• ABSTRACT

It has been suggested that agricultural scientists in developing countries are more willing to pursue lines of pure research established abroad, than to work on more applied problems of farm production. This note examines the criteria used by agricultural scientists, working at four Brazilian universities in two distinct subfields, to select research topics. The evidence presented here contradicts this accepted view. On the contrary, Brazilian scientists tend to choose research topics which they perceive to be directly relevant to local agricultural problems.

Sources of Influence on Problem Choice in Brazilian University Agricultural Science

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In contrast to advanced countries, where the determinants or criteria for problem choice have attracted considerable interest among science analysts, there are no studies on how scientists in developing countries choose their research topics. In accordance with the so-called 'theories of the marginalization of science', it has been assumed that scientists in the developing countries orient their scientific activity toward research problems defined in the advanced countries, and do not carry out research work aimed at contributing to the solution of local problems.[1] The agricultural sciences are a field in which scientists are under considerable pressure from client groups.[2] This fact, added to the location-specificity of agriculture has led some to argue that this is one of the very few scientific fields in which scientists in developing countries are likely to be more autonomous – both intellectually and institutionally – relative to world centres.[3] Notwithstanding, others stress that 'agricultural research workers [in developing countries] have tended to concentrate

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on more theoretical research problems rather than working to solve farm production problems'.[4]

Much of this type of discussion, however, is purely theoretical. This paper represents the first attempt to provide empirical evidence on influences on problem choice in agricultural science in one developing country – Brazil. Its main aim is to investigate the factors involved in decisions made by agricultural scientists working in Brazilian universities as to which research problems to pursue. Are they more concerned with producing knowledge in line with what has been recently published abroad, or with doing research to solve practical problems?

Most of the information used in this Note was obtained in the course of individual interviews conducted with ninety-five agricultural scientists working in two subfields – Crop Production (CP) and Soil Sciences (SS)[5] – in four Brazilian universities: twenty-four each for the Federal University of Viçosa (UFV) and the agricultural branch of the University of São Paulo (ESALQ), twenty-five at the Federal University of Rio Grande do Sul (UFRGS), and twenty-two at the Federal University of Ceará (UFC).[6] In what follows, the factors identified as influencing the choice of research topics in Brazilian agricultural science will be taken in turn, and the reasons why some criteria seem to be more important than others for specific scientists, subfields and institutions will be discussed.

Scientific Curiosity

Only two scientists (representing 2% of the respondents) maintained that they choose their research problems primarily on the basis of their scientific interest and have no concern whatsoever with the application of their research findings. Both researchers belonged to the SS subfield and to the same institution, namely ESALQ. This figure is perhaps too small to justify explanations in terms other than the individual characters of these two scientists. However, small as it is, the figure could reflect a previously noted commitment among scientists in the University of São Paulo – of which ESALQ is the agricultural branch – to 'pure-science' questions.[7]

Other scientists identified 'scientific curiosity or interest' as one criterion for problem choice, although by no means the most important one. These typically expressed their feelings in slight variations of the following statement:

> I do not carry out research for the sake of accumulating scientific knowledge only. However, I do have more scientific interest in some problems than in others. When I can do more useful research which matches with my scientific interest, all the better.

The number of scientists who explicitly recognized scientific curiosity as influencing their selection of research problems to some degree was sixteen in ESALQ (66%); twelve in UFV (50%); thirteen in UFRGS (52%) and six in UFC (27%). These findings seem to indicate that scientists in ESALQ are more likely to consider criteria that represent a commitment to scientific ideals than their colleagues in the other universities.

Graduate Training

The scientists interviewed were almost unanimous in recognizing that graduate training (including post-doctoral training) helped to shape their research orientation in one or more ways. The development of certain research skills during graduate training involves some commitment to particular ways of formulating problems and ways of working on them, as well as to certain means of interpreting results. These, it has been suggested, form the basis for more general commitments to theoretical, technical and interpretative norms which will direct future research foci and approaches.[8] In this sense, research conducted during graduate training exercises a major influence on future work. This point is illustrated by the frequency with which scientists in the four universities – about 75% of the informants – maintained that their MSc and/or PhD researches were related to the lines of investigation they currently pursue. If this is correct, and considering that around 70% of the researchers in the sample received some sort of graduate training abroad, it would seem that a significant proportion of agricultural scientists in Brazilian universities were pursuing research problems defined outside the country, supposedly disconnected from national needs.

