2.2 The Role of Science and Technology in Development Cooperation with the Less-Advanced Developing Countries in the 1990s.

John M Pratt
University of Surrey, Guildford, UK

The OECD's Development Assistance Committee organised a meeting in 1990 of experts concerned with aid to the less-advanced developing countries. Discussions at this meeting led to a number of suggested policy 'orientations', which were incorporated into a document with the above title which provided clear pointers to needed shifts in emphasis in aid policy, in particular to an increased emphasis on building up science and technology in those countries. It is, therefore, of great potential interest to the scientific community and very relevant to the subject matter of the conference. With the agreement of the OECD's Development Corporation Directorate, the document has been abstracted with minimum editing and rearrangement to provide the following shortened version, where the numbers in parentheses refer to the original sections.

The orientations set out below are echoed in broad terms in statements and publications emerging from a number of other fora. Some major departures from existing habits are being called for; this is not 'business as usual' either for developing countries or their development partners. The full integration of science and technology into the development process through the building of national capacities and coordinating domestic and international efforts round a set of key technology development missions is a major, exciting task for the 1990s [50].

With the technological choices in front of developing countries rapidly multiplying, the opportunities for applying science and technology to transform the life prospects of masses of poor people have never been so great [6]. However, this requires a capacity [8] to:

(a) identify needs and opportunities;

(b) select technologies that are suited to a country's individual situation;

(c) adapt or develop these technologies in each particular national context;

(d) implement them on a broad scale.

It is not building up science and technology per se that is the core issue, but strengthening the capacity to manage technological change [9]. This involves [10]:

(a) Linking together a series of measures and approaches in the fields of policy-making, central and local administration, education and investment decision-taking in a way that brings about a better exploitation of both existing and new technological options;

(b) A political and intellectual climate which allows and encourages free and open debate about key social and economic problems, the use of the country's resources, and the merits of alternative theories and practices;

(c) Fostering the emergence of a national science and technology community which is able to help identify and respond to national challenges and opportunities and to interface with international and regional science and technology.

The capacities of developing countries to manage technological change are now highly differentiated, both between and within countries. What increasingly defines the less-advanced developing countries is the weakness or even complete absence of a capacity to manage technological change [11]. Among the poorer developing countries only a few, notably India and China, have any significant capacity in this sense. Almost all the others are in a desperate situation [12]:

(a) The personnel, policies, institutions and culture through which technologies can be created or transferred and disseminated are largely missing;

(b) They depend on others to identify their technological needs and they lack the ability to assess the range of technological options available and make appropriate choices;

(c) They lack the economic power to harness the world's scientific and technological endeavours to address their particular needs, while the absence of a flourishing private sector and of significant inflows of foreign direct investment severely restrict their acquisition and application of relevant foreign technologies.

Strengthening the national capacity of less-advanced developing countries to manage technological change should be regarded as a central and urgent development issue for the 1990s [13], but practice in both developing countries and in aid agencies is seriously lagging behind the conceptual progress on how to incorporate science and technology into the development process [19]. Reorientation and effort would be required as follows [20]:

(a) Science and technology programmes and priorities must be derived from a national dialogue among the stakeholders on needs and opportunities, rather than be driven by the 'suppliers' of science and technology, whether domestic or external. There must be a much enhanced partnership between economic and social policy-makers and science and technology professionals, but the defining and coordinating role should be assigned to the former, not to the latter.

(b) A strong national science and technology community must be fostered both through national efforts and the intermediation of regional and international efforts, oriented to serving the basic development needs of their communities.

It must provide capacities in the fields of pure science, applied science and effective technological applications appropriate to local conditions.

(c) At the international level, ways must be found to orient more of the world's science and technology effort to the development problems of less advanced countries. At present there is a major problem of 'market failure', because the low income levels of less advanced countries mean they cannot translate their needs into effective demand through market mechanisms. Science and technology is largely driven by the demand patterns of the developed countries' private and public (including military) sectors. In a world development perspective, this represents a fundamental distortion in the allocation of science and technology resources and should be seen as a central issue for international consideration and action in the 1990s.

A crucial requirement is the establishment of a sound economic policy environment [30]. Proper technological choices are only possible when markets can operate freely and effectively with rational pricing of resources (labour and capital in particular) and outputs to guide decision-makers, including environmental costs whenever possible [31]. Strong market-based incentives for adopting technological improvements are essential, as are the economic and legal conditions for stimulating the creation and flow of affordable proprietary technologies [32].

Donor agencies should make it their primary objective in the less advanced countries to assist them to create a national capacity to manage technological change [33]. There is a strong tendency in the whole aid system to supply a wide range of capital equipment on a highly-subsidised basis, while at the same time failing to ensure that the recurrent expenditure on human resource capacities needed to sustain the effective use of this capital is available. Particularly in less advanced countries this propensity has a major negative impact on the national capacity to manage technological change [34]. Aid agencies should increasingly shift from a project-by-project approach to a more strategic, capacity building thrust with longer-term commitments to help accomplish well-defined technology development missions [37].

A key requirement will be to create a synergy within aid agencies between economic analysts, programme planners, and science and technology specialists so that the building of national capacity to manage technological change becomes a central, early issue in programme design. A high degree of integration of science and technology into all aspects of an aid agency's operations is essential [39]. Aid agencies should seeks ways to enhance dialogue with the wider science and technology community in their countries, including non-governmental organisations and the private sector in this endeavour [40], and should consider long-term 'linkage grants', joining together NGOs, universities, and the private sector in their countries with counterparts in developing countries [41].

The capacity to manage technological change has to be, by definition, a broadly-based national capacity. At the same time, most of the less-advanced developing countries will not be able, solely on a national basis, to create and sustain flourishing science and technology communities of the size and quality needed to cater for their needs [43]. Particularly in those areas of the developing world where there are many small countries unable to achieve a critical mass of their own expertise, a few regional centres of excellence could provide the most realistic option for developing a vital science and technology community [45]. National capacity building should also be an important objective of international cooperative research schemes, such as mission-oriented 'networks' of scientists and institutions [47].