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The Role of Appropriate Technology in a
Redistributive Development Strategy

by

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PREFACE

The concept of appropriate technology emerged from a sense of frustration with growing poverty and inequality in most countries of the Third World. So far, however, much of the considerable literature on the subject has tended to focus on the contribution that appropriate technology itself might make to ameliorating these problems. Only relatively slight attention has been paid to the broader question of the role that more appropriate technologies might play in a redistributive development strategy (i.e. in conjunction with other policy instruments).

In this paper, by Jeffrey James of the ILO, this question is taken up in relation to two main types of redistributive strategies - which he terms gradualist and radical. It is argued that because the demands - both economic and political - vary considerably between the two strategies, the role of appropriate technology will differ accordingly. James stresses, however, that much more work needs to be done in relating policies for appropriate technology to development strategies that embody a redistributive component.

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LIST OF WORKING PAPERS

The Role of Appropriate Technology in a
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In the 1950s and 1960s when growth of GNP was widely considered to be the primary goal of developing countries, technology was discussed mainly in terms of its contribution to this goal. Sen (1968) and others, for example, argued that capital-intensive techniques would lead to faster growth because they are associated with a higher rate of investible surplus than relatively labour-intensive techniques.

During the 1970s, however, it became apparent that GNP growth alone would not necessarily solve the problems of mass poverty and unemployment. Indeed, despite unprecedented high growth rates between 1950 and 1975 in many developing countries, there has been both a rapid rise in the numbers of unemployed and an increase in the numbers who live in poverty.¹

It also became evident that one of the reasons for the dualistic pattern of growth was the use in the modern sector of most developing countries of advanced capital-intensive technologies imported from the West. In particular, "the resource requirements of advanced country

technology has involved high levels of investment per man, concentrating LDCs' scarce investment resources on a small proportion of the population with the consequence of un- and under-employment and low productivity for the rest of the population."²

Attention consequently shifted to the need for redistributive growth strategies and to the advocacy of alternative, more appropriate technologies for contributing towards a reduction in inequality and the alleviation of mass poverty. In much of the subsequent discussion, however, there was a tendency to simply assume that these technologies should form part of a redistributive strategy. Rarely were the merits and demerits of policies for appropriate technology compared to those of alternative redistributive instruments. As a result, the possibility that there may be circumstances in which the latter are preferable to the former has seldom been contemplated. (Put another way, few authors questioned the logicity of the view that technology should form part of the solution to inequality, simply because it contributed to the problem). The aim of this paper, accordingly, is to assess the role that policies for appropriate technology might play in different kinds of redistributive development strategies. For this it is necessary i) to examine the extent to which these policies are in principle capable of reaching the heterogenous target groups among the poor ii) to examine the range of alternative policies that are available to policy-makers iii) to assess the merits and demerits of these alternatives in relation to appropriate technology iv) to identify complementarities between policies for appropriate technology and other policy instruments.

We begin with an examination of the first of these issues.

1. The economic relationship between appropriate technology and poverty

As noted above, one of the major consequences of inappropriate technology is economic and technological dualism - the co-existence of a high-productivity modern sector employing a small proportion of the labour force, with a low productivity sector in which the majority of the population are employed and under-employed.

Appropriate technology is often defined, conversely, with reference to its contribution to reducing this type of dualism.³ Because the reduction can take place at both ends of the technological continuum, - on traditional as well as on modern technology - the effects of appropriate technology on poverty and inequality operate in two different and separate ways. The division of the economy into two sectors - traditional and modern - is of course a gross oversimplification. Nevertheless, it provides a convenient basis on which to approach the main issues.

The purpose of modifying modern sector technology is to increase employment opportunities, particularly those of an unskilled kind. The technologies that are capable of achieving this increase may already exist (but for various reasons remain unchosen) or they may need to be created through adaptation/generation. From the point of view of this dimension of appropriate technology policy, it is clear that only those among the poor who were formerly unemployed are capable of benefitting. But there may be some among the poor unemployed or underemployed who, as Sen (1975, p.39) has pointed out, "do not look for work elsewhere and could not be persuaded to take up wage employment elsewhere even if it were offered to

them". That is, it cannot be assumed that all those among the poor who are unemployed (underemployed) can be helped through the creation of additional wage employment opportunities.

