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DISTRIBUTION OF PUBLICATIONS AS AN INDICATOR FOR THE EVALUATION OF SCIENTIFIC PROGRAMS

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This article describes investigations into the publication behaviour of scientific authors from the GDR. The obtained data revealed that – analogous to the Lotka-distribution – not only a fifth of all authors produce half of the publications of a certain institute , but that these authors also have a quicker reaction time and receptivity to new international research problems. These findings may make it possible to substantiate proposals by guiding scientists in the direction of themes, respectively to help the science policy in the process of the elaboration of new research programs.

Introduction

Since the 1920's, bibliometric indicators for the analysis of science have been developed, especially indicators for counting publications and patents.[1] In the past decade it was common practice to compare publication rates in order to determine the rank of scientific institutions on national and international levels. Ranks of these kinds demand a qualitative interpretation of this phenomenon, especially the investigation of the question of how far these ranks have their cause in the specific particularity of the national, respectively international "situation for research".

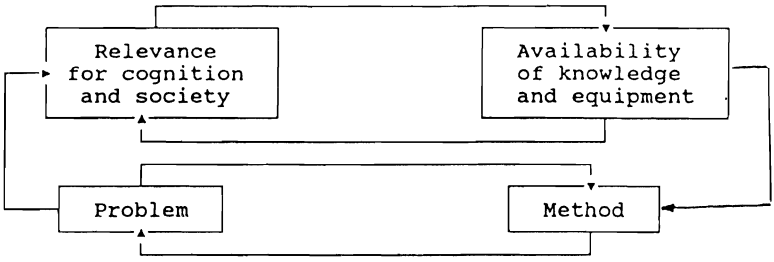

Fig. 1. The flow diagram of the "situtation for research"

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The term "situation" means, in this context generally a "complex of conditions for action for attaining an aim", i.e. "situation for research" means a "complex of conditions for solving scientific problems" (Fig. 1).

Object

Citation rates of selected european countries (especially in the fields of chemistry and biological sciences) highlighted that countries whose share of publications in the field of chemistry is lower than that of the German Democratic Republic (e.g. the Netherlands, Switzerland, Sweden, Belgium and Denmark) have not only a higher percentage of publications in biological sciences, but also an altogether higher citation rate of publications in the fields of chemistry and biological sciences.[2].

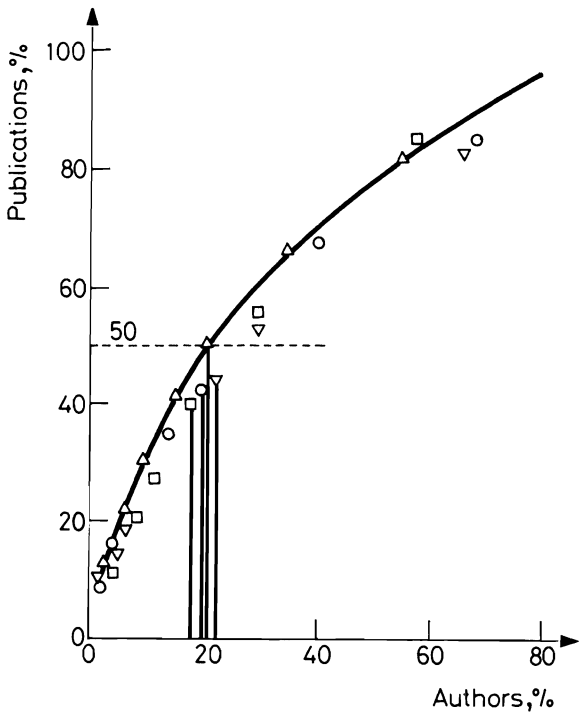

Fig. 2. Cumulation of the number of publications written in the institutes of biological sciences I_n (n = 1 ..... n) of the Academic of Sciences of the GDR (beginning with high publication rates): I_1: □ Institute for Genetics and Plant Research; I_2: ∧ Institute for Biochemistry of Plants; I_3: ∇ Institute for Molecular Biology; I_4: o Institute for Microbiology and Experimental Therapy; in 1987.

This fact can be interpreted in the following sense: a delayed reaction of the scientists to new fields of problems, which are emerging in the case of the transition from chemistry to biological sciences, or in connection with them,leads these scientists to work on problems and publicize results which, internationally are less cited than those adressing new fields of problems.[3]

In conformity with our hypothesis this would be an explanation of the Lotka distribution of scientific authors in the case of the survey of a country, a university or an institute. In other words: the distribution of authors according to publication rates obviously points to a characteristic regularity according to which, at different times and in different institutes, one fifth of all authors, with their high publication rates, accounted for about half of all publications of an institute.

