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DETERMINING INVESTMENT PRIORITY RATINGS :-

1. On the Social Marginal
    Product Method of Allocation
    (SMP)

2. Questionnaire For the Calcula-
    tion of the Social Return on
    Investment Based on the Exper-
    ience of Turkey

3. Questionnaire For Determining
    Investment Priority Ratings
    Based On the Experience of the
    Philippines.

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(I)

<u>On the Social Marginal</u>
<u>Product Method of Allocation</u>
<u>(SMP)</u>

ON THE SOCIAL MARGINAL
PRODUCT METHOD OF ALLOCATION
((SMP)

1. <u>Introductory note</u> :—

    In the previous lecture we have discussed the
benefit—cost criterion in its simplest form. This lecture
proceeds to shed some light on the social marginal product—
ivity method of investment allocation as worked out by
Professor H.B. Chenery. The rule however has been advocated
by many economists of repute. For instance, Professor A.E.
Kahn has pointed out that from the point of view of the
society as a whole, the correct criterion achieving the max—
imum social return is the social marginal product, related
to the national income as a whole.

    The SMP criterion has also been recommended by Profs.
J. Tinbergen who has conceived the idea that priority figures
generally will have to be the ratio of net results (defined
as the difference between returns and total costs) to total
costs, all taken at accounting prices.

    The SMP method is also recommended by Professors F.
Holzman, R. Nurkse and others. In this lecture we will only
concentrate on Professor Chenery's explaination. To begin
with may I remind you that according to the economic theory
of allocation; an efficient allocation of investment is
achieved by equating the social marginal productivity of
capital in its various uses.

    In view of the above—mentioned theory investment
projects are to be ranked according to their SMP's.
Those projects which achieve a high rate of social return
are to be selected for implementation up to the exhausion of
the available investment funds. But in an over—all invest—

ment programme, it is enough to rank projects in order of their social value. And then one has to determine the marginal project from the total funds available. All projects having a lower-rank to the marginal project have to be excluded. Clearly the SMP criterion serves here as a cut-off point.

Our task in this lecture however is to give you a brief description of the SMP method and the need formulae of its practical quantification. A numerical example based on the work of Professor Chenery will also be included.

2. Formulae :-

$$\text{SMP} = \frac{X + E - M_i}{K} - \frac{L + M_d + O}{K} -$$

$$\frac{r}{k} \ (a \, B_1 - B_2) \qquad\qquad (1.1)$$

where :

SMP = is the " social marginal productivity" or the total net contribution of the marginal unit to national product, plus " balance of-payments" equivalent;

X = the increase in annual production value originated by the project, at market prices, after excluding tariffs, taxes and subsidies;

E = value added to production due to external economies;

M_i = the cost of imported materials;

L = labour cost;

M_d = the cost of domestic materials;

O = fixed costs, including administration costs and depreciation;

r = units of national income equivalent to an improvement of one unit in the balance of payments owing to over – or under – valuation of the exchange rates. (r is to be obtained by subtracting the official from the real rate of exchange and dividing the difference by the official rate);

K = capital increment (investment)

a = combined rate of amortization and interest on foreign loans;

B_1 = effect of the project's installation costs on the balance of payments (that part of the investment which is carried out in foreign currency);

B_2 = the effects of the project's operation upon the balance of payments (foreign-exchange receipts and expenditure in the construction and operation of the project).

Formula (1.1) may also be expressed in the following form :

$$SMP = \frac{V}{K} - \frac{C}{K} + \frac{B_r}{K} \qquad (1.2)$$

$$V = X + E - M_i \qquad (1.3)$$

$$C = L + M_d - O \qquad (1.4)$$

$$B = aB_1 + B_2 + B_3 \qquad (1.5)$$

where

V = gross production value of the project[*], modified by subsidies, taxes and external economies, and from which imported input factors have been deducted;

C = total costs of national factors;

B = total net effect on the balance of payments;

$\dfrac{V}{K}$ = value added in the domestic economy per investment unit or the rate of turnover;

$\dfrac{C}{K}$ = operation cost per investment unit, excluding imported materials;

$\dfrac{B_r}{K}$ = premium per investment unit due to the effect of over- or under-valuation of the balance of payments, expressed in national income units

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[*] OR the project's total production value, socially priced including external economies but excluding imported materials.