Modification of traditional technology however, will have a more diverse impact on the various groups living in poverty. For one purpose of improving this technology is to improve productivity and raise the incomes of those who possess (un) productive assets (such as small farmers, artisans in the urban-informal sector and so on). In addition, depending on the system of wage determination improved technology may benefit those workers whose productivity has increased.⁴ The first distinction that needs to be made here is between wage and non-wage modes of production. In the latter case, where the family system predominates and wages are determined by the average product, an increase in productivity will benefit all the family members to an equal extent. On the other hand, where wage employment prevails, it is the individual worker whose wages may or may not increase following a rise in productivity. In classical-type models, for example, productivity gains are appropriated by the owners of the means of production. The constancy of the real wage in the "capitalist" sector faced by a perfectly elastic supply of labour, is a feature of the well-known Lewis model of development. In the neo-classical model, on the other hand, wages are determined by the (marginal) productivity of labour (though imperfections in factor or product markets mean that labour may receive less than its marginal product even according to this theory).

Whether or not direct employment increases as a result of improving traditional technologies depends on whether the decline in unit labour requirements associated with the rise in labour productivity is fully offset by an expansion of output. In part, this depends on the price elasticity of demand for the output. If demand is elastic, an expansion of output leads to only a small reduction in price. Under competitive conditions, for example, in which each producer faces a highly elastic demand curve, there is no discouragement from this point of view to an expansion of output associated with an increase in productivity. On the other hand, where demand is inelastic - as in the case of some agricultural products - increased labour productivity could reduce the demand for labour. In such a case, the gains to some of those living in poverty from the application of appropriate technology would have to be weighed against the losses to those who formerly were employed. (Though the extended family sharing system that prevails in most developing countries may, to some extent, act as an automatic equalising influence on individual gains and losses).

Improved traditional technology is capable therefore, of impinging on the welfare of numerous low-income occupational groups but the outcome need not always have an unambiguously favourable impact on inequality. Table 1 sets out these various groups and the probable direct impact on their incomes of the various dimensions of policies for appropriate technology.

Table 1

Effect of Group among appropriate the poor technology	The direct impact of appropriate technology		
	Unemployed	Working poor	Owners of product- ive assets
Rise in wages	-	/	- or X
Rise in employment	/or - ¹	-	-
Fall in employment	-	X	-
Rise in profits or earnings	-	-	/

/ = gain from change
 - = position unchanged
 X = lose from change

¹ This depends, as noted above, on whether or not the unemployed (underemployed) are willing to accept new wage-employment opportunities.

It is, of course, entirely possible that none of the diverse groups comprising the poor benefit from improved technology. This will occur, for example, if the improved technologies are adopted mainly or only by those with incomes above the poverty line and if wages and employment of those in poverty both fail to increase. Something like this appears to have occurred with the new technology of the Green Revolution in many countries. At the other extreme is the case in which all the poverty groups benefit but none of those living above the poverty line are able to do so. Of course, in reality most cases will fall somewhere in between these two extremes, with the final impact on inequality depending upon the particular combination of those who gain, those who lose and those whose position is left unchanged.

The disaggregated way of looking at the impact of appropriate technologies on poverty and inequality that is embodied in table 1, differs somewhat from the view of many advocates of appropriate technology who tend to see poverty in more homogeneous terms and who, in consequence, tend to adhere somewhat uncritically to the maxim that "small is egalitarian".

