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TRANSFER AND DEVELOPMENT OF APPROPRIATE
TECHNOLOGY IN THE LESS DEVELOPED
COUNTRIES

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Title: Transfer and Development of Appropriate Technology in the Less Developed Countries

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1. This year Sri Lanka counts exactly 3 decades since gaining independence after centuries of foreign rule. These 3 decades have also been a period during which technological development in the world has advanced perhaps to a greater extent than it did in the whole of human history previously. How have the less developed countries (LDCs), most of which emerged as independent nations during this period, faced this brave new world?
2. Much has been said on the theme of development and underdevelopment. The declaration of the two Development Decades, the declaration of the New International Economic Order, the proposal to hold UNCSTD 1979, and so many other events have focussed world attention on the shameful disparity between the 'haves' and the 'have nots' of this world. About $\frac{1}{4}$ of the world's population, nearly all of whom live in the LDCs, have not benefited at all from the technological achievements of the past few decades. While the few developed countries possess the bulk, by far, of the world's science and technology and are advancing exponentially, the LDCs are crawling at a snail's pace. So great is the disparity and so unconcerned world opinion generally, that when the fuel crisis occurred, the rich nations were disturbed that they would have to turn down their thermostats by a few degrees or reduce the number of weekend excursions, but the mass media gave hardly any prominence to the plight of the poor whose very existence was threatened by the escalating food prices caused by the fuel crisis.
3. If anything, the space achievements of the superpowers have shown, in stark reality, the finiteness of this space ship earth which is the only home of mankind. Can you imagine a situation where in a space ship one astronaut lives in comfort and luxury and the others are deprived of everything, including sustenance? But this is just what prevails in space ship earth.
4. This is not an equilibrium situation, and it cannot endure. To remedy it there must be a firm commitment on the part of the LDCs, backed up by action, to improve the lot of the poor and disadvantaged, and to increase the pace of economic development through the effective use of science and technology. But, equally, there should be a commitment by the developed countries to assist meaningfully in the efforts of the LDCs to transfer and develop appropriate technology.
5. The government of Sri Lanka has accorded the highest priority to the development of agriculture and industry. In the agricultural sector, Sri Lanka's rice production has been below the level required for self sufficiency, and the government has therefore reprogrammed the giant multipurpose irrigation scheme (Mahaweli Project) for completion of its major stages in 6 years instead of 30 years as originally planned. In the industrial sector the programme of development falls broadly into 2 major areas of activity:
 - (a) The Greater Colombo Economic Zone (which includes the Export Processing Zone (EPZ)) in which all major industries will be located and where a package of incentives is offered to attract foreign entrepreneurs, and

(b) The development of small and medium scale industries outside the Zone giving preference to industries which, inter alia, are export based, produce essential commodities required by the people, strengthens the industrial structure through the manufacture of intermediate and investment goods, are dispersed in their location in the rural areas, diversifies the technological capacity of the economy, and have a high employment potential.

6. The criteria under (b) above have been listed by me as they are precisely the areas where industrialisation and technological transfer have not made an effective impact in the past. I shall in the rest of this paper refer generally to the area of activity (b) which is the development of small and medium scale industries outside the Greater Colombo Economic Zone. In the past, technology of this scale was transferred in the following forms.

(a) Foreign subsidies, where the industry is owned and operated by the parent company. The entire technology package is transferred, and running and maintenance is in foreign hands. There is little horizontal transfer of technological know-how to benefit other similar industries in the country, and a good proportion of the profits flow out to the parent company.

(b) Joint ventures, where the subsidy is foreign controlled but there is very active cooperation with local industrialists

(c) Local enterprises, where the technology is transferred to the local industrialists either through outright sale or through agreements where payments is made for a stipulated period and limited foreign assistance is provided by way of training local personnel, supplying spares etc.

(d) Technical assistance by UN agencies and governments of aid-giving countries

7. Despite 30 years of striving since independence, though Sri Lanka has made some headway in industrial development, the progress of this sector has fallen well below expectation. The unsatisfactory features of the sector are its low contribution to the GNP (13 per cent in 1976), the very high proportion of raw materials that are imported (70 per cent of the value of raw materials in the factory industries in 1974), and the degree of under-utilisation of installed capacity (under-utilisation was 36 per cent in 1976). Obviously the transfer and development of technology has not achieved the desired results in contributing towards development.

8. The diagnosis of the problems related to the transfer of technology to the LDCs has been made many times over and is well documented. However, I will deal with a few points related to our experiences.

9. In technical assistance programmes, very often, and understandably so, what is given as aid or soft loans are the technology and expertise of the donor countries. These technologies are often too sophisticated and too complex to fit into the local set up, and even if it were not so, the acceptance of such technology as being the panacea for all ills, tends to make us ignore our traditional technologies. Hence the traditional technology that may have been improved by the application of modern scientific and technical knowledge remains unchanged. To take a simple case, we continue to depend more and more on modern trucks for road transport and the bullock cart that can be improved to perform a

very cheap and useful service for light, short distance transport remains backward as ever. Then again, technical improvements in timber felling and extraction tends to be done by the introduction of powered chain saws and heavy tractors while not paying sufficient attention to increasing the efficiency and speed of traditional methods. There is no doubt that the transfer and development of small and medium scale technologies should concentrate heavily on upgrading traditional methods - which have evolved using indigenous skills and materials - by the application of modern technical know-how. Even in the case of modern production technology there are many problems in its transfer to the LDCs. It is often said that modern industrial units are such that small units that are generally more labour intensive are less economical than large units. This concept, however, does not apply to operations in many LDCs where ample and cheap labour is available. It is particularly so in the smaller LDCs where, unless the product is also meant for export (as is the case with the industries established in the EPZ), the limited local market could be more economically served by small production units. For the small and medium scale industries, therefore, what would be required are small scale units that are easy to operate and maintain, are labour intensive, and are suitable for installation in rural areas.

