

EVALUATION OF THE SECTORIAL PROGRAM OF PUBLICATIONS IN SCIENCE AND TECHNOLOGY FINEP/SCT/BRAZIL

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ABSTRACT

The present study aims to evaluate the programme performance from 1983 to 1989 and its initial proposal of having for each area of knowledge at least one scientific journal with an international pattern of quality. Here are delineated the profile of the financed journals and being verified quality data indicators such as: circulation, periodicity, graphic pattern, standardization, type of publisher, editorial body, content structure, selection of mechanisms and collection of papers indexed and distribution. In this context we also intended to verify the programme goals such as: an upgrade in the level of quality, form and matter of these journals and an increase of its disclosure in the country, and abroad by comparing quality indicators when starting the financing and after five years.

RESUME

Le but de ce travail est d'évaluer un programme d'aide à la publication (1983-1989) et sa proposition initiale d'avoir, au Brésil, pour chacun des domaines de connaissance au moins un journal scientifique de qualité internationale. Les caractéristiques des journaux financés et leur qualité sont passées en revue à l'aide d'indicateurs tels que la circulation, la périodicité, le graphisme, la standardisation, le type d'éditeur, le comité de rédaction, la structure du contenu, les mécanismes de sélection, les modes d'indexation et de distribution. Les objectifs du programme ont également été vérifiés en s'attachant particulièrement à la promotion de la qualité, la forme et le contenu, la circulation à l'intérieur et à l'extérieur du pays à l'aide d'indicateurs de qualité mesurés au début du programme et après cinq années.

INTRODUCTION

The Sectorial Program of Publications in Science and Technology is carried out by FINEP - Studies and Projects Financing Agency, a subordinate of Brazil's Federal Secretary of Science and Technology.

Investment in the development of national scientific/ technical literature is the primary philosophy of this program, considering that publication of research

results is part of the process of communicating knowledge and constitutes an integral step in Science and Technology development .¹

The policy of support for scientific journals was established with the objective that Brazil would shortly have at least one journal with international prestige in each field of study. ² An estimate of the number of technical/scientific journals existing in 1982 in Brazil is about 1,600.³

The objective of the Sectorial Program of Publications in Science and Technology is to improve the form and content of the journals and to broaden the scope of distribution of scientific and technological information in Brazil and abroad. Its aim is to raise the present level of quality and distribution of 50 journals: 20 already known abroad and 30 relatively unknown abroad.

Publications are selected for financing by FINEP based on profile indicators such as: technical/scientific and administrative autonomy, quality of editorial policy, graphic presentation, periodicity, content and distribution.

The objective of the study was to evaluate the Program based on the profile indicators and on a comprehensive analysis aimed at characterizing standards of quality of the financed journals in relation to international standards, their performance in the publishing aspects and dissemination of scientific information, as well as each journal's distribution.

METHODOLOGICAL PROCEDURE

Period of financing and representativity of subject field were the criteria that defined the sample which was composed of 17 journals with at least five years of financing, representing 75% of the subject areas, covering six years from 1983 to 1988 (Appendix I). Classification by area is as follows: CET: Pure Science, including Earth Sciences; E: Engineering; CA: Agricultural Sciences; CB: Biological Sciences; CS: Health Sciences; CH: Human Sciences; CSA: Applied Social Sciences; LLA: Linguistics, Literature, and Fine Arts.

Materials analyzed in this study were forms from FINEP's archives submitted every year by editors applying for financial support from this agency. Active editors during the study period were interviewed, as was FINEP's representative on the Editorial Committee at the time the Program was created. The material analyzed was also complemented by texts of the Sectorial Program of Publications in Science & Technology and documents related to scientific information policy.

RESULTS

Profile of the scientific periodicals

Table 1- General Information - presents the profiles of the journals that belong to the sample, taking into consideration extrinsic data such as: subject field, periodicity, number of copies printed per edition, number of published papers per issue, initial year of publication, place of publication - journal's main office-, publishing institution. Scientific periodicals are mainly concentrated in the areas of CET and CB. The number of printed copies per journal edition averages around 1,800.

