 theses produced, and only 3 guidebooks and 1 video related to preventive medicine.

The general lack of interest to publish in journals of peripheral nations or in languages other than English is a feature that is common to scientists from the periphery as well as to scientists from the centre. This might be due to the lack of bibliographic control, visibility, and the somewhat insular character of the journals (Cano, 1993). However, the internal mechanisms of the reward systems for science prevailing within specific LDCs might also exert an influence in the choice of dissemination media. Certain countries in Latin America have instituted policies carried out on a national basis, to reward "elite scientists" for the publication of articles in specific journals pre-selected by a coalition of science administrators, science advisers and, subject experts. This practice encourages the generation of knowledge and the publication of documents geared to mainstream international audiences but it might also condition the types of problems to be researched (Gordon, 1979). Moreover, this practice undercuts the development of local journals, which have the potential of acting as viable local dissemination mechanisms and as information outlets for local invisible colleges. In the case of Mexico this system has led to considerable controversy (Schoijet and Worthington, 1993).

One of the recognized problems in the daily experience of scientists in LDCs is the lack of information sources within a suitable information infrastructure (Gordon, 1979). The STD2 programme might seek to design guidelines stressing the need to raise the awareness of European researchers of the condition of the information infrastructure in LDCs, and if voluntarily adopted might facilitate research teams from LDCs to negotiate the choice of disseminating outlet. The voluntary adherence to these guidelines would not hinder the dissemination of results in highly visible international outlets, but would ensure that at least a portion of those results might be made available within the local framework of the LDC partners.

Alternatively, the results could be made available in electronic format and disseminated through e-mail journals and discussion groups through the Internet. The spread of telecommunication networks throughout the world has facilitated the dissemination of

information in a paper-less format, through electronic channels (Cerf, 1991). Refereed electronic journals are no longer the exception (Garfield, 1991 ; Taubes, 1993), and this electronic form of dissemination has viable possibilities for LDCs in terms of speed of retrieval of documents, speed and breath of dissemination of research results, and relatively modest costs when compared to the costs of traditional formats of accession, storage, dissemination and retrieval of printed information.

Guidelines for the dissemination of research results produced by STD2 via refereed electronic journals and discussion groups imply an approach that encompasses the application of information technologies within the larger framework of a European information policy. Moore and Rowlands (1993) have reported on the plans for the fostering of an Information Policy Support Network on a European level. It is only to be hoped for that the eventual formulation of an EEC information policy will take into consideration the need for an equitable access to information for developing countries.

The present pilot study has raised a number of questions that need to be addressed in order to present a clearer picture of the mechanisms that condition North-South research cooperation. There is a need for longitudinal studies that address the way in which research topics are negotiated. Similarly, case studies are needed to examine the extent to which the desired partnership and subsequent task allocation is a result of tokenism and an artefact to secure funding, or due to the genuine need for the expertise and knowledge of all the collaborating partners. These problems remain largely un-researched although it is precisely these intimate, detailed aspects of the research process that might provide the information necessary for science-policy decision makers to design programmes to improve the chance of more equitable North-South research cooperation to take place.



NOTES

- 1) The following institutions are given as examples of specialized organisations channelling research funds into LDCs: International Development Research Center, IDRC in Canada; diverse programs within the U.S.A.I.D in the US; the Centro de Cooperacion Iberoamericana in Spain; or the Advisory Council for Scientific Research in Development Problems, RAWOO in The Netherlands; the International Foundation for Science in Sweden.
- 2) See also Gaillard and Schlemmer "Chercheurs du Nord, chercheurs du Sud: itinéraires, pratiques, modèles – un essai d'analyse comparative" in Volume 6.



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