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Charles Hirschman and Kwaku A. Twum-Baah
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CHARLES HIRSCHMAN AND KWAKU A. TWUM-BAAH*

I. INTRODUCTION

In response to the growing crisis of labour underutilization throughout much of the developing world, there has been increasing interest in the adoption of more labour-intensive technologies in agriculture, industry and construction. This point of view has been most thoroughly explored in the publications of the International Labour Organization.¹ While there have been only scattered policy initiatives in this direction so far, one senses that the choice of appropriate technology is no longer a decision left to engineers, but a topic of concern for planners and policymakers. In a recent article in this journal,² Warren Robinson warns against uncritical acceptance of this proposed direction in development policy. He points out a number of potentially adverse or negative consequences that may follow from a labour intensive strategy of development, including:

- (1) if the marginal product of labour is very low, the necessary wage level for full employment may be at or below the subsistence level,
- (2) policies that eliminate overtime or dual job holding will result in "income sharing", reducing the income of some workers,
- (3) labour-intensive employment will likely maintain high fertility levels, thus further postponing development,
- (4) labour-intensive development will reduce the need for skilled labour, thus weakening incentives for those who have or seek to acquire skills,
- (5) there is a potential trade-off between increased employment and total product,
- (6) a labour-intensive strategy may direct the economy into producing goods that will not provide the basis for an industrial take-off,
- (7) labour-intensive strategies will lower product quality and thus lower export potential, and
- (8) if large scale projects are undertaken with large numbers of workers, coercive or semi-militaristic methods of labour control will be necessary.

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1. Most important have been the ILO reports on employment in various developing countries. These include: *Towards Full Employment: A Programme for Columbia* (1970); *Matching Employment Opportunities and Expectations: A Programme of Action for Ceylon* (1971); and *Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya* (1972). For a recent summary of ILO sponsored research on this question, see chapter 5 in International Labour Office, *World Employment Programme: Research in Retrospect and Prospect*, Geneva: ILO, 1976.

2. Warren Robinson, "Some Negative Thoughts about Labour-Intensive Development", *Malayan Economic Review*, Vol. XX, No. 1, April 1975, pp. 12-26.

In this article, we would like to review each of the issues that Robinson presents in his critique of labour-intensive development. To anticipate our conclusions, we find little support, either theoretical or empirical, for Robinson's arguments about the adverse consequences of labour-intensive development, if it is carried out on a selective and pragmatic basis. By presenting the labour-intensive strategy as an "all or nothing" option and in its most extreme form, Robinson argues against a "straw man" and really doesn't consider realistic alternatives to the conventional policies.

In no way do we wish to foster an uncritical stance to labour-intensive technology, but we think that it does represent a viable policy alternative that deserves more consideration. Our presentation will first offer a brief outline of the case for a more labour-intensive strategy and then review the critique by Robinson. The final section will review the alternatives to both the contemporary labour surplus crisis and the need for rapid socioeconomic development in Third World countries.

II. WHAT IS LABOUR INTENSIVE TECHNOLOGY?

The image of labour-intensive technology as the industrial machinery that was used in the West a hundred years ago is an unfortunate one. One potential strategy is to strengthen the labour-intensive industries that already exist in developing countries, which often means just reducing uneconomic subsidies for the introduction of capital-intensive technologies. But there is also a search for modern, labour-intensive technology, or in Marsden's words,³ "progressive technologies". This implies that the central question involved in the choice of technology is not whether it is traditional or modern, but whether it makes optimal use of the country's resources, especially the large supply of labour that is manifest in growing unemployment and underemployment.

In their efforts at rapid socioeconomic development, there was a natural tendency for most developing countries to emulate the already developed countries of the West. In terms of technology, this meant that the route of modernization implied the adoption of the most modern means of production. So large factories, heavy machinery, and labour productivity were seen as the landmarks of progress. There was little attention paid to the problems of labour underutilization, since the leading economic theories of the day, those of Lewis⁴ and Fei and Ranis,⁵ postulated that labour surplus in the rural areas would gradually be absorbed as modern industry expanded.

But these theories of the 1950s and early 1960s really didn't foresee the labour surplus crisis of the 1960s and early 1970s. Nor did these prescriptions for economic development in the contemporary Third World accurately reflect the uses of technology during the industrialization process in the West of a hundred years ago. Although there were undoubtedly severe problems of unemployment during this earlier era, the techniques of industry were rather

3. Keith Marsden, "Progressive Technologies for Developing Countries," *International Labour Review*, Vol. 101, No. 5, May, 1970, pp. 475-502.

4. W.A. Lewis, "Economic Development with Unlimited Supplies of Labour," *Manchester School of Economic and Social Studies*, May, 1954, pp. 139-191.