Finally, equation (1.2) may be presented as follows :

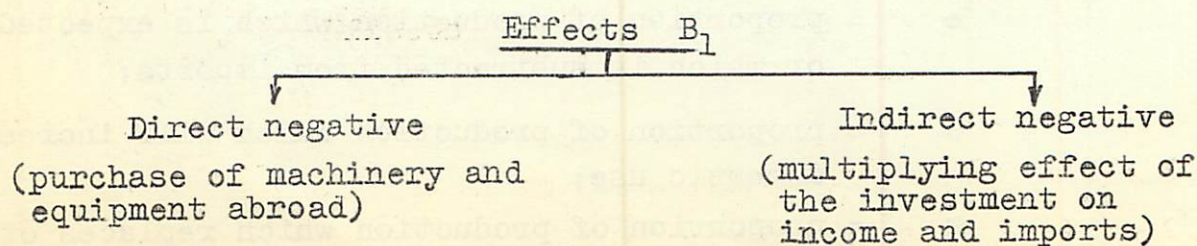$$SMP = \frac{V}{K} \cdot \frac{V - C}{V} + \frac{B_r}{L} \qquad (1.3)$$

That is to say in words, social marginal productivity is the addition of two terms : (1) the result of multiplying capital productivity by the ratio of profits to value added in production; and (2) the balance of payments premium. If the effect on the balance of payments remains constant, low capital productivity $\frac{V}{k}$ in a given project can be offset by a high value $\frac{V - C}{k}$ as it can be observed from the above formula.

Balance of payments effects : Further analysis :--

Let the total effects on the balance of payments be $a B_1 + B_2 + B_3$

where

        a = the capital recovery factor (combined amortization and interest rate);

        B_1 = effects of the installation of the project (direct and indirect);

        B_2 = direct effects of the operation of the project, and

        B_3 = indirect effects of the operation of the project.

Effects B_1

Direct negative
(purchase of machinery and equipment abroad)

Indirect negative
(multiplying effect of the investment on income and imports)

$\dfrac{B_1}{}$

Equals

$$mi.k - mz(I - mi)K$$

in which

mi.k	= the investment component in <u>foreign currency</u>
mi	= that proportion of the investment requiring imports, directly or indirectly,
k	= total investment
m	= ratio of increase in imports to increase in gross national product (marginal propensity to import)
z	= multiplier = $\dfrac{1}{m+s}$ y
s	= marginal propensity to save
(I−mi)k	= the investment component in national currency with a multiplying effect (z) on income.
z(I−mi)k	= the increase in income that would result from investment in the project
mz(I−mi)k	= the secondary increase in imports coused by the investment.

$\dfrac{B_2}{}$

Equals

$$e(I-\overline{mp})\ X - \overline{cmp}\ X + g\ (\overline{mp'} - \overline{mp})\ X$$

in which

e	= proportion of production which is expected or which is subtracted from imports;
c	= proportion of production which will increase domestic use;
g	= proportion of production which replaces other goods formerly consumed.

The sum of these partial outputs is total production,
so that :$(e + g + c = 1)$

$\overline{mp}$ = marginal ratio between imports required for
the project (direct and indirect) and the
output of the project in question;

$\overline{mp}'$ = marginal ratio between imports required for
the project (direct and indirect) and the
output of the project in question

$\overline{mp}'$ = $\overline{mp}$, for the production of the other commod-
ities which the project's output replaces

X = total production

OR :

$$\frac{B_2}{\text{Equals}}$$

$$eX - \overline{mp}\,X + \overline{mp}'\,g\,X$$

in which

eX = production exported or replacing imports,
which represents a positive effect on the
balance of payments;

$\overline{mp}X$ = the effect on imports, considering the
project's direct and indirect requirements;
$\overline{mp}$ is the direct and indirect need for
imports per unit of the project's output;
note that the effect is negative.

