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The Ever Widening Gap

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Since the general theme of this year's meeting of the AAAS is "How Man Has Changed His Planet," I felt that an apt subject for my talk might be the great unevenness of these vast changes. Hence my title.

It was some time in the 1950's that the phrase "the Widening Gap" came into use to designate the obvious fact that the poor countries of the world were getting less poor very much more slowly than the rich countries were getting much richer. This, of course, had been true for many decades, but it only came to be widely studied and talked about after the beginning of decolonization, which was inaugurated in 1947 by Britain when she gave political independence to India, Pakistan, Ceylon, and Burma. With political freedom grew an aspiration to rapid social, economic, scientific, and technological advance. So the mechanism of economic growth came under detailed study, both in the rich "Northern Countries" and in such poor "Southern Countries," for instance, as India, which created a sophisticated economic planning organization and possessed able indigenous economists and statisticians.

It is a bit surprising that so relatively little attention was paid to the study of economic growth by economists in the rich countries till after the second world war. In fact, their thinking had previously been largely conditioned by the cyclic problems of booms and slumps which were so blatantly in evidence in the 1920's and 1930's. With the postwar period came, of course, the problem of the economic and political recovery of the countries devastated by war, and this, of course, required a long period of preferably steady growth. Moreover, the slump-and-boom problem loomed much less menacing than it had before the war, partly no doubt due to the influence of the Keynesian revolution in economic theory, and partly because of objective factors.

So for somewhat different reasons the theory and practice of economic growth came to the forefront during the 1950's: in the rich North, because of the new problems of the postwar era, and in the poor South, because the very continued existence of the new nations depended on the achievement of a far faster and more broadly based economic and social growth than had been achieved under the previous decades of colonial rule.

Though the role of science and technology in leading to a vast increase of wealth in those northern countries, which had undergone the Industrial Revolution, was everywhere recognized, little detailed study seems to have been directed to elucidating in detail what really happened. What, for instance, were the respective roles of science on the one hand and of superbly successful craft and empirical technology on the other? Certainly Britain rose to world-power status with very little organized science at all. The United States became the richest nation in the world while spending on science a mere fraction of what she spends today.

In fact, it is only quite recently that government expenditure on research and development rose to the present high levels. In 1938 the United Kingdom spent 0.3 percent of the gross national product on R & D, and in 1965 over 2.8 percent. This spectacular rise resulted partly from military requirements related to the second world war and to the cold war which followed, and also from the indirect effects of the Space Race between the U.S. and the U.S.S.R. Of all countries in Europe, Britain at present spends most on R & D as a percentage of gross national product, but she has only achieved one of the lowest economic growth rates. Japan has achieved an astonishingly high growth rate, over three times that of the United Kingdom, but with less than half the expenditure of R & D.

It is clear from these and many other examples that the relation between economic growth in the rich countries and expenditure on scientific research and development is by no means a simple one. As a result, it is necessary to be very cautious in applying uncritically to the poor countries the lessons learned from the rich ones—without, that is, taking into account the different social and economic structures of the two groups of countries.

Before I get down to the problem of the role of science and technology in the economic and social growth of the poor countries of the world, I want to make quite clear the nature and magnitude of the problem. Let us begin with a few facts. There are 800 million people in the rich countries—mainly Europe, including the U.S.S.R., and North America—and their average per capita income is about $1700 a year. There are 2000 million people living in the poor southern countries, including Mainland China, and their income is only $110 a year—that is, one-fifteenth of income in the rich countries. These are average figures; between the richest and the poorest, the ratio is much greater. For instance, in 1960 the per capita share of the GNP in the United States was $2300 per year; in the United Kingdom, $1150 per year; and in India, $70 per year. Thus, the average American was 32 times as rich as the

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average Indian and the average Briton was 16 times as rich.

