

## CRITERIA FOR CHOICE OF PRODUCTION TECHNIQUES IN A DEVELOPING ECONOMY \*

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The author states that after long disputes the theory of choice of production techniques in a developing economy has reached a "draw" position. The maximization of the long term rate of growth adopted as a strategic goal of choice of production techniques in all past theoretical considerations, has not proved very fertile. While in a highly developed economy economic growth also ensures the development of the whole economy, in a developing economy the situation is reversed: growth with no development is possible. Strategy should, therefore, focus on the maximization of the rate of development and not of the growth rate. This sheds a completely new light on the problem of choice of production techniques.

In principle, these considerations are confined to developing economies, although many comments and conclusions may to a greater or lesser extent be applied to any economy in which a programme of economic development is being implemented. In the new approach to the problem the choice of production techniques must be subordinated to structural changes, i.e. to the development of the whole economy and not, as has been fashionable so far, to the maximization of the growth rate as the main strategic goal.

It has become a certain tradition in studies on the advancement of technique and the choice of techniques that because the problem is still controversial every author sets out by first distinguishing between these categories. Two schools of thought may be singled out. The first takes a rather narrow approach to the choice of techniques defining it as a motion along the same identical product curve. According to this school, technical progress moves to a point located below the curve, i.e. it moves to another curve. The second school also includes motion along the same curve in technical progress.

Both schools dispose of a substantial arsenal of arguments. There is, however, no need to get involved in details here. Personally, I am more inclined to the view that the approach of the first school is the more precise and logical. Moreover, it seems to me that the criterion of time is much more important than the criterion of method. In other words, the choice of techniques is possible only during the period of making investment decisions. Once these decisions are made, once the project is under way according to the adopted documentation, it is then no longer possible to choose techniques. On the other hand, however, technical or organizational progress still remains possible.

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I treat technical progress in the broad and general terms as obtaining the same effects with reduced outlays of at least one productive factor without increasing the outlays of the remaining productive factors. In view of the subject of this article, there is no need to get involved in what are otherwise essential distinctions between technical, organizational and economic progress, as well as embodied and disembodied progress.

The maximization of the long term rate of economic growth is traditionally adopted as the main strategic goal of choice of techniques in a developing economy and the criteria of choice of production techniques are subordinated to this goal. This, in my opinion, is the main weakness of the theory (and worse still, frequently of practice) of the choice of techniques. Putting critical comments aside for the moment, I shall present very briefly (and with a simplification unavoidable in such cases) the evolution of the state of knowledge in this field.

The view that prevailed undisturbed in economic theory, more or less up to the mid-fifties, was that in a developing economy it is necessary to select techniques of low capital intensity which maximize national income in every period. This seemed logical, since the shortage of capital had been regarded as a main obstacle to economic development of the Third World Countries. O. Lange suggested the definition that developing economy is one where with modern technique the available capital resources are not sufficient to insure the full employment of manpower resources<sup>1</sup>. The following axioms (these could safely be called dogmas today) generally recognized at that time, were usually given as additional arguments: unlimited resources of manpower, disguised unemployment in the traditional sector with zero marginal labour productivity and the related alleged cheapness of manpower in economically underdeveloped countries.

These views could be directly traced to Böhm-Bawerk who argued that, in consequence of an appropriate dissipation of capital (today we would say: lowering capital intensity or the capital intensity of labour), it is possible to employ practically any amount of labour. It may, indeed, seem strange that the repercussions of these views should survive even though Marx proved that there is a limit to employment in a capitalist economy. It is determined by the amount of capital and by its organic composition. The organic composition of capital is not arbitrarily selected by entrepreneurs, but is imposed on them by competition.

More recent studies also indicated that the concept of disguised unemployment based on zero marginal productivity, so that there is always a certain number of superfluous persons who can be withdrawn from the traditional sector (usually agriculture) without a decline in the total output of that sector, is erroneous. If after the departure of a large number of people from agriculture total production does not decline, and even after a certain period of time it increases, this is due not to the migration of superfluous people, but to the technical and organizational changes in agriculture. Other things being equal, a decline in total output is unavoidable, even though this decline, percentage-wise, is lower than the decline in

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<sup>1</sup> Cf. O. Lange, *Niektore problemy planowania gospodarczego w krajach nierozwiniętych* (In:) *Problemy wzrostu ekonomicznego krajów słabo rozwiniętych*, Warszawa 1958.

employment in agriculture. Briefly, the marginal productivity of labour in the overpopulated agricultural sector is low. However, it is always positive and never equals zero<sup>2</sup>.