The above discussion has been concerned with only the direct impact of policies to secure appropriate technologies. Table 1 lists only these direct effects. Yet, in addition, there will be a series of indirect effects which may either reinforce or counteract the initial redistributive effects. To the extent that appropriate techniques make fuller use of local materials and resources, the linkage effects are likely to reinforce the initial effects. About the direction of other types of indirect effects, there is, however, little that can be said a priori. Nevertheless, it is important to recognise that they may often be substantial. Adelman and Robinson (1978, p.103), for example, conclude their simulation analysis of redistributive policies in South Korea with the warning that "immediate effects rarely reflect the overall impact of a policy intervention, and the partial-equilibrium solution is seldom quantitatively close to the final-equilibrium solution. Indeed, in many of our experiments the ultimate effect is opposite to the initial impact or partial-equilibrium effect". What they found was that there are powerful interactions between the various sectors of the economy that affect the responses to policy interventions. They found, for example, that changes in the terms of trade for wage-goods, consequent upon a rise in the incomes of the poor have a powerful secondary impact on the initial redistribution.⁵ In the following section, where we examine the direct impact of technology on

the structure of poverty in different countries, the limitations of the partial-equilibrium approach need, therefore, to be borne in mind.

Finally, it is important to note that although we shall be concerned in the paper only with process technology, new products may also have a redistributive impact. Consider for example, the situation portrayed in Figure 1.⁶

Figure 1

Suppose the consumer is initially at R. New good Z (assumed for ease of exposition to be indivisible) is now introduced enabling the individual to reach S on the higher indifference curve IC^2 . If, however, good Z₁ had been developed instead (so that P could be reached) or if Z had been available at a lower price (so that Q could be reached) the individual would have been even better off on indifference curve IC^3 .

Because almost all new goods are developed in and for rich countries, there is a systematic inegalitarian bias in the world innovation system. Deliberate efforts are required to offset this bias by the design of goods embodying characteristics in proportions that match the tastes of the low-income majority in the Third World (that is, through the design of so-called appropriate products). In this way the level of welfare associated with given low incomes can be increased.

2. Appropriate technology and the heterogeneity of poverty

In the previous section we showed that while appropriate technology is capable of benefitting the majority of groups comprising the poor, it could, depending on the circumstances, have a differential impact on these groups, benefitting some of the poor, leaving the position of others unchanged and harming the position of yet others. In such a case, where appropriate technology has a non-uniform impact on the poor, its usefulness as a redistributive policy therefore depends on the relative proportions of the different groups in poverty in the particular country concerned.

Consider the situation in the sample of four countries contained in Table 2.

Table 2

Occupational composition of the poor (percentages)

	<i>Employer</i>	<i>Self-employed</i>	<i>Employee</i>	<i>Housewife</i>	<i>Unemployed</i>
Malaysia, 1970 (poorest 49%)	0.5	51.8	41.8	2.3	3.6
	<i>Employer</i>	<i>Self-employed</i>	<i>Employee, private sector</i>	<i>Employee, public sector</i>	<i>Sharecropper</i>
Brazil, 1960 (poorest 31%)	0.5	51.0	37.0	3.0	8.0
	<i>Employer</i>	<i>Self-employed</i>	<i>Salary earner</i>	<i>Worker</i>	
Chile, 1968 (poorest 46%)	0.0	24.0	5.0	71.0	
	<i>Employer</i>	<i>Self-employed</i>	<i>Employee</i>	<i>Unemployed</i>	<i>Other</i>
Trinidad and Tobago,* 1975/6 (poorest 42%)	0.4	15.1	25.6	18.6	40.3

* The table on which these figures are based classifies households by monthly income and occupation of head of household.

Source: K. Griffin and J. James, The Transition to Egalitarian Development: Economic Policies for Structural Change in the Third World, Macmillan 1981, p. 26.

The table illustrates, firstly, the heterogeneity of poverty within each of the four countries. That is, it shows how diverse are the occupational categories of those classified as living in poverty. It also shows how the size of the groups in poverty varies substantially from one country to another. In Trinidad and Tobago a relatively high proportion of those classified as poor are unemployed, whereas in Malaysia poverty clearly has little to do with unemployment. Indeed, in Malaysia, as in Brazil, over half the poor are self-employed. In Chile, in contrast, poverty is mainly a problem of the "working poor" since over half the poor are wage earners.