The main origin of this staggering difference is the fact that the industrial and scientific revolutions have taken place in the northern countries and have made them rich, while they have not taken place in the southern countries and so have left them poor. As far as the evidence goes, Europe 300 years ago was as poor as China or India. The main part of the big difference now is thus historically of quite recent origin. While the now-poor countries—till 1947 many colonies of Europe (mostly of Britain!)—increased in wealth very slowly, probably less than 1 percent per year, the colonial powers increased in wealth much faster.

Thus, in colonial days, both the *relative* and the *absolute wealth gaps* were widening. The *relative gap* is defined as the *ratio* of the wealth, per capita, of the rich countries to that of the poor; as we have seen, the average relative gap is now around 15 to 1.

As soon as the ex-colonial countries became independent, they strove to increase their wealth through social, agricultural, and industrial changes. In this endeavor they received quite substantial financial and technical aid from the rich northern countries. Striking results have been achieved, though less than had been hoped for. For instance, between 1950 and 1963 the gross national products of both the less-developed, poor countries and the rich, developed countries have increased at just about the same rate of 4 percent per year.

Unfortunately the situation is not as good as these figures suggest. For the increase of population in the poor countries is about 2.5 percent per year, while in the richer countries it is only 1.5 percent. We get the trend in the per capita incomes by subtracting the rate of increase of population from the rate of growth of GNP, which I have taken as 4 percent in both cases, thus obtaining 2.5 percent and 1.5 percent for the rate of growth of this per capita share of the GNP for the rich and poor countries, respectively. So even the relative gap of income per capita is still widening—in fact, at the rate of about 1 percent a year.

Though the *relative gap* in living standards is not yet closed, a moderate improvement in the progress of the developing countries will allow it to do so. But the *absolute gap*—that is, the arithmetic excess of the per capita income in the rich countries over that in the poor countries—is still widening, at the rate of only a little under 4 percent per year. For instance, the average income for the rich countries of $1700 per year is increasing at 4 percent—that is, by $70 per year; this is over half the total income of $110 per year which is the average for the poor countries.

These are some of the facts which led me to name this address "The Ever Widening Gap."

Population Growth and Control

It is important always to remember that the high and rising populations of the poorer countries are not due to any large increase of the birth rate, but are mainly due to a large decrease of the death rate, as a result of the import of modern medicine from the rich northern countries. In the Industrial Revolution in the northern countries, wealth came first and health followed after. But, in the southern countries, health came first and the required extra wealth is still not there.

There is a large difference between the effect of a high rise in population on a wealthy country and on a poor country. For instance, in the United States, more people means more demand for material goods—houses, clothes, food, automobiles, and so on—and this stimulates the economy generally by providing a steady increase in the market for innumerable products. But in a poor country, like India, every extra birth means a greater drain on the food supplies, housing, transport, and so on. It has been calculated that in India it would pay to spend up to $140 to stop a birth; this is the amount of capital required for one extra life under the social conditions of India today.

Recent years have seen a general acceptance nearly all over the world of the dangers of the so-called population explosion. Pockets of opposition to population control still exist, but, by and large, the problem now is one of education, exhortation, and, of course, provision of the technical means, which may have to include some sort of paramedical organization to get the methods properly used. Much more medical research is clearly needed, but existing methods seem to be just adequate for attempting a successful start.

However, whatever is done now, the world population will go on increasing rapidly, reaching perhaps double its present 3000 million by the end of the century.

As we have already seen, the economic gain to any poor country resulting from a reduction in the population rise is very great. Suppose that India, by a wave of a wand, could bring her population rise down from 2.4 percent to 1.4 percent—that is, from 12 million to 7 million. This would mean a reduction by about 5 million. It would pay economically to effect this reduction even at the cost of spending $700 million a year on birth control.

Moreover, as the population rise decreases, the rate of growth of the per capita income for the whole population would increase, other things being equal, from 1.5 to 2.5 percent—an increase of over 60 percent. We see, therefore, that the population problem, serious as it is, is still a calculable problem, which can be treated in simple economic terms, however difficult and complex its solution. In its present form, the population explosion in the south is the offspring of the northern compassion which exported a revolution in health but did not encourage the much more difficult revolution in wealth.

