# Chapter 3

# International Cooperation in Technology and the Role of the Commonwealth

## I. INTRODUCTION

3.2 We have hitherto discussed policy questions primarily in terms of individual countries. However, such is the extent of internationalisation of the world economy that the policies of individual countries, especially large states, and of transnational corporations have implications for policies being pursued elsewhere. This calls for a broader, multilateral, perspective for technology management.

3.2 Cooperation in technology occurs between developed and developing countries ('North-South') and among developing countries ('South-South') and developed countries ('North-North'). It takes a multiplicity of forms—bilateral and multilateral, concessional and commercial. While there are obvious reasons why developing countries should seek support from developed countries in improving their capacity to manage technological change, there are also strong arguments favouring technical and economic cooperation among themselves. We place considerable stress on such 'South-South' cooperation, starting perhaps on a regional basis, and fully support the efforts of the United Nations and other institutions to promote it. But we also recognise that there are major constraints to be overcome—attitudinal, institutional and financial. The strength of traditional trading and investment patterns is such that many developing countries do not utilise technology from other developing countries, while the institutional framework is often unable to support such efforts, and finance is insufficient.

3.3 There are several areas in particular which call for a multilateral approach:

—where national policies spill over and, if only inadvertently, influence other countries. For example, if one country offers tax incentives on high-tech industries with the aim of upgrading its technological base, this may attract footloose companies from elsewhere, precipitating competition in investment incentives. Even where the spill-over effects of national actions are positive—as, for instance, with a decision by a government in one country to promote adjustment of its industrial base up the technological ladder, which leads to other countries gaining its 'cast-off' low-tech industries—cooperation may still help to maximise the benefits;

—where there are large and increasing economies of scale in R & D. Even in countries with relatively large, mature economies, such as the EEC, there have been several programmes of joint activity (in this case Esprit, the $1.5 billion five-year research programme on information technology) in a attempt to keep pace with the technological leaders—the USA and Japan.[1] There are also cases of high fixed costs in the use of new technologies (as in telecommunications) which make their adoption too expensive for smaller economies except on a joint basis; and

—where countries acquire their technology externally, the terms of technology acquisition may be improved by joint negotiations with foreign suppliers, often transnational corporations. Individual governments may find that their attempts to identify new technologies, let alone to control the terms on which they are acquired, are frustrated by their lack of technological information and evaluation capacity and by their weak economic strength relative to the large technology-producing companies or countries. Concern over the inequitable nature of current technology transfer mechanisms has led to strong demands from developing countries for a framework of multilateral cooperation to cover the terms of technology acquisition.

3.4 In this chapter we first consider existing forms of international cooperation, and how they might be improved, with particular reference to education and training, R & D, technology policy formulation, capital goods, and various other 'North-South' issues. The second part of the chapter focuses on the Commonwealth dimension and recommends new mechanisms for member countries to share their experiences in adjusting to the introduction of new technologies.

## II. AREAS FOR INTERNATIONAL COOPERATION

### Education and training

3.5 We have already stressed the key role of education and training both in creating an indigenous capacity in relation to new technologies

and in facilitating adjustment. While some developing countries have created a large cadre of scientific and technically skilled manpower themselves—notably India—others need help in training at various levels. All developed countries and most multilateral bodies offer various forms of technical assistance incorporating training, ranging from financial or technical support for the establishment of training institutes, to scholarships for training abroad.[2] In addition there are a number of bilateral commercial initiatives, for example specialised training units set up by foreign firms to develop the skills necessary for their local activities. We consider that much more could be done to strengthen these activities, especially in relation to the 'software' requirements of microelectronics technology, by increasing their funding, particularly for the poorer developing countries where public education is under severe constraints.

3.6 Developing countries' shortages of skilled workers can also be relieved through cooperative efforts, such as the establishment of joint training institutes. As with joint R & D, this will reduce wasteful duplication—for example, in one region of Africa three neighbouring countries, despite having small textile industries, each have their own textile training institutes.

3.7 Skills in and experiences of new technologies can also be acquired by countries exchanging personnel. Such exchanges may take the traditional form of technical assistance—for example skilled workers from the technologically more advanced (developed or developing) countries helping to train workers in less advanced countries—or they may involve workers, managers or policy-makers from the latter gaining technical skills and experience by working in technologically more advanced industries or institutions in the former.[3] Both are desirable but in the second case, measures may be needed to persuade the newly trained personnel to return to their country of origin.