$\overline{mp}'g X$ = the effect resulting from the replacement,
by the project's output, of other goods form-
erly consumed; gX is that part of the project's
output which replaces them, and for each unit
of production of those replaced goods $\overline{mp}'$

units of direct and indirect imports are
needed; the product of both factors repres-
ents the amount of imports superseded by
that part of the project's production which
replaces other goods formerly consumed.

$$\frac{B_3}{\text{Equals}}$$

$$mzf(1 - \overline{mp}) X - mz\ B_2$$

in which

f is the fraction of production financed by
inflationary means; note that B_3 measures
both the multiplying effect of inflationary
financing of consumption (negative effect)
and the multiplying effect of the change in
the foreign trade balance (positive or nega-
tive)

$(1 - \overline{mp}) X$

or $(X - \overline{mp}\ X)$ = domestic component of production; since X is
the project's annual production and $\overline{mp}$ is the
amount of direct and indirect imports per
unit of X

$zf(X - \overline{mp}X)$ = the increase in income brought about by the
assumed inflationary finance

$mz\ B_2$ = balance-of-payments effects of the multiplying
power of income resulting from the balance B_2
which has previously explained.

SMP of Industrial Projects in greece

	Symbols	(1) Mining	(2) Nitrogenous Fertilizers	(3) Cement	(4) Phosphate Fertilizer	(5) Sulphuric Acid	(6) Glass	(7) Refractories	(8) Soda	...
Investment (000's)	k	23,350	17,000	6,750	2,450	1,450	2,800	650	3,500	
a) Capital Turnover	$\dfrac{V}{K}$	.83	.62	.93	.74	.52	.86	1.16	.41	
b) Cost Ratio	$\dfrac{C}{K}$	-.36	-.29	-.37	-.37	-.11	-.43	-.82	-.27	
c) Balance of payment	$\dfrac{B_r}{K}$	.33	.35	.07	.07	—	-.04	-.03	.09	
d) Value Margin	$\dfrac{V-C}{V}$	.56	.56	.60	.49	.79	.50	.29	.34	
SMP		.80	.73	.63	.44	.41	.39	.31	.23	
Rank based on SMP		1	2	3	4	5	6	7	8	
Rank based on capital turnover		4	6	2	5	7	3	1	8	

Source : H.B. Chenery (1953)

SMP = (a) + (b) + (c) = (a) X (d) + (c)

(II)

**Questionnaire For the Calculation
of the Social Return on Investment
Based on the Experience of Turkey**

Questionnaire For the Calculation
of the Social Return on Investment
Based on the Experience of Turkey

A. <u>INVESTMENT</u> :-

   1. Value of fixed assets
      a. Site
      b. Buildings and construction
      c. Machinery and equipment
      d. Installation costs

   2. Working capital

   3. Total investment
      a. Domestic cost
      b. Foreign exchange cost

B. <u>SALES</u> :-

   1. Value of sales, by product

   2. a. Exports
      b. Substitutes for goods at present imported
      c. Other domestic goods

C. <u>COSTS</u> :-

(All costs are included except for purchase of office supplied
and other miscellaneous overhead items which amount to less
than one percent of total costs. Imported components of each
item are tabulated separately)

   1. Raw materials
   2. Energy
   3. Auxiliary materials
   4. Maintenance
   5. Labour
      a. Administrative

II. 2

     b. Technical

     c. Skilled

     d. Unskilled (less than six months' training required).

D.   FOREIGN EXCHANGE EFFECTS:-

    1. Foreign exchange costs

      a. Annual cost of the foreign exchange component of
         investment.

      b. Cost of imported materials (from C)

      c. Indirect import component of domestic materials.

    2. Foreign exchange earnings (from B. 1a)

    3. Net foreign exchange effect (D. 2 minus D. 1)

E.   SOCIAL PRODUCTIVITY:-

    1. Grose private profit (sales minus costs, exclusive of
       taxes and interest)

    2. Corrections for social value:-

      a. Price corrections for protection, subsidies, etc.

      b. Foreign exchange value

    3. Increase in social value (B. 1 plus E. 2)

    4. Rate of private return on investment (E. 1 divided by A. 3)

    5. Rate of soical return on investment (E. 3 divided by A. 3)

F.   MATHEMATICAL EXPRESSION OF THE ECONOMIC PRIORITY FORMULA:-

      From a theoretical point of view the comparison of value
of output to cost of input can be stated in any one of the
following forms :-

   (a) Social return on total
       resources used throughout
       the economy   = $\dfrac{\text{Total value of output}}{\text{cost of total labour, capital and natural resources}}$