This inference, however, is too simple, for some of the informants pointed out that the research they conducted while training abroad was not dissociated from problems of Brazilian agriculture. The justifications for this view were mainly of two kinds. Firstly, because foreign students – particularly from the Third World – make up a large proportion of the postgraduate student body at American colleges of agriculture, the latter had to develop some degree of awareness of agricultural problems in developing countries, and thus work out appropriate theories and

methods to deal with them.[9] Consider, for example, the words of one researcher:

> American soil scientists are very interested in the problems of tropical soils. In fact, they are avid for information on these topics because, among other interests, they have to train students coming from tropical regions.

Secondly, other scientists stressed that, when they travelled abroad, they carried with them materials from Brazil – such as strains of nitrogen-fixing bacteria, soil samples and the like – on which they wanted to work. Some interviewees also pointed out that the relationship between their PhD research abroad and their current line of investigation was not so much in terms of the research problems themselves but more in terms of how they approached them. One scientist noted:

> I work on different aspects of phosphorus and aluminium in soils. Both are very serious problems for Brazilian agriculture. However, the way whereby I approach these problems is very much a reflection of what I learned abroad. I work, for example, by building theoretical models which allow me to understand phenomena, contrary to what other Brazilian scientists do elsewhere.

Scientific Literature

Research ideas and problem development may be influenced by the channels of scientific information exchange, particularly publication. If so, it will be to some extent reflected in the referencing patterns of the scientists, if it is accepted that 'citations are [. . .] very often a visible record of genuine influence'.[10] For the purposes of this Note, the problem is to identify the extent to which the interviewees explicitly pointed out the scientific literature as influencing their selection of research problems.

Significantly – and perhaps surprisingly – only ten researchers (10% of the total) mentioned that scientific literature is important for their problem choice. It could be argued that the scientists are unaware of the influence of scientific literature on their selection of research problems. However, other empirical studies report similar findings. In psychology, for example, a study of over 200 research projects found that ideas for less than one out of seven (about 14%) originated from sources such as journal articles and the like.[11] Also, an investigation into the sources of influence for problem choice among American

agricultural scientists identified twenty-one criteria they used, and none can be said to be directly related to scientific literature.[12]

Influence of Colleagues

Scientists may be influenced by colleagues or by other scientists (for example, basic scientists in parallel research areas) in their selection of research problems, in a variety of ways. On a more general level (as already discussed), they may be influenced by what their colleagues report in the literature. On another level, they may get ideas for research by communicating informally with colleagues at conferences, in visits to other research institutions, or by correspondence. It has been noted, for example, that American psychologists rely heavily on informal networks of information exchange to keep abreast with the current views of the community on the value and relevance of specific research problems.[13] This, however, does not seem to be the case among the Brazilian agricultural scientists contacted during this study. The informal communication network within this community was found to be quite underdeveloped.[14] Actually, up to one half of the scientists interviewed maintained that they did not communicate informally at all, either with colleagues in other Brazilian agricultural research centres, or with foreign ones. Thus it seems that colleagues in other research institutions can be, at best, a minor influence on research topics chosen by Brazilian agricultural scientists.

On a more specific level, scientists may be influenced in their selection of research problem by their colleagues, and by other scientists in their own department or institution. Many of the researchers in this study seemed to have difficulty identifying their colleagues in the same institution as a source of influence, since they meet formally and informally at the university and socially, where they frequently discuss their research. However, it was found that, in the case of UFRGS, colleagues seemed to be particularly influential because the researchers meet formally once a week, systematically to exchange ideas, and to discuss their work. Nothing similar was found in the other three institutions.

Contacts with other scientists within the same institution, particularly those working on parallel basic fields – chemistry, physics, molecular biology and the like – were quite rare. In very few cases, physicists, statisticians, biochemists and other basic scientists were said to collaborate in investigations. Thus, while it is true that influence of colleagues in

the selection of research problems may vary from individual to individual and from institution to institution, reflecting individual features, fellow scientists from the same department remain important sources of influence. By contrast, other scientists in the same institution seem not to be important in this respect.