Since the underdeveloped world will have to live with its present high population rise for at least a few decades, it is essential that the rate of increase of the wealth of these countries should exceed the population rise by a big margin. A growth rate of 6 percent per year would be a reasonable minimum target for their GNP. Thus a rapid growth of the output of both agriculture and industry must take place. For the two must go together. Agriculture cannot advance fast enough without the transport, tractors, fertilizers, pesticides, pumps, and irrigation which only an industrial system can provide. This means that the fraction of the labor force working on the land must fall and the fraction working in the factory and the office must rise.

Science and Technology in Developing Countries

With this background giving the size of the problem, I want now to say something about the role of science and technology in the poor, developing countries. One can start with the confident assertion that all developing countries need a great increase in the numbers of young men and women

trained in science, technology, and engineering and management. I will call them QSE's—that is, qualified scientists and engineers. Quite recently the Indian Government has published a massive report on the whole of the Indian educational system, recommending very many and important improvements. I do not remember having seen such a comprehensive study of the whole educational system of any other country. Since educational advance costs a lot of money, the fulfillment of such an educational plan will depend to a considerable extent on the growth of the national income. Conversely, the growth of the national income must depend on the success of the educational system in training the right types of people in the right disciplines in adequate numbers, and in seeing that they go to the right section of the economy. Economic growth and educational advance are in fact symbiotically dependent on each other.

A rapid and massive advance of both agriculture and industry is, therefore, essential, and this must be a governing factor in the orientation of the higher educational system.

Since it is generally admitted that the needs of agriculture have been relatively neglected in some countries during the first years of independence, as regards both capital investment and supply of trained personnel, some immediate shift in the allocation of these scarce resources seems necessary, and it is seemingly going on. But it is manufacturing industry which will absorb a major part of the investment resources and so should utilize a major fraction of the trained manpower. In Britain today the fraction of the active stock of qualified scientists and engineers which is employed either in, or in close relation to, manufacturing industry is about 60 percent; I would like to see it still higher. In both India and Britain, QSE's are in very short supply and set a limit to industrial advance.

In what follows I confine myself mainly to the relation between science and technology on the one hand and manufacturing industry on the other. This is partly because of the vital importance of this relationship and partly because the problems inherent in this relationship in, say, India are not so dissimilar to some of the present problems in Britain. So some things we in Britain have been learning the hard way during the last few years may have definite relevance to India. Vital as they are, I do not have space, nor have I the competence, to discuss agricultural and medical research and their applications in practice.

One notes that, while the difference between an Indian and a British village is immense, the difference between an Indian and a British factory is much smaller. Correspondingly, while British agricultural experience may not be very directly relevant to Indian conditions, mainly because of the very different climates and social structures, British industrial experience may be very relevant.

Industrialization

Let us approach the problem of the role of research and development in relation to the industrialization of India and Pakistan by noting what goods are now manufactured and what imported.

Firstly, it is clear that the majority of the goods now manufactured by Indian industry (I include Pakistan throughout), whether privately or publicly owned, are rather conventional things which do not change very fast. Obvious examples are textiles, road and railway vehicles, houses, clothes, household goods, bicycles, radio and television sets, simple machine tools, tractors and other agricultural machinery, earth-moving equipment, and fertilizers.

I believe that, in relation to conventional manufactured goods over the next decade, the role of research and development directed to new types of products is less important than improvement in the methods of manufacturing existing goods, with the object of lowering the cost of production. Where QSE's are desperately needed is just at the workshop and drawing-office level, and in management. The main objective must be increased productivity.

A vital task for both Britain and India is to ensure that many more of the students emerging from the educational system are both trained and motivated to enter manufacturing industry. But, for this to come about, changes in industry are needed, particularly as regards the technological quality of the top management.

When one turns from what I have called slow-changing conventional industries to rapidly changing science-based industries, some new factors of great importance come in.