3.8 There is already a large flow of workers between countries. For some developing countries, it involves the migration of skilled workers, in whom they have invested scarce resources in education or training, to other countries with greater economic or professional opportunities. According to UNCTAD the imputed capital value of this 'overflow' or 'brain drain' from developing countries as a whole was roughly equal in value to all bilateral aid during the period analysed.[4] There is also a substantial flow of labour from poor, labour-surplus developing countries to others such as Singapore and countries in the Middle East.

3.9 Offsetting the short-term cost of reduction in the availability of skilled workers (itself partly offset by migrants' remittances of foreign exchange) are the medium-term benefits which are realised when

migrants return home with the experience of working in technologically more advanced industries. For example a large number of entrepreneurs in China (Taiwan), South Korea and the Caribbean have been to the USA, not only for training but also to gain technical and managerial experience and even to set up R & D bases there. It is an example which entrepreneurs in India and elsewhere have begun to follow. Migrants to other developing countries may also acquire new skills. For example, construction workers who go to the Middle East learn how to utilise the heavy equipment in use there.

3.10 But for many countries there is still a problem of skilled nationals being reluctant to return home, because of difficulties in exploiting their technological expertise. In most cases host countries have provided these skilled workers with incentives to stay, in contrast to the treatment of the unskilled. Some form of international labour compensatory facility, as proposed by UNCTAD, may therefore be appropriate. Under it, countries experiencing a large-scale outflow of skilled nationals could be given financial assistance, to be spent on expanding training schemes, foreign fellowships, or equipment to substitute for skilled labour, as relevant.

**Joint research and development**

3.11 There is growing recognition of the need for collaborative R & D, especially among small states and on matters of importance to developing countries. Among the more significant institutions in this respect is the International Rice Research Institute, which has played a major role in developing new seed varieties. Other institutions have concentrated on high-tech areas; for example, the International Centre for Genetic Engineering and Biotechnology which is being established (at the initiative of UNIDO) with sites in Italy (Trieste) and India (New Delhi). This Centre will concentrate on R & D (including setting up a gene bank) and training in industrial microbiology, agriculture and health, with particular attention to the needs of developing countries.[5]

3.12 While producing valuable research themselves, these international institutions have had difficulty in helping governments to minimise duplication in their national research programmes. A survey by the Asian Institute of Technology in 1983 found that each of 15 alternative energy sources was being studied by at least three of the five ASEAN countries, while six sources were being studied in all five countries. There are several regional centres which could help to coordinate R & D; examples include the Africa Regional Centre for Technology and the ESCAP Regional Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific. Given the important role the centres can play, they seem generally to be underfunded.

3.13 Another important area for cooperation is the dissemination of information about R & D. Such information is important for countries to take account of the implications for their own economies of developments elsewhere and to minimise R & D duplication.[6] While there are mechanisms for the results of most aid-funded research in developed countries to be channelled to developing countries, there is little institutional support for the transfer to developing countries of information about other R & D generated in the public sector. UNCTAD has proposed that information about technologies in the public domain (publicly funded R & D and patents which have lapsed) should be made available to developing countries on concessional terms. The information could be included in existing international data-bases, such as the UNIDO Industrial and Technological Information Bank or the WIPO International Patent Documentation Centre, or incorporated in a new data-base, together with information on the results of UN-funded R & D which have not been assembled elsewhere.

3.14 In addition, the UN agencies produce a number of basic bibliographical or reference systems covering R & D projects, technology sources, patent documentation or training and technical assistance programmes.[7] The purpose of the Advanced Technology Alert System (ATAS), launched recently by UNCSTD, is to provide developing countries with information about emerging developments in the frontier areas of science and technology, and the implications for their economies. An international network of specialised research institutions and experts will monitor technological developments and select relevant information for dissemination to developing country planners and scientists via seminars and publications (notably the ATAS *Bulletin*). The information may eventually be made available via a computer network.