The contention that manpower is cheap in a developing economy has also proved erroneous. What happened, is that the wage level, which is actually very low, has simply been mixed up here with labour cost which, because of very low labour productivity, is very high. Practitioners are only too well aware of this: this is one more example in support of the comment made by Marx with reference to the theory of absolute rent. He said in effect that whenever there is a conflict of views between practitioners and theoreticians, the former are always right. It is not possible to give different interpretation of a phenomenon which prevails in Latin America, namely agricultural labourers of the large estates now being modernized are laid off because of a rapid spread of mechanization. There is no doubt that mechanization is profitable in spite of low wages.

Finally, wherever investment decisions remain in private hands — and this is fairly widespread in Third World Countries — investors are guided by current micro-economic objectives (profit maximization), and not by macro-economic considerations (maximization of the growth rate of the national income, or employment).

The attack — strangely enough — came from a completely different side. A number of economists, especially Galenson and Leibenstein, who were the first<sup>3</sup>, and Dobb, Sen and others, came to the conclusion that the short term maximization of the national income does not, by itself, have to bring about the long term maximization of the national income. They pointed out that preference for techniques which maximize the national income over a short term involves the selection of low capital intensity techniques and by the same token of a low capital intensity of labour and low productivity. Hence, even though the level of income is at a maximum, the growth rate is not at all maximized, because the lion's share of the national income is absorbed by wages and therefore by consumption. The remaining available economic surplus which could represent an investment fund will therefore be small and, in consequence, the growth rate of the national income will also be very low. But accelerated growth is the only means of moving a country out of its economic backwardness. In the opinion of those authors, therefore, it is necessary to select techniques which maximize economic surplus and not income. It is true that although the level of income will thus not be at a maximum in any year, the rate of growth will be. As a result, after a lapse of a certain period of time, the level of the national income will also be higher than it would have been if techniques which maximize income in every single year were to be selected.

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<sup>2</sup> In view of the subject matter of the present article I shall not conduct here an elaborate criticism of the traditional interpretation of the concept of agrarian overpopulation; I intend to do this on another occasion.

<sup>3</sup> W. Galenson, H. Leibenstein, *Investment Criteria, Productivity and Economic Development*, "Quarterly Journal of Economics" 1955, No. 3; M. Dobb, *An Essay on Economic Growth and Planning*, London 1960; A.K. Sen, *Choice of Techniques*, Oxford 1960.

The arguments quoted above have become part of economic theory and are known as the Dobb-Sen model; they close the second stage in the development of the theory of choice of production techniques in a developing economy.

This model, however, did not withstand the test of time either, and was soon attacked by a new group of economists, among which Polish economists are included. First mention should be given to M. Kalecki, next to Z. Dobrska, A. Müller and A. Rybarski<sup>4</sup>. The views held by this group open a new — the third — stage in the development of the theory of choice of production techniques in an underdeveloped economy.

These economists have rightly pointed out that to-date the dispute was of an academic nature, because the contradiction between the results of techniques which maximize either surplus or income is significant only if specific — and fairly unrealistic — simplifying assumptions are accepted. In fact, however, there is room for both depending upon the specific situation in which each of the techniques gives approximately similar results.

Therefore, instead of clearcut answers given in previous stages concerning what should be maximized: national income (stage 1), or surplus (stage 2), a number of criteria have been proposed as guidelines for selecting techniques, if the object is to maximize the growth rate in the long run.

Thus, when wages are high at the starting point or when they are expected to increase, then — with other conditions remaining the same — it is necessary to maximize economic surplus and not the national income (the case incorrectly generalized in the Dobb-Sen model). However, the remaining conditions do not always stay unchanged. Primarily, among these is the nature and the source of investment funds.

Therefore, when the original is investment fund nonrecurrent (and therefore is a resource — eg. a foreign loan), then surplus should be maximized. If, however, it is not a resource, but a flow, then its source should be investigated. If its amount depends upon the level of the national income (eg. taxes), then preference should be given to techniques which maximize income. If the investment fund depends upon previous investments (and therefore is a dependent fund), then surplus should be maximized. If, on the other hand, it is independent, then income should be maximized. Since in any economy we have both dependent and independent funds, then their weights should be studied and further action should depend upon the changes in these weights — the initially small weight of dependent funds increases gradually as the national economy gets more developed.

Finally, the situation changes radically if we abandon the initial simplifying assumption of technical stagnation and admit the possibility of technical progress.

