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The Supervisory Panel of *Industry and Development* welcomes readers' opinions and comments and will be glad to consider for possible publication articles relevant to the aims and scope of the journal (see "Information for contributors").

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In tables:

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A hyphen indicates that the item is not applicable.

An em dash (--) indicates that the amount is nil or negligible.

Two dots (..) indicate that data are not available or are not separately listed.

The following abbreviations are used in this publication:

CHIs	cottage and household industries
CGE	computable general equilibrium
FI	foreign capital inflow
MG	manufactured goods
MLSI	medium- to large-scale industry
MVA	manufacturing value added
NIC	newly industrializing country
SOC	social opportunity cost
SSI	small-scale industry
TFPG	total factor productivity growth

The following technical abbreviations are used in this publication:

C/L	capital per worker
VA/C	value added per unit of capital
VA/L	value added per worker

Structural change and economic development of Egypt: between planning and the open-door policy

*M. A. Elkhafif and A. A. Kubursi**

The late 1950s and 1960s mark a period in which Egypt built up a modernized dominant public sector under a managed economy. The objective of the Government of Egypt under President Gamal Abdel Nasser was to speed up industrialization of the country. Public investment was primarily directed towards achieving this goal. It could be argued that most of the existing industrial infrastructure of Egypt was built during that period.

This experiment was aborted, practically, by the 1967 war in the Middle East. But real change did not come about until 1974 when the Government of Egypt, under President Mohamed Anwar El-Sadat, introduced the open-door policy (*Infitah*). The laws formulated under this policy specifically aimed at opening Egypt to foreign investment, liberating imports, empowering the private sector and dismantling bureaucratic red tape. While the private sector did indeed increase its share in total economic activity, this increase manifested itself, almost exclusively, in the services sector, and did not feature much in the commodity-producing sectors of agriculture and industry [1]. This has raised the suspicion that the open-door policy may have been conceived as part of early preparations by the Government of Egypt for the full adoption of the structural adjustment programmes and stabilization policies of the World Bank and the International Monetary Fund (IMF) in the second half of the 1980s.

The present paper attempts to analyse two different economic regimes - a "socialist" one under President Nasser and a market-oriented one under President Sadat. The two regimes are fundamentally different in terms of their emphasis, class orientation, the economic instruments they used and the results achieved. In fact, what happened in Egypt between 1960 and 1990 may represent a natural experiment that the countries of Eastern Europe and the Commonwealth of Independent States may find useful and relevant to what might be expected from shifting their policy orientation from a command to a demand economy.

The point of departure of the analysis is two input-output tables that will be used to analyse and diagnostically study the impact of the two

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development strategies.* [2] The 1966/67 input-output tables reflect the planned and managed economy under President Nasser and the 1983/84 tables relate to the Egyptian economy after 10 years of the open-door policy of President Sadat. It is hoped that results of this analysis will provide analysts and policy makers with new insights about structural change and policy sensitivities of the Egyptian economy. This could help in formulating better future plans and policies.

The paper is organized as follows. Section A sheds some light on the role of the public sector and structural change in the Egyptian economy between 1955 and 1985. Section B is devoted to the input-output analysis; several typical input-output indices are constructed to determine sectoral multipliers, linkages, sectoral income distribution, degrees of processing, key sectors, types of sectors and market dependency in the Egyptian economy in 1966/67 and 1983/84. Concluding remarks and a summary of the main points of the paper are presented in section C.

A. The public sector and structural change

The public sector plays a major role in the economy of Egypt. Its dominance has historical and geographical dimensions. The first attempt to introduce modern industries in Egypt in the early nineteenth century was made by the Government and all the established projects then were publicly owned (see Mabro and Radwan, 1976). Even before these attempts, the maintenance of the agricultural economy in the Nile valley required a centralized administration of the irrigation and drainage systems, which in turn required a centralized and relatively large public sector. The Government of Egypt in the 1950s and 1960s re-emphasized the dominant position of the public sector in almost all sectors by managing and directing investments towards public sector enterprises.

In the 1970s and 1980s, however, policies were designed to reduce the influence of the public sector. As shown in table 1, the share of the public sector in total investment has dropped from more than 85 per cent in 1975 to about 73 per cent in 1985/86. It seems that this trend will continue; the 1987/88-1991/92 five-year plan allocates 62 per cent of total planned investment to the public sector. Evidently, these policies will result in major structural changes in the economy.

Tables 2 and 3 suggest that changes in the sectoral shares of output were strongly influenced by the pattern of investment. Of significant interest is the reversal of investment shares allocated to agriculture and industry, and that allocated to services. The increase in the investment

*Handoussa, Nishimizu and Page [2] have assessed the impact of the open-door policy on the performance of Egypt's public sector industries using flexible functional forms and econometric techniques.

Table 1. Public sector share of total investment 1975-1986

Investment	*1975*	*1976*	*1977*	*1978*	*1979*	*1982/83*	*1983/84*	*1984/85*	*1985/86*
Public sector share	85.6	79.4	80.2	83.0	77.5	77.5	78.7	77.2	73.4

Sources: For the period 1975-1979, see Committee on Financial and Economic Affairs, "Report on public sector" (Cairo, 1982), derived from G. Abdel-Khalek, *Stabilization and Adjustment Policies and Programmes*, Country Study No. 9, Egypt (Helsinki, United Nations University, World Institute for Development Economics Research, March 1987); for data covering the period 1982/83-1985/86, see *Ministry of Planning, Second Five-Year Plan for Economic and Social Development 1987/88-1991/92* (Cairo, May 1987), part I.

Table 2. Sectoral shares in gross domestic product at factor cost and growth rates
(Percentage)

Sector	Sectoral shares							Average annual growth rate		
	1955/56	1960/61	1964/65	1969/70	1977	1981/82	1984/85	1969/70-1977	1977-1981-82	1981/82-1983/84
A. Commodity sectors										
Agriculture	34.4	31.5	29.7	31.1	22.7	17.3	16.6	2.0	2.6	2.9
Industry and mining	13.4	20.1	21.5	15.6	15.4	13.9	14.6	6.6	6.8	10.3
Petroleum products				5.1	5.8	6.9	15.9	8.8	14.5	13.6
Electricity	0.4	0.8	1.2	1.0	1.3	1.1	0.7	10.8	5.4	10.7
Construction	2.3	2.8	4.7	6.2	4.9	5.4	4.5	3.0	12.8	6.7
Total	50.5	55.2	57.1	59.0	50.1	44.6	52.3	4.2	6.6	7.6
B. Productive services										
Transportation and storage	..	..	..	3.5	6.8	6.7	6.1	17.2	9.4	8.9
Suez Canal	..	..	..	0.0	2.5	4.1	2.6	..	24.0	0.4
Transportation and storage	6.0	7.3	8.9	3.5	9.3	10.8	8.7	..		
Trade and finance	11.0	10.4	8.6	14.8	19.3	22.7	19.8	10.8	14.2	8.1
Total	17.0	17.7	17.5	18.3	28.6	33.5	28.5	13.1	13.8	7.4
C. Other services	22.5	26.8	25.3	22.8	21.3	21.6	19.2	5.8	10.9	7.2
Total GDP, A, B and C	100.0	100.0	100.0	100.0	100.0	100.0	100.0	6.7	9.7	7.5

Sources: For pre-1960 data, see Ministry of Planning, *Follow-up Reports*, various issues, derived from R. Mabro and S. Radwan, *The Industrialization of Egypt, 1939-1973: Policy and Performance* (Oxford, Clarendon Press, 1976); for data covering the period 1969/70-1984/85, see Ministry of Planning, *Five-year Plan for Economic and Social Development 1982/83-1986/87*, vol. I (Cairo, November 1982), derived from G. Abdel-Khalek, *Stabilization and Adjustment Policies and Programmes*, Country Study No. 9, Egypt (Helsinki, United Nations University, World Institute for Development Economics Research, March 1987).

share of the services sector in the 1970s and 1980s was at the expense of the share of the commodity-producing sectors.

Table 3. Sectoral allocation of total investment: period averages (Percentage)

Sector	*1957/58-1959/60*	*1960/61-1964/65*	*1965/66-1967/68*	*1969/70-1973*	*1979-1982/83*	*1983/84-1985/86*
			A. Commodity sector a/			
Agriculture	14.9	23.4	21.8	14.6	7.0	9.0
Industry and mining	25.7	26.6	27.4	33.9	23.2	21.5
Petroleum products					13.4	4.4
Electricity	4.0	7.4	17.1	6.3	7.1	7.2
Total	44.6	57.4	66.3	54.8	50.7	42.1
			B. Services			
Suez Canal transportation and storage	18.8	19.3	13.4	23.4	20.0	23.0
Housing	23.1	10.7	12.5	9.3	10.1	14.4
Trade and finance	..	..	..	..	2.3	1.7
Construction	..	..	..	..	3.8	2.7
Other services b/	13.5	12.6	7.8	12.6	19.2	16.1
Total	55.4	42.6	33.7	45.3	49.3	57.9

Sources: For pre-1973 data, see Ministry of Planning, *Follow-up Reports*, various issues, derived from R. Mabro and S. Radwan, *The Industrialization of Egypt, 1939-1973: Policy and Performance* (Oxford, Clarendon Press, 1976); for data covering the period 1979-1985/86, see Ministry of Planning, *Second Five-year Plan for Economic and Social Development 1987/88-1991/92* (Cairo, May 1987), part I.

a/ Excluding construction.
b/ Including trade and finance and construction.

After a substantial increase in the 1950s and 1960s, the share of investment in agriculture dropped sharply in the 1970s and 1980s. The high shares in the 1950s and 1960s were perhaps a direct result of the high cost of the horizontal expansion strategy pursued through expensive reclamation projects and the provision of new hydraulic resources. It could, however, also reflect the reluctance of the private sector to invest in the agriculture sector under the open-door policy in the 1970s. The

relative importance of the agriculture sector has declined, especially in the latter part of the period. Its growth rate in the 1970s and 1980s was significantly lower than that of the economy at large.

Although the share of investment allocated to industry followed a similar pattern to that of agriculture, the change was less dramatic and came about with some delay. It is evident that the increase in petroleum exploration investment has moderated and delayed the reversal of the increasing trend in the share of investment in industry.

Investment in services received the lion's share under the open-door policy. In fact, its share increased from almost 50 per cent in the period from 1979 to 1982/83 to about 58 per cent in the period from 1983/84 to 1985/86. This increase was driven by a significant rise in investments in transportation and communications to improve the commercial sector infrastructure and increase its ability to attract foreign investors. In addition, substantial resources were allocated to reopen the Suez Canal in 1975. The unchecked population increase during the period has also resulted in large investments in housing to meet the growing demand for shelter particularly in Cairo and the urban centres. Surprisingly, the increase in the share of investment in services did not raise the share of services (including construction) in gross domestic product (GDP). This share actually dropped from 60.5 per cent in 1981/82 to 52.2 per cent in 1984/85, due mainly to the decline in the share of the Suez Canal and trade and finance.