3.15 Some form of coordinating or switching mechanism is however needed to channel inquiries about technological developments to the appropriate information system. It is also desirable to link the UN network with some of the commercial data banks, provided their owners allow developing countries to use the information at rates they can afford. International information networks may also help improve contacts between small- or medium-scale industries in developing countries. Some such mechanisms already operate. For example the UNIDO monthly newsletter publishes lists of companies offering (and seeking) various technology packages, and the Centre for Industrial Development, set up under the Lome Convention between the EEC and 66 African, Caribbean and Pacific countries, provides a similar service for member countries. The International Technology for the People Fairs provide an opportunity for developing countries to become acquainted with a wide range of technologies in such basic needs areas

as food production and processing, housing, energy, and health. These initiatives are rather fragmentary and there is a case for better coordination, perhaps even integrating them into a single information network easily accessible to entrepreneurs (and governments) in both developing and developed countries; one possibility might be to use the UNDP Information Referral System as a basis.

3.16 Finally, most developing countries need both financial and technical support to develop their information infrastructure. As well as financial assistance with the hardware, technical assistance could help utilise information sources and improve domestic information collection and processing capacity. A further requirement is a capacity to standardise technology information systems to ensure that the information is more easily shared.

**Technology policy formulation**

3.17 Nearly all major multilateral agencies have an active interest in the management of technological change, in the case of the UN stimulated by agreement on the Vienna Programme of Action in 1979.[8] The UNCTAD Advisory Service on the Transfer of Technology assists developing countries to formulate technology plans, with special attention to critical sectors such as energy, food processing and capital goods. Other agencies offer advice on policy in their own fields of expertise, for example, UNIDO in industrial technology, and FAO in food technology. As well as the terms of technology transfer, much of the emphasis is on the actual or likely impact of new technologies. For example, ILO is concerned with their implications for employment and working conditions,[9] and UNESCO with those for education. There would appear to be scope for greater coordination of these activities to avoid overlap and to ensure consistent advice. The UN Financing System for Science and Technology for Development, UNIDO, and others have organised international seminars on country experiences in technology policy-making; but much more could be done. What does appear to be lacking, however, is an effective input from international agencies, and especially from the World Bank, into technology policy formulation. This is increasingly important in connection with the growing emphasis on policy conditionality and dialogue at a national and sectoral level in association with structural adjustment lending.

3.18 There are several ways in which developing countries can provide mutual support at the policy level. One is to exchange experiences they have had in negotiating contracts with foreign suppliers of technology or in managing the impact of these technologies. Institutional mechanisms for exchanges of this type have been developed, such as the regional conferences organised by UNESCO for ministers responsible

for the application of science and technology for development; various inter-governmental groups of experts have also been established. Such mechanisms should be assisted by relevant information networks. Examples include the Technology Information Pilot System (TIPS) being developed by UNDP for ten developing countries,[10] covering technology transfer, trade and investment needs, business opportunities, etc., in seven new technologies and a traditional one; and UNIDO's Technology International Exchange System (TIES), which disseminates information on commercial technology contracts.

3.19 In addition developing countries could harmonise their technology practices on a regional basis, if not more widely, if they want to stimulate greater cooperation in trade and investment. In particular, common technical standards would facilitate the compatability of information systems (allowing software and data banks to be shared) and production systems (allowing countries to specialise in producing different products or parts, and thereby realise economies of scale). The experience of the EEC, where failure to adopt common standards has frustrated both R & D and production plans, should be a lesson for developing countries interested in promoting regional development.

**Acquiring capital goods**

3.20 To the extent that some technology is embodied in hardware, there is an argument for extending cooperation to the acquisition of capital goods. Developed countries have provided developing countries with subsidised export credits and bilateral aid tied to capital purchases. In practice, however, the technology which developing countries are being helped to buy may not be as appropriate as others which are not on 'special offer'. In this case the subsidies may be more effective if they are channelled through multilateral agencies for use in the acquisition of new technologies appropriate to developing countries.