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<sup>4</sup> M. Kalecki, *Zagadnienia finansowania rozwoju ekonomicznego*, (In:) *Problemy wzrostu ekonomicznego krajow slabo rozwinietych*, Warszawa 1958; Z. Dobrska, *Wybor technik produkcji w krajach gospodarczo zacofanych*, Warszawa 1963; A. Müller, *Kierunki optymalizacji technik produkcji w krajach slabo rozwinietych*, Warszawa 1966; A. Rybarski, *Kryteria wyboru technik w krajach slabo rozwinietych*. Warszawa 1968.

Now, the answer is not unequivocal because the antagonism between techniques maximizing income or surplus will be weakened by technical progress. Hence, if we maximize income, for instance, then the surplus and therefore the growth rate will also increase due to technical progress. And *vice versa*, techniques which maximize surplus will in effect also produce an increase in the national income due to technical progress.

Thus, there is no general and clear cut answer. There are only specific answers, wholly dependent upon the situation. This, no doubt, is a very sensible and convincing approach to the problem. Nevertheless, in order to characterize in one word the present, i.e. third stage of development of the theory of choice of techniques in a developing economy, it would be difficult to find a better term, than a draw. That is probably how it has been interpreted by economists, because for a number of years now there has been no discussion whatever on this problem.

It seems, however, that the situation is ripe now for a further theoretical search, because it appears that the above criteria for selecting production techniques in a developing economy are now weighed down by the same original sin as the two previous stand-points, i.e. that of stage 1 and that of stage 2. This sin, in my opinion, consists in an excessive glorification of the maximization of the rate of growth as the main strategic goal in all stages, hence also in the "draw" stage.

The fetish of maximization of the growth rate has been partly dethroned in Poland, although the manner in which this was done was not altogether fortunate. After having some second thoughts, some authors regretfully realized that economic growth cannot be an objective in itself, but only a means to an end. The final goal of every mode of production is, as we know from Marx, consumption. It is well that this has been brought back to mind, but it is not well, in my mind, that attempts are being made to raise the importance of consumption by promoting it as one of the factors of economic growth. Valid intentions have, therefore, been expressed by an incorrect theoretical formulation. In fact, growth is still an enthroned fetish. It has only been given a different throne to sit on. Now, not only investment, but also consumption is considered as a growth factor! Yet surprisingly enough simple reproduction was predominant in primitive societies or even in civilized precapitalist formations where consumption absorbed almost the whole national income.

The point is that this is not how the fetish of the maximization of the long term growth rate should be dispelled. The weakness of all the variations of the modern theory of choice of techniques is that it invariably revolves in the sphere of the modern sector.

It is the modern sector which accumulates investment surpluses, chooses techniques, invests and maximizes its rate of growth. What about the traditional sector? The theory confines its role to that of a reservoir of manpower — but when this reservoir is drained it is then not possible to make a choice of techniques. And what is this economic growth where progress is confined to the modern sector? Economic theory defines it as growth of an enclave type, or so-called growth with no development.

That is exactly how foreign enclaves grew in the colonies, that is how the apartheid countries in Africa are growing, that is how the national income of some oil producing countries is growing. Highly developed countries used to grow in a similar manner. A case in point may be Great Britain. Industry was long concentrated in England and much less so in Scotland, while Wales has hardly anything but cattle, sheep, coal mines, a coal port and steel mills. That is also how the United States economy grew: a rich and developed North and a poor and backward South. Before the war, what was called Poland A developed while Poland B and C remained in a state of stagnation and the effects of this are still felt today. Neither did Germany completely avoid the consequences of this kind of growth: the Federal Republic of Germany has a super modern industry and a backward agrarian structure. The mechanisms behind the widening gap between backward and highly developed regions of one country (and this may be applied also to economic sectors) have been convincingly described by Myrdal<sup>5</sup>.

And yet, not only the level of per capital national income is the decisive criterion for including a given country in an appropriate group of countries. Otherwise, Kuwait would have long been included in the group of highly developed countries, not to mention the United Arab Emirates. What is of decisive importance for the level of development is the structure of the economy. A backward structure (including also the infrastructure), disproportions in labour productivity and in the level of income between the sectors and branches of the economy — are the basic criteria for whether a given country may be included into the group of developing countries.

