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CONDITIONS AND METHODS OF INVESTMENT PROJECTS EVALUATION IN THE ECONOMY OF DEVELOPING COUNTRIES

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The problem of new investment projects evaluation in developing countries is one of the most difficult economic problems in the sphere of theory and practice of development of those countries. The degree of difficulty and the scale of complexity of the problem result from both the diversification of socio-economic forms of their economy and the necessity to solve it in a complex way in macro- and microeconomic scale.

From the macroeconomic point of view, it is necessary to primarily evaluate the general development conditions in definite countries and regions in order to be able to make research into labour and investment balances in material, financial and currency aspects. The analysis gives us grounds for the choice of the level of technical capital intensity in the new investment projects.

It is also necessary to turn attention to the sphere of investment outlays allocation as there are various purposes and motivations determining the efficiency of investment parameters in various forms of properly in the multi-sector economy typical for developing countries.

The macroeconomic analysis and the necessary data on the preferences in the field of choice of the new investment projects technical level enable us to take up research in the sphere of synthetic, and later, detailed indicators of the economic

efficiency of investments on the macroeconomic scale concerning the particular new projects.

1. The General Conditions of the Choice of Technology

Speaking about technology, we have in mind a certain combination of factors of production used in production of a given commodity or of a group of commodities, and more broadly a combination of aggregated methods of production enabling achievement of a definite production result in the form of an aggregated unit of the national income increment.[1] The means applied in achieving the intended goal and the method of their application constitute the t e c h n o l o g y of a definite economic activity, and therefore in production activity we deal with technology of production.[2] This notion we may replace with an equivalent notion of the method of production meaning "... a systh matic method of acting aimed at achieving a definite goal"[3]. In the production process, an achievement of the intended goal, i.e. some definite products requires an application of a combination of material means of production which are put into operation by human labour.[4] The ratios between the material means of production and the size of labour outlays composing the technology of production constitute an effect of the collective productive experience of people emerging in the social process of labour.[5]

The characteristic feature of the particular technologies of production is their respective "... combination of efficiencies of the separate factors of production".[6] It means that the separate technologies of production differ by definite combination of unit outlays, i.e. co-factors of production.[7] The efficiency of factors of production is increasing along with the processes of technical progress. It is expressed in an increasing efficiency

of new technologies as compared to technologies utilised earlier. The technical progress achieved under the influence of the cumulation of the collective productive experience of people comes a continuous increase of efficiency of the utilized factors of production including the human factor, i.e. leads to increased saving of live and crystalized labour.

It is necessary, from the theoretical point of view, from to differ between the coexisting technologies at the given level of technical knowledge and the technical progress understood as a process evolving in time.

Production of a product or a group of products is possible by unification of material and human factors of production. However, the role played these two kinds of factors of production in the social production process is different. The material factors of production - means of labour and objects of labour are indispensable for the production process to take place. However, they are a passive party in this process and they are put into operation under the influence of the human factor, i.e. of labour. The human labour in its diversified concrete forms constitutes a creative and active dement of the production process putting into operation the material means of production.[8]

Human labour being an active factor in the production process is the live labour while the means of production are the result of a labour expanded earlier which crystalized in the means of production.[9] The role of live labour as a purposeful and consious human activity aimed at achieving the assumed goals of the production process is exposed by the Marxist political economy indicating its decisive importance for development of the social productivity.[10]

Oskar Lange presented the described characteristics of the process of production as a unification of labour and the means of production with the following formula

$$\begin{bmatrix} L \\ Q \end{bmatrix} \longrightarrow P$$

where L denotes outlays of various kinds of concrete labour while Q - outlays of various kinds of concrete means of production necessary for achieving the assumed production goal P". The values L and Q constitute combinations of labour or means of production outlays embracing some concrete kinds of both factors constituting elements of the given combinations /L_1, L_2.../ L_m and Q_1, Q_2,..., Q_n which together constitute the L and Q values/.[12]