The importance of this variation in the composition of poverty between countries is immediate, for it means that a given policy of appropriate

technology will have a quite different impact depending on where it is applied. For example, an improvement in the productivity of traditional technology which is not also associated with an increase in employment (because of demand inelasticity) will do little to solve the poverty problem of Trinidad and Tobago (which is importantly associated with unemployment). Moreover, it is very likely that the degree of inequality will worsen. Similarly, unless the working poor of Chile are able to share in the productivity gains associated with an improvement in traditional technologies through higher wages, the result will be only a fairly slight impact on poverty and perhaps even an increase in inequality. The extent to which the Chilean working poor would, in fact, be able to share in any productivity gains depends mainly on their relative strength vis-à-vis employers - in turn, a function of the degree of unionisation, the role of government etc. And in Malaysia and Brazil it is mainly the self-employed who need the benefit of improved technology if poverty is to be substantially reduced.

In our assessment of the role of appropriate technology as a redistributive instrument we have thus far dealt with the question of its impact on heterogeneous poverty groups. We have argued that it may or may not be capable of reaching a large proportion of those individuals classified as living in poverty. But even in situations where the economic relationships are such that technology policy is able to effect the desired reduction in poverty among the target groups, one has still to ask whether there are not alternative policy instruments that can achieve the same result more effectively. The answer to this, depends, of course, not only on the range of alternatives available but also on the meaning that is given to the concept of

'effectiveness' according to which these alternatives are to be compared with appropriate technology.

3. The range of policy options

In principle, there is a wide variety of policy options available to governments wishing to effect a reduction in the degree of inequality in the distribution of income. But the range that is actually available will vary a great deal according to the political situations that prevail in particular countries at particular times.

In most Third World countries of the mixed-economy type, governments owe their allegiance to powerful groups among the rural and urban elite and measures that run counter to the interests of these groups - particularly those that do so on a large scale - are usually not politically feasible. The most that can generally be expected from these governments, therefore, is a series of minor distributive reforms. In the context of these reforms, certain policies - particularly those which involve a sharp change in asset ownership in favour of the poor - will generally not be available to policy-makers.

There are, however, political configurations in which governments are able to pursue a more radical redistributive strategy, in which, the choice of instruments is much less restricted. It is the role of policies for appropriate technology in these, albeit somewhat rare, kinds of circumstances to which we first turn our attention. Thereafter, the role of appropriate technology in the more conventional, reformist type of context will be briefly considered.

a) Radical strategies

In a radical redistributive strategy the emphasis, mainly for political reasons, is on the speed (and perhaps also the visibility) with which the reduction in inequality can be effected. This emphasis on rapidity is due to the fact that a radical strategy is normally associated with a political revolution, the dynamics of which generally require that the redistributive programme be pushed through at maximum speed. When discussing the problem of redistribution in a socialist context, Lange (1964, p.124), for example, in an often-quoted remark, has noted that, "A socialist government has to decide to carry out its socialisation at one stroke, or to give it up altogether".

In at least the early phases of the programme, policies for appropriate technology, because they are relatively slow-acting, are consequently unlikely to have much appeal. That such policies take time to implement is obvious where the technologies have to be created. But even if this is not the case, and the technologies already exist, there are nevertheless often considerable lags in the search for and installation of them. (These lags are not merely due to the inevitable delays that occur even in rich countries, but result additionally, from the particular difficulties caused by the absence of promotional efforts for the sale of most forms of appropriate technology⁷). Moreover, policies for appropriate technology tend to lack the visibility or directness that often and understandably seems to be required of policies to redistribute incomes in the aftermath of a political revolution. For both of these reasons, therefore, the scarce administrative resources of policy-makers will tend to be concentrated on alternative policies, among the most important of which are land-reform and policies to expand employment through

expansionary policies (such as wage increases) designed to make use of the often considerable amount of excess capacity which exists in LDCs. Together, these policies may often be able to bring about a quite substantial reduction of poverty and inequality within a short period of time.

