



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

The Development Potential

Produced by

Manufacturing Companies

IN PLANNING FOR sustained industrial development it is desirable to know whether existing or new establishments themselves are able to generate further development. A method of calculation is developed in this article which enables the Development Potential of an undertaking to be estimated. This is related to its ability to generate new capital, which in turn is connected to the established method of appraising an investment on the basis of its pay-back period, though differing in important respects.

A manufacturing company has a number of impacts on the over-all economy; among them are the following:

- It adds to the gross domestic product (GDP) an amount equal to its net output, that is the value added to the raw materials and services it consumes;
- It generates purchasing power in respect of final consumption, equal to the total bill for wages and salaries. This holds good within a close margin, even if the incomes generated are taxed, since such taxation in general only transfers consumer purchasing power from the individual to the state;
- It absorbs final consumption expenditure in an amount equal to the sales of consumer goods and services. This will be much larger than its generation of purchasing power and than its contribution to GDP, if it is producing only consumer goods and services. It will be nil if it is producing only intermediates and services for other enterprises;
- It uses services provided by the state. These give it external economies which do not appear in the accounts. They include factors such as: security, education, health, justice and communications;
- It contributes to the cost of operation of state services through taxation levied on its output or profit;
- It consumes capital in the form of obsolescence of the physical assets used over and above the cost of ordinary maintenance. This item depends to some extent on external conditions over which it has no control, specially on the

rate of development of the economy as a whole, that is on the expansion of consumer demand. With a rapid expansion of demand, a given set of production equipment will have to be replaced much sooner by something larger or more efficient;

- Finally it generates potential development by accumulating surplus capital that can finance either its own expansion or the setting up of another undertaking.

The concept of development potential

An item "Fixed Capital Formation" appears in the National Accounts, which is usually reported as a fraction of the gross domestic product. In an individual enterprise this corresponds to the ratio between capital accumulation and net output. This, however, is not a measure of the potential generated for increased net output in the future. The Development Potential must relate the capital accumulation to the fixed capital needed to create more output. This introduces complex relationships between fixed capital investment and net output involving the technologies of process and management, for example capital/output ratio and capital intensity.

Project design and level of technology

Under conditions of high unemployment there is a greater social need to find productive jobs for more people than there is merely to invest more capital in production. The rise in the average levels of process technologies should be kept, therefore, to a minimum, since a more advanced technology is labour saving and capital consuming, with the rider that the new enterprises must be able to operate economically.

Usually the design and evaluation of a project starts from an assumed level of technology, or set of processes and equipment; an assumed management structure; an assumed minimum scale of operations; and hence a predetermined ratio between capital and output. Local wage rates for the various skills required and local costs of capital then convert this into a predetermined capital/output ratio which may or may not be appropriate to local conditions. If it is too high, the enterprise will consume too much capital and employ too little labour, and will have small chance of accumulating surplus capital for future development. Alternatively, design may start with a capital/output ratio known to be feasible and appropriate to local conditions and the required process technology, equipment and scale of operations can then be determined from this basis. In order to apply such a method, a means of evaluating the currently appropriate parameters for new projects is needed.

The ruling conditions, especially of scale of operation and level of technology necessary to meet the requirements both of maximum increase in employment and of profitability can be deduced from a study of the performance of existing enterprises that are: operating economically; unsubsidized; generating pressure towards development.

It is useful, therefore, to devise a means of measuring the development potential first from the records of existing enterprises and secondly from a project report.

Definitions of Fixed Capital Formation Potential and of Development Potential

Every profitable enterprise both generates and consumes capital. Its capital generation arises in the form of repayments of borrowings and in reserves set aside for future capital expenditures. Its capital consumption is in the form of interest paid on borrowings and in dividends to equity (shareholders' risk capital). The net excess of generation over consumption is its amount of Fixed Capital Formation (FCF). To relate this to the targets of the economy as a whole, this amount can be reported as a fraction of the net output of the enterprise, that is the fraction of its contribution to GDP which appears as new fixed capital and can be called the Fixed Capital Formation Potential of the enterprise.

The normal application of the new fixed capital formed is in the expansion of output which involves new investment and creates new output and new jobs. Assuming that expansion is to be carried out without change in the levels of technology, the net output per job and the fixed investment per job will both remain approximately constant, the expansion being measured in terms of new jobs. Thus the ratio between the FCF for a given year and the replacement cost of fixed capital assets in use gives a measure of the new jobs that can be generated from the operations of the enterprise and without requiring new capital. This ratio can be designated the Development Potential of the enterprise.