P in the above formula denotes the product obtained through unification of combined elements of L and Q. Both these elements can be presented in their desaggregated forms. The product P may be then defined in the following way:

$$L = \begin{bmatrix} L_1 \\ L_2 \\ \vdots \\ L_m \end{bmatrix} \quad Q = \begin{bmatrix} Q_1 \\ Q_2 \\ \vdots \\ Q_n \end{bmatrix} \quad \text{therefore} \quad \begin{bmatrix} L_1 \\ L_2 \\ \vdots \\ Q_1 \\ Q_2 \\ \vdots \\ Q_n \end{bmatrix} \longrightarrow P$$

The volume of labour expanded to achieve the product P and the volume of means of production involved in this process, we define as an i n p u t; the volume of the product obtained by undertaking the input, we call o u t p u t.[13]

Ratios between input and output vary in relation to changes taking place in the conditions of production which depends an overall conditions determining the productive force of labour[14].

The progress in development of social productive forces causes changes in the volume of the product obtained through a definite input of live labour and material means of production[15]. The general trend of these changes is an increase of the volume of the product obtained through the particular input or a decrease of input in relation to the given obtained product. The duplicity of this trend is not of tautologic character as the concrete solution - maximization of results /product/ from the given input of live labour and of means of production or a decrease of input in relation to the obtained output /product/ result both from the existing needs and economic possibilities do not mean an analogous result.

The development and improvement of the conditions of production is followed by changes in relations between composition elements of production groups so that it is possible to obtain a given production result at the given level of technical knowledge not only through various inputs of human and material factors of production but also through various combinations of these factors[16]. There appear the possibilities of different formation of u n i t i n p u t s which may be expressed in the following formula

$$\left[\frac{L}{P}; \frac{Q}{P}\right]$$

where $\frac{L}{P}$ denotes a combination of unit inputs of various kinds of live labour while $\frac{Q}{P}$ a combination of unit inputs of various kinds of means of production[17]. The composition elements of these groups /unit inputs/ could be defined as technical coefficients of production of technical norms as they depend of the technical conditions of the production process[18]. Technical conditions of production, and the applied technologies of production in particular determine the efficiency of live labour and the efficiency of the means of production applied and operated by that labour. There is a certain regularity here consisting in the fact that an achievement of a higher efficiency of labour requires a bigger outlay of means of production. It is not only the possibility of processing of a bigger quantity of raw materials and materials in question here, but also and primarily a better supply of labour means /tools, machines, aggregates, etc./ necessary in achieving a higher level of labour efficiency. The functional dependence between the level of the labour means availability or technical labour equipment and its efficiency is expressed by a continuous increase of technical equipment which is a precondition of an increasing level of labour efficiency[19]. We should not miss the fact that an increase of means of production outlays in connection with an increase of labour efficiency is of a different character in

relation to the objects of labour /materials, raw materials, fuels, power/ and in relation to the means of labour. An increase of the means of labour outlays is a precondition of an increase of labour efficiency. A worker better equipped with labour means can produce a bigger quantity of the product within a given period of time /and also products of a higher quality/. On the other hand, an increase of outlays of the objects of labour, i.e. an increase of the volume of processed materials and raw materials is a consequence of an increase of labour efficiency as thanks to the possibility of producing on increased quantity of products within a time unit /which is the result of a better technical equipment of labour and in consequence an increased efficiency of the live labour/ the quantity of objects of labour processed within a given period of production process also increases[20]. Along with an increase of the technical equipment of labour, not only the labour efficiency increases, but also change the quantitative relations in production which is manifested in a relative decrease of live labour outlays /the volume of labour/ in relation to outlays of means of production /the volume of means of production put into operation by labour/. In other words, there appears the tendency towards a decrease of the human factor of production outlays in relation to outlays of the material factors of production. We may conclude, therefore, that the technical equipment of labour increases as a consequence of application of more capital intensive technoligies or as a result of the general social tendency of the technical progress. The notion of the technical composition of capital was first introduced into the theory of economy by Karl Marx[21]. The notion differs in a sense from the technical equipment of

labour indicator:

1. technical equipment of labour concerns new investment projects and is, therefore a marginal value while the technical coefficient of production concerns the economy as a whole;
2. technical equipment of labour concerns solely the outlay of investment means in relation to the number of employed workers /in new investment projects/, i.e. the indicator overlooks the volume of the objects of labour outlays; the indicator of the technical composition of capital embraces the volumes of the means, as well as of the objects of labour /the total value of fixed and liquid means/, i.e. it embraces the total outlay of material factors of production in relation to employment in the whole economy[22].