Table 1

Single- and co-authorship and time of reaction of authors with high publication rates in institutes of biological sciences I_n (n = 1, ... 4) of the Academy of Sciences of the GDR (I_1: Institute for Genetics and Plant Research; I_2: Institute for Biochemistry of Plants; I_3: Institute for Molecular Biology; I_4 : Institute for Microbiology and Experimental Therapy, (1979-1984)

		I_1	I_2	I_3	I_4
$\frac{\text{Number of AG}}{\text{Number of AI}}$	=	0.2	0.2	0.2	0.2
$\frac{\text{Publication rate of AG}}{\text{Publication rate of AI}}$	=	2.5	3.4	2.3	2.4
$\frac{\text{Co-authorship of AG}}{\text{Co-authorship of AI}}$	=	1.0	1.2	1.0	1.1
$\frac{\text{Single-authorship of AG}}{\text{Single-authorship of AI}}$	=	3.4	6.5	3.6	4.9
$\frac{\text{Time of reaction of AG}}{\text{Time of reaction of AI}}$	=	0.4	0.3	0.8	0.3

AG: Group of authors producing half of the publications of an institute.
AI: Total of all authors of an institute.
Source:H. *Parthey* (1987)[5]

Methods

Studies made on the basis of a survey of institutes of the Academy of Sciences of the GDR on the behaviour of scientific authors in publications, can be considered as an attempt of explanation. Over a period of four years, from 1979 to 1984, we questioned 463 scientists in 4 institutes of biological sciences of the Academy. On the basis of these questions we have compiled a comparison of answers, showing the occurrence of single-authorship and the length of reaction time for those authors who have orientated themselves to new "research fronts". The results show that this group of scientists are distinguished by a special productivity behaviour, their publication rate comes up to an average of 50% of all publications made by the respective institutes. The table 1 demonstrates the formation of the single-authorship and the reaction time of those authors with high publication rates. The institutes of the Academy were: Institute for Genetics and Plant Research; Institute for Biochemistry of Plants; Institute for Molecular Biology; Institute for Microbiology and Experimental Therapy.

Results

In detail Table 1 contains the following obtained data:

1. The publication rate of this group lies 2 to 3 times higher than the average.
2. The characteristic single-authorship and co-authorship of this group lie clearly above the value of the other authors: 3 to 6 times and 1 to 2 times.
3. In comparison with the average value of the institutes this group of authors demonstrates a quicker reaction time and receptivity to internationally new research problems.[4]

   This situation is also demonstrated by Fig. 3. in which the 3 distributions are integrated. The figure shows that most authors are dealing with the main themes – theme numbers 2 and 4. That is the "normal research", not a "front" field. In the case of theme number 5 we have a relatively massive employment, but only a small amount of authorship generally and not a single authorship. More interesting for the analysis are the themes number 1, 8, 9 and 10. On these themes, there was no official occupation of any scientist, but we find that a relatively large number of persons have chosen and treated these themes. Among them are numerous "L-authors" with high publication rates (see Table 2).

Table 2

Percentage of distribution of themes on the researchers, the authors and L-authors(authors with high publication rates about L-percent of the number of all publications of an institute; L=50) for the institutes of biological sciences In (n=1,2,3) of the Academy of Sciences of the GDR (I_1 :Institute for Molecular Biology/Berlin-Buch; I2 : Institute for Microbiology and Experimental Therapy/Jena; I3: Institute for Biochemistry of Plants/Halle) in 1988.

Percentage of distribution of researcher (N = 457)

Theme	01	02	03	04	05	06	07	08	09	10
Inst.I_1		40			20	1	1			
Inst.I_2		6	9			7				
Inst.I_3				16						

Percentage of distribution of authors (N = 177)

Theme	01	02	03	04	05	06	07	08	09	10
Inst.I_1		22			7	2	1	2		1
Inst.I_2	2	10	11			7			6	
Inst.I_3				29						

Percentage of distribution of L-authors (N =31)

Theme	01	02	03	04	05	06	07	08	09	10
Inst.I_1		10				7		13		6
Inst.I_2	3	10	16						6	
Inst.I_3				29						

Percentage of distribution of researchers, authors and L-authors of all institutes In on the research programs

Theme	01	02	03	04	05	06	07	08	09	10
Research.		46	9	16	20	8	1			
Authors	2	32	11	29	7	9	1	2	6	1
L-Authors	3	20	16	29		7		13	6	6

Source: *Jahrbuch der Akademie der Wissenschaften der DDR 1988.*[6]

Conclusions

To conclude these explanations it may be said that

- there exists a possibility of measuring the reaction of scientists to new themes(if one compares the 1st distribution with the 3rd one);

– there is probably a possibility of substantiating proposals with which to address the scientists, leading them to deal with new themes, respectively to help the science policy in the difficult process of the elaboration of new research programs (if one compares the 3rd distribution with the 1st one).

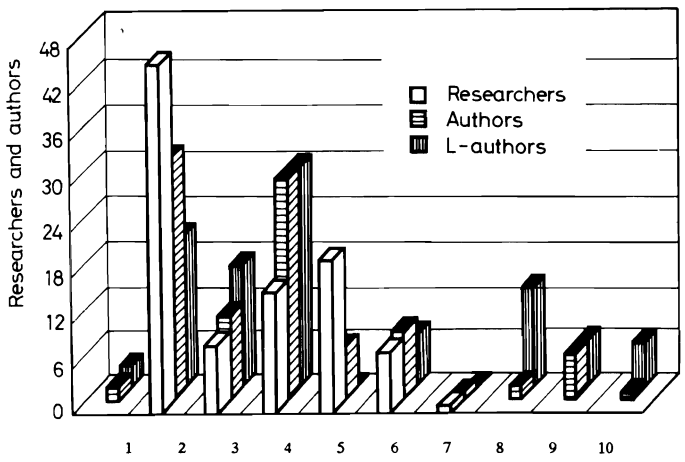

Fig. 3. Percentage of distribution of researchers and authors for themes. Source: Number of research themes, Institut für Theorie, Geschichte und Organisation der Wissenschaft, Berlin

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