Calculation of Development Potential and of FCF Potential

The following data can be extracted from a project report for a new enterprise or from the data collected by a survey of industrial production:

- Undepreciated fixed capital per job U
- Depreciated fixed capital in use per job F
- Working capital in use per job W
- Productivity of labour (value added per job) . . . V
- Payroll per job P
- Return to capital, per job V - P

The last item is made of:

- Cost of working capital } measured per job; that
 - Cost of fixed capital } is the dividends and interest at a basic rate, say c , to cover costs of financing and to contribute to the necessary increase in the supply of money.
 - Obsolescence of fixed assets (present book value divided by expected further useful life taking into account physical deterioration and technological obsolescence, O years).
 - Amortization; the provision of reserves for eventual renewal of equipment, etc., measured per job as A
 - Tax per job T
- some of which is diverted into fixed capital formation through the provision for development capital expenditure in the budget. This fraction can be designated b

The remainder $(1-b)$ is the necessary contribution of the enterprise to the cost of external economies generated by the state. If the enterprise does not pay tax either through lack of taxable profits or through a waiver by the state, the enterprise is drawing a subsidy from public funds on its operations and the potential fixed capital formation by the state is reduced by the amount unpaid. Thus:

$$V - P = (F + W)c + \frac{F}{O} + A + T$$

In this equation, two items rank as FCF namely:

- Amortization in an amount A
- The development capital element in taxation, in an amount bT

So:

$$FCF = A + bT = V - p - (F + W)c - \frac{F}{O} - (1 - b)T$$

The FCF Potential is measured by the ratio of FCF to value added, i. e. $\frac{FCF}{V}$ and the Development Potential is measured as a first approximation by the ratio of FCF to undepreciated fixed capital, i. e. $\frac{FCF}{U}$.

It should be noted that a closer approximation to the Development Potential can be made by relating FCF to the present replacement value of the fixed assets. If such information is not available, it can be assessed by allowing three per cent per year rise in the cost of fixed assets over the average number of years that have elapsed since the equipment was installed. Thus for a given pair of values of FCF and U, the revised value of the Development Potential will be 3 per cent less for each year that it has been operating.

Examples of the calculation of FCF Potential and Development Potential are worked out below from data on the performance of individual factories in India in 1964, given in ID/SER. E/4, Vol. 1.

Example 1

Five factories in ISIC Group 20 (food manufacturers) India 1964

Data:

	Rupees ¹
Depreciated fixed capital per job	3,319 = F
Working capital per job	4,503 = W
Total capital in use per job	7,822 = F + W
Undepreciated fixed capital per job	6,153 = U
Value added per job	2,120 = V
Pay per job	1,140 = P

Assumptions:

c = 5 per cent per year

O = 5 years of useful life left

T = (F + W)e (i. e. the state takes out of profits an amount equal to that taken by the suppliers of capital)

b = 5 per cent

Then:

$$\begin{aligned} \text{FCF} &= 2120 - 1140 - 0.05 \cdot 7822 - \frac{3319}{5} - 0.95 \cdot 0.05 \cdot 7822 \\ &= 2120 - 1140 - 391 - 664 - 371 \\ &= \text{Minus } 446 \text{ rupees per job} \end{aligned}$$

In this case, the first approximation to the Development Potential is negative at a rate of $\frac{446}{6153}$ or about 7 per cent per year.

Also the FCF Potential is negative, which means that the enterprises are consuming more capital than they are generating, at a rate equal to 446 rupees per job per year or $\frac{446}{2120} = 21$ per cent of the contribution to GDP.

Comments on Example 1

The internal accounts of these five factories taken as a whole do not necessarily show a loss. The deficit of 446 rupees per job as calculated will be covered in the accounts:

- by a reduction in tax paid and/or by a reduction in dividends.
- by a reduction in the amount allowed for obsolescence.

¹ US\$ 1.0 = Rs. 9.55.

The first of these measures means that the enterprises are not contributing adequately to the current operation of the country as a whole, either via the taxation system that finances the state operations that provides them with a number of external economies, or via the capital market that supports their operation.

The second indicates that the enterprises do not show any prospect of maintaining present performance since the provision made to keep the equipment in efficient operation even at its present level of output is inadequate. In time, they will be forced to undertake uneconomic levels of current expenditure on day-to-day maintenance for lack of funds to replace worn out items of plant; or they will have to bring in new capital, thus reducing still further their contribution under the first item.