A definite level of the technical equipment of labour characterizes the given technology of production characterized by its proper composition of unit outlays with a determined efficiency of separate factors of production. Wishing to achieve the intended production result in the form of a given quantity of the product, we may, as a rule, apply various technologies of production, i.e. various technical p r o c e s s e s, each being characterized by different ratios between human and material means of production[23]. The production experience indicates that it is possible to apply various quantities of factors of production to obtain the envisaged quantity of the product. Let us assume that the quantity of raw material used for the purpose is the same in various methods of production. We shall limit, therefore, our analisis to two basic factors of production - labour denoted by L and outlays of investment means denoted by I.

Both factors are complementary to each other, i.e. putting into operation of one of them requires a respective quantity of the other. Both factors are also s u b s t i t u t i v e to each other, i. e. they can substitute each other to a certain extent. Various quantitative relations of employment and investment /L and I/ representing various methods of production /technologies/ may appear alternatively in technical processes applied in production of a given commodity or an aggregated group of commodities.

It can be clarified by a simple example. Let us assume that the aggregated group of commodities is composed of two products A and B and each of the products may be obtained with two technologies characterized by different notion between outlays of live labour L and crystalized labour /investment goods/ I.

Product A may be obtained using for its production:

L_1 and I_1 /first method/, or

L_2 and I_2/ second method/.

For production of commodity B we have to use alternatively:

L_3 and I_3 /first method/, or

L_4 and I_4 /second method/.

For production of A and B commodities, we have to alternatively apply the following factors of production:

$L_1 + L_3$ and $I_1 + I_3$, or

$L_1 + L_4$ and $I_1 + I_4$, or

$L_2 + L_3$ and $I_2 + I_3$, or

$L_2 + L_4$ and $I_2 + I_4$ which creates the possibility of production of the aggregated group of commodities composed of A and B products by means of four aggregated methods of production. If the considered group of commodities is composed on n products, and

each of them may be produced with two or more methods, then the total number of combinations will be enormous and will reach:

$$m^n = q^t$$

where m denotes the number of alternative methods of production of each of commodities within the aggregated group of products;

n - the number of products in the group;

q^t - the total number of combinations of aggregated production methods applied in production of the aggregated group of commodities embracing n products.

The number of products in our example was n = 2 and the number of methods of production for each product m = 2. The total number of possible combination will amount to $2^2 = 4$, i.e. $q^t = 4$ which results from the example. If we had 4 products, and each of them could be produced with two methods, then the number of combinations would amount to $2^4 = 16$. If the number of products were 10 and the number of technical variants of production for obtaining each of them, say - 3, then according to our formula, the number of combination of aggregated production methods would rise to 59049.

Not all technical combinations may be taken into consideration while choosing the alternative methods of production. While appraising the methods we have to pick effective and ineffective methods. We call the method ineffective when outlays of all factors of production are higher than in other methods or when outlay of at least one factor of production in higher while outlays of other factors are not lower than in other methods. The method is effective when outlay of one of the production factors is higher than in other methods of production, but the

outlay of the other factor is lower than in other methods[24]. Only the effective methods may be the subject of choice in the process of choice of aggregated methods of production. They are, therefore, the real technical alternatives. The ineffective methods should be eliminated from the sphere of choice of technologies.

The theory of economy applies various research methods in explaining basic dependencies appearing in the process of choice of technologies. One of these methods is the model of choice of technologies based on the, so called, production curve[25] which is, de facto, the curve of alternative production methods.