Research Facilities

It has often been pointed out that the choice of research problems is constrained by the experimental technology and particular kinds of techniques on hand. There is, for example, a report on how a relatively minor physics department in the US became committed to nuclear physics after it agreed to receive a nuclear physics plant which the scientists never asked for.[15] Another study describes how distinct equipment and research techniques influenced the research orientation of two radio astronomy research groups in England.[16] In the same vein, some agricultural scientists indicated that current investment in laboratory equipment made radical changes in research problems and orientation difficult, if not impossible.[17] These findings suggest that, once a strong commitment has been made to specific technical equipment, the nature of this equipment limits future strategy and the choice of further areas of study. On the other hand, no research can be undertaken without proper space, equipment, laboratory supplies and all the other paraphernalia of research. Thus, the lack of facilities can no doubt restrict the choice of research topics. This was particularly true in this study.

Some of the interviewees emphasized that there are times in which they are prevented from doing research they deemed important for lack of proper equipment and materials. A plant scientist described one such case:

> I am not talking about sophisticated equipment only. You could think I wanted to work with Biotron [a climate controller], like I did during my doctoral training in the US. I am talking about simple things like laboratory drugs, an oven, precise scales and, most importantly, spare parts for already existing equipment.

Complaints of infra-structure deficiencies were quite widespread during the interviews. Similarly, in a recent survey of 1900 Brazilian agricultural scientists, as many as 65% of the respondents stated that the lack of material – equipment and laboratory supplies – was the most serious impediment to research and teaching.[18]

Influence of Graduate Students

In Brazilian colleges of agriculture, graduate students play an important role in research carried out by the staff. A large proportion of the journal articles analyzed in this research – 40% in both CP and SS – were jointly written by professors and their students.[19]

Although students usually work on dissertations broadly relevant to the professor's line of research, each has a definite problem of his/her own. Actually, a consistent finding during the interviews was that professors are often driven to work on specific research problems which they might not otherwise have investigated through supervising a particular student. This was detected in the two subfields and in the four institutions, but was found most often at UFV and ESALQ, because while all four universities offer graduate courses leading to an MSc degree, doctoral training is offered by only a few institutions, and about 80% of these programmes are concentrated at ESALQ and UFV.[20] Thus, whereas students seeking MSc degrees tend to apply and enter graduate courses within their own region, both ESALQ and UVF receive doctoral students from all regions of the country. Those students often arrive with an idea of what they want to investigate in their thesis, since most of them have had work experience prior to attending graduate school and are on paid leave from employment.[21] The result is that professors in ESALQ and UFV must often supervise research dissertations about problems in which they have no more than a remote interest. These researchers recognized that working on research problems chosen by students is challenging and rewarding, but at the same time they expressed concern that this practice may drive them away from their own research interests.

Priorities of the Department

A consistent finding of this research was that departments and graduate courses do not have research programmes or priorities decided according to a planned and discussed agenda. In other words, the overall research programme of the departments is simply the summation of the lines of investigation pursued by each individual scientist, and not the result of previously elaborated plans. The scientists interviewed were unanimous in pointing out that they are under no pressure whatsoever from the head of the department or from colleagues to work on some problems rather than others. From this point of view, therefore, it seems clear that if

Graduate Education (CAPES) which, although being the most active in providing scholarships for graduate students, is much less important in terms of providing grants for research.

At the state level, two research funding agencies – the Foundations for the Support of Research of the state of São Paulo (FAPESP) and the state of Rio Grande do Sul (FAPERGS) – support scientific research within their respective states. Four researchers at ESALQ and two at UFRGS reported some contact with these state agencies.

The government research funding agencies do not usually solicit research or attempt to direct it; instead, they approve or refuse requests for grants made by individual scientists employed in universities. Actually, I found a wide agreement amongst the informants to the effect that financing agencies have very little influence on their decisions about research topics. This fact notwithstanding, research funding agencies do have a kind of veto power, and might be expected to influence the research decisions made by a scientist. This veto power, however, is exerted first and foremost by the members of the scientific community and tends to reflect their own interests, not necessarily those of the funding agency.

Agencies and banks for regional development seem to have a considerable influence over the choice of research problems by some scientists at UFC, but not in the other three universities. This is because UFC is located in the northeast of Brazil, a relatively underdeveloped region, where federal government has established a number of institutions for coordinating and implementing action in different sectors. These institutions frequently contract scientists at UFC to carry out specific pieces of research, and thus have a direct influence on the choice of research problem. The Brazilian Corporation for Agricultural Research (EMBRAPA) only occasionally contracts for research with universities. Most of its research is carried out through its own centres. Only three informants were currently being funded by EMBRAPA to investigate specific problems. On such occasions EMBRAPA has a considerable influence on problem choice.