Example 2

Six factories in ISIC Group 34 (basic metals) India 1964

Data:

	Rupees
Depreciated fixed capital per job	27,212 = F
Working capital per job	12,040 = W
Total capital in use per job	39,252 = F + W
Undepreciated fixed capital per job	38,228 = U
Value added per job	16,900 = V
Pay per job	3,040 = P

Assumptions:

c = 5 per cent per year

O = 10 years

T = (F + W)e

b = 5 per cent

Then:

$$\begin{aligned} \text{FCF} &= 16900 - 3040 - 0.05 \cdot 39252 - \frac{27212}{10} \\ &\quad - 0.95 \cdot 0.05 \cdot 39252 \\ &= 16900 - 3040 - 1963 - 2721 - 1865 \\ &= 7311 \text{ rupees per job per year} \end{aligned}$$

The Development Potential is therefore $\frac{7311}{38228} = 19$ per cent a year

and the FCF Potential is $\frac{7311}{16900} = 43$ per cent of the contribution to GDP.

Example 3

45 factories in nine product groups, India 1964, including those in Examples 1 and 2

Data:

	Rupees
Depreciated fixed capital per job	12,650 = F
Working capital per job	5,000 = W
Total capital in use per job	17,650 = F + W
Undepreciated fixed capital per job	20,000 = U
Value added per job	7,620 = V
Pay per job	2,360 = P

Assumptions:

- e = 5 per cent per year
- O = 5 years
- T = (F + W)e
- b = 5 per cent

Then:

$$\begin{aligned} \text{FCF} &= 7620 - 2360 - 0.05 \cdot 17\,650 - \frac{12\,650}{5} \cdot 0.95 \\ &= 0.05 \times 17\,650 \\ &= 7620 - 2360 - 883 - 2530 - 838 \\ &= 1009 \text{ rupees per job per year} \end{aligned}$$

The Development Potential is therefore $\frac{1009}{20\,000} = 5$ per cent per year and the FCF Potential is $\frac{1009}{7620} = 13$ per cent of the contribution to GDP.

Comment on Examples 2 and 3

In both these examples the Development Potential assigned as a first approximation is smaller (as a growth rate) than the FCF Potential. The relationship between them is the same as the relationship between undepreciated fixed capital per job and value added per job.

In a given enterprise or project, if the fixed capital per job can be reduced, the ratio between Development Potential and FCF Potential can be increased. This is not strictly true, since by providing simpler equipment, less skilled labour at lower wage rates could be employed, thus reducing both the elements that make up value added per job. However, this is unlikely where minimum wages are controlled by the state. It is more likely to happen in a developing country where a simplification of equipment and processes leads to the elimination of the need to import highly skilled technicians.

A case where the Development Potential is greater than the FCF Potential is given in Example 4 below. In this example a second approximation based on estimated present day replacement value of assets shows that the Development Potential of this factory is still very large.

Example 4

Paint and varnish factory, India 1964. ISIC Group 313

Data:

	Rupees	
Depreciated fixed capital per job	2,967	= F
Working capital per job	1,300	= W
Total capital in use per job	4,267	= F + W
Undepreciated fixed capital per job	5,200	= U
Value added per job	8,833 p. a.	= V
Pay per job	3,100 p. a.	= P
Average age of major items of equipment	13 years	

Assumptions:

- e = 5 per cent per year
- O = 2 years
- T = (F + W)e
- b = 5 per cent

Then:

$$\begin{aligned} \text{FCF} &= 8833 - 3100 - 0.05 \cdot 4267 - \frac{2967}{2} \cdot 0.95 \\ &= 0.5 \cdot 4267 \\ &= 8833 - 3100 - 213 - 1384 - 202 \\ &= 3934 \\ \text{FCF Potential} &= \frac{3934}{8833} = 44.5 \text{ per cent per year} \end{aligned}$$

Development Potential:

First Approximation $\frac{3934}{5200} = 75.6$ per cent per year

Second approximation $\frac{3934}{5200 - 1,0313} = 51$ per cent per year

Comment on Example 4

The second approximation to the Development Potential (51 per cent per year) suggests that this factory ought to be able to double its output in two years without calling on outside capital. This however, is not necessarily the case, since the elements allowed for interest, dividends and taxation are merely notional sums chosen to show whether the enterprise is relying on hidden subsidies. The actual amounts appearing in the accounts for these three items will probably be much higher, which means that some of the capital accumulation will appear elsewhere, as for example in the shareholders' pockets in government revenues. However, from the point of view of the country as a whole, the potential new output and employment of future years which can be based on the total capital accumulation either in this undertaking or in some other enterprises operating at similar levels of technology remains at 51 per cent of its present output/employment for each year it continues to operate at its 1964 level of performance.