Far be it from me to belittle the importance of economic growth in general — without it development is unthinkable. But it is structural change, elimination of the flagrant disproportions in the national economy and in the society that are the questions of greatest urgency. These problems cannot be solved by economic growth alone, nor can they be solved rapidly and painlessly. The overriding not only the maximization of the rate of economic growth but also the maximization of the rate of structural transformations. Selection of production techniques is an element and not an unimportant one, of the strategy of structural transformation. To speak of a proper development strategy certain conditions of an institutional nature must first be met. Above all a progressive government and considerable authority vested in the state. Only the state — if it has the required economic executive power — can formulate and implement macro-economic programs of economic development, only the state guided by the interest of the whole national economy may in fact select techniques on a macro-scale, if the government is progressive. Wherever economic decisions are the domain of private enterprises, it is hardly possible to speak of a choice of techniques in the full sense of this word because, as a rule, the enterprises choose techniques which maximize profits, i.e. the surplus. Techniques which maximize the national income being less profitable, are simply disregarded, in this case the interest of the whole economy is a hollow slogan because the interest of the enterprise is of decisive importance.

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<sup>5</sup> G. Myrdal, *Economic Theory and Underdeveloped Regions* (Polish transl., *Teoria ekonomii a kraje gospodarczo ierozwiniete*, Warszawa 1958).

The results of this situation may best be seen on the example of Latin America. According to the United Nations Organization data <sup>6</sup> for this region taken as a whole, the average growth rate of industrial production in the 1960's amounted to 5.6 per cent per annum, while the growth rate of employment in this sector was 2.3 per cent. Since the rate of natural increase amounted to 2.8 per cent, and the migration rate from the rural areas to 4.8 per cent (the modernization of large latifundia — mechanization!) — the population of the slums rose at 15 per cent per annum!

Since the growth rate of the industrial sector was 5.6 per cent while the growth rate of employment in this sector amounted to 2.3 per cent, it follows that 40 per cent of the increase in production resulted from an increase in employment and 60 per cent from an increase in labour productivity. With these growth proportions and techniques what industrial growth rate would be necessary so that industry could currently absorb (without reducing the existing unemployment in the cities) the whole new supply of labour power? Calculations indicate that it should amount to as much as 19 per cent, i.e. 3.5 times over what it has been thus far. Is it possible to achieve this rate of growth? For if present unemployment is taken into consideration, it will turn out that industry should keep growing at the rate of 25 per cent during the next decade. And what would the rate of capital formation have to be to make this possible?

Since achievement of this high growth rate is out of the question, another possibility suggests itself: the use of less capital intensive techniques. But this, again, would call for profound socio-political reforms: if private investors use such techniques then they evidently find them profitable. Large land estates also find it profitable to mechanize work, in spite of the notorious "cheapness" of labour force. It is unfortunate that capital intensive techniques are simultaneously chosen in agriculture and in industry: agriculture gets rid of people and industry does not need them.

The agricultural population of Latin America constitutes an average of 60 per cent of the total population. At the present industrial growth rate and with the present preferences for intensive techniques, it would need at least 59 years to change the structure of employment so that the share of agricultural population decline to 30 per cent. Yet, the 30 per cent is but small progress when compared with the less than 10 per cent in the most highly developed countries. And what will it be in those countries 59 years from now?!

It should be added here that private entrepreneurs in developing countries not only choose capital intensive techniques, but also utilize only one half or even less of the productive capacities of their enterprises. This is a common phenomenon <sup>7</sup>.

Thus, for instance, in Argentina there are as many as 4 tractor plants which could cover the demand of all the Latin America countries if they worked at their full productive capacity. One plant could satisfy the needs of the country. In Brazil

<sup>6</sup> *The Latin American Economy in 1969*. Excerpt from ECLA Survey of the U.N. May 1970.

<sup>7</sup> This was correctly pointed out by M. Kabaj, *Shift Work and Employment Expansion Towards an Optimum Pattern*, "International Labour Review", Vol. 98, 1968, No. 3.

there are many as 13 automobile factories. All of them work only one shift. Many more examples of this kind could be given.

Studies by a group of United Nations Organization experts (unpublished materials) have shown that excessive investments, although not very effective on the macro-scale (which is quite understandable), are very profitable on the micro-scale, i.e. for private investors. The matter is childishly simple. Investors take advantage of tax rebates and low interest government credits, the amount of which depends upon the volume of investment. Since inflation is rampant in many countries, credit is paid off in a depreciated money. The group of experts mentioned above calculated that in Latin America, where the rate of inflation frequently exceeds 20 per cent per annum, one dollar's worth of investment actually costs the investors only 11 cents, because they get back the difference of 89 cents in various ways from the government. Under these circumstances it makes no sense to talk about the choice of techniques!

