

Towards Sustainable North-South Scientific Collaboration

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I. INTRODUCTION

Traditionally, North-South (N-S) research collaboration in science and engineering is one-directional: industrial nations provide funding and maybe hosting for researchers from developing nations to work on projects that may be of interest to both parties, but more frequently, to industrial countries alone. Usually, visiting scientists join ongoing projects in industrial countries for periods of varying length after which they either stay abroad or return home and discontinue their work for lack of an appropriate research infrastructure.

This mode of collaboration, while of certain benefits to the individual scientists and institutions involved, is of limited help in changing the disparate state of research in science and engineering in the developing countries. The fact that potential visiting scientists may be disconnected from the state-of-art in their fields of research requires their hosts to invest much resources on supervising the collaboration. This diminishes the interest of potential hosts in such joint ventures. Difficulties in finding affiliation, cultural and financial problems of moving and adjusting to a foreign country/culture and the short duration of the research stay abroad, all make such programs of limited appeal to many scientists. The fact that the main part of joint research is done at the laboratories in industrial countries, combined with the lack of an appropriate mechanism for technology transfer in the developing nations, minimizes the economic returns of this collaboration for third world countries.

A sustained N-S scientific collaboration needs to be of clear value for both parties. We emphasize the material returns rather than the cultural exchange component, since the latter is not sufficient to sustain a long-term collaboration. From the side of developing countries this effort needs to have clear economic benefit by being relevant to their long- or short-term developmental needs. An initial target could be the establishment of a viable research program at the institutes of higher education. For industrial nations this collaboration must be one part of a more general exchange scheme that involves the start of the collaboration before executing the research visits, currently the only mode of collaboration, and its continuation long after that. The visits can be instrumental in integrating the scientific effort in the developing countries into the research web world-wide. However, much more is needed to ensure the establishment and long-term survival of vigorous research programs in developing countries, which is, in our view, the main guarantor of a sustained North-South collaboration in science and engineering.

II. CURRENT STATE OF AFFAIRS

Many factors contribute to the weakness (or absence) of a serious research effort in developing countries in science and engineering. They include the lack of appropriate infrastructure such as current library materials, connectivity to the world-wide information infrastructure, inadequate budgets, the lack of graduate programs and research institutions, poor management of whatever is available in research funding, the weak industrial base and lack of coordination between existing industries and educational/research institutions, the absence of sufficient numbers (critical mass) of scientists/researchers in particular areas and the lack of sufficient incentives for scholarly research. Many of these arguments are still valid when a whole region (e.g. the Middle East) rather than an individual country is considered. The result is not only a weak research effort but the brain drain where the best scientists are forced to move to the industrial countries to do their research work, making it harder to break this vicious cycle. To be more specific, we briefly discuss the current state of affairs at a typical Palestinian university in as far as the major research components are concerned.

The library holdings, to begin with, grow at an alarmingly slow pace. This is especially true for journals and other research materials. The libraries are also behind in introducing innovative technologies to facilitate access to their holdings and to holdings elsewhere in the world. So far, no library in the country offers public automated cataloging to its users or Internet access to libraries outside the country. While some of the needed materials may be available at locations elsewhere inside and outside the country severe restrictions on the movement and the high cost of travel tend to hamper resource sharing. The library expenditure per faculty/student for the last years in science and engineering

has reached alarmingly low levels and both new book acquisitions and journal subscriptions had to be drastically reduced.

On a related front, Internet access by individual faculty members is not adequate. Many don't have that access at all and even when available it is slow and/or restricted because of the lack of arrangements (official subscriptions) to gain full access to databases and libraries abroad. The situation is improving but at a very slow pace.

The number of researchers in each individual field doesn't reach the critical mass for a healthy research environment. Peer review of research results becomes a problem and frequently this has to be done by colleagues abroad with all the difficulties regarding delays and matching work schedules of the parties involved.

Faculty members are generally very busy doing their teaching duties. 12 hours of lecturing per week leave very little time for faculty members to conduct scientific research. The experience of the last five years is an indicator: load reduction for research per faculty member is close to zero, basically due to financial considerations.

The proportion of senior staff is still low. Only 2 percent of faculty are in the rank of full professor and 13 percent are associate professors. Coupled with the small department sizes (the average number of faculty members per department is about 12), this creates problems regarding cooperative research and research supervision.

The fact that local researchers are not actively involved in an ongoing research program tends to reduce the interest of foreign researchers in joint ventures on the assumption that little contribution is expected from the visiting researchers. This makes selecting partners for research a difficult task for local scientists. The other side of the matter is the lack of enthusiasm on the part of researchers from industrial countries to visit their counterparts in the Third World because of the lack of research infrastructure. This contrasts with much more frequent two way exchanges of social scientists and workers in areas like archaeology.

Research expenditure was less than three hundred US Dollars per faculty member per year. Research allocations in the budget of the Ministry of Higher Education or its predecessor, the Council for Higher Education are nonexistent. The same is projected for the next year.

Equipment budgets are very limited. Most of that is allocated to educational purposes and not to research. Despite recent improvements, in general, faculty members have access to pooled computers rather than an individual station for each faculty member.

The expenditure substantially varies from one year to another leading to unstable acquisition of resources: this creates gaps in library holdings and problems with equipment upgrades and makes long-term planning difficult. Sustained research will need a more stable environment.

III. EVALUATION OF EXISTING EXCHANGE PROGRAMS

The main mode of current collaboration between Palestinian scientists and their counterparts in the industrial nations is facilitated by research visits. In order to assess the existing exchange programs, we asked the opinion of our colleagues who participated in such programs in the past several years. Following is a summary of their assessments.