To sum up, it seems that while the growth of public investment was restrained, the open-door policy has encouraged both private and foreign investment. Both were reluctant to invest in the commodity-producing sectors, and were more inclined to invest in the services sector where the return on capital has been traditionally much faster and larger than in other sectors. It is not surprising, therefore, to find that the Egyptian economy has become increasingly more dependent on the services sector and foreign investment.

B. Inter-industry changes

Input-output analysis generally permits a better understanding of the internal structure and performance of the economy. The basic tool of input-output analysis is the "inter-industry" table. The major advantage of this table is that it reveals the indirect relationships of the economic system and facilitates the economic interpretation of these indirect relationships and their consequences.

This section attempts to use the input-output systems of Egypt in 1966/67 and 1983/84 as a basis for a detailed analysis of some of the economic and technical implications of sectoral interdependence in the

Egyptian economy in these two years.* It is important to explain, at the outset, the significance of the chosen two dates. The 1966/67 table depicts the Egyptian economy a decade after the creation of the National Planning Committee, the first industrial plan in 1957, the full implementation of the first five-year general plan (1960/61-1964/65), and more than 25 per cent of the completion of the second general plan (1965/66-1969/70). On the other hand, the 1983/84 table shows the inter-industry structure of the economy after 10 years of the open-door policy.

This section examines the following, and their implications, in the two periods:

(a) The nature and the extent of indirect output links among the various sectors in the economy;

(b) The various primary income and employment multipliers of each sector;

(c) The income distribution and the degree of processing of each sector;

(d) The different types of productive sectors classified according to their input uses and output distribution;

(e) The nature and extent of backward and forward linkages among sectors;

(f) The determination of measures of dispersion of the various coefficients of linkages;

(g) The identification of key sectors of the economy;

(h) The nature and extent of dependence of the various sectors on the various categories of final demand.

The general aim of this section is to consider each of these topics for both the 1966/67 and 1983/84 tables and to determine the nature and pattern of change in the economy between them.**

1. Nature and strength of indirect sectoral links

The technical input-output matrix reveals the direct connections of industries with others. However, an industry may directly sell or buy from only a few industries, but its customers and suppliers may be connected with many industries. It may thus have a strong influence on the

*The reconciliation of the 1966/67 and 1983/84 systems is explained in annex I.

**Good sources for the basic techniques of input-output analysis are Miller and Blair [3] and Bulmer-Thomas [4].

economy through its indirect relations with other industries. Therefore, it is essential to consider all direct and indirect relations that a given industry has with the other industries in the economic system.

To evaluate the direct and indirect relations an industry has with other industries, the "matrix multiplier" $(I-A)^{-1}$ must be evaluated, where I is the identity matrix and A is the typical technical coefficient matrix. This is so since the gross output levels (x) required to sustain a given vector of final demand (f) in the model are determined by the following equation system:

$$x = (I-A)^{-1} f \tag{1}$$

If the inverse of (I-A) exits (that is. the determinant of the matrix (I-A) is non-zero), it may be expressed by means of the binomial expansion:

$$(I-A)^{-1} = I+A+A^2+A^3+ \ldots\ldots = \sum_{k=0}^{n} A^k \tag{2}$$

The inverse matrix, $(I-A)^{-1}$, indicates the total direct plus indirect outputs required per unit of final demand. The series in (2) simply explains the iteration process of the total output requirements. The first term, I, accounts for the one unit of output to be delivered to final demand. The second term, A, indicates the direct input required to produce this unit of final demand. The next term in the series accounts for the total indirect inputs required to produce the direct input A, and so on.

Writing the $(I-A)^{-1}$ matrix in terms of its elements, c_{ij}, the sum of the column elements can be written as:

$$\sum_{i=1}^{n} c_{ij} = c_j \qquad \text{for all } j = 1,\ldots, n \tag{3}$$

where c_j indicates the total input requirements (direct plus indirect) for a unit (1 Egyptian pound (LE)) increase in the final demand for industry j.

The system described above makes no distinction between domestic and foreign requirements unless the A matrix represents the technical coefficients of the domestic intermediate inputs only, as is the case in the 1983/84 table. Therefore, equation (1) is applicable to the 1983/84 table but not to the 1966/67 table, since its A matrix represents the technical coefficients of total (domestic plus imported) intermediate inputs. To compute the domestic components of total direct and indirect output requirements for delivery to final demand, imports are separated in the following manner:

$$x_d = Ax_d + f - m \tag{4}$$

Imports are assumed to be proportional to domestic output x_d:

$$m = \hat{m} x_d \tag{5}$$

where $\hat{m}$ is a diagonal matrix whose diagonal entries are the import requirements per Egyptian pound of domestic output of the respective industries. Substituting (5) into (4) yields:

$$x_d = Ax_d + f - \hat{m} x_d \tag{6}$$

Rearranging system (6), domestic output is:

$$x_d = (I + \hat{m} - A)^{-1} f \tag{7}$$

If the elements of $(I + \hat{m} - A)^{-1}$ matrix are denoted by d_{ij}, the sum of the column elements is:

$$\sum_{i=1}^{n} d_{ij} = d_j \qquad \textit{for all } j = 1, \ldots, n \tag{8}$$

This indicates the total direct plus indirect domestic output effects per increase of 1 LE in the final demand of the j'th industry. To obtain comparable results from both tables, equation (7) is used for the 1966/67 table and equation (1) is used for the 1983/84 table.

Total output effects (direct plus indirect) are reported in table 4 for each industry in both years for which the input-output tables are available. Only 18 industries (out of 32) have experienced an increase in their total output effects of an increase of 1 LE in final demand between 1966/67 and 1983/84. The total output effects of the remaining 14 industries have declined. The other transformation industries moved from one of the smallest output generators in 1966/67 to the largest in 1983/84. Output generated by an increase of 1 LE in the final demand for agricultural products improved by 30 per cent. The greatest decline (except for tobacco) was in the clothing industry. Output generated by an increase in final demand in all services sectors either increased or declined slightly, ranging between 44 per cent for insurance and -6.3 per cent for transportation. Probably, the most notable phenomenon is the significant increase in the total output effects of the heavy industries group, with an output increase of 247 per cent as a result of an increase of 1 LE in final demand expenditure on machinery. This is perhaps a direct result of the maturity of these industries, having received significant amounts of public investment in the 1960s, and could also

Table 4. Total direct and indirect output effects and income and employment multipliers, 1966/67 and 1983/84

Industry	Total output effect		Income multiplier		Employment multiplier	
	1966/67	1983/84	1966/67	1983/84	1966/67	1983/84
Agriculture and animal products	1.210	1.571	1.149	1.535	1.160	1.565
Petroleum and natural gas	0.798	1.062	1.080	1.079	0.857	1.597
Other quarries and extraction	1.296	1.098	1.252	1.063	1.117	1.189
Food	1.556	1.591	3.695	3.064	3.278	2.240
Beverages	1.440	1.422	2.473	1.406	1.598	1.708
Tobacco	1.969	1.695	7.459	0.610	6.568	2.360
Textiles	1.972	2.233	2.734	3.650	2.417	1.769
Clothing	1.898	1.634	1.727	1.509	2.308	1.607
Non-shoe leather	2.139	1.938	2.695	2.649	3.004	2.122
Shoes	1.948	1.929	1.788	2.112	2.035	1.785
Wood and furniture	1.071	1.263	1.018	1.322	1.141	1.454
Paper and printing	1.359	1.398	1.425	1.823	1.295	1.525
Non-petroleum chemicals	1.384	1.489	1.507	2.173	1.506	1.600
Petroleum products	1.371	1.319	1.364	1.364	2.612	1.962
Rubber and plastics	1.212	1.986	1.175	4.400	1.152	2.132
China and pottery	1.571	1.433	1.648	1.573	1.481	1.436
Glass products	1.389	1.302	1.300	1.358	1.131	1.310
Metallic and other products	1.538	1.667	1.685	2.189	1.532	1.689
Iron, steel and metals	1.218	2.041	1.640	2.987	1.196	2.021
Machinery	0.458	1.591	0.453	1.846	0.415	1.828
Transportation equipment	0.551	1.479	0.568	2.071	0.485	1.551
Other transformation industries	0.944	2.272	0.861	6.367	0.993	7.402
Electricity, water and gas	1.438	1.406	1.278	1.656	1.272	1.157
Construction	1.647	1.488	1.508	1.815	1.393	1.517
Wholesale and retail trade	1.218	1.207	1.217	1.131	1.230	1.332
Hotels and restaurants	1.717	1.717	1.720	1.701	1.648	1.692
Moving and storage	1.133	1.414	1.056	1.598	1.082	1.413
Transportation	1.212	1.136	1.132	1.100	1.087	1.067
Financial institutions	1.139	1.374	1.095	1.354	1.057	1.120
Insurance	1.037	1.495	1.016	1.520	1.022	1.457
Real estate	1.116	1.179	1.051	1.147	1.843	1.485
Other services	0.929	1.076	0.965	1.045	0.752	1.021
Weighted average	1.304	1.361	1.472	1.490	1.487	1.491

reflect the fact that the industries have become more integrated into the economy and more dependent on the other sectors for intermediate inputs.

As for the economy as a whole, it seems that there was very little improvement between 1966/67 and 1983/84. The weighted average of the total output effects for the 32 industries (weighted by the sectors' share of the value added of the economy) improved marginally, from 1.304 in 1966/67 to 1.361 in 1983/84 (4.4 per cent). This indicates that the open-door policy had almost no real effect on the performance of the economy.

2. *Sectoral income and employment multipliers*

The macroeconomic "Keynesian" multipliers, and in particular the income multipliers, are simply the overall totals of direct and indirect effects of an increase of 1 LE in final demand. This summing of the direct and indirect income effects is quite similar to the summing of the direct and indirect output effects in the input-output context discussed in the preceding section. In fact, it is also possible to use the input-output techniques to evaluate the income effect due to a change in final demand. By its nature macroeconomics is concerned with the economy at large, and this is also true of its income multipliers. The question of what industries will produce the extra output when final demand is increased is irrelevant to macroeconomic analysis. This shortcoming of macroanalysis can, however, be eliminated if the input-output method is used instead. Input-output analysis deals with smaller components of the economy than macroeconomics; its emphasis is on individual sectors, not national totals.

Starting with the input-output system in (1), the gross output vector can be changed into total income

$$\eta = h'(I-A)^{-1} f \tag{9}$$

where η is total income (overall sum of labour income and operating surplus) and h' represents a row vector of labour income and operating surplus per unit of output in each sector. The vector of incomes generated directly and indirectly by a dollar increase in the final demand of the various sectors will then be

$$y = h'(I-A)^{-1} \tag{10}$$

where

$$y = \sum_{j=1}^{n} \eta_j$$

and η_j is component j of vector y

Moore [5] simple income multipliers can be calculated as follows:

$$m^y = h'(I-A)^{-1}(\hat{H})^{-1} \tag{11}$$

where $\hat{H}$ is a diagonal matrix whose entries are the respective components of h'. These multipliers reflect the total increase in the economy's income when the income of a given industry increases by 1 LE.

Similarly, simple "employment" multipliers can be calculated in the following manner:

$$m^w = w'(I-A)^{-1}(\hat{W})^{-1} \tag{12}$$

where w' is a row vector of the wage value added per output of 1 LE of each industry and $\hat{W}$ is a diagonal matrix whose diagonal entries are the components of the wage vector.