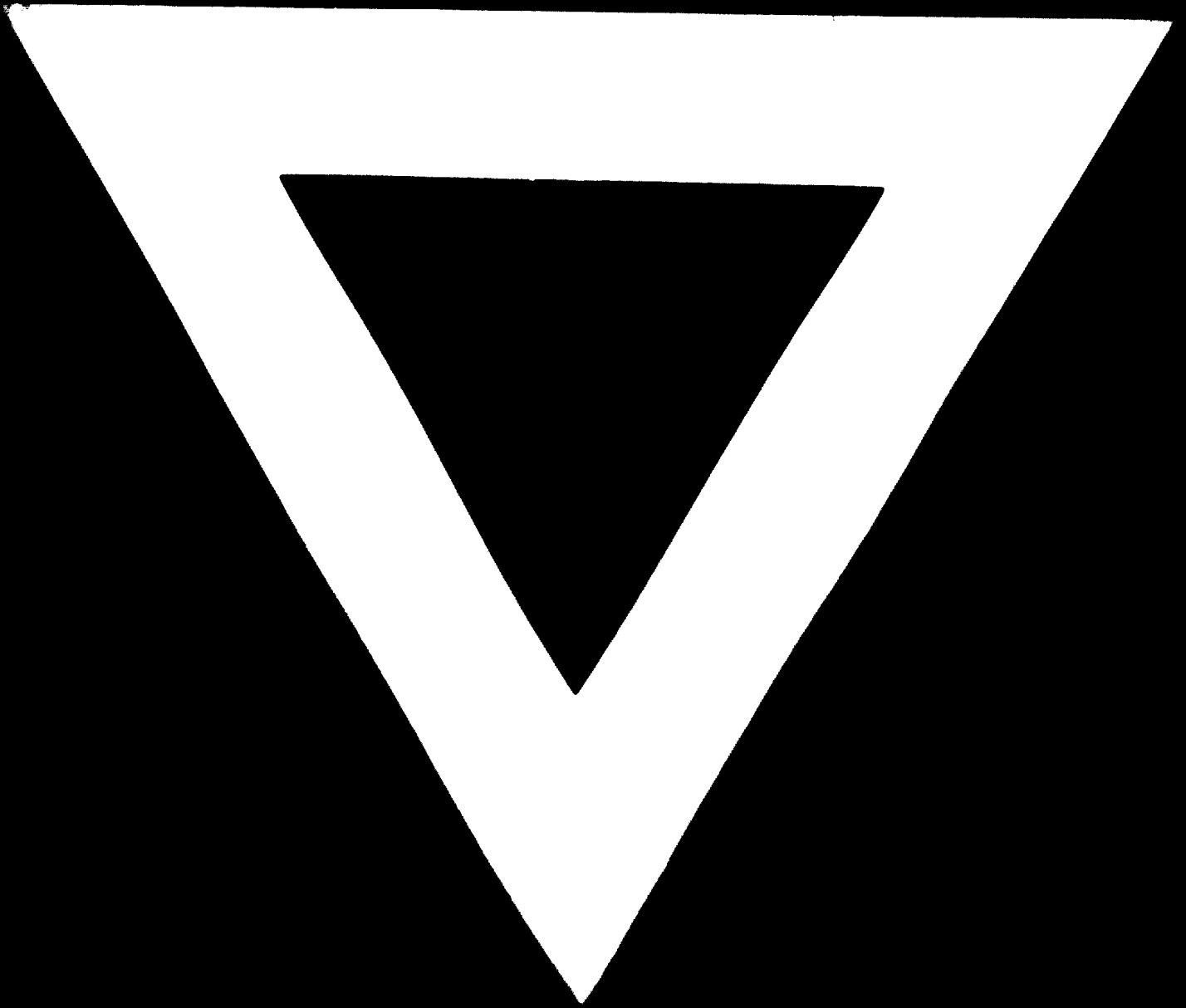
The effect of foreign investment

In the case where some or all of the investment is held and managed abroad, the analysis can be repeated by dividing each item into two elements, local and foreign, and making two sets of calculations. This will yield two answers for each calculation:

Development effect	local
Development effect	foreign
FCF effect	local
FCF effect	foreign

In unfavourable cases, it will be possible for the local effects to be negative and the foreign effects positive; or at least for the foreign effects to be greater than the local effects.

Such a divided calculation will also show how the contributions to the local and foreign GDPs compare. This is quite separate from the balance of payments effect of such an investment which will also be taken into account when assessing the value to the country of the operation as a whole.



74 . 10 . 10