On financial support:

There is almost unanimous agreement amongst responses received that the support provided by German agencies is adequate, provided housing arrangements are made well in advance in university dorms or guest houses. On the other hand, all respondents who made short- or long-term visits to French and British institutions cited severe financial difficulties and problems with finding suitable housing.

On the language question:

While almost everybody agreed that communicating with their peers in the host institutions was done in English and without much difficulty, some cited language problems when trying to get things done elsewhere (especially in town). Many of the respondents showed real interest to learn Deutsch and French and are willing to take an intensive course in the respective language if offered at their home institution.

On collaboration with Israeli scientists:

Several schemes have been suggested in the past few years for funding trilateral research projects that would involve Israeli and Palestinian scientists as well as counterparts from the country providing the funds. Responses to questions relating to this issue were split between supporters and opponents. Those who did not favor the idea cited some of the following: (1) Linking the idea (a purely scientific endeavor) with the peace process (a purely political undertaking) will tend to politicize science, something the scientists don't feel very comfortable with. (2) The immense disparity between the (underdeveloped) Palestinian institutions of higher learning and the (advanced) Israeli institutions, makes the process rather lopsided. (3) Many scientists are of the belief that a lot of money may better be spent on building the research base in the Palestinian institutions, on libraries, computers, laboratory equipment, and the like. (4) The restrictions on mobility imposed by the Israeli authorities on the Palestinians makes collaborations across the so-called Green Line virtually impossible.

There is also the fact that some scientists also have a political thinking of their own. Those take the stand that normalization of relations with the Israelis, scientists and non, ought to be withheld pending resolution of the big political issues.

On duration of visit:

Short-term visits, in addition to being inadequate for accomplishing significant results, pose tremendous difficulties when it comes to fixing the dates and obtaining a leave from one's teaching duties. Some responses to questions related to this issue suggest extending a short-term visit to cover a full semester, thus eliminating all constraints that stem from teaching at the home institution. A long-term visit tends to allow people to get fully involved in the research environment with less time pressure. The time span between short-term visits tends to decrease the returns because of the overhead needed to "pick up the speed". Short visits don't seem to add up to produce the effects of longer-term stays.

Other:

Everybody naturally is asking for a more active role to be played by the home university in promoting the research activities through allocation of funds, teaching load reduction, and easing of the restrictions (mainly because of teaching) on travel of the research-active faculty to give them the opportunity to attend conferences in their fields.

Despite all the problems, most concerned think the money spent on the research visits is better spent in the industrial country, rather than in the developing country, to support research. This may be attributed to the fact that most think that this money will not be sufficient to help create the necessary research environment (comparable to that which one finds abroad).

The results of our questionnaire indicate that the main factors that are of interest in the visits are the library holdings, laboratory and computer resources and contacts with researchers in the same field of interest.

When asked to give a general rating for the trips, most participants evaluated them positively; more so for long-term research visits than short-term ones (less than three months).

Finally, we note here that only 75 percent of faculty are eligible for the exchange/research programs because of the degree requirements. About 30 percent of the faculty participated in these programs with some taking part in more than one trip.

IV. RECOMMENDATIONS

In view of the above findings it is of interest to use the limited available resources for scientific cooperation to create the necessary conditions for establishing a research effort in developing countries that would make Third World scientists equal partners in joint projects with institutions in industrial countries. Following are some recommendations aimed at achieving some progress towards realizing this goal.

A. Recipient Nations (South)

- A research budget needs to be allocated by the appropriate government bodies and should be made an integral part of funding higher education. This has to cover equipment purchases and load-reduction for researchers.
- Close ties must be maintained between potential consumers and potential producers of scientific research: that is between governmental and private organs that need the research and universities where it can be done. Financial arrangements have to be worked out.
- The creation of a body to foster and coordinate scientific research and development with stable sources of funding. Active scientists must play an active role in the running of this body.
- Resource-sharing: for example by creating a national library or a coordinated system of regional libraries so that the literature would be available to concerned individuals. Arrangements can also be made with foreign libraries for access to their holdings. Information technology can help greatly in this regard.
- A system for evaluation and rewarding of excellence in research ought to be adopted.

B. Donor Nations (North)

- The research visits arrangements offered by industrial nations have to be re-evaluated to see how they serve the needs of developing nations. In particular the duration of these visits and their frequency are to be re-assessed.

- Follow-up programs have to be maintained so that relations between the scientists do not get terminated by the end of the visit.
- Creating centers of excellence in research at the national/regional levels. The example of the International Center for Theoretical Physics (ICTP) in Trieste-Italy is worth studying.
- Coordination between donor agencies and the responsible bodies/active scientists in the developing countries to define the best course of action to advance research in the Third World and thus enable a sustainable North-South research collaboration.

V. CONCLUSION AND REMARKS

We have made a careful study of the attempts on joint scientific cooperation between Palestinian institutions and academics and their counterparts in industrial countries through bilateral and international agreements. Based upon our personal experiences in this field, we have given a critical analysis of the past effort and have tried to outline an approach to utilizing available resources in order to optimize and invigorate future North-South collaboration in science and engineering research. We emphasize that steps have to be taken by the granting institutions/agencies aimed at redirecting or adjusting their current programs with an effort to stabilize the research environment in developing countries. This should be matched by efforts in the local institutions of higher education and research and their managing bodies in developing countries to ensure the relevance of scientific research to the local developmental goals and therefore the long-term survival of research in science and engineering.