3.21 Cooperation among developing countries has led to a substantial increase in their mutual trade in capital goods.[11] Despite the growth of this trade, the volume might be even larger were it not for various information gaps, financial difficulties and institutional and infrastructural barriers which hinder South-South trade in these and other products.[12] The case for removing these barriers to capital goods trade rests largely on the assumption that goods developed or adapted in one developing country may be more appropriate for another such country than are those imported from developed countries. Certainly, for the least developed, technologically-backward, developing countries, it may be easier to assimilate technologies which have been tried, digested and adapted by other developing countries, than those imported directly from developed countries, with whom there is a large technology gap;

in particular, such technologies should reduce the least developed countries' need for costly trial and error procedures.

3.22 But disadvantages are possible, similar to those arising from buying capital goods from developed countries. For example, the risk of becoming dependent on the technology supplier for spare parts (or even for management of the plant where the technological know-how is not fully transferred); restrictions on the use of equipment for the production of goods for export; or technological obsolescence. It is also likely that technologies imported from other developing countries are even further behind the state of the art (let alone best practices) than those purchased from developed countries. While in some cases this may make them more appropriate, in others it may make them simply less efficient.

**Other areas for cooperation**

3.23 There are several other issues being discussed in international fora which have a direct bearing on technology management at a national level. They centre on the terms and conditions of technology transfer, and the interaction between technological change and international trade. There are also many other areas which have indirect but important implications for technological change, such as the UN Convention on the Law of the Sea or the UNCTAD Common Fund for Commodities. All call for a consensual rather than confrontational approach. Here for illustrative purposes we focus on four issues of direct relevance.

3.24 The first issue concerns *international codes of conduct* for the transfer of technology. Essentially the concern is for a balance to be struck between improving developing countries' access to new technologies on fair terms, and ensuring that foreign companies are not deterred from developing and transferring their technologies, whether under an investment package or through the sale of goods or services. Since the mid-1970s there have been efforts in UNCTAD to draw up a code of conduct on technology transfer similar to that governing restrictive business practices or sought in the UN Commission on Transnational Corporations for the activities of such enterprises. Despite six years of negotiations in UNCTAD, there are still several major areas of difference between the developed and developing country groups. They include such basic issues as whether the laws of the technology supplying or receiving country should govern technology transactions, how disputes would be settled, and how the code should apply to transactions between related parties. Even if agreement is reached on such matters, the code is unlikely to be mandatory.

3.25 Another issue relates to *access to high-technology products.* Fifteen countries (14 members of NATO and Japan) have long operated

a Coordinating Committee (Cocom) to restrict exports of certain high-tech goods, including computers, robots, and sophisticated electronic and telecommunications products, to socialist countries, primarily in Eastern Europe. However, Cocom has recently extended its export controls to 12 developing countries, including Hong Kong, India, Malaysia and Singapore, on the alleged grounds that importers in these countries are 'unreliable', i.e they are suspected of having re-exported Cocom listed products to socialist countries (or of attempting to do so). In some cases this has led to lengthy delays before technology export licences to these countries have been granted, and sometimes they have been refused.[13] Moreover, although the initial rationale for the Cocom system was one of security, it has become increasingly difficult to distinguish between products of civil and of military application (many are in fact 'dual use'), with the result that controls have begun to affect imports by developing countries of high-tech products which have important industrial uses. Controlled products include electronics and semiconductor manufacturing equipment; measuring and calibration equipment; microcircuits and integrated circuits; computers; silicon chips and other components; sapphire substrates; and carbon technology. It is not clear whether there are also non-security motives (for example a desire to restrict industrial competition), but the volumes of trade involved may be considerable, while the upgrading of manufacturing capacity will also be affected indirectly.[14] This development illustrates some of the problems involved with dependence on a few, quasi-cartelised, companies for high-technology imports.

3.26 A third area of concern relates to *copyrights and counterfeiting*. According to EEC estimates as much as 2 per cent of international trade is now in counterfeit goods, i.e. those which are produced in contravention of copyright law, including illicit copies or goods using trademarks falsely. This trade occurs in both developed and developing countries. In many cases the issue is not one of techology, *per se,* but how to protect consumers from copies which are often inferior if not totally unreliable. For example, counterfeit antibiotics, birth control pills, and fungicides have caused widespread damage. The use of the latter by West African cocoa farmers and East African coffee farmers allegedly contributed to harvest losses of some $20 million in each case. Developed countries are concerned by the implications not only for their consumers, but also for their producers—manufacturers of car parts in Europe claim to have lost 6,000 jobs (a year) as a result of counterfeit parts imported from three developing countries alone, while in the USA some 14,000 jobs are said to have been lost through this means. Counterfeiting has also spread to high-tech products such as computers and related software; here the problem consists both of copying firms being able to produce goods of similar quality but at lower prices (as they have no R & D costs to defray) and of poor