The need for fundamental change in the employment structure, primarily in agriculture and outside agriculture, results from the fact that without reducing considerably employment in agriculture there is no way of radically increasing labour productivity in this sector and thus of equalizing disproportions in the income levels of the urban and rural populations. One farmer in the United States now provides food for about 50 persons, in Latin America — for 1.6 persons and in Africa for 1.3 persons. And yet, United States is only fourth in the world after New Zealand, Australia and Canada in agricultural labour productivity.

This means, however, that Third World countries would have to increase agricultural labour productivity 20-40 fold in order to achieve the present level productivity of the leading countries. With the present employment structure (60-90 per cent employed in agriculture) this would denote an equal increase in the total agricultural output. Not only is this impossible, but also quite unnecessary because there is no market for such a big production. Even a 2-3 fold increase in total production is utter nonsense. Thus, the only way out is to depopulate the village areas considerably.

The problem is, however, how and at what pace should this operation be conducted. A spontaneous development of industry and spontaneous mechanization do not solve the problem, as may be seen from the example of Latin America. It may be assumed that the problem is even more complicated in countries with an agricultural population, not of 60 per cent as in this region, but for instance of 80-90 per cent, as in many countries of Africa and Asia.

Much depends upon the choice of techniques, and not merely or mainly, as is fairly commonly believed, upon the rate and structure of investment. One thing remains certain: capital intensive techniques must not be chosen in both sectors simultaneously, because this leads to mass unemployment. All countries had committed major or minor sins in this respect. It might be stressed, however, that in the past the situation was more advantageous to countries which were first to embark upon the road of industrialization. They had extensive areas to which they were able to direct their population surpluses. This is not the situation of the present developing countries. People forced out of agriculture and not needed by in-



dustry have nowhere to go. For this reason the choice of techniques is now a problem which demands careful analysis. A notable exception is Japan which alone would not be misled by the mirage of premature mechanization of agriculture and first developed its industry. And even in industry Japan used various techniques, including also and on a considerable scale capital-saving techniques which maximize employment. Even Japan, a country with the highest rate of accumulation in the world in the recent past, could not afford to intensify production techniques simultaneously in agriculture and in industry. And how could Latin America afford this, let alone the economically more backward regions?!

In theory it does not make much difference where the technical reconstruction of the economy begins — with agriculture or with industry. If, however, capital intensive techniques are chosen in agriculture, then growth in industry should preferably be of an extensive nature in order to allow the economy to employ people withdrawn from the agricultural sector. But if industrialization begins with mostly capital intensive techniques, then efforts should be made to prevent migration from agriculture by using agricultural production techniques of low capital intensity.

In practice the variant in which the modernization of the economy begins with agriculture is not realistic any longer. True, in the past, several countries, such as for instance New Zealand and Australia, have succeeded in this, but that was due to the long depression on the world agricultural markets<sup>8</sup>. Thus, while the prospects for the development of export-oriented agriculture are unrealistic, the domestic market for agriculture may be created only by non-farmers, i.e. mainly by the industrial sector. Therefore, only the second variant is practicable: industrialization first and then a gradual modernization of agriculture. It is not possible to modernize both sectors simultaneously in the initial stages of economic development.

This means, however, that agriculture as the reservoir of manpower now plays an entirely different role than that ascribed to it in the literature on growth models. Since the rate of structural change cannot be very high (unless we accept the Latin American type of urbanization with the slums and all the rest), because it is limited by the growth rate of the non-agricultural sector and by a high natural increase of population, then it follows that agriculture as the reservoir of manpower is not so much supplying labour to other sectors, as keeping it in the rural areas until the situation improves and until employment opportunities expand. This serious and complicated problem was not hitherto taken into consideration by the theory of growth and by the theory of the choice of techniques because, by tradition, theoretical considerations were limited to the modern sector. Meanwhile the traditional

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<sup>8</sup> The present boom on the world agricultural markets should be treated as a typical phenomenon of short duration. Besides, the boom only affects the grains and the Third World imports rather than exports. Even a considerable increase in agricultural prices is no indication that the shortage on the market is equally great: the demand is simply much less flexible than the prices. Attempts to increase the supply to the same extent would result in a drastic decline in prices. The several similar boom periods noted over the last three decades did not change the general trend.

sector is the place where a majority of the population lives. It is imperative that conditions necessary for its role as a reservoir of manpower be ensured to it. Manpower reserves are not like the reserves of mineral deposits which can wait peacefully with no costs involved. The point is that in most developing countries, with the commendable exception of Africa South of Sahara, the agrarian system is not suited to this role. Hence the need for agrarian reforms. Although this subject does not lie in the scope of this article, I would only like to stress that as the saying goes, "times have changed" and manpower reserves, the source of joy to economic theoreticians, (how else would it be possible to design countless models "with unlimited manpower resources"?), cannot as in the past be left any longer to their own devices. Particularly since, as I have already said, the safety valve in the form of migration is not longer available.