In (10), y represents the domestic income vector that could be generated from an increase of 1 LE in the final demands of the respective industries if the input-output table shows only the domestic direct and indirect requirements, as is the case for the 1983/84 table. For the 1966/67 table, output requirements should be adjusted to reflect net domestic production only. This can easily be done by premultiplying system (7) by the row vector h' of income per unit of output of each industry. Thus,

$$y_d = h'(I+\hat{m}-A)^{-1} \tag{13}$$

where y_d refers to the domestic income vector.

By generalizing Moore's procedure to account for foreign inputs, the simple income and "employment" multipliers can be calculated as follows:

$$m^y = h'(I+\hat{m}-A)^{-1}(\hat{H})^{-1} \tag{14}$$

$$m^w = w'(I+\hat{m}-A)^{-1}(\hat{W})^{-1} \tag{15}$$

Equations (11) and (12) are used to calculate the income and employment multipliers for the 1983/84 table, while equations (14) and (15) are used for the 1966/67 table.

The two sets of multipliers are reported for both 1966/67 and 1983/84 in table 4. Both sets followed a similar pattern, with substantial increases in the 1983/84 income and employment multipliers for other transformation industries sector over their levels in 1966/67 (more than sevenfold). Multipliers for the heavy industries group increased significantly, and similarly to their experience with respect to total output effects as discussed in the previous section. Both multipliers for the

agriculture sector increased by about 34 per cent between 1966/67 and 1983/84, while the employment multipliers for clothing and textiles dropped by 30 per cent and 27 per cent, respectively. The multipliers for financial institutions and insurance industries increased, but the increases in the income multipliers were higher than those associated with the employment multipliers.

Table 4 also reports the weighted average for both multipliers (weighted by the sectors' share of the value added of the economy) in 1966/67 and 1983/84. As was the case with total output effects, the weighted averages of the multipliers show very little improvement between the two periods under consideration. This, once more, indicates that more than 10 years of the open-door policy failed to realize real improvements in the performance of the economy.

In the following section, the discussion of the multipliers is extended by presenting the changes to the wage share in total income and the degree of processing for each industry.

3. Income distribution and the degree of processing

Wage value added as a percentage of total income (wages + operating surplus) and the degree of processing represented by value added per 1 LE of output are shown in table 5 for each industry in 1966/67 and 1983/84. Ratios of operating surplus to wages are also presented in the table in order to help determine the nature of the changes in the shares of wage value added between 1966/67 and 1983/84.

While the wage share in total income for the economy as a whole increased by 12.5 per cent, from 37.5 per cent in 1966/67 to 42.2 per cent in 1983/84, the surplus-to-wages ratio of the economy dropped 17.7 per cent. For the heavy industry group (industries 18-22 in table 5) the situation was different: wage shares declined while the surplus-to-wages ratio increased significantly. The iron, steel and basic metals industry and the transportation equipment industry produced positive surpluses in 1983/84 after negative surpluses in 1966/67. This could reflect the substantial public investment in the late 1960s and the maturity of these industries. This experience was shared by financial institutions and insurance industries. On the other hand, the surplus-to-wages ratios of both the textiles and clothing industries dropped; in fact, the textiles industry produced a negative surplus in 1983/84, a situation that indicates structural difficulties which could be the result of a lack of investment. Extractive industries (petroleum, natural gas and others) experienced massive increases in their surplus-to-wages ratios, reflecting the substantial oil and natural gas discoveries and price increases in the late 1970s and early 1980s.

Table 5. Sectoral income distribution and degree of processing

Industry	Wage share of income a/			Surplus-to-wage ratio			Degree of processing value added per L.E. of output		
	1966/67	1983/84	Percentage change	1966/67	1983/84	Percentage change	1966/67	1983/84	Percentage change
	Percentage								
Agriculture and animal products	30.9	33.6	8.8	2.239	1.977	-11.7	0.672	0.601	-10.6
Petroleum and natural gas	83.9	3.0	-96.4	0.192	31.875	16 501.6	0.599	0.765	27.8
Other quarries and extraction	62.0	11.5	-81.4	0.613	7.678	1 152.5	0.506	0.925	82.9
Food	37.6	56.5	50.4	1.661	0.769	-53.7	0.174	0.232	32.9
Beverages	87.6	20.8	-76.2	0.141	3.803	2 597.2	0.586	0.630	7.5
Tobacco	37.4	-21.3	-156.9	1.673	-5.702	-440.8	0.205	-0.148	-172.1
Textiles	41.0	133.8	225.9	1.437	-0.252	-117.5	0.312	0.215	-31.0
Clothing	17.7	38.8	119.0	4.651	1.580	-66.0	0.519	0.615	18.5
Non-shoe leather	28.6	50.9	77.8	2.494	0.965	-61.3	0.240	0.321	33.7
Shoes	26.8	52.8	97.5	2.738	0.892	-67.4	0.435	0.419	-3.7
Wood and furniture	30.0	20.8	-30.7	2.332	3.807	63.3	0.422	0.475	12.4
Paper and printing	60.2	42.6	-29.2	0.662	1.348	103.6	0.403	0.342	-15.2
Non-petroleum chemicals	38.5	63.4	64.5	1.595	0.578	-63.8	0.390	0.258	-33.9
Petroleum products	14.5	7.3	-49.6	5.885	12.648	114.9	0.483	0.597	23.7
Rubber and plastics	39.1	98.8	152.3	1.554	0.012	-99.2	0.489	0.202	-58.6

China and pottery	64.4	26.7	-58.6	0.552	2.751	398.4	0.451	0.604	33.9
Glass products	67.9	35.4	-47.8	0.474	1.821	284.2	0.460	0.566	23.2
Metallic and other products	52.9	39.5	-25.4	0.892	1.535	72.1	0.390	0.452	16.1
Iron, steel and metals	100.2	94.9	-5.3	-0.002	0.054	-2 800.0	0.217	0.330	52.2
Machinery	66.6	46.1	-30.8	0.501	1.168	133.1	0.406	0.390	-3.8
Transportation equipment	101.8	78.0	-23.4	-0.018	0.282	-1 666.7	0.385	0.270	-29.9
Other transformation industries	40.6	27.8	-31.4	1.463	2.591	77.1	0.355	0.158	-55.4
Electricity, water and gas	35.9	103.7	188.8	1.785	-0.036	-102.0	0.670	0.544	-18.8
Construction	68.8	48.8	-29.0	0.454	1.048	130.8	0.474	0.400	-15.6
Wholesale and retail trade	32.5	13.6	-58.1	2.078	6.344	205.3	0.791	0.833	5.3
Hotels and restaurants	36.5	37.1	1.8	1.742	1.695	-2.7	0.477	0.502	5.4
Moving and storage	43.3	41.0	-5.2	1.310	1.438	9.8	0.743	0.567	-23.7
Transportation	75.0	55.4	-26.2	0.333	0.806	142.0	0.783	0.896	14.4
Financial institutions	64.1	86.3	34.7	0.560	0.158	-71.8	0.875	0.590	-32.6
Insurance	36.1	51.2	41.7	1.770	0.955	-46.0	0.939	0.655	-30.3
Real estate	3.8	13.2	244.7	25.182	6.596	-73.8	0.897	0.850	-5.3
Other services	89.1	95.3	7.0	0.123	0.049	-60.2	0.537	0.929	73.2
All sectors	37.5	42.2	12.5	1.663	1.368	-17.7	0.529	0.566	6.9

a/ Income is the sum of the wage and operating surplus components of value added.

The Egyptian economy moved marginally towards producing a higher share of value added in output. Value added per 1 LE of output increased from 0.53 in 1966/67 to 0.57 in 1983/84. The largest percentage increases were in the other quarries and extractive industry and other services, followed by the iron, steel and metals industry. The largest decline (except for tobacco) was in the sector of other transformation industries.

4. *Types of productive sectors*

The interdependence among productive sectors can be studied from several points of view. This section is devoted to the analysis of types of productive sectors by grouping industries according to the pattern of output distribution and input sources. It is proposed in this section that the characteristics of an industry are in part described by the proportions of its output sold to other industries (for intermediate use) and to final demand, and in part also by the proportion of the ultimate factors of production used to produce a given commodity that are employed in the sector producing that commodity.

Let

$$\phi_i = \frac{\textit{total sales of intermediate product by industry } i}{\textit{total output of industry } i}$$

A large ϕ_i means that industry i is an important supplier of materials and semi-finished goods rather than a supplier of final goods. Actually,

$$\phi_i = \sum_{j=1}^{n} a_{ij} = a_i \qquad (16)$$

where a_{ij} is the ij'th element of the technology matrix A.

Similarly, let λ_j denote the proportion of inputs purchased from other industries by industry j:

$$\lambda_j = \frac{\textit{total purchases of intermediate inputs by industry } j}{\textit{total output of industry } j}$$

or

$$\lambda_j = \sum_{i=1}^{n} a_{ij} = a_j \qquad (17)$$

A large λ_j means that a large proportion of the output of industry j consists of intermediate products acquired from other producing industries.*

To have a complete picture, the a_{ij} used in this section includes both domestic and foreign intermediate inputs to reflect the type of each sector. Omitting foreign intermediate inputs could distort the type of sector.

For the economy as a whole, the extent of indirect factor use and the extent of indirect demand are the same. The ratio of intersectoral use to total production constitutes a weighted average of either the ϕ or the λ.

$$0.491 = \frac{\sum_{i=1}^{n} \phi_{i\,1966/67}}{n} = \frac{\sum_{j=1}^{n} \lambda_{j\,1966/67}}{n} \qquad (18)$$

$$0.501 = \frac{\sum_{i=1}^{n} \phi_{i\,1983/84}}{n} = \frac{\sum_{j=1}^{n} \lambda_{j\,1983/84}}{n} \qquad (19)$$

However, there is no necessary connection between the two measures for any single sector.

Inasmuch as the study of sectoral interrelatedness involves the relation of sectors on both the demand and supply sides, the analysis in this section classifies sectors according to these two measures. Specifically, the analysis applies a simple tow classification for each measure, based on whether the values of ϕ and λ are below or above their mean value. These values in 1966/67 and 1983/84 are shown in table 6 for each industry.

Table 6. Types of productive sectors, 1966/67 and 1983/84

Final (low a_i)	a_j	a_i	Intermediate (high a_i)	a_j	a_i
A. Manufacturing (high λ), 1966/67 (average = 0.491)					
Metallic and other products	0.610	0.205	Iron, steel and metals	0.783	1.597
Construction	0.526	0.193	Food	0.826	1.251
Other transformation industries	0.645	0.176	Machinery	0.594	1.182
Rubber and plastics	0.511	0.133	Non-petroleum chemicals	0.610	1.070
Tobacco	0.795	0.011	Paper and printing	0.597	1.070
Shoes	0.565	0.000	Transportation equipment	0.615	0.792
					0.492

continued

*The analysis of this section follows Chenery and Watanabe [6].