quality goods falsely marked with trademarks associated with high quality products. Developed country producers and governments have attempted to resolve the matter under the Paris Convention on Industrial Property Rights[15] by seeking to strengthen patent protection in developing countries. They argue that unless developed country firms have some means of recouping their R & D costs, these firms will be reluctant to reveal details of their new products, whether through patents or other means, while their willingness to invest in R & D could also be dampened. But developing countries have different, and to some extent opposing, interests—seeking greater and concessional access to patent information, such as the ability to suspend patents if licences are not fully used, and shorter periods for which licences are valid. They also fear that to enforce restrictions on the use of intellectual property rights would be to keep developing countries technologically backward.

3.27 The fourth area to which we wish to refer is that of *transborder data flows*. Here, developing countries are concerned not only with access to such data but with implications which it has for their sovereignty. While transborder data flows can bring enormous potential benefits (for example providing developing countries with information on the international commodity and technology markets), they also raise a number of problems. One is the likelihood of increasing external dependence for data processing. Another is control over data use—which may be sensitive if strategic sectors are involved. A third is the greater centralisation of decision-making, especially by transnational corporations. Some developed countries share these concerns and there have been a number of efforts to draw up international guidelines for transborder data flows, in the Intergovernmental Bureau for Informatics, the OECD and elsewhere. However before there can be much progress, more in-depth evaluation of the impact on individual countries is needed.

## III. AREAS FOR COMMONWEALTH COOPERATION

3.28 After broadly analysing the impact of new technologies (Chapter 1), setting out some of the principles and experiences of policy to 'manage' technology (Chapter 2) and recommending ways in which the international community can help developing countries to maximise their benefits from new technologies, we addressed the question of how the Commonwealth could assist. We paid particular attention to the role that could be played by the Commonwealth Secretariat and, where appropriate, the Commonwealth Science Council (CSC). In doing so we were aware of the funding contraints involved in suggesting new

activities, and of the fact that, to be realistic, any recommendation to that effect must be modest in scope. We were also conscious of the need to avoid duplication of existing activities and of the very different requirements of Commonwealth countries as regards technology.

3.29 By the end of our deliberations we concluded that there is an important role for the Commonwealth Secretariat in encouraging or carrying out certain information and promotion activities and advisory services, as well as in organising training courses and seminars on the management of technological change. We decided to make recommendations on each of these, though it should be understood that these are merely of an indicative nature and are for purposes of illustration. More detailed assessment, including costing, would need to be undertaken on their implications before a properly informed decision could be made, though in our view this would not preclude governments from making a commitment in principle.

**Information and promotion activities**

3.30 As we have shown in earlier parts of our Report, a large number of developments are occurring in the technological field, particularly in the emerging technologies, with important implications for economic and social activity worldwide. For most Commonwealth developing countries it is very difficult, if not impossible, to keep abreast of these changes, let alone to be in a position to evaluate the likely impact on their economies. Although a great deal of work on many facets of technological change is being undertaken in several United Nations' organs, notably UNCSTD, UNIDO and ILO, which is of considerable interest to developing countries, many also lack the capacity to keep up with this work. We therefore examined whether the Commonwealth Secretariat might itself perform a useful function by monitoring developments and disseminating information in an easily accessible and digestible form to decision-makers in Commonwealth governments and also to non-governmental organisations (NGOs). In this context it could draw on its network of contacts and its experience of supporting the work of decision-makers, especially in small states.

3.31 It also became clear, in the course of our work, that there is little readily available data on the economic and social impact (particularly on employment) of new technologies in most Commonwealth countries. Such information is crucial for technology assessment in the countries to which it refers, while it can provide important lessons for others. Although the ILO, in particular the newly-established ILO Advisory Committee on Technology, is doing some work in this area, we feel that the Commonwealth Secretariat can usefully encourage Commonwealth countries to collect such information and help in its dissemination. We

have therefore given careful thought to the nature of the Secretariat's possible involvement in this area. One possibility would be for it to carry out or commission studies to widen understanding. For example, it would be useful if the Secretariat initiated comparative studies of the impact in different environments of the same technologies.