The production curve is a geometric population of points representing aggregated methods of production used in obtaining the given product. The principles of its elaboration are rather complicated. Skipping the details, we may say that the curve is a broken line linking few points representing alternative technologies in cases when we deal with only one or few products. When we deal with a big aggregate in which the production result appears in the form of an aggregated unit of national income increment the production curve will be a smooth and rather continuous line as it represents numerous aggregated methods of production which are put according to the assumed order from the most labour intensive and the least capital intensive to the least labour intensive and the most capital intensive[26]. The curve represents only the effective methods, i.e. we do not take into consideration the ineffective methods which were eliminated from the sphere of choice of technologies according

to the principles of praxiology as ineffective at the present state of technical knowledge. The production curve is, therefore, a smooth line concave at the beginning of the system and dropping at the decreasing rate. This shape of the curve results from the assumptions and from excluding ineffective methods which enables a rational choice among the alternative effective methods.

An analysis of the production curve representing a set of aggregated production methods applied in new investment projects put into operation requires, first of all, a determination of production results which are to be achieved at these projects. We assume that the production result is a unit of the national income increment, $Y' = 1$. To simplify our considerations, we assume that the methods of production differ only by the number of employees / 'L/ and the size of investment outlays / I/. The number of aggregated methods of production is very big /which results from the formula $m^n = qt$/ which causes that our curve is a smooth line and is composed of a population of points representing separate technologies accessible due to the possibility of choice /see Fig. 1/.

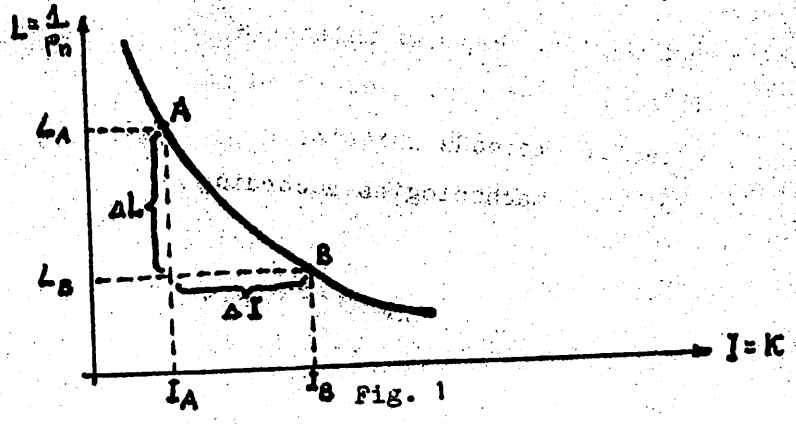

Fig. 1

The size of employment we mark on Y axis. Assuming that $f' = 1$, the value of L is equal to reciprocal of labour efficiency, i.e. $L = \frac{1}{p_n}$ /where p_n denotes labour efficiency in new investment projects created to achieve a definit increment of the national income. The size of investment outlays is marked on the x axis. According to our assumptions the outlays are equal to the capital intensity of production, i.e. $I = k$.

All points on the production curve represent aggregated effected methods of production which permit to produce a unit of the national income increment of a determined material composition at various ratios between employment and investments, i.e. with methods differing in labour and capital intensity. We have to assume here the employment is uniform, i.e. we leave aside the problem of differences in the level of qualifications. Any changes in the level of labour efficiency are then only the result of changes in the technical equipment of labour. The methods of production represented on the curve are the result of the earlier technical progress and reflect the present state of technical knowledge. Methods representing highest labour intensity and lowest capital intensity are at the beginning of the curve /left upper end/. Methods of lower labour intensity and higher capital intensity appear while moving down along the curve. At the same time, a higher labour efficiency is achieved. The given state of technical knowledge means a coexistance of various effective methods of production of differing capital and labour intensity at a definite period of time. The factors of production applied in these methods are characterised by a definite substitutiveness.