Table 6 (*continued*)

Final (low σ)	a_j	a_i	Intermediate (high σ)	a_j	a_i
Wood and furniture	0.578	0.374	Petroleum products	0.517	1.196
Non-shoe leather	0.760	0.236	Textiles	0.688	1.054
Glass products	0.540	0.090	Other quarries and		
China and pottery	0.549	0.034	extraction	0.494	0.651
Hotels and restaurants	0.523	0.008			
B. Primary production (low λ), 1966/67 (average = 0.491)					
Moving and storage	0.257	0.362	Agriculture and		
Other services	0.463	0.325	animal products	0.328	2.269
Insurance	0.061	0.077	Petroleum and		
Transportation	0.217	0.071	natural gas	0.401	0.521
Financial institutions	0.125	0.059	Electricity, water		
Beverages	0.414	0.039	and gas	0.330	0.497
Clothing	0.481	0.024			
Real estate	0.103	0.464			
Wholesale and retail trade	0.209	0.263			
C. Manufacturing (high λ), 1983/84 (average = 0.581)					
Metallic and other					
products	0.548	0.292	Iron, steel and metals	0.670	0.774
Construction	0.600	0.268	Food	0.768	0.725
Other transformation			Machinery	0.610	0.701
industries	0.842	0.253	Non-petroleum		
Rubber and plastics	0.798	0.137	chemicals	0.742	1.287
Tobacco	1.148	0.284	Paper and printing	0.658	0.672
Shoes	0.581	0.083	Transportation		
Textiles	0.785	0.475	equipment	0.730	0.685
			Non-shoe leather	0.679	0.571
			Wood and furniture	0.525	0.511
D. Primary production (low λ), 1983/84 (average = 0.581)					
Moving and storage	0.433	0.355	Agriculture and		
Other services	0.071	0.106	animal products	0.399	2.369
Insurance	0.345	0.298	Real estate	0.150	1.243
Transportation	0.104	0.147	Wholesale and retail		
Financial institutions	0.410	0.443	trade	0.167	1.190
Beverages	0.370	0.055	Other quarries and		
Clothing	0.385	0.024	extraction	0.075	0.743
Glass products	0.434	0.293	Petroleum products	0.403	0.518
Electricity, water and gas	0.456	0.263			
Petroleum and natural gas	0.235	0.225			
China and pottery	0.396	0.022			
Hotels and restaurants	0.498	0.003			

The present system of classification attempts to focus on the different roles played by various sectors in the total process of production. Those sectors that fall under "final primary" production are relatively independent of other producers and provide a different link between final users and owners of primary factors. Those in category II, intermediate manufacturing, are at the other extreme. The cost of their use of primary factors of production is less than the cost of their purchased inputs, and more than 50 per cent of their output goes to other producers.

It is worth noting that industries with large multipliers and large indirect output effects fall under "final manufacturing", while industries with low multipliers and output effects fall under "final primary.

Equations (18) and (19) indicate that there is almost no change in the overall economy average of ϕ and λ between 1966/67 and 1983/84. This may imply that the structure of the economy did not move towards a specific type of sector as it would have done had the maturation process of sectors proceeded as envisaged by the planners. The policy switch triggered significant switching in the technical positioning among sectors.

As shown in table 6, the number of sectors in the combined manufacturing category dropped from 20 to 15 between 1966/67 and 1983/84. In 1983/84, the petroleum products, other quarries, glass products, china and pottery, and hotel and restaurants industries had moved from the manufacturing category to the primary production category. Most of this loss occurred, specifically, in category I (final manufacturing), which represents the more "mature" industries. The number of industries in category I dropped from 11 in 1966/67 to only 7 in 1983/84. The heavy industries group did not change from its intermediate-manufacturing category. The agriculture sector also did not change from its intermediate-primary-production category, with almost no change in its ϕ and λ values. An interesting change is the switch in the real estate and the retail and wholesale trade industries from final-primary production to intermediate-primary. This could reflect the increased importance of the services sector and the uncontrolled escalation in speculation in the real estate market in the late 1970s and early 1980s.

All of the above observations, especially the drop in the number of more "mature" sectors from the final-manufacturing category, suggest that the change in policy emphasis away from industry to services, and within industry away from heavy and publicly owned industries to consumer and privately owned ones, in the early 1970s, may explain, to a large extent, the significant switches in the technical classifications of several activities. This process led to a decline in the overall capital stock in industry, as the loss in the capital stock in the publicly owned industries was not fully compensated by a commensurate increase in the capital stock in privately owned industries. This may also have stunted the maturation process of industry and contributed towards stifling the development momentum developed under President Nasser.

The distinctions drawn so far neglect the fact that intersectoral transactions may involve either one or many other sectors, and that the resulting patterns of interdependence may at least take an infinite variety of forms. In particular, the coefficients used reflect only direct relationships, but as has already been pointed out, an industry with little or no direct influence on the system may generate significant impact through its indirect effects. In the following section, consideration is given to both direct and indirect effects, adjusted by their measures of dispersion as a mean of identifying key sectors.

5. *Key sectors in the Egyptian economy*

The averages of the total input requirements for a unit increase in the final demand of the j'th sector is given by

$$\frac{1}{n}\sum_{i=1}^{n} c_{ij} = \frac{1}{n} c_j \qquad \text{for } j = 1,\dots n \tag{20}$$

Rasmussen [7] interprets (20) as an estimate of the direct and indirect increase in output to be supplied by an average industry in the economy if the final demand for the products of industry j increases by one unit.

A similar interpretation has been suggested by Rasmussen regarding the set of averages

$$\frac{1}{n}\sum_{j=1}^{n} c_{ij} = \frac{1}{n} c_i \qquad \text{for } i = 1,\dots n \tag{21}$$

These sets in their present form are not suitable for making intersectoral comparisons, and for this purpose the set of averages are normalized by the overall average defined as

$$\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} c_{ij} = \frac{1}{n^2}\sum_{j=1}^{n} c_j = \frac{1}{n^2}\sum_{i=1}^{n} c_i \tag{22}$$

Consider the following indices

$$U_j = \frac{1}{n} c_j \Big/ \frac{1}{n^2}\sum_{j=1}^{n} c_j \tag{23}$$

and

$$U_i = \frac{1}{n} c_i \Big/ \frac{1}{n^2}\sum_{i=1}^{n} c_i \tag{24}$$

U_j and U_i were interpreted by Rasmussen as the "index of power of dispersion" and the "index of sensitivity of dispersion". Hazari [8] interpreted them as measures of Hirschman's [9] backward and forward linkages.*

Since the average

$$\bar{U} = \sum_{j=1}^{n} \frac{U_j}{n} = \sum_{i=1}^{n} \frac{U_i}{n} = 1 \tag{25}$$

it implies, for any sector i with $U_i > 1$, that its output will have to increase more than others for a unit increase in the final demand of the whole system. Similarly, for any sector j with $U_j > 1$, it implies that sector j absorbs more than the average of the whole system of outputs of other sectors, and vice versa, if $U_j < 1$.

Hazari justifiably notes that the average indices in (23) and (24) may be influenced by extreme values, and hence may give misleading results. Therefore, he devised two other indices to be used in conjunction with U_i and U_j. The first is:

$$V_j = \frac{\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(c_{ij} - \frac{1}{n}c_j\right)^2}}{c_j / n} \qquad \text{for all } j = 1,\ldots n \tag{26}$$

which is equivalent to the standard deviation of the c_j divided by their average. This is known as the coefficient of variation index. Similarly,

$$V_i = \frac{\sqrt{\frac{1}{n-1}\sum_{j=1}^{n}\left(c_{ij} - \frac{1}{n}c_i\right)^2}}{c_i / n} \qquad \text{for all } i = 1,\ldots n \tag{27}$$

A high V_j may be interpreted as indicating that a particular industry draws heavily on one or a few sectors, and a low V_j as indicating that a sector draws evenly from other sectors. One can interpret the V_i in a similar way.

Following Hazari's criterion, a key sector is one that has:

(a) Both U_i and U_j greater than $\bar{U}$ (i.e. $U_i > 1$ and $U_j > 1$);

(b) Both V_i and V_j low relative to their averages.

---

*Detailed questions on the exact role of linkage measures and the identification of key sectors in development planning are considered in McGilvary [10] and Hewings [11].

This definition can again be identified with Hirschman's [9] definition of a key sector as one with high forward and backward links. Hirschman's definition, however, does not impose any restriction on variability.

Although the focus is on domestic output (input) and the key sectors as they relate to the domestic output, total output (input) which includes both domestic and foreign inputs has very important implications for the key sectors of the economy, especially if a significant portion of the inputs of those sectors is imported. Therefore, the analysis in this section will consider both domestic and total output (input).

The c_{ij} coefficients of the 1966/67 input-output tables represent total intermediate inputs and can be used directly to calculate the above mentioned indices for total output. To exclude the impact of imported inputs from the 1966/67 tables, the c_{ij} in (20) to (27) are replaced by the d_{ij} coefficients of equation (8). For the 1983/84 input-output tables the c_{ij} coefficients of domestic and foreign intermediate inputs are provided separately. Therefore, domestic c_{ij} are used directly in the calculation of domestic indices, and the sum of domestic and foreign technical coefficients are used for the indices of total output.

Tables 11 to 14 of annex II present both the two-way classification of U_j and V_j, and U_i and V_i and their respective distribution for domestic output and total output in 1966/67 and 1983/84. Obviously, the sectors that fall under high U_j and low V_j reveal a high absorption rate from a large number of sectors of the economy. Similarly, sectors with high U_i and low V_i involve an above-average supply of direct and indirect output to a large number of other sectors.

The sectors that possess (a) high U_i and U_j and (b) low V_i and V_j are the key sectors. Other sectors may qualify, if the strict conditions (a) and (b) are relaxed. Potential key sectors are those that might have qualified as key sectors but did not because of slight violation of one of the conditions in (a) and (b), while doing better than average on the rest.

Table 7 lists the key and potential key sectors in 1966/67 and 1983/84 when only domestic output (input) is considered. Surprisingly, only a small number of three key sectors in 1966/67 dropped to two in 1983/84. While the number of potential key sectors was maintained at four, the food industry was the only sector that preserved its position as a key sector in the two periods. The key sector status of non-petroleum chemicals in 1966/67 declined to that of a potential key sector due to greater dependence on imported inputs. Except for these two cases, none of the key sectors or potential key sectors in 1966/67 was able to maintain a position in one of the two classifications in 1983/84. This supports the observation made in the previous section regarding the switching of industries among the various types of productive sectors. It could be the result of the radical change in policies in the early 1970s.