The single most important consideration is the worldwide dissemination of modern advanced technology. There is, so to speak, a world supermarket for modern technology and production goods, which are thus made available to all who can afford to import them. Whereas India wisely does not allow, in general, the importation of advanced and expensive *consumer* goods, she does and must acquire in some way or other a great variety of advanced *production* goods, such as advanced machine tools, chemical processes, electronic devices, and scientific instruments. For on such things depends the efficiency of a large part of her manufacturing industry.

The extreme importance of these considerations in India is seen from the fact that, in the Indian third Five-Year Plan, of the total import bill of $2400 million per year, $850 million—that is, 37 percent—was for imports of machinery and equipment; this put a heavy burden on the limited foreign exchange.

In a recent lecture in the United Kingdom (*1*) I spoke as follows about conditions in Britain.

> An important consequence of the fact that a country of the size of Britain cannot hope to contribute more than a fraction, say less than 10%, of the total world flow of new technology and know-how (though in certain fields it should be much higher) means that it must install in its factories and plants a great deal of production equipment which was originally of foreign manufacture. It would be disastrous for Britain to limit her production methods to the means of production which Britain has herself invented. It has often been pointed out that though it is important to *make* Electronic Computers, it is still more important to *use* them. The same doctrine applies to many advanced *production* goods, though much less so to *consumption* goods. It applies with particular force to machine tools, metal forming processes, computers, automatic control, chemical engineering in general, a large variety of scientific instruments, etc.; in fact, to all equipment which can increase productivity, especially of export goods.
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> It is inevitable that, just in so far as our export industries install the latest and most productive machinery, the demand for the import of sophisticated production goods of foreign origin will grow. If the present drive for increased general productivity is successful, the growth of such demand could be spectacular. If no preparation on a national scale is made for such a rising demand, then a big rise in imports of advanced production goods will occur, thus putting a severe strain on the balance of payments. . . .
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> Where no British designed and developed equipment is available, then to avoid a big import bill it is essential that the required equipment of foreign origin,

needed particularly by the exporting industries, should be manufactured in Britain. There are three main ways for this to occur. The required goods can in some cases be manufactured under a foreign license. If the foreign firm will not grant a license, it may be prepared to form a joint subsidiary. Lastly, a foreign firm can be encouraged to set up a wholly owned subsidiary in Britain.

One can list these options in order of increasing demands for foreign exchange. Much the best is, of course, to manufacture, in Britain, British designed and developed equipment. Next best is to manufacture foreign designs under license. Third best is to set up a jointly owned subsidiary. Fourth best is to get a foreign firm to manufacture here. The one fatal action is to do none of these things.

Most of these arguments apply, with suitable adjustment, to India as well as to Britain. In fact, the arguments have wide application in the present world of many nation states at widely different levels of industrialization. For instance, if Britain can contribute less than 10 percent of new world technology, then for India at present the figure would surely be less still. If it is unwise for Britain to use scarce QSE's to repeat what has been done elsewhere, if it can be avoided, then in India it is a folly.

Two Precepts

Let me elaborate a little two useful precepts in relation to industrial progress: (i) never re-invent if you can avoid it; (ii) buy your way as near as possible to the front line of technological advance before starting expensive R & D. Consider, say, an advanced machine tool. This may be required in India to reduce costs of some manufactured product, with a special eye on exports. But the shortage of foreign exchange may well prevent the tool's being imported. A common reaction to such a situation is to start to develop a similar tool oneself. If this is done, it is vital that the R & D effort, measured in money, time, and QSE's, is adequate to the job. To attack difficult development problems with less than a minimum of R & D resources is like attacking the enemy in war without adequate forces, and results in casualties without advance. The minimum R & D effort for a number of projects has been listed by Freeman (*2*). It may be worth pointing out that the tumultuous advance of fundamental science has rested on a worldwide and rapid dissemination of scientific results. So every research worker in fundamental science can start his researches from a point very near the front line.