3.32 Another approach would be to concentrate on the dissemination of information already available, using expertise in the Secretariat, particularly in the Commonwealth Science Adviser's Office, the Industrial Development Unit (IDU) and the Economic Affairs Division. For example, the CSC's Earth Sciences Newsletter and other publications already document certain changes relevant to new technologies. The IDU is currently designing data bases on industrial technologies and processes required by some member countries and Commonwealth regional organisations, as part of its ongoing project work for the implementation of subcontracting exchanges and information centres.

3.33 We feel that in addition it would be desirable and feasible to compile, and distribute to member governments, a quarterly newsletter aimed at policy- and decision-makers and covering, together or separately, technical and socio-economic aspects of developments concerning new technologies. The information would be in a summary form with references to sources for those interested in obtaining further details. The groups of new technologies and sectors of application to be covered would depend partly on the resources available and partly on countries' requests. There are other modes of transmitting such information—for example via micro-computers linked to a data bank, by 'talking' word-processors, facsimile machines, or even satellites—and consideration could be given to incorporating some of these once the simpler means of communication had been established and proved to meet a need.

3.34 At the same time, action should be taken to raise member states' knowledge of the existing technology-related activities being undertaken by the Commonwealth Secretariat. Equally, the technology-related work of the CSC and Commonwealth NGOs should be more widely recognised and, in so far as practical, coordinated with that of the Secretariat.

3.35 At the very least, a concerted effort is required to ensure that the importance of technology policy and the need to formulate quick responses to accomodate major new technologies are kept to the forefront of future meetings of Commonwealth Employment/Labour Ministers and of other Ministers, including Ministers of Planning, Education, Industry, Agriculture, Finance and Trade.

**Advisory services**

3.36 The Commonwealth Secretariat as well as several Commonwealth NGOs already provide their respective constituents with a range of advisory services relating to the assessment and use of technology. To date, however, there has been little focus on the actual or potential use of 'new', as opposed to 'traditional', technologies, or on the possibilities of 'blending' the two, especially in developing countries. The material submitted to us has shown that the technology requirements of Commonwealth countries differ very considerably, according to a whole range of considerations. Nevertheless, all countries need to optimise their use of technology, in the choice of which they should take account of all its economic and social effects, not least on employment. In addition they must be prepared for future technological changes.

3.37 The speed of technological change and plethora of new technologies available mean that many governments, particularly of developing countries, will need to seek external advice on technology identification, assessment, application and forecasting. For this reason they are turning progressively towards international institutions for impartial guidance. The Commonwealth Secretariat should expect to receive an increasing number of detailed requests for such advice. If it is to respond to them, it will have to strengthen its capacity. This will need additional resources. We are especially aware of the gravity of the present situation in Africa and believe that a strong case can be made for a special effort to increase advisory services to African member countries on how new technology (for example biotechnology) might be used to meet their urgent needs, particularly in relation to food supply.

3.38 There is also merit in an advisory panel of experts who could be drawn upon as the need arose. As well as being available to provide advice on technology forecasting or assessment, the panel would be able to help Commonwealth developing countries to develop technology institutions and improve contacts between them.

**Training and exchange programmes and education**

3.39 The choice of the most appropriate new technology and its effective deployment is dependent on a greater understanding by decision-makers of the technological options available. The Commonwealth can play an important role in this respect by organising training or exchange programmes for key personnel, with the aim of creating a better awareness of new technologies and their impact. In the first instance such initiatives should be directed at those who decide on the use of new technologies rather than at the operators of those technologies.

3.40 Government officials, scientific advisers, managers and trade unionists are all directly concerned with the choice of new technologies. In many cases they need greater knowledge of the systems available, in order to negotiate effectively on the acquisition of new technology or its use at the workplace. One way of enabling decision-makers to acquaint themselves with the uses and implications of new technologies, and how they are best managed, would be through contacts with others in Commonwealth countries who have had comparable experiences and problems. This could be done through instituting exchange schemes in a manner somewhat analogous to those which already exist in other spheres, for example among senior officials for regional integration secretariats. Further, seminars for representatives of both the public and private sectors could be organised on a regional or wider basis specifically to learn from experiences in the use of new technologies.