Table 1. General information

Area	No. of the Journal	Periodicity	Copies per Edition	Published papers per copy*	Initial year of publication	State	Publishing Institution
CET	08	Quarterly	5,000	8	1971	SP	SOC
CET	04	Quarterly	3,500	9	1971	RJ	SOC
CET	12	Quarterly	3,000	15	1978	SP	SOC
CET	09	3 times/y.	2,000	4	1982	RJ	SOC
CET	07	Bimonthly	700	8	1982	SP	SOC
CS	02	Quarterly	3,000	17	1981	SP	SOC
CS	10	Quarterly	1,400	12	1967	DF	SOC
CB	06	Quarterly	2,000	16	1978	SP	SOC
CB	13	Quarterly	1,600	6	1982	SP	SOC
CB	11	Quarterly	1,100	11	1970	SP	SOC
CB	3	Quarterly	650	15	1954	SP	SOC
CA	16	Bimonthly	2,000	10	1948	MG	EI
CA	05	Quarterly	900	17	1976	DF	SOC
E	15	Bimonthly	1,200	6	1982	RJ	SOC
E	01	Quarterly	1,000	4	1979	SP	SOC
CH	17	3 times/y.	1,300	8	1966	RJ	EI
CH	14	3 times/y.	1,000	5	1975	SP	SOC

SOC: Scientific Society; EI: Educational Institution

*Refers to the average of 1984, 1985, AND 1986

The average number of published papers in the journals is ten articles per issue. The fields with a larger number of published articles belong to Biological Sciences, Health Sciences, and Agrarian Sciences. Periodicity of the majority of the journals is quarterly. Journals have high standards of graphic quality and adhere reasonably well to technical norms of scientific publications such as: experience, summary, abstracts and other references. Some journals provide

titles and abstracts in English and half of them indicate in the summary the types of articles contained in the journals. Most of the analyzed journals are edited by Scientific Societies. They are headquartered in the southeastern region (77%), in the states of Sao Paulo and Rio de Janeiro, and were formed in the seventies.

Editorial structure

Practically all the journals have an editor, generally assisted by two associate editors. The editors are not remunerated and they divide their time between the journal and academic functions. In most of the journals the editor is helped by the associate editors with the tasks of pre-selecting the articles, choosing referees and deciding which articles to publish. The editorial board is formed by qualified researchers, serving on a permanent basis or in renewable terms, fulfilling functions that overlap other levels of the editorial structure. They analyze manuscripts, select referees, discuss editorial policy or simply lend prestige to the journal. These functions are aggregated in some journals and they are exclusive in others.

The figurehead function appears exclusively in three periodicals. The referee function appears in three others. For the remaining journals the editorial council assumes the various functions described. The editor and associate editors are familiar with practically the entire scientific community in their respective areas and it is through this knowledge that the referees are selected. The number of referees who judge the articles varies from one to three, depending on each editor's needs.

Nine journals (56%) publish their articles based on the formal opinion of two referees. Four (25%), publish based on three opinions, and three journals (18%) publish based on only one formal opinion.⁴

Quality control

Most of the journals are intended for the community of specialists with a graduate degree or higher. Some journals also try to reach the undergraduate community, reserving page space for undergraduate research.

Scientific journals dedicate an average of 77% of their page space to original articles concerning research results; 5% to theses summaries and communications, and 8% to reviews.

All the periodicals analyzed adopt the evaluation by peers system for at least 80% of the journal, since the other 20% is dedicated to reviews and communications that do not necessarily go through the referees. Seven journals (44%) adopt the quality control by peers system for all the articles. For the other periodicals the control of the review articles, communications, and thesis summaries are done according to the criteria of each editor. An attempt was made to group data related to the academic background and degrees as well as the

institutional origin of the consultants, with the objective of verifying the qualification level of the people involved with quality control of the journals.

Results of the analysis of this data should be interpreted as indicators of a tendency of the referees' academic qualifications, since only four gave sufficient information for the intended analysis, relative to the last year of the studied time span.

Academic background (Table 2) includes degrees at the undergraduate, master's or doctorate level or equivalent. 61% of the personnel involved with evaluation of the articles in the CET area have a doctorate.

Table 2. Academic qualification of the specialists involved with evaluation

Area	Journal number	Graduate (%)	MS (%)	PhD (%)	NI (%)	Total
CET	07	-	3 (18)	12 (70)	2 (12)	17
CET	08	7 (17)	9 (21)	26 (62)	-	42
CA	16	8 (6)	56 (36)	91 (54)	-	155
CA	05	11 (15)	15 (20)	48 (65)	-	74
TOTAL (%)		26 (9)	83 (129)	177 (61)	2 (1)	288 (100)

NI: not Indicated. Data from 1988.

High percentages of personnel with master's degrees (21, 36 and 20%) can be explained by the journal's policy that addresses the undergraduate level. In this case undergraduate authors' papers probably would be judged by referees with master's degrees.

