

Technique of Production and Employment in an Underdeveloped Economy

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THE purpose of this note is to study the relation between the technique of production and the volume of employment in an economy in which labour is plentiful but capital is in short supply.

We shall assume, first, that a proportion, a rather small proportion, of the national income is available for investment; secondly that there are two alternative techniques of production one capital intensive and the other labour intensive in which the investment can be made, and finally, that the first can give employment to x workers and the second to mx workers at a wage rate w (m is a positive integer).

On these assumptions, the cost of the total output by the capital-intensive technique would be less than that by the labour-intensive by $w(m-1)x$. What happens to the total volume of employment in the long run depends upon whether this producers' surplus is spent, re-invested or hoarded. If this surplus and the similar surpluses that accrue subsequently are reinvested in capital intensive techniques, total employment would be, in the long run, larger than mx . (In fact, the chain of reinvestments would constitute an investment multiplier based upon successive saving of costs rather than on successive additions to income.)

The preceding thesis has been stated rather tersely in order to bring out its central point, viz that the volume of employment depends on the size of the national output and the use to which it is put, rather than directly on the technique used to produce that output.

The statement, however, smooths over several difficulties which are important in the real world. In the first place, capital goods which embody higher techniques have a longer period of gestation. This is disadvantageous for two reasons. There is, first, the loss of output that can be obtained in the shorter period by the adoption of labour intensive methods. Secondly, if total income rises early, investment for further expansion can begin early too. But the first loss is not likely to be large even in under-developed countries except

in circumstances of grave shortage of some basic commodity, and the second is more than made up by the higher productivity of the capital intensive technique in the long run. (The postponement of output is taken into consideration in discounting marginal productivity of the capital intensive method.)

A more widespread criticism has its source in what we may call "the theory of" balanced growth by small stages for under-developed countries". To put it very briefly, it is argued that production is a matter not merely of technology but also of markets, and since different goods and services provide markets for one another, an extended output of one commodity or some commodities should be matched by expanded production of others. But and here is the crux of the argument total saving in an under-developed country is never large enough for all round use of capital intensive techniques, while to adopt these in some avenues of production only may upset the economic balance and retard total development. Hence the right policy for an under-developed country is to use labour intensive methods as much as possible, each industry employing as little capital as the total capital supply permits.

The criticism and the theory from which it is derived are, however based on a confused conception of economic balance and of the process of economic growth. In the first place, a single industry can adopt superior technique, and expand its output and sale without other industries expanding simultaneously, so long as the price of its products does not fall more than the cost of production. The total output of the economy and the real incomes of all sectors can rise and a new balance be established through new price relationships. "Moreover, there is no reason to think that the rise of real income achieved in this manner will not be greater than if the same investment were spread over a larger number of new industries, each of which used inferior labour intensive techniques.

Secondly, if the resources avail-

able for investment are too large for a, single industry, the proper course is to invest the excess in superior techniques in other industries. The new adjustment will take place, in part, in the manner already described, but, in part through increased supplies from other expanded industries. And the more superior the new techniques are, the faster will the economy develop. For the extent of the market depends not so much on division of labour as on the associated increase of efficiency. Of course, as income per in the economy rises, a wider variety of goods have to be produced and a wider range of industries established. But it is the rise of income caused by increasing adoption of superior technique that both renders possible and calls for diversification of the economy; it is not diversification without reference to efficiency that can bring about a rise of the national income. The proper policy, then, in an under-developed country is to employ superior technique:- whenever possible, of course, limiting the number of advanced industries to be established at each stage to the size of its investment resources".

Does the fact that inferior labour intensive techniques are already in use in an under-developed country suggest serious modifications of this conclusion? Hardly any. It is true that with the introduction of superior techniques, the old instruments of production will lose their value as income-earning assets. The new capital goods will destroy the old, but there will be no net "disinvestment" in the economic sense, for the true value of an investment is its power to produce income, and the new capital goods are, by hypothesis, more productive than the old. There is a waste of capital only in the ideal sense that if the superior technique could have been adopted earlier, the economy would have avoided double investment. But nobody, except writers of history, can "foresee" the past.