3.41 The Commonwealth Industrial Training and Experience Programme (CITEP), which would give trainees up to six months' industrial training or experience in other Commonwealth countries, would have a significant role to play. It would provide training opportunities, not only for technology decision-makers but also for operators of new technology, especially in the less developed small island states and those in special need in sub-Saharan Africa, where such opportunities are limited. We were pleased to hear that at the June 1985 meeting of Commonwealth Employment/Labour Ministers, several Ministers spoke in favour of CITEP giving priority to the training of key personnel in the use of new technologies. In that connection we suggest that the possibility is investigated of co-financing from a variety of sources, including manufacturing companies, which have an interest in promoting technological diffusion, and other international bodies working in this field. Meetings of Commonwealth Employment/Labour Ministers' should serve as a focal point for reviewing and stimulating future exchange and training arrangements.

3.42 Finally we have been most impressed with the possibilities of making greater use of new technologies to facilitate and promote education. Satellite communication has already been used to bring education to the rural areas of India, where it has been particularly useful in disseminating knowledge on agricultural technologies. We see much wider scope for this means of communication. The combination of satellite technology and English as the common language not only of international communication but also of the Commonwealth, could be used to achieve more cost-efficient education systems, especially in higher and specialist education, throughout the Commonwealth or in particular regions of it. Economies of scale would make such a medium especially suitable for assisting the learning process in small states and the poorer countries which are unable to receive specialist education

through conventional means. We suggest thought should be given to the financial and technical implications of such an idea.

## NOTES

1. The EURONET-DIANE network, which was inaugurated at the end of 1984, shows what cooperation can achieve (albeit at considerable cost—$33 million, excluding the cost of the data-bases themselves). It provides access to more than 60 million pieces of scientific, technical, economic and social information, stored in nearly 500 data banks in the public and private sectors, via a data transmission service operated by national post and telecommunications offices. Besides the ten EEC members, Switzerland, Sweden and Finland have joined the network, while Austria and Portugal are likely to do so shortly.
2. Among multilateral bodies the ILO, with its International Centre for Advanced Technical and Vocational Training, is perhaps foremost, but training is also provided by other parts of the UN system, such as UNIDO, and elsewhere including the Commonwealth Fund for Technical Cooperation.
3. This is one type of exchange envisaged under the Commonwealth Industrial Training and Experience Programme (see para 3.41, below).
4. UNDP, *TCDC News*, No. 2, 1983, p. 8.
5. Its resources are however modest. Its budget for the first five years has been set initially at $41 million—barely as much as Japanese public spending on this area in one year. (*New Scientist,* 9 February 1984.)
6. For example, the Socially Appropriate Technology Information Service, based in Senegal, promotes exchanges of information on R & D programmes.
7. See Volume II, Appendix 9 for details.
8. UN activities in science and technology under the Vienna Programme of Action are discussed in more detail in Volume II, Appendix 9.
9. It has recently set up a tripartite Advisory Committee on Technology, representing workers, employers and policy-makers to consider these issues.
10. Brazil, Egypt, India, Indonesia, Kenya, Mexico, Nigeria, Pakistan, Peru, Philippines. The list may later be extended.
11. Comprehensive up-to-date figures are not available, but even by 1980 the share of capital goods in the rapidly-growing total of intra-developing country trade had reached 20 per cent, compared with 4 per cent in 1960. The bulk originates in a few developing countries, notably South Korea, Brazil, India, Argentina and Mexico.

12. See for example, UNCTAD, *Trade and Development Report* 1983, Part II, Economic Cooperation Among Developing Countries.
13. Such problems led to Singapore agreeing in April 1985 to cooperate with Cocom, the first country outside NATO and Japan to do so.
14. For example, in Spain, plans by AT & T to set up microchip production and by Corning Glass to construct a fibre-optics plant have been under threat, putting pressure on the Spanish Government to reconsider its commercial ties with Cuba.
15. The basic legal instrument governing the international use of patents, trademarks, designs, etc, to which almost all developed market economy countries and more than 50 developing countries belong.