As already mentioned, an important alternative to importing is to buy a license to manufacture oneself. If one is granted it will probably cost in foreign exchange less than 10 percent of the purchase price of the machine. Some foreign firms may refuse to sell a license. But there may be others who will grant one—there are many keen salesmen behind the counters of the world's supermarket for production goods, and they come from both the Free Enterprise and the Soviet countries. What one country will not sell, perhaps another will. Anyway, import restriction may prevent any sale of the product to a country, like India, with a desperate shortage of foreign exchange. So a northern firm may find the sale of a license the only way of earning any money at all from India.

If a license is acquired for an advanced machine tool, then a strong force of QSE's will be needed to get the machine tool into successful production—not as many as would be needed to re-invent it, but nearly as many. However, this work of getting into production must be carried out mainly in the factory itself. So as many as possible of the QSE's must thus be in the factory, not outside it. As a matter of fact, the bringing of a bought design into production is the best way, if not effectively the *only* quick way, in which the QSE's can be trained to design eventually their own new models. This is the content of my second precept: Buy your way as near as possible to the front line before attempting to make an advance!

Historically Japan has always been, and still is, an avid consumer of foreign licenses, as Western Germany has been since the war, both with great industrial success. To all but a few giant powers, an adverse balance of royalty payments might be taken as a sign of an intelligent use of its scarce scientific and technological resources! Provided, of course, that original R & D follows after the front line has been reached.

In a recent U.N. document (*3*) the spread of know-how by enterprise-to-enterprise arrangements is discussed and commended, and possible government aid to this process is mentioned.

I would like to make a personal comment as a result of the above arguments. I would like to see the rich northern countries including in their Technical Aid programs the financing of the export of industrial know-how.

For instance, the Overseas Development Ministry in Britain might reimburse a British firm for granting a free license to firms in selected developing countries—for example, India. This might markedly speed up the spread of technology and discourage unnecessary waste of indigenous QSE's.

So far I have been talking mainly of the problems of the best use of QSE's to promote the most rapid industrialization and increase of exports of manufactured goods. I have deliberately treated this as a short-period problem—that is, have implied that the objective of the R & D should be to bring added material benefit to the country within, say, 5 years or so. It is, of course, the stated policy of the Indian Government, and of most other governments in a similar situation, to attempt to concentrate its financial investment on projects with a relatively short payoff time. For instance, a steel or fertilizer plant should pay a dividend, in a commercial sense, in 5 years or so. Smaller projects should achieve shorter payoff times.

There is, of course, a whole range of technological problems of great interest and potential importance which, however, are very speculative, and, even if successful, will have a very long payoff time, perhaps measured in decades. Desalination, weather control, solar power, production of edible vegetable proteins, exploitation of the oceans and ocean beds, and development of new forms of land and sea transport are a few. Some of these are discussed in the U.N. document already referred to. In general, the still very poor developing countries, like India, would be wise to leave most of such projects to the much greater R & D resources of the developed countries. But the latter should be encouraged to study these fields energetically in cooperation with the developing countries.

Fundamental Research

It is necessary now to say something about fundamental research carried out to add to our knowledge of nature and for the excitement and intellectual interest of doing it. All countries need some fundamental research, but no one, as far as I know, has ever suggested a way of estimating how much money should be spent on it.

Several advanced countries spend around 0.3 percent of their GNP on fundamental research; this similarity of the amounts may perhaps be due more to competition and imitation than to calculation! The total amount spent on all R & D may lie between 1.5 and 3 percent. In India and Pakistan the total spent on all R & D is probably below 0.1 percent. Fundamental science can, of course, be justified as having possible but unforeseeable practical payoffs in the long term. Nuclear physics in the Rutherford era is the classic example. But this does not help a government to decide how much to to spend on it today.

Wherever possible, there are advantages in linking fundamental research with university teaching, as is usual in the United States and the United Kingdom, for instance. For in this way the intellectual excitement, which is both the stimulus and the result of first-rate fundamental science, is communicated to successive generations of students and becomes an invaluable part of their education. It is certainly not useful in general to attempt to find direct material short-range justifications for pure research, which must essentially be curiosity-directed. On the other hand, of course, the universities must be brought into a close relationship with manufacturing industry.

