2.14 Science and Technology in Latin America and the Caribbean: Strategies for Tackling Present and Future Challenges with Limited Resources

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Introduction

Latin America is facing a very difficult situation with problems increasing in the economic and social fields, in education and in S and T (science and technology), particularly since the start of the 1980s:

- the region is severely affected by external debt and the energy crisis;
- the percentage of the population living in critical poverty is increasing;
- there is great concern about the need to preserve natural resources and to manage the environment intelligently;
- indicators of S and T activity, such as patents and scientific publications and available human and financial resources, provide no grounds for optimism;
- there is an increasingly serious inability of the education system to cope with the accumulation of knowledge and wisdom and to 'teach to think' and a growing divergence between education and S and T;
- the 'brain drain' out of the region may be joined by an increasingly severe 'internal brain drain' into unrelated professions.

There have, however, been some encouraging signs which must be built on, in particular a distinct improvement in the political situation and in regional collaboration, together with an increasing awareness of the importance of S and T and of education, even though this has not yet been reflected in the formulation of relevant policies, in the allocation of resources or in the overall planning processes. The financial restrictions continue to have very negative effects on education and on S and T in general.

The economic crisis will last for some time and requires that we (governments, private and public institutions) search for new and imaginative strategies, both national and regional and compatible with limited resources, which can serve to raise the standard of living without undue sacrifice of natural resources or destruction of the environment. To achieve this there needs to be a constant, on-going analysis and evaluation of the whole process with a critical analysis of priorities and - even more difficult - of postponements. Above all, states should endeavour, even at extreme sacrifice, to allocate the greatest amount of resources possible to education and to S and T.

Actions and Strategies to be Carried out on a National Basis

1. It is essential to establish well-defined and realistic S and T policies aimed at increasing the number, type and quality of human resources engaged in S and T with the maximum financial support possible in the present crisis situation, together with the priorities and mechanisms required to implement them. These S and T policies should be closely related to policies in other sectors, particularly education, and a close relationship established with productive sectors.

2. Scientific communities and related bodies need to be effectively trained in planning and cooperation in the making of political, economic and social policies that affect related areas; the role of universities and professional bodies is very important here.

3. Basic science should be given the importance it deserves.

4. A more rational and intelligent use of knowledge and information generated at the world level needs to be achieved; S and T information services should be strengthened (or established) in the countries.

5. The public, both at the level of political decision-making and among the general public, should be made aware of the importance of S and T development in improving both the economic sector and the quality of life.

6. Scientific planning and management, both in the universities and other institutions, should be improved.

7. Priority should be given to selected areas, themes and lines of S and T research, and areas of concentration and excellence chosen in order to avoid dissipation of energy and expertise.

8. Greater participation by the private sector in S and T research should be sought.

9. The right mechanisms must be established for transferring the results of S and T research to the productive sector.

10. Based on personal experience, I would recommend that the planning, coordination and promotion of S and T activities should be located outside the sphere of influence of education ministries and have direct links with the Prime Minister and the finance and planning ministries.

11. Adequate S and T personnel must be trained at the graduate and post-graduate levels.

12. Technological research should walk on two legs, viz. (a) appraisal and improvement of endogenous technologies, and (b) adaptation and assimilation of imported state-of-the-art technologies.

13. The measurement of S and T activities and the preparation of detailed and relevant analyses for decision-making need to be improved.

14. National consultancy and technical assistance services should be strengthened.

15. Training of specialised human resources capable of formulating and implementing integrated S and T projects is required.

Actions and Strategies to be Carried out on a Regional Basis

These are even more important than the national actions because, in the prevailing economic climate, most of the complicated problems can only be solved by working together. Regional and sub-regional integration, which is presently advancing with firm steps, provides the conceptual framework within which S and T development should also take place; conversely, many of the problems presented here are factors which will lead to accelerated integration. As examples:

1. Significant progress has been made in biotechnology on the basis of agreements between Argentina and Brazil, to which Uruguay has adhered and other countries will shortly be associated; the same applies to the field of informatics.

2. Most of the high-level meetings that have taken place recently (eg. those of the 'Group of Eight', now widened and called the 'Group of Rio') give particular emphasis to S and T developments in their working schemes and include educational and cultural aspects; these are concrete and pragmatic actions in the process of implementation.

3. Another important area that warrants special attention is preservation of the environment and its natural resources; the Treaty signed between the eight Amazon countries is an excellent example.

4. Regional integration is also greatly assisted by the action of international and regional organisations, eg. the major regional programmes organised through UNDP and its specialised regional programmes in the field of biotechnology. A similar regional programme in the field of chemistry is being set up.

The university system participates in the process in two ways: by training people who are capable of understanding and carrying out integration, and by formulating projects and concrete scientific, technological, educational and cultural actions in the countries at sub-regional level and even to perceiving regional actions. The strategy must be to develop a capacity for S and T within the countries on a regional level by creating critical masses of researchers in intelligently selected areas and to request international (bilateral and multilateral) support; efforts such as those being made by the University of Surrey with the British Council in post-graduate training in chemistry (with spectacular results in Peru), provide very valuable examples (see 2.12). We need the help of all, not as a gift but as working partners, to achieve the new model of 'integrated development' based on the application of knowledge, information, S and T and the improvement of our education systems.

Postscript

Finally, referring to this conference which forms part of the 150th Anniversary celebrations of The Royal Society of Chemistry, I feel to a certain extent that I am bringing to the Society the best wishes of the scientific community, particularly the chemists, of Latin America and the Caribbean. The meeting has achieved the objective of bringing together men and women from the world over. At a meeting in 1988 on chemistry teaching, organised by the National University of San Luis in Argentina and sponsored by UNESCO and IUPAC, the theme was 'Chemistry as a universal language for the unity of nations'. The truth of this attractive theme has been successfully demonstrated here in London at this event.

The Author

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