Private corporations seemed more likely to influence the problem choice of scientists working in specific research areas: for example, soil scientists working on the effects of chemical fertilizers and limes in plants and plant scientists working on the effects of herbicides. When researchers are funded by these institutions – this was more likely to be the case for ESALQ, because of the concentration of private firms in its surroundings – they work on problems of interest to the corporations.

Commodity associations and cooperatives are, at most, minor sources of funds for agricultural scientists in universities, and to that extent they have practically no influence in the scientists' decisions on research. This finding is perhaps surprising, but can be easily explained. Firstly, producers of 'luxury' or export crops such as sugar-cane, coffee, rubber, cocoa and the like have succeeded in establishing specific institutions to do research in these commodities. Secondly, producers of staple food crops such as beans, rice, maize and cassava are generally small, subsistence farmers scattered throughout the country, and are not organized in associations. Consequently, they are not in a position to fund research.

Finally, wealthy farmers occasionally – if rarely – contract research with university scientists in an attempt to find solutions to their specific problems. Only one group (of three scientists) was currently investigating under such a contract.

In conclusion, it appears that the main sources of research funds for agricultural scientists in Brazilian universities are the federal government research grant agencies, which have little influence in the scientists' selection of research problems. All the other sources of funds are more influential in problem choice, but their action is restricted to specific regions, universities and research areas.

Importance to Brazilian Agriculture

The single most important criterion in choosing a research topic appears to be its importance for Brazilian agriculture. Significantly, only two scientists did not mention any concern with the 'utility' or applicability of their research findings to solve agricultural problems. Even those scientists who identified scientific curiosity or interest as one criterion for the selection of research problems also expressed hopes that their research would ultimately contribute to the solution of regional or national agricultural problems. Other scientists claimed that their *only* criterion in choosing between specific problems is the potential contribution of the results to Brazilian agriculture. If the scientists are so strongly committed to the solution of agricultural problems, an important question would seem to follow – exactly how do they identify these practical problems?

According to the scientists interviewed, clients or users rarely go directly to them seeking a solution for a particular problem. These clients are most likely to be private corporations – particularly in the sectors

of seed production, fertilizers and limes, agro-chemicals and reforestation – commodity associations, or cooperatives or large farmers. Such clients are usually able to provide funds for research or consultancy work. Small farmers very rarely convey their needs directly to university scientists. Thus, it seems that demands raised by clients themselves are not an important means by which the scientists identify practical problems.

All the four universities studied are public Brazilian universities and have three main functions – namely, teaching, research and liaison services. Scientists are usually not involved in the latter – nominally, for lack of time. In the instances where 'extension' activities take place, they are generally restricted to courses, seminars or services to the community such as soil analysis, seed-germination tests, and the like. The fact that university agricultural scientists are not very much concerned with extension work would seem unimportant, considering the existence of the Brazilian Agency for Technical Assistance and Rural Extension (EMBRATER), an organization spread throughout the country and responsible, among other things, for establishing the necessary links between scientific and technological research and potential clients. However, according to my informants, their links and communication with extensionists are quite weak. Besides lack of time, one researcher explained:

> The extensionists of EMBRATER think that the research we do in the university is too fundamental. Moreover, they work much more closely with EMBRAPA and are not much interested in what we do here.

If demands from clients and feedback from extension agents are both very limited in letting scientists identify agricultural problems, other mechanisms must exist. Significantly, I found that scientists identify agricultural problems *mainly* through *their own assessment of client needs*. Perhaps this finding is not totally surprising because researchers, like any participants in a given society, are able to judge and interpret society's needs. What is striking is that scientists are much more likely to rely on a commonsense assessment of client needs than on a careful inquiry into the problems experienced by various client groups.