5. J.C.H. Fei and G. Ranis, "A Theory of Economic Development," *American Economic Review*, September, 1961, pp. 533-565.

primitive, and necessitated substantial inputs of unskilled labour, which was supplied by the drift of population from country to town. While no one with any awareness of the terrible working environment in early factories would advocate a return to the sweatshops of the 19th century, there was probably a growing demand for labour during the process of industrialization.

This is precisely what is missing in contemporary developing countries. While high rates of natural increase and rural to urban migration provide an increasing pool of labour, much of it with higher education and other skills, there are only minimal job opportunities provided by modern industrialization in the cities of Third World.⁶ This is where the question of the appropriate choice of technology arises. Does it make sense to borrow advanced technology from the developed countries which requires large amounts of capital (using up scarce amounts of foreign exchange) and only minimal labour inputs, when the available resources of the developing countries are just the opposite? While planners are beginning to acknowledge the problem, it is difficult to formulate policies that will effectively stimulate more intensive use of domestic labour and also bring rapid development.

In order to develop alternative policies, it is necessary to understand why capital-intensive techniques have become so prevalent throughout the developing world.⁷ Have past and existing policies subsidized capital to such an extent that capital-intensive projects appear to be the most cost-efficient? Or are there structural blockages that encourage industrialists and engineers to choose capital-intensive technology regardless of the relative cost? Probably both are true.⁸ Before addressing these factors and the alternative policy choices, let us consider Robinson's arguments against the over-enthusiastic adoption of labour-intensive technology.

III. CRITIQUE OF ROBINSON

Wages Below the Subsistence Level

Robinson notes that some proposed policies to encourage labour-intensive development may actually backfire and worsen, rather than improve, the conditions of the workforce. One solution that has often been proposed is to remove institutional subsidies for capital and allow it to rise to a price that accurately reflects its scarcity. If the same logic were applied to wage levels, Robinson notes, wages may fall below the subsistence level. This could happen if the wage levels necessary for full employment were reduced (from their current over-priced level) to only reflect labour's marginal product.

It is extremely doubtful that the productivity of very many current workers can really be below the subsistence level and yet receive above subsistence level remuneration. Perhaps only in household enterprises is this even possible for any sustained period. Any enterprise in the market sector—and most all small

6. For more background on this problem, see, David Turnham, *The Employment Problem in Less Developed Countries: A Review of Evidence*, Paris: OECD, 1971; and Paul Bairoch, *Urban Unemployment in Developing Countries*, Geneva: International Labour Office, 1973.

7. Werner Baer and Michael E.A. Herve, "Employment and Industrialization in Developing Countries", *Quarterly Journal of Economics*, Vol. 80, February 1966, pp. 88-107.

8. See discussion in A.S. Bhalla, "Technology and Employment: Some Conclusions", *International Labour Review*, Vol. 113, No. 2, March-April, 1976, pp. 189-204.

urban enterprises are in a very competitive market—can not pay out more in wages than it receives from sales or production, otherwise it would soon be out of business. Thus, it doesn't seem that employment expansion at existing levels of productivity would result in wages below the subsistence level.

But there is another element of wage-protection that Robinson might have in mind, namely, the above average wages paid by employers in the modern sector. For instance, workers with strong unions or those employed by foreign owned businesses are typically paid more than workers with comparable skills in other sectors. While one might argue that these modern sector workers are over-paid relative to workers in traditional industries, it is very unlikely that these high wage workers earn more than their productivity levels would support. In fact, such modern industries certainly have much greater productivity per-worker than those in the more traditional sector. Thus, the wage levels of such modern industry workers may be "overpriced" relative to the traditional sector, but not in terms of worker productivity.

Work Sharing and Income-Sharing

While it is sometimes mentioned that the elimination of overtime work or multiple job-holding would offer more jobs for the jobless, this policy would not really create that many new employment opportunities. As such, it is a marginal issue in the debate over labour-intensive technology, and we will not dwell on it at length.

As Robinson points out, if one worker loses his second job or overtime hours to a newly employed person, the original worker will see his income decrease. Robinson sees this as a major problem, but we do not. In fact, it may be a social if not an economic improvement for both the original worker and his employer, as well as for the newly employed person.

Workers are certainly not as productive or efficient as they might be if they must work extraordinary hours. It would be objectively better for the employer to have a fresh worker, untired by a previous shift, and better for all workers to have more free time to spend with their families and friends. While new workers would have to acquire the basic job skills, this would only require short term training in most occupations.

But there remains the problem of workers who do not get a satisfactory income from their first job. This problem calls for wage increases, (through collective bargaining with employers and also higher productivity levels), not for multiple job holding. Since most workers probably don't "count" on regular income from second jobs or overtime, the income-sharing with jobless workers will probably not be felt as a real income loss.