Thus in developing countries, as also in developed ones, there are three main levels of scientific and technological activity: (i) short-payoff work related to defined goals in industry, medicine, and agriculture; (ii) long-payoff or speculative large projects which are often too big for the resources of the poorer developing countries, but where collaboration between developed and developing countries may be valuable; and (iii) pure curiosity-directed research, generally best combined with advanced teaching in the universities. But it is the first only which can bring direct material gain in the short run; so, for the majority of developing countries, short-payoff work must have the highest priority.

An Intermediate Technology

As I have pointed out, the problems of bringing into being in India a limited number of efficient advanced manufacturing firms are not so different from the corresponding problems in Britain. However, when one looks at the process of industrialization as a whole, then the picture is very different—essentially because of the extreme poverty of such countries, their per capita wealth being only one-fifteenth that of the United Kingdom. However, the capital cost of providing a work place in modern industry is not so very different in the two countries—for example, $6000 per place in the United Kingdom and, say, $3000 per place in India. This arises, of course, from the similar cost of the machine tools, of processing and transport equipment, of instruments, and so on. Only the cost of buildings and other facilities will be markedly cheaper.

Again consider India. Assuming that, as was the case in the third Five-Year Plan, 8 percent of her GNP of $36,000 million—that is, $2800 million per year —is invested in manufacturing industry, we find that, at $3000, for example, per place, less than a million new work places will be produced. But the annual increase of the population is over 10 million and the increase of the labor force is over 4 million—that is, over 4 times the new places created by investment of $2800 million in $3000-per-head manufacturing methods.

If, therefore, India invested all her available capital in modern high-cost manufacturing plant and took no other steps, a great increase of unemployment would be inevitable. It has been said that, in several of the five-year plans of developing countries, the planners had to accept the prospect of greater unemployment at the end of the plan than at the beginning.

A number of economists, especially Schumacher (*4*), have deduced from this situation that it is necessary to develop an intermediate technology more appropriate to a developing country's real situation. Calling modern technology in India a $3000-per-head technology and an Indian village technology a $3-per-head technology, Schumacher has advocated the development of an intermediate $300 technology. This is, of course, a new name for many aspects of the village-industries movement known in many parts of the world. From the figures just given, clearly a $300 technology all over the country would allow full employment of the increased labor force, all working at low productivity. But this, of course, would be disastrous. The real problem for the investment planners is to discover what is the best mix of high- and low-capital intensive schemes.

It must be mentioned that some economists, perhaps a majority, oppose the whole concept of an intermediate technology, arguing that it always pays to use the most productive technology, however expensive it may be and however few people it employs (*5*). However, Arthur Lewis has recently argued (*6*), in some economic detail, that considerations of urban unemployment lead one to the view that both "employment creating" and "employment destroying" manufacturing methods are needed in a developing country, thus implicitly favoring a mix of advanced and intermediate technology.

It is not for scientists and technologists to enter the lists when the knights of economics are belaboring each other, but we can, I think, very usefully get on, in partnership with our colleagues in the developing countries, with the job of investigating what forms of technology are appropriate in different developing countries—for example, in Southeast Asia, Africa, and South America. Barbara Ward has written as follows (*7*):

> The technology which is dominant in the world today is not always appropriate to the needs of the developing countries—and for a very simple reason. The whole weight of economic research and of investment in further research is virtually confined to the developed countries and has, for fifty years and more, taken the form of trying to find labour-saving methods of production. In other words, modern technology is largely designed to substitute machines for manpower. In addition, it is designed more and more for large units and for large markets. But large-scale, labour-saving technologies constitute, at this stage of development, the least suitable methods of production for continents such as Asia where the one abundant resource is labour or for countries like many African countries in which the one potential competitive resource is labor that is still relatively cheap.

Much valuable discussion is to be found in the U.N. report already referred to (*3*). In the end the decision as to what types of production are good to invest in will be decided by the planners and investors of the developing countries themselves.