If, on the one hand, scientists' assessment of client needs may be accurate – as indicated by several instances in which university agricultural scientists have indeed contributed to improvements in agricultural production and productivity in Brazil – on the other hand, the risks involved in trying to meet clients' needs without asking the clients themselves, or the extensionists, are considerable. One informant, for

instance, after dedicating almost his entire academic life to research on beans as a single crop, recognized:

> When I was close to retiring from the university I was finally convinced that the small farmers had strong reasons to cultivate beans associated with other crops. I have been working in recent years harder than ever with intercropped beans to compensate for the time I spent with beans as a single crop.

Finally, it is worth stressing that despite the fact that feedback mechanisms (both from clients and extension) seem relatively ineffective in directing research, and despite the risks involved in assessing client needs with little feedback from users, university agricultural scientists are, apparently, succeeding in identifying and working on problems of relevance to Brazilian agriculture.

Conclusions

The evidence presented here seems to contradict the view of those who have suggested that agricultural scientists in developing countries are more eager to pursue research topics initiated abroad than to solve clients' problems. Also, it appears that agricultural scientists working in the university context in Brazil – even though they are granted almost complete freedom of choice of research topics – do not make this choice primarily on the basis of the scientific relevance of the theme, but consider first the needs of national agriculture, as they perceive them. Actually, the findings reported here suggest that agricultural research in the university context in a Third World country, Brazil, is mostly concerned with the solution of practical problems.

The interviews revealed a quite marked commitment by the scientists to the needs of agricultural production – the first criterion volunteered by most of the researchers when asked about how they choose their research problems. Of course, it could be argued that the importance attributed by the scientists to practical problems is meant to justify their research on the basis of social relevance, and does not necessarily reflect the actual most important source of influence in their choice of research problems. In this respect it should be pointed out that, although I have worked here specifically with the scientists' perception of the criteria they use for problem choice, the content analysis of papers produced by the scientists interviewed revealed that they dealt mostly with practical problems, while maintaining a degree of commitment to the generation and development of scientific knowledge.

Pure scientific curiosity and the scientific literature are minor sources of influence on the choice of problems. If, as some authors suggest, scientists in developing countries were science-oriented, and tried to imitate the scientific community of advanced countries, publishing in mainstream periodicals, then a much stronger influence of these two criteria would have been found. Even on the occasions when scientific criteria were explicitly recognized as having some influence over the selection of research topics, concern over the application of results was also expressed. It is quite significant that only two scientists, out of ninety-five informants, maintained that they were interested exclusively in the scientific outcome of their research.

The interviews failed to confirm the previously mentioned view that research in Soil Sciences tends to be more science-oriented than that in Crop Production. No significant differences were found between informants of the two subfields which would warrant this conclusion. Rather, the differences found in orientation of research seemed to be more a result of the personal interests of individual scientists in either scientific or practical problems, than of the fact that they worked in one or the other subfield. To a lesser extent, the institutional location of the scientists also seemed to have a bearing in this respect. Broadly speaking, researchers at ESALQ showed a greater concern with scientific questions than those at UFC, with those at UFV and UFRGS standing somewhere in the middle.

Clearly, university agricultural scientists in Brazil seem to choose their research problems first and foremost out of a *belief* that what they are working on is relevant and important, and will be applied to the practice of agriculture. This is so irrespective of the subfield or institution in which they work, although other factors may be more or less important in particular situations. Ironically, the scientists' heavy reliance upon commonsense assessment of clients' needs – due to the relative ineffectiveness of formal feedback mechanisms – may hinder the full achievement of their main research objective – that is, contributing to the solution of problems in Brazilian agriculture.

• NOTES

1. For a detailed account of the theories of the marginalization of science in Third World countries, as well as the explanations for such behaviour, see C. Cooper (ed.), *Science, Technology and Development* (London: Frank Cass: 1973), especially the

Introduction by the editor, 1–18, and the article by A. Herrera, 19–37. See also H. Vessuri, 'The Social Study of Science in Latin America', *Social Studies of Science*, Vol. 17 (1987), 519–54, which suggests that scientists in the region are still seen as 'sealed off from the social and economic reality, oriented to the symbols, messages and rewards of the world centres, as if they were not settled in a continent full of enormous potential, desperate disease and poverty, military dictatorships, multinational corporations and political intrigues' (458).

2. C. E. Rosenberg, 'Rationalization and Reality in the Shaping of American Agricultural Research, 1875–1914', *Social Studies of Science*, Vol. 7 (1977), 401–22.