10. In this context it may be even true to say that, in some cases at least, technologies that are in an earlier state of development than what is now available in the industrialised countries may offer better prospects of adaptation for use in the LDCs than the more sophisticated modern ones, provided they could be upgraded and converted into 100 per cent local industries where the machinery and the spares are turned out locally. Even with more sophisticated industries, process modifications are necessary to make them less capital intensive and more labour intensive to adapt them to use local raw materials in place of imported ones, and to scale them down. These are avenues of development that have to be pursued vigorously. In this context, the LDCs could learn much from each other. But it should not be assumed that a technology developed in one LDC would be automatically suited to others. For example, the production of biogas from cow-dung to supply the energy needs of villages requires that the cow-dung be available in quantity and that collection is cheap. In Sri Lanka there is no tradition of collecting cow-dung as in India, and the quantity available may also not be adequate in many villages. Moreover, many villages in Sri Lanka are not very remote, and the alternative of supplying energy through the electricity grid is a distinct possibility and may be preferred. We cannot rule out biogas, but we must examine its feasibility under our conditions without taking it for granted.

11. These are not new concepts. They are ideas that have emerged in the past few years. Despite this, what has been the impediment to their application? For implementing any of all of the strategies for transferring and developing technology in the LDCs as very briefly outlined above a sine qua non is that the LDCs should have a strong indigenous science and technological capability and infrastructure. There should be a strong corpus of local experts in the different branches of science and technology, and there should be sufficient capital available for the purchase of equipment and literature. It is the lack of these in adequate measure that has crippled the transfer and development of technology in many of the LDCs. The expenditure on R & D is low and the brain drain has assumed alarming proportions. What is not generally realised with regard to brain drain is that it cannot be gauged merely in terms of numbers, as those who leave are generally the middle aged scientists and technologists who are experienced and whose productive capacities are at their peak, while those who join the services are raw graduates who have yet to learn their job.

12. Without an adequate S & T capability, unpackaging of technology and carrying out the innovations that are necessary for effecting the modifications referred to earlier will not be possible; neither will it be possible to effect improvements to traditional technologies.

13. To build an effective S & T capability, governments of LDCs must be fully committed to this end and must strive for the ultimate objectives of total self-reliance. With regard to brain-drain, the Government of Sri Lanka does not believe in compulsory restraint, but, on the other hand, has offered incentives for the scientists and technologists to stay and assist in the development of their homeland. These incentives in no way match the salaries offered abroad, but there are signs that the appeal to the patriotic sense of these Sri Lankans is having a salutary effect. In the meantime the Government is taking steps to increase the output of scientists and technicians at all levels.

14. The developed countries have also a vital role to play in the transfer and development of appropriate technologies in the LDCs. While much project aid has flowed from the developed countries, this has not had an effective impact in building up an adequate S & T infrastructure and capability in many of the LDCs. The governments of the developed countries should join the few which are making a conscious effort to help the LDCs in this respect.

15. In conclusion I would like to quote from the summary of the Sri Lanka National Paper for UNCSTD where some proposals have been made with regard to (a) Possible assistance the developed countries could render to the LDCs to help them to achieve a faster rate of development through the application of S & T, and (b) Possibilities of cooperation among the LDCs themselves.

"It is recommended that a Special Fund be created (under the auspices of the UN), to be subscribed to by the nations that utilize the skilled human resources of the less developed countries, and to be used for increasing the training capacity of the LDCs that lose their trained manpower.

"With regard to assistance being provided by industrialized countries and international financing institutions to the less developed countries, it is urged that, while continuing aid for development projects, additional assistance be provided to LDCs for developing the S & T human and material infrastructures so that there would be a substantial increase in indigenous R & D. Some developed countries have ongoing programmes for aiding LDCs in increasing their R & D capabilities by strengthening the indigenous institutions (by providing equipment etc.), but there is scope for increased assistance; and other affluent countries could mount similar programmes.

"Most scientific and technological institutions in the developed countries, while obviously concentrating on research and development relevant to those countries, could also initiate programmes of R & D relevant to problems of LDCs. Such programmes while directly benefiting the LDCs in regard to the R & D output could also be used for training scientists from these countries.

"The developed countries could assist the less developed countries in the procurement (at low cost) of technologies that have a high potential for increasing the pace of development (e.g. solar energy technology),

"Regional cooperation among the less developed countries by joint participation in the manufacture of industrial goods and in the development of S & T in some selected areas would greatly assist the LDCs in the application of science and technology for development; a scheme for mutual cooperation in these fields may be difficult to put into practice but the concept is worth pursuing."

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