Table 7. Key, potential key and least prominent sectors in the domestic output of Egypt, 1966/67 and 1983/84

Sector	U_j	U_i	V_j	V_i
A. 1966/67				
Key				
Non-petroleum chemicals	1.033	1.343	3.498	2.689
Food	1.162	1.513	3.664	2.803
Textiles	1.472	1.848	3.946	3.162
Potential key				
Petroleum products	1.024	1.863	4.155	2.245
Electricity, water and gas	1.073	1.208	4.029	3.466
Paper and printing	1.014	1.175	4.538	3.895
Other quarries and extraction	0.967	1.069	3.639	3.369
Least prominent				
Transportation equipment	0.041	0.372	4.213	4.686
Transportation and communications	0.905	0.803	4.660	5.263
Financial institutions	0.850	0.796	5.061	5.413
Wholesale and retail trade	0.909	0.966	5.141	4.828
Insurance	0.774	0.786	5.363	5.275
B. 1983/84				
Key				
Food	1.041	1.058	4.012	3.948
Iron, steel and metals	1.336	1.330	4.119	4.176
Potential key				
Agriculture and animal products	1.028	2.370	4.856	2.543
Non-shoe leather	1.268	1.131	3.910	4.509
Non-petroleum chemicals	0.974	1.241	4.017	3.273
Moving and storage	0.926	1.011	4.157	3.762
Least prominent				
Glass products	0.852	0.732	4.456	5.208
Wood and furniture	0.826	0.846	4.750	4.635
Transportation and communications	0.743	0.809	5.092	4.665
Insurance	0.979	0.946	5.519	5.336
Other services	0.704	0.777	5.288	4.776
Petroleum and natural gas	0.695	0.756	5.319	4.881

Three industries in table 7 showed particularly interesting changes: the iron, steel and basic metals industry; agriculture; and textiles. The iron, steel and metals industry moved from a non-key or potential-key sector in 1966/67 to a key sector in 1983/84. This supports the argument of the maturation process of this industry (following a significant amount

of investment in the 1960s) as it became more integrated into the economy. This change also suggests that the iron, steel and basic metals industry became more dependent on domestic inputs and less dependent on imported inputs (a point to be discussed further below). Agriculture became a potential key sector in 1983/84, which suggests a change in its structure and pattern of production from being a traditional sector towards being more capital-intensive and more dependent on other sectors for intermediate inputs. Textiles (one of Egypt's important industries), however, lost its position as a key sector in 1983/84. This indicates, as suggested in the previous sections, that the textile industry is facing some structural difficulties and has lost its public support. An additional analysis, on the micro-economic level, is needed in order to determine the reasons for these difficulties.

When total output (input) is considered by including the impact of foreign intermediate inputs, the situation becomes different. As shown in table 8, there was no change in any of the four key sectors of the economy between 1966/67 and 1983/84. Combining this result with the result presented in table 7 implies that both non-petroleum chemicals and machinery maintained their key sector status by increasing their dependence on imported inputs. This is especially true for non-petroleum chemicals, since it lost its key sector position in the case of domestic output (table 7) due to a below average rate of absorption of domestic inputs. On the other hand, the data in tables 7 and 8 implies that the iron, steel and basic metals industry maintained its key sector position in relation to total output due to increased dependence on domestic inputs and, probably, substitution of domestic inputs for foreign inputs in 1983/84 (the backward index U_j in table 7 is higher than its counterpart in table 8).

Table 8. Key, potential key and least prominent sectors in the total output (domestic and foreign) of Egypt, 1966/67 and 1983/84

Sector	U_j	U_i	V_j	V_i
	A. 1966/67			
Key				
Non-petroleum chemicals	1.147	1.566	2.989	2.166
Iron, steel and metals	1.431	2.525	3.236	1.979
Machinery	1.198	1.980	3.238	1.979
Food	1.220	1.518	3.406	2.566
Potential key				
Textiles	1.122	1.406	3.585	2.795
Paper and printing	1.121	1.287	4.068	3.519
Other quarries and extraction	0.982	1.039	2.940	2.850
Petroleum products	0.959	1.814	3.331	1.632

Sector	U_j	U_i	V_j	V_i
Least prominent				
Other services	0.896	0.783	3.462	3.953
Transportation and communications	0.708	0.546	3.878	5.040
Financial institutions	0.592	0.536	4.728	5.235
Wholesale and retail trade	0.634	0.726	4.969	4.320
Insurance	0.533	0.549	5.228	5.068
B. 1983/84				
Key				
Non-petroleum chemicals	1.345	2.051	3.466	2.405
Iron, steel and metals	1.172	1.220	3.123	2.834
Machinery	1.172	1.451	3.683	3.071
Food	1.297	1.203	3.374	3.398
Potential key				
Paper and printing	1.217	1.243	3.736	3.634
Construction	1.087	0.780	2.705	3.665
Least prominent				
Glass products	0.907	0.753	3.817	4.620
Petroleum and natural gas	0.656	0.717	4.396	3.978
Transportation and communications	0.595	0.641	4.875	4.508
Other services	0.569	0.625	5.042	4.579
Insurance	0.761	0.735	5.081	5.623

Tables 7 and 8 also show the least prominent sectors of the economy. These are the sectors that exhibit structural and linkage weaknesses and possess both low U_i and U_j and high V_i and V_j. It is worth noting that the number of least prominent sectors increased, in the case of domestic output (table 7), from five in 1966/67 to six in 1983/84. The figure was maintained at five when total output including imported inputs were considered (table 8). Another interesting observation is the disappearance of the financial institution sector from the least prominent sectors list in 1983/84 in both tables 7 and 8, indicating the increased importance of that sector.

6. Sectoral market dependencies

Structural and linkage weaknesses may also be the result of the structure of trade in the economy. It is therefore important to analyse the contribution of the different categories of final demand to the generation of a demand for each individual sector. This necessitated the construction of a final demand matrix F whose typical element f_{ij} represents output of

sector i destined to final demand category j. The percentage contributions of the different types of final demand to the generation of demand for each productive sector for the 1966/67 and 1983/84 input-output tables are computed from the following systems:

$$1966/7: \quad S = (\hat{X})^{-1}(I - \hat{m} - A)^{-1} F \tag{28}$$

$$1983/4: \quad S = (\hat{X})^{-1}(I - A)^{-1} F \tag{29}$$

where $\hat{X}$ is a diagonal matrix whose diagonal entries are the elements of the domestic gross output vector X. Equation (28) is used in the treatment of the 1966/67 input-output tables to exclude the impact of imported intermediate inputs from the A matrix, and equation (29) is applied to the 1983/84 tables where the A matrix in this case represents domestic intermediate inputs only. The typical element s_{ij} of matrix S represents the percentage contribution of the final demand category j to the generation of demand for the output of sector i. For instance, in 1966/67 (table 9) s_{11} shows that 85 per cent of the output of agriculture is generated by private consumption, while s_{12} shows that government consumption accounts for only 0.6 per cent of the output of this sector.

Table 9 presents the percentage contribution (relative importance) of each final demand category to the output of each industry in 1966/67 and 1983/84. The following discussion will concentrate on four groups of industries: the petroleum and natural gas extractive industry; agriculture and animal products; the group of heavy industries, including metal products, the iron, steel and basic metal industry, machinery, and transportation equipment; and the group of services sectors representing the last eight industries in table 9.

The main change that the agriculture sector experienced between 1966/67 and 1983/84 is the reduction in the percentage contribution of exports to agricultural gross output. This reflects the increasing pressure on the agriculture sector to meet the rising domestic needs associated with high population growth rates. The petroleum and natural gas extractive industry experienced a substantial shift from private consumption as the major contributor in 1966/67 to exports in 1983/84. Probably the most interesting and important changes are those observed in the heavy industries group and the services group. As seen earlier, the heavy industry group showed improvements between 1966/67 and 1983/84 with respect to almost all the indices presented in the paper. These improvements were associated with an increase in the percentage contribution of private and government consumption to the gross output of the industries, and a decline in the percentage contribution of investment. On the other hand, the change in the relative importance of the final demand categories to the gross output of the services group was basically the result of a decline in the percentage contribution of private

Table 9. Percentage dependency of sectoral output on various final demand categories, 1966/67 and 1983/84

Industry	*Private consumption*	*Govern-ment*	*Fixed capital formation*	*Change in inventory*	*Total capital formation*	*Exports*
			A. 1966/67			
Agriculture and animal products	84.5	0.6	0.8	1.1	1.9	13.1
Petroleum and natural gas	44.0	8.5	12.3	3.9	16.3	31.3
Other quarries and extraction	28.7	2.8	75.9	-17.1	58.8	9.7
Food	85.5	2.2	0.2	1.2	1.5	10.8
Beverages	99.5	0.0	0.0	-0.2	-0.2	0.7
Tobacco	98.8	0.0	0.0	0.4	0.4	0.4
Textiles	39.0	0.4	0.5	6.5	7.0	53.6
Clothing	86.5	2.7	0.0	10.7	10.7	0.2
Non-shoe leather	97.0	0.3	0.8	0.4	1.2	1.6
Shoes	99.0	0.0	0.0	0.0	0.0	1.0
Wood and furniture	24.5	0.6	65.1	5.2	70.4	4.5
Paper and printing	66.0	14.6	5.7	5.7	11.5	7.8
Non-petroleum chemicals	69.0	6.6	3.9	9.9	13.7	10.7
Petroleum products	49.3	9.5	13.8	3.6	16.4	24.8
Rubber and plastics	72.0	0.9	14.1	3.7	17.8	9.2
China and pottery	25.0	0.5	73.8	0.1	73.9	0.6
Glass products	87.6	2.2	2.4	3.3	5.7	4.5
Metallic and other products	9.3	0.5	69.4	4.5	73.9	16.2
Iron, steel and metals	21.9	2.0	64.5	6.0	70.5	5.5
Machinery	17.7	1.0	69.0	7.2	76.2	5.1

continued

Table 9 (*continued*)

Industry	*Private consumption*	*Government*	*Fixed capital formation*	*Change in inventory*	*Total capital formation*	*Exports*
Transportation equipment	35.0	2.0	38.4	-6.1	32.3	30.6
Other transformation industries	24.9	9.7	28.8	31.6	60.3	5.1
Electricity, water and gas	61.1	9.3	11.3	2.7	14.0	15.6
Construction	10.6	0.6	88.1	0.1	88.2	0.6
Wholesale and retail trade	97.9	0.1	0.6	0.2	0.8	1.2
Hotels and restaurants	99.8	0.1	0.0	0.0	0.0	0.1
Moving and storage	41.4	2.2	2.1	0.1	2.2	54.2
Transportation	72.5	20.8	2.9	0.3	3.2	3.5
Financial institutions	97.1	0.6	1.1	0.2	1.3	1.0
Insurance	85.6	1.1	3.4	0.8	4.2	9.1
Real estate	82.3	11.3	2.7	0.5	3.2	3.2
Other services	58.4	28.6	5.5	0.4	5.9	7.1
		B. 1983/84				
Agriculture and animal products	81.5	7.0	5.1	0.2	5.2	6.2
Petroleum and natural gas	1.6	0.6	0.2	1.6	1.8	96.0
Other quarries and extraction	27.6	15.9	38.1	6.8	45.0	11.5
Food	77.6	17.2	0.6	1.2	1.8	3.5
Beverages	96.2	0.4	0.0	-0.3	-0.3	3.6
Tobacco	96.1	0.1	0.0	2.7	2.7	1.2
Textiles	60.2	17.2	0.4	10.0	10.3	12.2
Clothing	83.0	14.6	0.0	1.0	1.0	1.4
Non-shoe leather	78.4	11.7	5.8	-1.5	4.4	5.5
Shoes	85.6	13.9	0.0	0.0	0.0	0.5