3. H. Vessuri, 'Consideraciones Acerca del Estudio Social de la Ciencia', in E. Díaz, Y. Texera and H. Vessuri (eds), *La ciencia periférica* (Caracas, Venezuela: Monte Avial Editores, C.A., 1983), 9–35, esp. 17.

4. B. E. Swanson, 'Impact of the International System on National Research Capacity: the CIMMYT and IRRI Training Programs', in T. M. Arndt, D. G. Dalrymple and V. W. Ruttan (eds), *Resource Allocation in National and International Agricultural Research* (Minneapolis, MN: University of Minnesota Press, 1977), 338.

5. These two subfields are the 'core' of the agricultural sciences. They were the only two subfields within the general field of agricultural science in which all four universities had recognized scientific capabilities. The choice of these subfields for this study proved to be interesting, since it has been argued that whereas research in SS is more science-oriented, that in CP tends to be more linked to client needs: see R. E. Evenson, P. E. Waggoner and V. W. Ruttan, 'Economic Benefits from Research: an Example from Agriculture', *Science*, Vol. 205 (14 September 1979), 1101–07.

6. These universities are located in different regions of the country, each being the leading agricultural college in its region. The concentration on agricultural scientists working in universities is justified by the fact that this setting still is the centre of gravity for agricultural research in Brazil: see C. M. Castro and F. Spagnolo, 'Science and Scientists in Agriculture: the Brazilian Case', paper presented at the Tercer Seminario Internacional de Investigación Educativa (Jalisco, Mexico, February 1982). All scientists interviewed were graduate degree holders; 80% were doctors in the specific subfields of this study; around 70% of them had some kind of graduate training abroad. Details of the methodology used in this research may be found in L. M. Velho, *Science on the Periphery: a Study of the Agricultural Scientific Community in Brazilian Universities* (unpublished PhD Thesis, University of Sussex, 1985).

7. S. Schwartzman, 'Struggling to be Born: the Scientific Community in Brazil', *Minerva*, Vol. 16 (1978), 545–80.

8. R. Whitley, 'The Context of Scientific Investigation', in K. D. Knorr, R. Krohn and R. Whitley (eds), *The Social Process of Scientific Investigation* (London: Reidel, 1980), 297–321.

9. According to *Science Indicators 1982* (Washington, DC: National Science Board, National Science Foundation, 1983), from 1975 to 1981, about 38% of all doctoral degrees in agriculture and forestry from US universities were awarded to foreign students, the vast majority of them being from Third World countries.

10. D. Edge, 'Quantitative Measures of Communication in Science: a Critical Review', *History of Science*, Vol. 17 (1979), 102–34, at 122.

11. W. D. Garvey and B. C. Griffith, 'Scientific Communication: its Role in the Conduct of Research and Creation of Knowledge', *American Psychologist*, Vol. 26 (1971), 349–62.

12. L. Busch and W. Lacy, *Science, Agriculture and the Politics of Research* (Boulder, CO: Westview Press, 1983).

13. Garvey & Griffith, op. cit. note 11.

14. See Velho, op. cit. note 6, esp. 207–18.

15. W. O. Hagstrom, *The Scientific Community* (New York & London: Basic Books, 1965), 166.

16. M. J. Mulkay and D. Edge, 'Cognitive, Technical and Social Factors in the Growth of Radio Astronomy', *Social Science Information*, Vol. 12 (1973), 25–61.

17. L. Busch and W. Lacy, 'Sources of Influence on Problem Choice in the Agricultural Sciences: the New Atlantis Revisted', in Busch (ed.), *Science and Agricultural Development* (Allanheld, NJ: Osmun Publishers, 1981), 113–28.

18. Castro & Spagnolo, op. cit. note 6.

19. See Velho, op. cit. note 6, esp. 201–03.

20. P. R. Silva, 'Evolução do Ensino de Ciências Agrárias no Brasil na Década de 70', *Educação Agrícola Superior*, Vol. 1 (1983), 43–64.

21. Castro & Spagnolo, op. cit. note 6, report that only about 8% of Masters students in agricultural sciences were unemployed before graduate courses. The corresponding figure for doctoral students is only 3%.

22. S. Schwartzman, 'For a Reappraisal of University Research', paper presented to the International Seminar on Development and Scientific and Technological Research Effectiveness (Rio de Janeiro, Brazil, January 1985).

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