*There may be other difficulties of lack of technical skill and organizing ability, in the way of establishing large scale enterprises.

There is, however, a subtler issue. To justify investment in the superior technique, the average cost of producing goods with its help, must be lower than the prime cost of turning them out with the assistance or the old technique. If this is not the case, the "superior" technique is not really superior during the lifetime of the old capital goods. But the life time of the old labour intensive instruments is not likely to be long. In any case, while this may suggest that the new investment be channelled to new industries, it does not justify artificial bolstering up of the old technique in the old industry.

Up to now, our argument has proceeded on the assumption of a unified economy in our under-developed country. Most under-developed economies are, however, dual in some measure or other. There is, first, a relatively large rural sector in which capital is scarce, labour abundant, the technique of production primitive and income per capita extremely low. There is, secondly, the relatively developed urban sector, where modern techniques of production are employed and wages and incomes are higher. Exchange between them is limited by the low level of income of the rural sector, and this inhibits the growth of the whole economy.

Obviously, everything should be done to raise the income of the rural sector. Let us, for the sake of argument, assume that this has to be done by the establishment of industries. The issue then is: should the country invest its limited capital resources to set up a few large modern establishments in industrial centres, and transfer the surplus labour from the rural areas to these centres or employ those resources to create (or revive) many small scale labour-intensive units in the rural sector? The movement of surplus labour from the rural to the industrial centres involves cost, which we may, for the sake of simplicity, assume to be covered by wages. This implies that the wage rate in the industrial centres should be higher than that in the rural sector. If the wage rate in the latter is taken to be a fraction k of that in the former, the superiority of the capital intensive over the labour intensive technique would be measured by $w(mk-1)x$, where the rural wage rate is wk and k is a fraction,

So long as this value is positive, i.e. so long as k is greater than $1/m$, the case for establishing modern industries in the industrial centres stands. (We are not here concerned with the various and often decisive, non-economic arguments in favour of establishing small scale industries in the rural areas.)

However, first, the mobility of labour between the two sectors may be, for various sociological reasons, very low at least, for a significantly long period. Exchange between the two sectors would then correspond to trade between two national economies, and there may exist in the rural sector some industries in which the comparative disadvantage is less than in others. The country as a whole would gain by encouraging the growth of these industries and locating them in the rural sector: of course they would be labour intensive.

Secondly, the previous argument has assumed that all the investment resources of the country are equally available for use in the industrial and the rural sectors. But, in fact, some savings are made in the latter sector which do not migrate to the former and are not wholly invested in the latter either. They may materialise into investment, if new industries are created in the rural areas.

Finally, the rural labour force is in part unemployed and underemployed. Any enterprise like the community development project, which draws upon this untapped supply of labour and helps it fabricate instruments of production, creates new capital which can, obviously, come into existence only in the rural sector. But the establishment of labour intensive industries in rural areas, with the aid of this "extra" capital and the surplus labour does not raise any problem, of the economic use of the transferable investment resources of the country. Moreover, the surplus labour is a "free" good and cost of production is limited to the price of the raw material that may have to be purchased from outside the producing unit.

A certain amount of industrialisation may be achieved in the rural sector in this manner, if the

In terms of our algebraic symbols $k = 0$, so that $w(mk-1)$ cannot be positive.

"extra" rural capital is distributed among different industries. The product of no rural industry will be "superior" enough to be sold outside the rural sector, but it will be good enough to be exchanged against the "inferior" products of other rural industries. A circle of rural exchange would be created and rural income would begin to rise. But, obviously, the scope for expansion which this "closed" circle can offer must be limited indeed. In the first place, the rural industries should be able, sooner or later, to sell their products to outside markets in order to buy their raw materials. But by hypothesis, these products are not superior enough for the national market. Secondly, even within the rural area, the local farmer to whom these products may be offered for sale, may find it "cheaper" to buy the competing products from outside, so that the closed circle of rural exchange may have to exclude the products of the farm. Obviously, such a circle of exchange cannot expand measurably without ceasing to be a closed circle, and once that happens, the industrial section of the rural economy becomes a part of the wider national economy and all the reasoning that has been used in the first part of this note would apply.

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