Wood and furniture	50.9	14.2	22.9	10.1	33.1	1.8
Paper and printing	49.7	25.5	5.3	5.6	10.9	13.9
Non-petroleum chemicals	66.9	15.7	5.1	5.3	10.4	7.1
Petroleum products	41.5	19.7	5.1	2.9	7.9	30.8
Rubber and plastics	70.6	4.4	5.3	12.3	17.6	7.4
China and pottery	21.3	2.8	71.5	1.8	73.4	2.6
Glass products	32.5	14.3	33.9	17.1	51.0	2.3
Metallic and other products	26.1	22.9	37.3	12.7	50.0	1.0
Iron, steel and metals	31.5	19.8	33.5	-3.0	30.5	18.2
Machinery	62.1	3.4	21.7	9.2	31.0	3.6
Transportation equipment	38.5	9.8	55.7	-15.4	40.3	11.4
Other transformation industries	38.1	10.0	0.6	-5.3	-4.7	56.6
Electricity, water and gas	58.5	22.7	7.3	2.0	9.2	9.6
Construction	5.5	3.1	89.1	0.3	89.4	1.9
Wholesale and retail trade	56.5	10.8	16.0	3.9	19.9	12.7
Hotels and restaurants	76.0	3.4	0.1	0.0	0.1	20.6
Moving and storage	32.2	4.3	5.4	0.8	6.2	57.3
Transportation	55.9	19.4	10.1	1.4	11.5	13.3
Financial institutions	63.3	8.6	14.0	1.9	16.0	12.2
Insurance	34.2	5.4	6.6	1.8	8.4	52.0
Real estate	61.4	18.5	6.5	1.3	7.7	12.4
Other services	15.2	82.9	0.7	0.1	0.7	1.2

consumption balanced in part by an increase in the shares of government consumption, investment and exports. Table 9 shows that, with few exceptions, sectors in the services group were the only ones that experienced increases in the contribution of investment.

It seems that the pattern of investment in the late 1970s and early 1980s was in favour of the services sectors over the commodity-producing sectors. The important question is the following: what if this pattern were to continue in the future? This may create structural difficulties in the commodity-producing sectors and especially in the heavy industries group, which had started to show signs of maturity after these industries were injected with a substantial amount of public investment in the 1960s and early 1970s.

C. Concluding remarks

Egypt has experienced two contrasting economic regimes. In the 1950s and 1960s the objective of the Government of Egypt was to build a dominant public sector within a managed economy framework. In the 1970s and 1980s, however, the Government adopted the open-door policy, which put more emphasis on the role of the private sector and private investment, either national or foreign. Under the new policy, the private sector was eager to invest in services but less inclined to invest in the commodity-producing industries. In the meantime, the share of the public sector in total investment declined. It seems that this situation resulted in structural difficulties in some of the commodity-producing industries, particularly those in which public investment was dominant (such as textiles and clothing). Shortfalls in public investment in these activities were not adequately compensated for by increases in private or foreign investment.

The analysis shows that between 1966/67 and 1983/84 there was very little improvement in the overall performance of the economy. The economy's overall weighted averages of the direct and indirect output effects, income multipliers and employment multipliers have all increased only marginally. This suggests that more than 10 years of the open-door policy was either not enough or not effective in bringing about any real improvements in the performance of the economy.

Between 1966/67 and 1983/84 the analysis of the types of productive sectors shows that industries did not move towards a specific type of sector and that there was almost no increase in the economy's overall ratio of intersectoral use to total production (the averages of ϕ and λ). Furthermore, the number of industries in the final-manufacturing category (usually described as the more "mature" industries) dropped from 11 in 1966/67 to 7 in 1983/84. This may indicate that the economy was not able to regain the momentum lost as a result of the sudden and not-well-coordinated change in policy.

The number of key sectors (sectors with high forward and backward linkages and low coefficients of variation) dropped from three in 1966/67 to only two in 1983/84, when only the domestic intermediate inputs were considered. When the analysis included the foreign inputs as well, all of the four key sectors in 1966/67 maintained their position in 1983/84. This implies that key sectors preserved their position by increasing their dependence on foreign intermediate inputs. On the other hand, the results suggest that the iron, steel and basic metals industry and agriculture sector were able to maintain and improve their positions as key or potential key sectors by increasing their dependence on domestic inputs.

The analysis of the sectoral market dependencies indicates that the pattern of investment under the open-door policy was heavily in favour of services at the expense of the commodity-producing industries.

Perhaps the most relevant result of this study is the observation that the group of heavy industries, which was mainly established in the 1960s, improved with respect to almost all the indices considered in this study. This group became more dependent on domestic intermediate inputs and more integrated into the economy. Industries in this group depend heavily on public investment, since the private sector is very reluctant to invest in them. It is crucial, therefore, to maintain an adequate level of investment in these industries, for otherwise their progress could be reversed. This is a difficult proposition to sustain, given the prevailing ideological imperatives of structural adjustment policies.

Alternatively, the position of some of the historically important industries in Egypt (textiles and clothing) have deteriorated. Without a thorough micro-economic study, the authors are not in a position to determine precisely the specific reasons for this deterioration. They can only observe that public investment in these sectors has declined measurably.

It is clear, however, that industrial development policy in Egypt has swung heavily to the opposite extreme of planning. This swing has resulted in some dislocations suggesting that a more balanced approach, in which private and public investment are coordinated and harmonized, may be a preferred course.

Annex I

RECONCILIATION OF THE INPUT-OUTPUT TABLES

The present study uses two sets of input-output tables for the Egyptian economy; relating to 1966/67 and 1983/84. In order to be able to use them in a consistent manner the two tables had to be reconciled. There are two major differences between the tables, namely: the dimension of the tables; and the nature of intermediate inputs in each table.

With regard to the first point, the 1966/67 tables disaggregate the economy into 34 industries (34 x 34), while the 1983/84 tables represent a higher level of disaggregation (37 x 37). To allow for appropriate reconciliation, some of the industries in each table were aggregated as shown in table 10. The reconciled tables disaggregate the economy into 32 sectors (32 x 32).

Table 10. Reconciliation of the input-output tables

Reconciled table	*1966/67 table*	*1983/84 table*
Agriculture and animal products	Agriculture, fishing and trapping	Non-animal agricultural products Animal products
Other quarries and extraction	Coal mining Metal mining and quarrying Non-metal mining	Other quarries and extraction
Other transformation industries	Other transformation industries	Cotton-ginning and -pressing Other transformation industries
Wood and furniture	Wood and furniture	Non-furniture wood industry Furniture industry
Other services	Other services	Social and community services Culture and entertainment Personal services

As for the second difference, the 1966/67 tables include total (domestic and foreign) intermediate inputs, while the 1983/84 system

provides two separate tables, one for domestic inputs and the other for foreign inputs.

The analysis in the present study requires the use of both domestic and total intermediate inputs. In the case where only the domestic inputs are required for the analysis, the impact of foreign inputs is excluded from the 1966/67 tables via equations (4) to (8), and the technical coefficients of the 1983/84 tables for domestic inputs are used with no modification. On the other hand, when total intermediate inputs are needed, the 1967 technical coefficients are used as they are, and the technical coefficients of the 1983/84 tables for both domestic and foreign intermediate inputs are added together to obtain the technical coefficients for total intermediate inputs in 1983/84.

Annex II

BACKWARD AND FORWARD LINKAGES

Table 11. Backward and forward linkages and their coefficients of variation: domestic output, 1966/67

Industry	*Index*		*Industry*	*Index*	
A. Backward linkages (average V_j = 3.989)					
Low U_j, low V_j	U_j	V_j	*High U_j, low V_j*	U_j	V_j
Other transformation industries	0.7045	3.451	Shoes	1.4539	2.959
Rubber and plastics	0.9046	3.519	Non-shoe leather	1.5964	3.016
Other quarries and extraction	0.9670	3.639	Metallic and other products	1.1479	3.309
Wood and furniture	0.7992	3.878	Clothing	1.4166	3.408
Machinery	0.3420	3.886	China and pottery	1.1725	3.411
Other services	0.6931	3.977	Hotels and restaurants	1.2814	3.418
			Construction	1.2290	3.469
			Non-petroleum chemicals	1.0326	3.498
			Glass products	1.0365	3.522
			Tobacco	1.4692	3.609
			Food	1.1617	3.664
			Beverages	1.0748	3.801
			Textiles	1.4715	3.946
Low U_j, high V_j			*High U_j, high V_j*		
Iron, steel and metals	0.9091	3.991	Electricity, water and gas	1.0731	4.029
Petroleum and natural gas	0.5955	4.213	Petroleum products	1.0235	4.155
Transp ortation equipment	0.4113	4.245	Paper and printing	1.0139	4.538
Transportation	0.9048	4.660			
Moving and storage	0.8453	4.680			
Financial institutions	0.8500	5.061			
Real estate	0.8329	5.063			
Agriculture and animal products	0.9030	5.115			
Wholesale and retail trade	0.9090	5.141			
Insurance	0.7740	5.363			
B. Forward linkages (average V_i = 4.292)					
Low U_i, low V_i	U_i	V_i	*High U_i, low V_i*	U_i	V_i
Machinery	0.5204	2.506	Agriculture and animal products	3.3377	1.847
Petroleum and natural gas	0.8969	2.950	Petroleum products	1.8634	2.245
			Non-petroleum chemicals	1.3427	2.689

Industry	*Index*		*Industry*	*Index*	
Low U_i, high V_i	U_i	V_i	*High U_i, low V_i*	U_i	V_i
			Food	1.5131	2.803
			Iron, steel and metals	1.2603	2.917
			Textiles	1.8483	3.162
			Other quarries and and extraction	1.0693	3.369
			Electricity, water and gas	1.2078	3.466
			Real estate	1.0917	3.830
			Moving and storage	1.0078	3.893
			Paper and printing	1.1753	3.895
Low U_i, high V_i					
Other services	0.6158	4.468			
Construction	0.9308	4.575			
Non-shoe leather	0.9156	4.683			
Transportation equipment	0.3724	4.686			
Metallic and other products	0.8066	4.706			
Wood and furniture	0.6442	4.801			
Wholesale and retail trade	0.9658	4.828			
Other transformation industries	0.4637	4.962			
Transportation	0.8032	5.263			
Insurance	0.7864	5.275			
Glass products	0.6910	5.290			
Rubber and plastics	0.5881	5.380			
Financial institutions	0.7961	5.413			
China and pottery	0.7294	5.425			
Beverages	0.7388	5.493			
Tobacco	0.7549	5.605			
Hotels and restaurants	0.7512	5.619			
Clothing	0.7650	5.651			
Shoes	0.7463	5.657			

Table 12. Backward and forward linkages and their coefficients of variation: total output (domestic and foreign), 1966/67

Industry	*Index*		*Industry*	*Index*	
A. Backward linkages (average V_j = 3.430)					
Low U_j, low V_j	U_j	V_j	*High U_j, low V_j*	U_j	V_j
Other quarries and extraction	0.9820	2.940	Shoes	1.1537	2.477
			Non-shoe leather	1.3863	2.612

continued

Table 12 (*continued*)