The effectiveness of land reform in the reduction of poverty varies considerably from one region to another. Most countries of Latin America, for example, have an abundance of land which is usually also subject to extremely concentrated ownership. Together with the fact that average incomes in Latin American countries are relatively high (compared to Asia and Africa), this means that "the worst of the rural poverty problem...can be overcome by an effective, implemented land reform."⁸ In the case of most African and Asian countries, in contrast, where land is scarce relative to population and average incomes are low, even a radical land reform would leave large numbers in absolute poverty. In relation to India, for example, Minhas (1970) showed that a transfer of some 43 million acres of land from the largest land-holding group would merely reduce the proportion of the population living in absolute poverty from about 40 per cent to about 33 per cent.

The success of policies to expand employment through an expansion of aggregate demand depends, of course, on the extent of excess capacity. In Cuba, for example, the existence of resources that had remained un- and under-utilised prior to 1959 allowed for increases in output and employment between 1959 and 1961.⁹ During the Allende regime in Chile, the availability of substantial amounts of excess capacity was made a cornerstone of the radical redistributive strategy. In 1970, when Allende came to power, idle industrial capacity and unemployment were among the highest ones recorded

in that decade.¹⁰ Members of Allende's Popular Unity government therefore expected that an increase in aggregate demand would lead to an increase of both production and employment, an expectation that proved, at least initially, to be justified.

The expansion of employment through the use of excess capacity can be regarded as a form of technology policy. In figure 2, for example, the increase in employment from L to L_1 that is brought about by the increased capacity utilisation of technique X (from K to K_1) is equivalent to that which would result from the adoption of the more labour-intensive technique Y .

Figure 2

Once full-capacity of existing techniques has been reached, however, unless these techniques are appropriate, further attempts to redistribute income via employment creation will encounter increasingly serious problems of inefficiency. The reason is that in the absence of a "capital-saving

efficient technique to provide jobs for all willing and able to work"¹¹ the reduction in inequality will be brought about with a considerable wastage of resources in the form of unproductive labour. The essence of the problem can be brought out in the oversimplified form of Figure 3.

Figure 3

II is a familiar neo-classical isoquant showing efficient combinations of capital and labour that are available to produce a given level of output of a single good. $\hat{K}$ and $\hat{L}$ represent the amounts of the two factors in a notional capital-abundant, labour-scarce type of economy. $\bar{K}$ and $\bar{L}$ are assumed to represent the factor-endowment in a typical developing country.

Full-employment of the two factors will be achieved in both countries when, respectively, techniques Y and X are used. Following Eckaus (1973), however,

let us assume that only one technique, Y, is actually available i.e. that capital and labour have to be used in fixed proportions. Then, in the developing country, even assuming full capacity utilisation, unemployment will be equal to $\bar{L}_1$. And given the redistributive aims of the government, with the implication that these workers cannot simply be left unemployed, they will have either to be given the dole or, what amounts to much the same thing, to be put to work unproductively (i.e. in the form of overmanning).

The Cuban case illustrates this problem rather clearly. Thus, the new factories installed in Cuba after the Revolution were highly capital-intensive and provided few employment opportunities. "Cuban planners discovered in the early 1960s what the Chinese had realised a few years before, that thirty years of technological progress made the Soviet miracle of rapid unemployment absorption through industrialisation difficult to repeat".¹² Partly as a result, a sizeable labour surplus existed, much of which was absorbed in the form of overmanning of state enterprises. As Mesa-Lago (1972, p.64) puts it, "the elimination of unemployment in Cuba has been achieved at the cost of considerable waste of national resources". To some extent China experienced the same problem, for until the break with the Soviet Union in 1960 which ushered in the "walking-on-two-legs" phase, she followed the Soviet model of industrialisation based on large-scale modern industry.