Labour-Intensive Employment and High Fertility

It is quite true that high fertility and labour-intensity are two characteristics of rural, less developed areas, but it is quite another thing to say that labour-intensive employment causes or even sustains high fertility. If a causal relationship does exist it is more plausible to posit it in the reverse direction. In rural villages and small towns in developing countries, the co-existence of large families and household enterprises is likely to encourage traditional labour-intensive technology. But the new policies put forth by the ILO and other

proponents of labour-intensive strategies are not simply to maintain the existing level and structure of production but to expand (and change) it on a much larger scale. For instance if labour-intensive industrial or construction projects were to be started in rural areas, many underemployed family members would be likely to leave household enterprises to enter the wage sector and receive higher incomes. The result of the increased income and job mobility is that (if the demographic transition theory is anything to go by) people will want, not more but, fewer children. It appears, then, that anything that can improve the socioeconomic conditions of the rural (or urban) poor (and this includes increasing earned income through new economic opportunities) will contribute to a decline, rather than a rise, in fertility.

Robinson seems to argue that capital-intensive modern industrial jobs might serve to lower fertility faster than semi-rural labour-intensive projects. We would agree, but the expansion of capital-intensive jobs is not a real alternative, given the existing circumstances. The real alternatives in most developing societies are continued crowding in the agricultural sector or joblessness in the urban sector, hardly circumstances that are conducive to lowered fertility.

Incentives for Workers

Robinson says that if labour-intensive industry becomes predominate, and only unskilled labour is required, then "skilled workers may find their skills unneeded and also unrewarded".⁹ The assumptions, upon which Robinson's assertion rests, are somewhat questionable.

First of all, there have been no suggestions, to our knowledge at least, that existing capital-intensive industries be scrapped. The emphasis has been on directing future growth in a more labour-intensive fashion, and to arrive at a pragmatic balance with the appropriate technology to be decided upon on a case by case basis, not by universal edict. If in some industries, only very capital-intensive methods are feasible, these should certainly be encouraged. In many other cases, modern or traditional labour-intensive technology may be better suited to local circumstances and should be encouraged. There is no call for a completely labour-intensive economy, only a more rational use of a nation's resources.

Secondly, it doesn't necessarily follow that labour-intensive technology requires only unskilled labour. In fact, the opposite case can be made, with the argument that modern industry only requires machine operators rather than skilled craftsmen. The role of labour skills is not one that is easily equated with the volume of labour inputs into the production process.

If the pace of industrialization is to be speeded-up with the introduction of labour-intensive technology, most new workers will likely come from the agricultural sector, not from the small capital-intensive sector. Thus the proper debate over necessary skill acquisition and incentives should focus on the transfer from farming to labour-intensive industry. There are important issues here, but not the ones that Robinson raises.

9. Robinson, *op. cit.* p. 19.

Employment-Product Trade-off

Is there always a trade-off between maximizing employment and maximizing output? Robinson suggests that there probably is, and argues that to insist on immediate employment targets will likely slow the prospects of long-term development and eventual prosperity for all. There are at least two significant issues involved here: the claim that employment maximization may reduce total production, and the more subtle issue of the distribution of the benefits of economic growth.

It is extremely unlikely that simply increasing employment will lower total product within a single firm; indeed it may result in a fuller use of the firm's equipment by multiple shifts. What Robinson has in mind is the choice of investment in alternative industries or even in different sectors, one of which may yield higher employment, the other a higher capital-output ratio. What are the criteria by which to judge the "best" investment of a nation's scarce capital resources: employment creation, output, export potential, or social value of the produce? There is no dogmatic insistence that employment creation must always be the sole criterion in making such a decision, nor is it inevitable that there will always be conflicts among these various objectives.

In fact, some studies have found that labour-intensive projects may also score higher on other criteria. A study of irrigation tubewells in East Pakistan by Thomas¹⁰ shows that the internal rates of return in actual and accounting prices (assuming equal installation rates) would be 48% and 54% respectively for low-cost labour-intensive wells and 33% and 25% respectively for medium-cost, while the rates for high-cost, highly capital-intensive wells were 7% and 4% respectively. In terms of employment and training, the low-cost wells would create over 26,000 man-years of employment for the unskilled and 9,000 man-years of employment for drillers and assistant drillers. By contrast, the medium-cost wells would create only 1,600 man years of employment over 5 years. Thomas also argues that the low-cost jets and percussion drilling rigs were light enough to afford greater distribution of wells over the country than if the heavy power rigs were used. Farmers were also much more likely to have greater understanding of well operation and much more aware of its potential benefits if they or their relatives were involved in the installation process than if heavy machines operated by foreign contractors did the job. Morawetz¹¹ also shows from studies of the petrochemical and light manufacturing industries in Columbia that labour-intensive investment would have been much more beneficial to the nation and the economy than investment in petrochemicals, because labour-intensive industry could create 20 times more jobs than the petrochemical industry, given the same amount of fixed investment. Petrochemical industries stimulate oil refining and crude oil production, neither of which uses much labour, but clothing production could stimulate the production of textiles, raw cotton and, shoe machinery industries, most of which are highly labour-using. Domestically produced petrochemicals were on the