One more comment in conclusion. In the light of arguments presented here one can hardly agree with the contention accepted in the literature on the subject that the investment structure is of decisive importance and that the role of the choice of techniques is in effect negligible. According to Z. Dobrska, for instance, the choice of techniques is applicable only in complementary industries, although competitiveness, nevertheless, is more common. Therefore not much can be expected from the choice of techniques in a developing economy.

It is both so, and not so at the same time. It is so, though not entirely so, if we take the long term maximization of the growth rate as the strategic goal. It is not quite so, however, even then because a "draw" indicates that, in fact and all circumstances considered, whether we select techniques that are less (the maximization of incomes) or more capital intensive (the maximization of the surplus), the resulting long term growth rate will not differ much. However, if we take the maximization of the rate of economic growth as our objective (without, for the reasons presented above, losing anything in practice in the rate growth) we have quite a different situation.

Indeed, if the choice of techniques is limited to the choice of production methods for a given product, then as soon as the investment structure is defined there will actually be very little room for manouever: what choice do we have, for instance, in the power industry, in electronics, in the motor vehicle industry, in the machine industry or even in the textile industry? Practically none, because either we build these industries with the newest technology (for which licences are usually purchased), or not at all. For in a macro-economic approach the choice of techniques cannot consist in the fact that we have already decided what we shall produce and now begin to think how. This sort of choice is a utopia; a very concincing case in point is the production of steel in the obsolete furnaces in China which gained notoriety some time ago.

We get quite a different situation when we stand on the ground of maximization of the growth rate. Knowing the potential of accumulation, we can then decide what is the optimal average capital intensity from the point of view of creating new jobs in the modern sector. We may then accordingly select an investment structure that will enable us to solve this problem without resorting to obsolete techniques and thus obtain a lower capital-output ratio for the whole economy. It will then be

possible to use mixed techniques, not on the principle of producing the same commodities with different methods, but by selecting a branch production structure containing branches with a higher and lower capital intensity. It is thereby possible to obtain the desired general capital intensity without relying on the spade and pickaxe technique, i.e. without sacrificing modernity. That is why the developing countries which stubbornly refuse to accept obsolete equipment willingly offered to them (which in the opinion of many experts would be "too modern, anyway,... as far as they are concerned"), behave — despite all appearances — very rationally.

We have thus come to our conclusions:

1. The present form of the theory of choice of techniques is not very useful in the formulation of correct development strategies for developing countries, because it is geared not so much to economic development, as to maximization of the long run growth rate, and that is not the same.

2. It is a serious error to confine theoretical considerations to the modern sector, while leaving the traditional sector to its own devices. A spontaneous development of industry by using techniques which maximize its growth rate alone, does not automatically solve the significant problem of structural transformation, or solves it so badly and over such a long period of time, that it cannot be relied upon.

3. Considerations concerning the choice of techniques in agriculture (the literature on this subject is much less extensive) are also one-sided, because they do not take into account such macro-economic problems as employment opportunities outside agriculture for persons forced out of agriculture in consequence of the application of capital-intensive techniques, the growth rate of external markets, and even more so of the domestic market, for agriculture etc. I have written on this subject in another article<sup>9</sup> and do not, therefore, consider it here.

4. The problem of the choice of techniques should be approached from the point of view of the right strategies at the right time. That is to say, depending on the given stage of economic development, preference as far as this is possible should first be given to extensive techniques (not in all branches this is possible) and only after appropriate structural changes are attained can gradually shift to intensive techniques (intensification of growth) be made.

5. It is an error, and a very costly one at that, to give preference to intensive techniques at the initial stage of development.

6. A "draw" cannot consist in the use of any technique if it maximizes the long term growth rate because this poses the danger of an enclave type of development; it may consist, at best, of the use of both in their proper order. Thus, first extensive techniques which maximize income and employment and therefore also the rate of structural change and only then, and that much later, intensive techniques which maximize the surplus.

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<sup>9</sup> A. Runowicz, *Rynek wewnętrzny a tempo utowarowienia rolnictwa*, "Ekonomista" 1973, No. 1.