The World Picture

I now want to look again at the world picture. The substantial advances made during the last decade and a half by the majority of the poor, developing countries, which I have al-

ready mentioned, have been made possible only by very substantial financial and technical aid from the rich countries. In fact, the 13 main donor countries gave just under 1 percent of their GNP in the form of government and private aid in 1963 and 1964. How much has this actually achieved? This is hard to calculate, but what it should have been able to achieve can be estimated as follows.

The calculation which I am going to make was, in fact, made by economists over a decade ago at the start of the aid program. The basic figures already given of 2000 million people with a per capita income of $110 per year give a total income for the poor countries of $220 billion. For the rich countries, with 800 million people and $1700 per year, the total is $1400 billion—that is, six times the income of the poor countries. Now, 1 percent of the income of the rich countries amounts to $14 billion, which would mean the addition of 6 percent to the income of the poor countries. If this was all wisely invested in the right sort of investment projects and if these projects were all well managed, then an output-to-capital ratio of 1 to 3 would be expected. So an additional economic growth rate of 2 percent per year *could* have been achieved. We may estimate, conservatively, that an additional 1 percent surely *has* been achieved. Comparing this figure with the 1.5-percent growth rate of the per capita GNP in the poor countries which has actually been achieved, we see that the aid given can well have staved off complete disaster in many parts of the world.

This aid program from the rich to the poor countries can be compared with the Marshall Plan for the rehabilitation of Europe in the immediate postwar period.

But with the real but limited success of this aid program goes a realization that the target was too low; 2 percent rather than 1 percent of the GNP of the rich countries would have been nearer the mark if the poor countries were to have been given a good start along the difficult road into the modern industrial world. What would such an additional 1 percent cost the rich countries? The real burden could be small, for two reasons. (i) For a rich country with a GNP growing at 3 percent per year (as most of them have been doing), the taking out of national income of another 1 percent would only reduce the rate of growth of income, rather than the level of income—and this only for a limited time. (ii) Experience shows that well over half the aid given by any one country in recent years has returned to that country in the form of trade. The greater part of the aid of the donor countries, taken all together, will be spent eventually in those countries. In fact a distinguished economist has put it this way: "the balance of payments problem is a domestic problem of the rich countries."

At the present time the political outlook for more aid is very bleak. Far from planning to increase the 1 percent to 2 percent, the tendency is to decrease even the present 1 percent. In fact, disillusion with aid giving is setting in in many donor countries.

No doubt there are many causes—psychological, political, and economic. Perhaps the donors expected a gratitude they did not receive. Some of the earlier aid programs were stimulated by the cold war. In the United States and in Britain, particularly, balance of payments difficulties inhibit the giving of more aid. I deeply regret that the British Government has felt compelled to cut its aid program by 8 percent due to Britain's balance of payments problem.

But is not the real difficulty more political than economic? If the major donor countries simultaneously increased their aid programs from the present 1 percent to 2 percent I cannot see how the balance of payments problem of any of these countries should be made substantially worse. If the real difficulty is a political one of getting so many nations to take concerted action to increase aid, then let us admit it and attempt to overcome these political difficulties. Actually, I think the main bar to wide-scale action to increase aid is disinterest and lack of knowledge. But the situation is dangerous. As B. R. Sen, director general of the Food and Agriculture Organization, put it:

> In this age of science which every day brings countries and nations closer, with political consciousness stirring the vast masses who until now had accepted poverty and hunger as preordained, against the background of unprecedented population growth which threatens even the present meager supplies of the necessities of life, the problem of ensuring conditions which may allow man everywhere to live in dignity can no longer be left to be dealt with by each nation on its own. International resources must be mobilized to assist the underdeveloped countries. We must be warned that in the present situation lie the seeds of unlimited progress or unlimited disaster, not only for individual nations but for the whole world.

Just because of the big difference between the wealth of the rich and the poor countries, a little additional aid from the rich can mean so much to the poor. Do we really want future generations to look back in anger and see us as affluent fools?

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