Table 3 covers the institutions that granted the degrees to the personnel related to the four journals listed in Table 2 who are involved with evaluation. Table 4 analyzes the institutional origin of personnel involved with evaluation who hold a Ph.D. The data show that 39%, or the majority, of the referee's titles were earned abroad and that 24% were earned at USP - Sao Paulo University. 37% of the titles are distributed among other schools, the majority of which are located in the southeastern region of the country. It was observed in the respondents' data that schools tabulated as "others" are also located in the southeastern region of the country. The concentration of titles earned in the southeastern region of the country coincides with the regional origin of the journals.

Table 3. Origin of personnel involved with evaluation

Area	J. No.	U S P	U N E S P	U N I C A M P	U F R J	U F F	U F M G	U F V	U R E M G	U F R G S	Un B	U F B A	O T H E R S	A B R O A D	T O T A L
CET	07	8	-			1	4	9	22						
CET	08	19	4	-						4	-	3	3	9	42
CA	16	20	6	1	6	4	39	2	2	3	-	-	5	67	155
CA	05	22	-	3	-	-	-	7	-	2	6	-	4	30	74
Total (%)		69 (24)	10 (4)	4 (1)	6 (2)	4 (1)	39 (14)	9 (3)	2 (0)	9 (3)	6 (0)	4 (1)	16 (6)	115 (39)	293 (100)

Table 4 demonstrates the tendency of utilizing evaluators who belong to the same institution that publishes the journal and houses its headquarters, which characterizes an endogenous system.

Table 4. Institutional origin of Referees with PhD degree*

Area	Journal number	Editor's & Journal's headquarter institution	Other institutions	Foreign institutions	Total
CET	07	8 (66%)	3 (26%)	1 (8%)	12
CET	08	13 (50%)	13 (50%)	-	26
CA	16	23 (25%)	64 (70%)	4 (5%)	91
CA	05	6 (13%)	42 (87%)	-	48

Data from 1988.

Considering that the editorial policy is a group of measures that set the general directions for the journal and constitute an indicator of quality, the manner in which the journals make these indicators explicit was analyzed.

It was found that in general the editorial policy is not presented clearly in the journals. Questioned about the importance of their publication, more than half of the editors think that the editorial policy of their journal is obvious to the scientific community, making its clarification unnecessary.

Journals that mention some indicators do not necessarily publish others. Only one of them clearly explains its editorial policy along with its reference system.

In the majority of these Journals the review articles are generally requested from authors of notable knowledge, with the objective of lending prestige to the periodicals and to stimulate the quality of articles written for the journals, or even to reach the minimum number of articles required to fill the journal.

Dissemination policy

The distribution of the periodicals in the international scientific community is a basic factor in the establishment of editorial policy. The main objective of the scientific journals is to be the channel of distribution for the nation's researchers. This distribution should reach national and international scope. Editorial practices related to the integral elements of a journal's dissemination policy have been demonstrated. They are: the publication's language, indexing, and distribution.

Language and indexing

The periodicals accept articles in Portuguese because this is the official language of the country, but they would rather have and motivate the authors to publish in English because it makes the journal's indexing and circulation abroad easier. Journals in the humanities are an exception. They are published in Portuguese and invest in well-elaborated abstracts to solve the language problem regarding international circulation.

Despite the fact that on one hand English facilitates international circulation, on the other hand it acts as an obstacle to internal circulation, because there is a large group in the community who are not sufficiently fluent in the language to submit articles in English. Language, therefore, constitutes a delicate problem to be faced by the editors.

The editors believe that being listed in international indexes is one of the most significant elements for a journal's visibility abroad, and they consider it a factor of the journal's quality. The indexing process is considered part of the editorial policy regarding distribution of the periodical in the international community. Fifteen (88%) of the seventeen periodicals analyzed are listed in index journals, national and international reviews of current summaries. Two journals, representing 11%, are not indexed. 86%, or thirteen periodicals, are listed in the main index sources of their respective fields of knowledge, all foreign. The majority of the periodicals have, on the average, five listings with a predominance for indexes of North American origin. Current Contents is cited by six editors as the most important index, followed by the specific index for the journal's field of knowledge.

Distribution

The periodicals are distributed through subscriptions, donations and exchanges. Among the journals published by Scientific Societies, about 70% of each edition is distributed among members either free of charge, or by subscription. Half of the Scientific Societies include a journal subscription with payment of annual dues. Societies that do not follow this procedure distribute the journals to their members cost free.

Journals published by educational institutions distribute their issues mainly through donations and have a very low number of subscribers. Journals published by educational institutions end up with the highest level of unsaleable copies in comparison to all other journals. These levels are considered high (44% and 24%) when compared to the average (around 14%). Library subscriptions represent an average of about 2% of a journal's total number of copies printed per edition. Subscriptions by foreign libraries are even lower. The significantly low percentages representing journal subscriptions by libraries reflects the reality: the country's libraries, in general, do not subscribe to national periodicals. When they are interested in the periodical, they request a donated subscription because of the lack of resources.