It is to avoid these sorts of problems that Stewart and Streeten (1976) view appropriate technology as one necessary (but not sufficient) component of an efficient redistributive strategy. The other two necessary "legs" of what they call "the steady tripod" are asset reform and price policy. None of the elements alone are considered sufficient but all are thought to be necessary. They also stress that efficient redistribution requires an

appropriate sequence of these policies. And, "In considering the correct sequence one must pay attention to the pressures which reform on one front will have in inducing or preventing reform on the other two, and the likely impact of the one reform taken by itself".¹³ This consideration provides additional support for the argument adduced earlier that policies for appropriate technology will tend to follow rather than precede asset redistribution. For without an initial impetus to equality, the markets for the type of low-income products normally associated with appropriate technology simply do not exist. One example of the complementarity between these two policies relates to an earlier period in China. Thus, "an essential aspect of China's textile technology has been to produce large quantities of standardised cotton outfits, rather than higher quality textiles in a variety of colours and styles. But this required a market for such cottons".¹⁴

So far, we have analysed the role of appropriate technology in a large-scale redistributive strategy that is rapidly implemented. As noted above, however, the far more common type of situation is one in which the redistributive options available to policy-makers are much more limited and tend to be confined to gradual reductions in inequality.

b) Gradualist strategies

For the 'reformongering' type of strategy, the requirements of redistributive instruments are quite different from those that are important in the radical strategy. Whereas in the latter, the emphasis, at least in the early stages of the strategy, is on the speed and visibility with which the redistribution can be brought about, the reformonger is concerned essentially with the feasibility of alternative policies. (Feasibility, as noted above,

is not really an issue in a radical strategy where almost all policies are likely to possess this quality.) And it is less overtly redistributive policies that are more likely to serve this goal than the direct and highly visible measures that are sought after in a radical redistribution. What appeared to be disadvantages of policies for appropriate technology in the earlier discussion - namely, their relatively slow speed and their somewhat indirect mode of redistribution - may therefore turn out to be more like advantages in the context of a gradualist strategy.

Whether technology policies are more feasible than traditional gradualist instruments (most notably fiscal measures), however, is a question about which generalisation is difficult, and which, partly for this reason, has tended to be ignored.¹⁵ A major difficulty here lies in the fact that appropriate technology comprises not one but a variety of different policies and outcomes, each of which may have different implications in terms of their feasibility. In the first section, for example, we observed that the gainers from appropriate technology policies could vary substantially according to the particular circumstances. In some cases the gains will be concentrated among a single group in poverty, and in other cases they will tend to be much more widely diffused. If the strength of the various groups in poverty varies substantially, then the feasibility of policies for appropriate technology which have different outcomes - because they depend partly on the relative strength of gainers and losers¹⁶ - will also vary. Moreover, there are many different ways of attempting to secure the adoption of more appropriate technologies. And each of these different methods is likely to be associated with a different outcome in terms of the composition of gainers and losers.

For example, a policy to change relative factor prices will generally have a different matrix of costs and benefits from a policy to restrict the production of certain goods or to divert resources to the generation of small-scale technologies for village use. As a result, the political feasibility of appropriate technology will depend upon exactly which set of policies is to be used in its implementation.

The feasibility of policies for appropriate technology will also vary according to their impact on important goals of policy other than income redistribution. In general, policies which, in addition to their redistributive impact, have a favourable impact on major goals of government, such as economic growth, appear to have a greater prospect of implementation than those with a negative (or neutral) impact. There are some technology policies, for example, that would, through a shift to alternative techniques, permit an increase in real national income as well as a rise in employment. These possibilities arise in circumstances where existing choices are technically inefficient i.e. they use more of all resources to produce a unit of output. A recent study of public enterprises in Tanzania, for example, found that there was a high degree of technical inefficiency among them - indeed, 78 per cent of the parastatals studied used more of both capital and labour to produce a unit of output than other firms in their industries.¹⁷ Where, as in this example, the choice of more appropriate techniques is associated with an improvement in resource allocation it is possible, in principle, for all groups to benefit. That is, it is theoretically possible for those who gain from the change (e.g. the formerly unemployed) to compensate those who lose (e.g. suppliers of capital-intensive

machinery) and still remain better off. (In the language of welfare economics, a potential Pareto improvement can thereby be converted into an actual improvement.) As Clive Bell (1974, p.59) has described the possibility, in the context of the feasibility of redistributive policies in general. "In practice, of course, there is almost bound to be some group or other which would lose as a result - unless they were to receive compensation from the rest. The trick here is to choose interventions which would cause the poor to gain, and then to devise specific means whereby rich - and politically powerful-losers could be actually compensated, while leaving the poor better off than before".