10. John Woodward Thomas, "The Choice of Technology for Irrigation Tubewells in East Pakistan: Analysis of a Development Policy Decision" in C. Peter Timmer, *et al*, *The Choice of Technology in Developing Countries: Some Cautionary Tales*, Cambridge: Center for International Affairs, Harvard University, 1975.

11. David Morawetz, "Import Substitution, Employment, and Foreign Exchange in Columbia: No Cheers for Petrochemicals in C. Peter Timmer, *et al*, *ibid*."

average 40-50% more expensive than imported ones, while locally produced clothing, footwear, furniture and textile products were close to world prices. More importantly, foreign exchange earned and saved per unit of capital invested was on average 5 times as great in the labour-intensive industries as in petrochemicals.

To consider the second issue, it is important not to postpone the possibility of full employment because this will certainly mean poverty and degradation for many workers and their families in the present. The ultimate objective of economic growth is to realize improved living standards for the majority of the population in the poor countries throughout the developing world. It appears to be an inversion of this objective to tolerate a substantial proportion of the workforce in open unemployment or severe underemployment. It makes no sense to argue that life will be better for the children of the present generation, if the present generation loses all opportunities for productive employment and passes on this hopelessness to the next generation. Even if there were to be a reduction in total output by using a more labour-intensive strategy, and we are not prepared to concede that this is inevitable, it seems like a strategy preferable to a continuation of the contemporary employment crisis.

Labour-Intensity and the Product-Mix

Robinson points out, quite correctly in our opinion, that if labour-intensive development leads to a more egalitarian income distribution, there will be an increase in the demand for primary goods and simple manufactured goods for the household and farm, and a reduction in the demand for sophisticated manufactured goods. This shift in demand will parallel the shift towards labour-intensive production techniques which are the most flexible in the production of light consumer goods. Robinson, however, warns against this shift because the resulting industry will not be sufficient to provide a "take-off"; we welcome it. Unfortunately much of the manufacturing industry in less developed countries is orientated toward the production of expensive luxury goods such as automobiles and heavy consumer durables. Such production faces a limited market—the small middle class—and creates fewer multiplier effects because of the heavy reliance upon imported inputs. The results is that most of the demand for simple household goods, farm tools, and other basic goods is met by foreign imports. Throughout Asia, most of these light consumer goods are imported from China and Taiwan, both of which seemed to have moderate industrial "take-off".

Quality of Output

Robinson argues that labour-intensive production is at an inherent disadvantage in maintaining quality-control for mass production. Therefore, to be competitive in the export market, the standardization inherent in capital-intensive production is essential. He also suggests that large construction projects such as roads or canals built with labour-intensive techniques will not last as long as those built with modern earth moving equipment.

Again we find no empirical support for these conclusions, and think that cogent arguments to the contrary are equally compelling. Labour-intensive production does not mean the complete absence of any tools or machinery,

but simply less reliance upon them. It seems that quality is not necessarily better just because bigger and more expensive machinery is used in the production process. In fact, one might argue that inappropriate use of capital-intensive machinery, and the lack of readily available spare parts and service personnel will lead to more frequent industrial breakdowns and inferior goods. Moreover, case studies of the applications of alternative technologies in developing countries do not report any decline in quality.¹²

Coercive Methods of Labour Control

Robinson notes in passing that large scale projects with labour-intensive techniques will force planners into coercive or militaristic management and he footnotes the experience of the Soviet Union. This seems to be the most questionable argument of all, based more on conjecture than reasoned analysis.

Most labour intensive projects will likely be on a smaller scale rather than the mass production methods of modern capital-intensive industry. In any case, coercion results from the method of labour control, not the type of technology used. If people are unwilling to work for established wages, one alternative is to force them. But no one is proposing anything of the sort. Rather the objective is to provide opportunities for the jobless and those who are underemployed. The attraction will be the opportunity for productive employment and wages, presumably above their current level. The need for forced labour is not an issue.

Duke University, Durham,
North Carolina, USA.

12. See studies in C. Peter Timmer, *et al, ibid.*