Periodicity and regularity

The vast majority of scientific journals do not adhere to their own publication deadlines. When regularity is maintained, albeit off schedule, past delays can never be recovered. The editing time for articles was analyzed with the aim of verifying the cause of the journals irregularity. The process takes twelve months on the average. The time between an article's submission and acceptance by the sampled journals averages 5 months and the time between acceptance and publication is seven months. The delay occurs during the production process, involving the journal's infrastructure and graphic techniques. The most frequent problems faced by the editors regarding production time goes back to the matter of resources. The journals depend on outside financing for survival. Frequent delays in liberating funds, aggravated by rising inflation, jeopardize payment of freelancers. As a result there is a general delay in publication and the journal's periodicity is compromised, which in turn compromises its credibility within the community. The editors see referees' delay in evaluating papers as a problem that also delays publication.

The journals with a smaller infrastructure, in general an administrative staff of one or two people, are the same ones that have longer turnaround times in the second phase of the publishing process. The majority of periodicals have, besides a minimal staff, minimal equipment to automate the simplest tasks. Only four journals have adopted the process of electronic publishing and even so, not all of them are completely equipped. Three journals work in a very simple fashion, generally with just the editor and some sporadic freelance work.

CONCLUSIONS

Scientific journals analyzed in the Sectorial Program of Publications in Science and Technology are characterized by being rather young, averaging 15 years in existence. Most have a quarterly periodicity and the average number of copies printed per issue is 1800. They are based primarily in the southeastern

region where more than half of the research in the country is concentrated.⁵ The majority are published by Scientific Societies (which are also relatively young) that guarantee the technical/scientific autonomy desired by the Program. An average of ten articles are published per issue, with 80% of the articles being original research results and the other 20% being review articles, communications, and thesis summaries. Regarding form, the journals have graphic design, structure, references, and standards appropriate for scientific periodicals. The publishers are aware of the importance of format in keeping with the elements of universal standards.

The scientific journals that were analyzed exhibit an editorial structure similar to the more prestigious international journals, which serve as models for the publishers. The editorial staffs are made up of highly qualified researchers and the editorial council is well diversified and representative, contributing to a journal's quality. The peer evaluation system is adopted by all of the analyzed journals. They are listed in the principal indexes of their fields of study, which presupposes the potential for adequate distribution. It can be concluded that the journals supported by the Program under these criteria are in accord with universal standards of quality in respect to form, structure, and quality control, fulfilling the profile indicators in the Program. The journals reflect the dimension and capacity of production in the scientific community, of which they are a vehicle.

In relation to editorial practices, the journals present characteristics which are slightly divergent from the expected model. If they all boast a diverse editorial council made up of renown researchers, for many this structure is a mere formality. The editorial council avoids its basic functions of discussing the journal's policies and aiding the editors in decision-making, which are built-in mechanisms to guarantee high standards of quality.

The journals have other unique characteristics which are related to their origin. The Scientific Societies that publish the journals are strongly connected to the educational institutions of the editors (all of whom are practicing researchers) through the editors' academic positions at the institutions and through their prestige for having arranged a headquarter site for the journal. The Society and the journal (for those that have headquarters) share the same space in a small room at the university where the editor gives class. The editors, in turn, divide their time between the university and the journal. Although the Scientific Society's structure guarantees the changing of editors resulting from periodic elections, there is in reality a tendency for the editor's permanence once he has been re-elected several times.

The publishers of scientific journals face such adverse conditions that a new editor is generally chosen from the same location as the previous editor. This practice is probably followed to prevent the journal's demise through the deterioration of the established infrastructure, which, however minimal, is the only one that exists. It was observed that the journals that do not make use of permanent headquarters are the ones that have interrupted production with each

new editor. The lack of a structure that guarantees discussions by the editorial council, the permanence of editors on reputation, or the continuation of editors from the same institution, in combination with the tendency to use a concentrated group of evaluators, also from the same institution, all add up to characterize the endogenous system which is generally criticized in the journals published by educational institutions. This condition deserves the Program's attention concerning the decentralization of this model.

The dissemination of the periodicals also deserves a careful look. On one hand the scientific journals are the channels of dissemination for national scientific production, publishing the work of a great number of researchers who are not able to publish abroad. On the other hand, they cannot do without researchers of international influence, and they must see that the journals reach the best researchers abroad so that our science can enter the international circle. In this sense it is necessary to reconcile the means to attend to an internal as well as an external public, represented by different levels of development. Some periodicals, according to characteristics determined by certain fields of study, aim to reach a readership at the undergraduate level, further complicating the problem of distribution. Besides the problem of reconciling various levels of qualification within the readership, language constitutes an obstacle to international communication.