Industry	*Index*		*Industry*	*Index*	
Hotels and restaurants	0.9821	3.029	Metallic and other products	1.1125	2.614
Beverages	0.9276	3.066	Construction	1.0879	2.620
Clothing	0.9948	3.199	Other transformation industries	1.3542	2.639
Petroleum products	0.9593	3.331	China and pottery	1.0538	2.678
			Glass products	1.0409	2.749
			Rubber and plastics	1.0229	2.954
			Non-petroleum chemicals	1.1465	2.989
			Wood and furniture	1.1664	3.030
			Iron, steel and metals	1.4310	3.236
			Machinery	1.1976	3.238
			Food	1.2204	3.406
			Tobacco	1.1096	3.412
Low U_j, high V_j			*High U_j, high V_j*		
Other services	0.8958	3.462	Transportation equipment	1.2291	3.447
Electricity, water and gas	0.8131	3.491	Textiles	1.1224	3.585
Petroleum and natural gas	0.8993	3.525	Paper and printing	1.1213	4.068
Moving and storage	0.7593	3.721			
Transportation	0.7079	3.878			
Real estate	0.6010	4.566			
Financial institutions	0.5915	4.728			
Agriculture and animal products	0.7624	4.869			
Wholesale and retail trade	0.6342	4.969			
Insurance	0.5330	5.228			

B. Forward linkages (average V_i = 3.948)

Low U_i, low V_i	U_i	V_i	*High U_i, low V_i*	U_i	V_i
Electricity, water and gas	0.9805	2.767	Petroleum products	1.8136	1.632
Real estate	0.8537	3.183	Agriculture and animal products	3.2120	1.637
Moving and storage	0.8510	3.254	Machinery	1.9796	1.908
			Iron, steel and metals	2.5247	1.979
			Non-petroleum chemicals	1.5657	2.165
			Petroleum and natural gas	1.3848	2.395
			Food	1.5181	2.566
			Textiles	1.4064	2.795

Industry	*Index*		*Industry*	*Index*	
			Other quarries and extraction	1.0385	2.850
			Paper and printing	1.2870	3.519
Low U_i, high V_i					
Other services	0.7826	3.953			
Construction	0.6686	4.150			
Wholesale and retail trade	0.7259	4.320			
Wood and furniture	0.7817	4.416			
Transportation equipment	0.9350	4.442			
Metallic and other products	0.6456	4.462			
Other transformation industries	0.6428	4.490			
Non-shoe leather	0.6074	4.596			
Rubber and plastics	0.6243	4.758			
Transportation	0.5460	5.040			
Insurance	0.5492	5.068			
Glass products	0.5565	5.120			
Financial institutions	0.5357	5.235			
China and pottery	0.5089	5.401			
Beverages	0.5056	5.492			
Hotels and restaurants	0.4922	5.586			
Tobacco	0.4918	5.604			
Clothing	0.4985	5.649			
Shoes	0.4862	5.657			

Table 13. Backward and forward linkages and their coefficients of variation: domestic output, 1983/84

Industry	*Index*		*Industry*	*Index*	
A. Backward linkages (average V_j = 4.287)					
Low U_j, low V_j	U_j	V_j	*High U_j, low V_j*	U_j	V_j
Construction	0.9738	3.800	Rubber and plastics	1.2994	3.017
China and pottery	0.9377	3.991	Textiles	1.4612	3.136
Non-petroleum chemicals	0.9743	4.017	Shoes	1.2624	3.188
Beverages	0.9304	4.020	Other transformation industries	1.4863	3.315
Electricity, water and gas	0.9200	4.088	Hotels and restaurants	1.1234	3.325
Transportation equipment	0.9676	4.130	Clothing	1.0691	3.548
Moving and storage	0.9255	4.157	Machinery	1.0410	3.714
Financial institutions	0.8988	4.194	Metallic and other products	1.0907	3.809
			Non-shoe leather	1.2679	3.910

continued

Table 13 (*continued*)

Industry	*Index*		*Industry*	*Index*	
			Food	1.0409	4.012
			Iron, steel and metals	1.3358	4.119
Low U_j, high V_j			*High U_j, high V_j*		
Paper and printing	0.9146	4.274	Tobacco	1.1091	4.590
Petroleum products	0.8629	4.416	Agriculture and animal products	1.0279	4.856
Glass products	0.8519	4.456			
Wholesale and retail trade	0.7899	4.714			
Wood and furniture	0.8262	4.750			
Real estate	0.7716	5.072			
Transportation	0.7434	5.092			
Other quarries and extraction	0.7186	5.151			
Insurance	0.9785	5.159			
Other services	0.7041	5.288			
Petroleum and natural gas	0.6951	5.319			

B. Forward linkages (average V_i = 4.372)

Low U_i, low V_i	U_i	V_i	*High U_i, low V_i*	U_i	V_i
Financial institutions	0.9931	3.727	Wholesale and retail trade	1.7885	2.023
Machinery	0.9951	3.807	Real estate	1.7003	2.247
Petroleum products	0.9916	3.833	Agriculture and animal products	2.3697	2.543
Paper and printing	0.9668	4.020	Other quarries and extraction	1.2050	3.190
Construction	0.9163	4.031	Non-petroleum chemicals	1.2412	3.273
Electricity, water and gas	0.9054	4.133	Moving and storage	1.0112	3.7762
Other transformation industries	0.8742	4.324	Food	1.0584	3.948
			Iron, steel and metals	1.3303	4.176
Low U_i, high V_i			*High U_i, high V_i*		
Transportation equipment	0.8861	4.503	Non-shoe leather	1.1310	4.509
Textiles	0.9550	4.605			
Wood and furniture	0.8463	4.635			
Transportation	0.8092	4.665			
Other services	0.7772	4.776			
Petroleum and natural gas	0.7564	4.881			
Metallic and other products	0.7967	5.117			
Rubber and plastics	0.7293	5.142			
Glass products	0.7324	5.208			
Insurance	0.9460	5.336			
Beverages	0.6912	5.429			

Industry	*Index*		*Industry*	*Index*
China and pottery	0.6704	5.518		
Tobacco	0.9108	5.607		
Hotels and restaurants	0.6576	5.628		
Clothing	0.6706	5.648		
Shoes	0.6866	5.657		

Table 14. Backward and forward linkages and their coefficients of variation: total output (domestic and foreign), 1983/84

Industry	*Index*		*Industry*	*Index*	
A. Backward linkages (average V_j = 3.703)					
Low U_j, low V_j	U_j	V_j	*High U_j, low V_j*	U_j	V_j
Clothing	0.9290	3.137	Rubber and plastics	1.3697	2.506
Beverages	0.9217	3.183	Construction	1.0869	2.705
Electricity, water and gas	0.8876	3.286	Textiles	1.3826	2.715
Moving and storage	0.8847	3.354	Shoes	1.1484	2.812
Metallic and other products	0.9128	3.537	Hotels and restaurants	1.0127	2.888
China and pottery	0.7843	3.648	Tobacco	1.7651	2.974
			Machinery	1.1723	3.123
			Other transformation industries	1.2313	3.144
			Non-shoe leather	1.2333	3.308
			Food	1.2969	3.374
			Non-petroleum chemicals	1.3453	3.466
			Iron, steel and metals	1.1715	3.683
Low U_j, high V_j			*High U_j, high V_j*		
Petroleum products	0.7914	3.737	Paper and printing	1.2170	3.736
Glass products	0.9071	3.817	Transportation equipment	1.4081	3.866
Financial institutions	0.8290	3.905	Wood and furniture	1.0328	4.273
Petroleum and natural gas	0.6564	4.396			
Wholesale and retail trade	0.6312	4.553			
Agriculture and animal products	0.8728	4.574			
Real estate	0.6217	4.828			
Transportation	0.5947	4.875			
Other quarries and extraction	0.5710	4.969			
Other services	0.5693	5.042			
Insurance	0.7614	5.081			

continued

Table 14 (*continued*)

Industry	Index		Industry	Index	
B. Forward linkages (average V_i = 3.968)					
Low U_i, low V_i	U_i	V_i	*High U_i, low V_i*	U_i	V_i
Petroleum products	0.9610	3.070	Wholesale and retail trade	1.6844	1.664
Financial institutions	0.9444	3.355	Real estate	1.6215	1.807
Moving and storage	0.8687	3.358	Agriculture and animal products	3.0583	1.977
Construction	0.7795	3.665	Non-petrochemical chemicals	2.0506	2.405
Electricity, water and gas	0.7696	3.728	Other quarries and extraction	1.1178	2.637
			Machinery	1.2195	2.837
			Iron, steel and metals	1.4505	3.071
			Food	1.2032	3.398
			Paper and printing	1.2430	3.634
Low U_i, high V_i			*High U_i, high V_i*		
Petroleum and natural gas	0.7170	3.978	Transportation equipment	1.3380	4.058
Other transformation industries	0.7093	4.118	Wood and furniture	1.0277	4.296
Textiles	0.8496	4.210			
Metallic and other products	0.7278	4.395			
Non-shoe leather	0.9425	4.429			
Rubber and plastics	0.6495	4.473			
Transportation	0.6413	4.508			
Other services	0.6247	4.579			
Glass products	0.7534	4.620			
Insurance	0.7351	5.263			
Beverages	0.5302	5.428			
China and pottery	0.5178	5.477			
Tobacco	0.6983	5.607			
Hotels and restaurants	0.5045	5.625			
Clothing	0.5143	5.647			
Shoes	0.5468	5.657			

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Formulating industrial strategies and policies in the context of restructuring economies: some preliminary thoughts

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The starting-point, or reference model, is the competitive equilibrium paradigm which features a large number of producers and consumers behaving individually as mere price-takers, sharing complete information and exchanging purely substitutable goods in the Arrow-Debreu sense. Under fairly weak assumptions on preferences and production sets, the theory establishes the existence of a Pareto-optimal equilibrium** and the resulting efficient allocation of resources in the economy.

The emerging price system automatically reveals the economic and social value of goods and services, and international trade reflects the global distribution of endowments in a broad sense, that is, encompassing natural resources availability, relative abundance of factors and technological capabilities.***

In such a scenario, developing countries will export raw materials, labour and labour-intensive goods, and import in return more elaborate products, until the country accumulates capital and know-how and moves into a broader range of manufactures (reservations on the dynamics and long-run effects notwithstanding - see box 1). Economic gains under this model will stem from spontaneous specialization based on comparative advantages and a more efficient utilization of endowments.

In the real world, however, the existence of externalities, increasing returns to scale, imperfect information etc. shatters the very foundations of the competitive paradigm, and the market forces actually lose their appealing property of optimally allocating scarce resources through the economy.

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**With all the limitations actually embedded in this concept, such as a somewhat static vision of the society. If, for instance, a low-income consumer is bound to an exclusive choice between education and food, he will most reasonably opt for the latter in his utility maximization. Profit maximization by the employer will in turn confine him to low-paying jobs, thus leaving no scope for an enlargement of his budget set and offering altogether no way out of the dilemma.

***These three elements are generally acknowledged to be the major determinants of trade patterns. See H. Forstner and Ballance. R., *Competing in a Global Economy* (London, Unwin Hyman, 1990).

On the production side, business strategies are designed to effectively respond to specific market failures: for instance, increasing returns to scale in most industries trigger the creation of ever-larger capacities, and their huge capital requirements are probably a major impetus in the expansion of stock markets worldwide. This in turn acts as an entry deterrent into that particular industry, increases market concentration, and weakens the stimulating effect of competition. The resulting prices no longer reflect the true economic value of goods, and necessarily entail inefficiencies.