In reality, however, compensation may be difficult to effect, particularly if losers comprise a heterogeneous group. For not only may those who lose sometimes be difficult or impossible to identify, but policies that benefit only these groups may also be hard to devise. As a result of these difficulties, even policies for appropriate technology that improve resource allocation (and which consequently satisfy the Kaldor-Hicks criterion) will frequently leave at least some people worse off. And, depending on the relative political strength of these individuals, policies which save resources may be no more feasible than those which use up resources (e.g. a switch to technically inefficient techniques) or which leave their total unchanged (e.g. a switch from one efficient technique to another).

Even from this brief discussion, it is evident that we need to know a great deal more about the factors that determine the political feasibility of particular policies in specific circumstances, before any realistic assessment of the role of appropriate technology in a gradualist strategy is possible.

Summary and conclusions

The point of departure of this paper was the view that while the notion of appropriate technology evolved out of a dissatisfaction with growing poverty and inequality in the Third World, only a relatively small amount of attention has been paid to the role that it might actually play in a development strategy designed to reduce these problems.

In order to formulate such an assessment, we began by noting that appropriate technology may or may not be capable of reaching a large proportion of those individuals classified as living in poverty. Then, to further the assessment, a distinction was drawn between two types of redistributive development strategies. In the first of these - the radical strategy - the aim is to achieve a large-scale redistribution of income in a short period of time. We argued that in the initial stages of this strategy, technology policy is more likely to take the form of an expansion in the capacity of techniques actually in use, rather than a shift towards more labour-intensive alternatives. Thereafter, in the longer-run, an expansion in the markets for appropriate products will permit, and the exhaustion of idle capacity will require, the pursuit of more conventional policies for appropriate technology. In the second type of redistributive strategy - which we termed gradualist - the emphasis is on the feasibility of policy instruments rather than the speed with which they can effect a given redistribution of income. The political feasibility of alternative policies for appropriate technology, and hence their claim for inclusion in this type of strategy, was thought to depend mainly upon the matrix of costs and benefits to which they give rise, as well as their impact on important goals of policy other than income redistribution.

All of these conclusions, it should be stressed, are more or less tentative; they are intended to provoke further research in this area rather than to offer firm conclusions to policy-makers who are concerned to pursue redistributive development strategies.¹⁸

Notes

- * I am grateful to Ajit Bhalla and Susumu Watanabe for comments on an earlier draft of this paper.
- ¹ See Morawetz (1977).
- ² See Stewart (1979, p.165).
- ³ See Stewart (1974).
- ⁴ See Griffin and James (1981).
- ⁵ Similar findings were reported in the BACHUE series of economic-demographic models. See Hopkins, Rogers and Wéry (1976).
- ⁶ This analysis, and the figure on which it is based, appear in James (1983). See also James and Stewart (1981).
- ⁷ One is referring here to sales by domestic capital-goods producers, agents of used-equipment dealers and representatives of producers of appropriate capital goods in developed countries. See Pack (1982).
- ⁸ See Bell and Duloy (1974, p. 102).
- ⁹ See Ritter (1974).
- ¹⁰ See Griffith-Jones (1978).
- ¹¹ See Stewart and Streeten (1976, p.401).
- ¹² See Mesa-Lago (1972, p.53/4).
- ¹³ See Stewart and Streeten (1976, p.404).
- ¹⁴ Stewart (1974, p.30).
- ¹⁵ See Cooper (1973).
- ¹⁶ See Stewart's paper in this volume.
- ¹⁷ See Perkins (1983).
- ¹⁸ This is also the conclusion reached by Stewart, in her essay in this volume.

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