Since the official language of the country, Portuguese, is not read in the countries that are ahead in research, the editors prefer to publish articles in English. Articles in Portuguese are accepted, but the authors are encouraged to submit manuscripts in English. This practice is good for distribution abroad, but it is not the best solution for internal distribution because a large section of the scientific community is not fluent in English.

It is also true that the journals publish few articles written by their own country's eminent scientists. These authors generally publish abroad, where their peers are located. When they publish internally, they are usually reviews or articles with a specific motive, written on request from the journal. In reality, national periodicals are not their first choice. Journals that also target the undergraduate level have this problem aggravated if they intend to maintain contact with the international community.

The inclusion of chronograms in the publication is an indicator of quality that permits the journals to enter the international scientific community. However, Brazilian scientific journals face a reality that has not provided the means for them to overcome their difficulties to keep their deadlines. Half of the periodicals analyzed take an average of seven months to publish an article; the other half take 14 months.

The journals depend on governmental resources for survival, but the funds are invariably liberated after delays and losses to inflation. The absence of infrastructure in terms of staff (in general two or three people produce a journal) and the absence of adequate, modern editing equipment complete an amateurish picture; nevertheless, the editors persevere in publishing the journals in the face

of all difficulties. The Brazilian scientific society is in its adolescence. At fifteen years of age it still has not matured. It does not possess a sufficient number of qualified researchers to hold on its own before international science. There are a few exceptions: a small group has earned distinction in the more traditional research areas or in new specialties, but nothing more.

The social stratification of Science produces a culture of elites. This culture is reflected in the absence of prestige given to national periodicals by the researchers themselves, with repercussions reaching the organizations that finance research. Data concerning distribution and leftover copies confirm the low prestige of periodicals that are provided free of charge to members of the Societies. When they are not published by a Society, copies remain undistributed or are donated to researchers. Data concerning library subscriptions confirms that the general scene has not changed much in the last few years. Resources exist only for subscriptions to periodicals that address the undergraduate level in their policies. Generally speaking, Brazilian researchers do not purchase Brazilian scientific journals.

This situation could probably be changed just by investing the appropriate level of resources for national research. Through the volume of articles produced and the subsequent selection of the best ones, journals would be able to raise the level of published science and compete on an equal level with the prestigious international journals.

This is not to say that the journals should not be published. On the contrary. It is through competition that quality is improved. Despite all their difficulties, journals continue to be the channels for the dissemination of national scientific production. To many publishers, Brazilian scientific journals have an important educational role for the researcher. This role is performed by editors and referees, giving constructive criticism to submitted work, raising the articles' level of quality and consequently improving the opportunity to contribute to Science.

The Sectorial Program of Publications in Science and Technology is part of the combined effort to raise the standards of Brazilian scientific journals. In this first phase its financing represents the survival of the periodicals. The government is making an admirable effort to establish strategies that attempt to overcome this situation by organizing the Sector of Scientific Publications. The goals of the Program are set, but reaching them will mean the adequate investment of human resources and research for the formation of a pool of qualified specialists.

Notes and References

- ¹ Interview with FINEP's Editorial Committee representative.
- ² CNPq/SEPLAN: *Uma Experiencia de Gestao em Ciencia e Tecnologia*, Brasilia, 1985, p.70.
- ³ Bastos, S. et al. Apud Furtado, J.S. *Programa de Publicacoes em Ciencia e Tecnologia*; preliminary proposal/s.e//s.ed./,1982.
- ⁴ The percentage is based on sixteen interviews.
- ⁵ MARTINS, Geraldo e QUEIROZ, Rubens. *Rev. Bras. Tecnol.* Vol. 18 (6), pp.38 - 6, September 1987.

APPENDIX I

LIST OF SCIENTIFIC JOURNALS ANALYZED

Arquivo Brasileiro de Medicina Veterinaria e Zootecnia
Brazilian Journal of Medical and Biological Research
Dados - Revista de Ciencias Sociais
Fitopatologia Brasileira
Psicologia
Quimica Nova
Revista Brasileira de Ciencias Mecanicas
Revista Brasileira de Engenharia
Revista Brasileira de Entomologia
Revista Brasileira de Fisica
Revista Brasileira de Genetica
Revista Brasileira de Geociencias
Revista Brasileira de Geofisica
Revista Brasileira de Matematica Aplicada e Computacional
Revista Brasileira de Medicina Tropical
Revista de Microbiologia
Revista Brasileira de Zoologia