In this example, a moderator in the form of the public authority is often called for to oppose the emergence of trusts and ensure to the extent possible a fair observance of the competition rules.*

Perhaps more fundamental is the role of the public sector as purveyor of public goods such as infrastructure, marked by significant consumption externalities. In the real world, a second-best setting, a minimum of government intervention is thus required to support economic growth by compensating market deficiencies.

The ideal form and magnitude of government intervention remains to be specified, and is currently the topic of elaborate discussions between economists. This paper sketches the outline of an analytical framework for such intervention in the industrial sector, consistent with the prevailing background of a second-best market economy.

Box 1

In the long-run, acute specialization in trade and manufacturing (along with productivity improvements in global transportation systems) is likely to challenge well-established issues in development economics, such as technology transfers. The effective mastery of appropriate technologies will lose its significance in explaining industrial performances: a key factor of success will increasingly rely on the management skills necessary to organize, in a timely and efficient manner, manufacturing processes around worldwide suppliers of inputs. The automotive industry in Europe is a good illustration of the case.

*Another widespread form of Government intervention in that case of non-convex technologies consists of merely substituting a public monopoly for a potential private one (see the example of railways, national airlines, electricity production and distribution etc.). Usually characterized by social-minded pricing policies, public utilities do not, however, escape the economic shortcomings attributed to monopolies in general.

A. Selection of key subsectors

Addressing industrial development issues at the particular level of subsectors is not a neutral choice, and deserves therefore convincing justification. First, this level offers a convenient compromise between precision and practicability: as economic behaviour is usually defined at the margin by infinitesimal displacements, the analysis should ideally proceed at the level of individuals for a better understanding and more accurate inferences.*

Although today's computers could handle the large amounts of data involved, a bottleneck is likely to be felt at the upstream stage of data collection. On the other hand, aggregates at sectoral level may conceal, behind average values, wide disparities across industries. In this respect, subsectoral statistics (usually at the three-digit level of the International Standard Industrial Classification of All Economic Activities (ISIC)) offer a workable compromise.

Second, most developing countries are characterized by low volumes of inter-industry trade, while business relations, when existing, are found within given industries. Thus the subsector represents a coherent cluster of individuals and a relevant subset for economic analysis.

Typically, developing countries exhibit a limited range of industrial subsectors,** reflecting the earlier bias towards basic needs and import-substitution strategies. Each one of them absorbs resources and yields in return value added, employment, foreign exchange etc., in different proportions. When resources are severely constrained, as it is in developing countries, it is essential to allocate them to those areas where they are expected to leverage the best possible return.

Several econometric tools are available to provide a quantitative support to the selection of priority subsectors, prominent among which are input-output analysis and applied general equilibrium models. Both approaches differ in their respective data requirements, the string of assumptions they are based upon (and thus their limits), and the type of simulation they allow for.

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*Sampling procedures are often applied as alternative to national accounts statistics, for instance in the form of business surveys to model investment behaviour, or surveys of household expenditures to draw demand patterns.

**And thus a relatively high degree of (manufacturing) specialization (*see Industry and Development: Global Report 1991/92*) (UNIDO publication, Sales No. E.91.III.E.19). In the absence of significant external trade, this is, however, no indication of an effective structural adjustment based on comparative advantages at global level.

Multi-criteria analysis thus leads to a specific ranking of the industrial subsectors and ultimately to the selection of those among them to be regarded as "priority industries"* henceforth to be focused on.

Box 2

In Malaysia, UNIDO developed a full-fledged, 18-sector, dynamic input-output model with special emphasis on manufacturing, to analyze the changing historical patterns and to project future sectoral developments. The 18 sectors include 12 industrial subsectors, belonging to either the resource-based (7) or the non-resource-based (5) category. The dynamic dimension of the model stems from a feedback effect obtained by endogenizing such variables as investment or import requirements, on a subsectoral basis. Growth prospects for each one of the 12 subsectors were first estimated by ordinary-least-squares (OLS) analysis of time series, in a partial equilibrium frame. The results were then fed into the input-output model, and check simulations were run to ascertain consistency with overall macroeconomic targets. The fine-tuning of the model having been completed, the latter can be simulated to suggest, for instance, that due to balance-of-payments considerations, "*...Malaysia in the 1990s should pursue an export-oriented and resource-based industrialization with a gradual shift to the non-resource based industrial development as she approaches the year 2000. Malaysia's built-in advantage in electronics and electrical sector, textiles and apparel sector, and increasingly competitive chemical sector which spearheaded manufacturing growth, export increase and employment generation in the last decade must be fully exploited in the next decade to maximize its far-reaching diffusion effects over the rest of the economy...*" (see Y. Ahn and others, "Dynamic input-output analysis and sectoral projections of the manufacturing sector 1990-2000" (DP/MAL/90/003), a report prepared for the Government of Malaysia by UNIDO acting as executing agency for the United Nations Development Programme).

B. Assessment of competitiveness and identification of key explanatory variables

The worldwide impetus towards increased trade liberalization and market economics bestows a decisive importance on the notion of competitiveness, previously irrelevant in most inward-bound developing

*This actually calls for two comments. First, it is clearly a "picking-the-winner" strategy, inasmuch as the priority subsectors, that is, those which will be granted particular support, are probably those enjoying already the strongest initial endowments, while the less fortunate industries will be hopelessly left aside. This way of accelerating a natural selection process as against the approach aimed on the contrary at ailing industries is, however, more consistent with a neo-classical background. A second remark points to the risk of missing real, if as yet unexploited, opportunities.

countries and their strongly protected domestic markets.* a particular good will be sold, and thus assume economic significance, only if it proves competitive** *vis-à-vis* existing substitutes on given markets.

The next step consists, therefore, in measuring the actual competitiveness of specific manufactures within the priority subsectors. Roughly speaking, the underlying cost structure leads to a price p that has to be compared to the price p_w observed in international markets for substitutable goods. The analysis may include social concerns such as employment generation, poverty alleviation, rural development or environmental hazards in the form of commensurate shadow prices.***

A vector-valued mapping is thus obtained:

$$p=f(x_1,x_2,\ldots,x_p,\ldots,x_n)$$

where x_i, i=1 to n, are the n components of the cost pattern, such as raw materials, import duties, capital, labour, handling charges, transportation, storage, marketing and advertising, value-added taxes, cost of access to foreign exchange and other financial transaction charges.

It is important to note at this stage that in a mixed economy, some of the cost components are under the control of private-sector agents while others depend on government macroeconomic and sectoral policy.

A strategic plan for the development of the subsector results from the optimization programme:

$$p^*=\min[p=f(x_1,x_2,\ldots,x_p,\ldots,x_n)]$$

constrained by

$$g=(x_1,x_2,\ldots,x_p,\ldots,x_n)= \vec{RMC}$$

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*In fact, die-hard, if disguised, protectionist reflexes are frequently encountered in developing countries, as revealed by an obsessive reference to the actual existence of markets. To be realistic, output volumes from any particular developing country are very low indeed by international standards, and therefore cannot significantly affect, even less saturate, global markets. Thus, provided it is competitive, the output is unlikely to be constrained by market size.

**In a perfectly competitive economy, this entails that the price of that particular good be lower than, or equal to, comparable prices of substitutes on international markets. In the real world, however, a wide range of quality specifications gives way to product differentiation strategies, where the competition is no longer in terms of prices but in terms of other attributes such as quality, exclusiveness and tied-in services.

***It appears indeed more fruitful to address such broad issues not in isolation as often suggested, but rather in relation to the relevant economic sectors.

which represents the resource mobilization capacity of the country (see box 3). Output levels must obviously be preserved, otherwise a trivial solution would exist at output level 0.*

Typically, strengthening competitiveness will call for upgrading manufacturing plants, enhancing the skills of the workforce, revamping or creating infrastructure etc., all activities likely to absorb resources prior to creating value.

Yet the cost structure f is most probably non-linear in its arguments. Therefore, the solution of the minimization programme is not straightforward, and the topology of f acquires a particular significance.

Formally, the Lagrangean associated with the optimization programme is written:

$$L=f(x_1,x_2,\ldots,x_p,\ldots,x_n)-\Lambda[g(x_1,x_2,\ldots,x_p,\ldots,x_n)-R\bar{M}C]$$

and the first-order conditions become:

$$\nabla p=\frac{dg}{dx}=\left(\frac{\partial g}{\partial x_1},\frac{\partial g}{\partial x_2},\ldots,\frac{\partial g}{\partial x_i},\ldots,\frac{\partial g}{\partial x_n}\right) \quad at\ p=p^*$$

where dg/dx is the cost attached to achieving a unit competitiveness enhancement (that is, a unit price reduction).

Obviously, a marginal "investment" in improving competitiveness will leverage a higher or lesser impact on the final price, depending on which of the cost components is targeted. Likewise, a given improvement in competitiveness will require more or less resources depending on which strategic factors are made to play an instrumental role.

To be rigorous, the following must be checked: the concavity of f at $p=p^*$ through the second-order conditions; and p^* is a global extremum and not a local one due to singularities of f.

In practice, however, improving competitiveness will rather proceed through a sequence of steps (*tâtonnement*); from an initial situation p^0, a cone in R^n delineates competitiveness-improving directions. Some of these strategic moves have greater impact on enhancing competitiveness than others for a given injection of resources. For instance, investing one dollar in upgrading the road network may bring about a sharper decrease in the price of a specific manufacture as compared to spending that dollar in offering management training courses to the staff.

Thus, following the direction that shows the greatest impact on improving competitiveness leads to a second step p^1, and so on, until

*It may well turn out that $p^* > p_w$, in which case either the concerned manufacture cannot be considered a priority for the country, or it offers sound improvement prospects for the future, and may therefore be granted temporary sliding subsidies $s = p^* - p_w$

theoretically p^* is reached.* A real-world application of this sequential process requires only basic algebra without calling for elaborate computing techniques.

Box 3

The notion of resource mobilization capacity (RMC) deserves further attention. Remember that RMC constrains the optimization programme and ultimately the competitive advantage a country may achieve for specific manufactures. It encompasses, however, a series of variables under either public- or private-sector control. Similarly, the objective function includes both public- and private-sector related variables. It would be, however, a strong assumption to consider the objection function as strictly additive -and separable- in its public and private components. In other words, the widespread idea of separating Government and business roles and responsibilities in the development process, as transparent in the motto "the Government is responsible for setting an enabling environment within which business may prosper and grow" will reach suboptimal results.

C. Market failures, organizational deficiencies and strategic management

The approach known as strategic management of industrial development was initially introduced in the context of severely disorganized economies painstakingly attempting to exit decades of government-led, inward-bound policies to enter an open economic space.

Its core argument is that, due to prevailing uncertainty and disorganization, ambitious restructuring programmes are thwarted from the start by the actual inability of their target beneficiaries to clearly understand the costs and benefits and to formulate and implement appropriate strategies. In particular, such programmes are designed on the basis of macroeconomic aggregates and with medium-term time horizons, while, on the other hand, businesses clearly lack essential human and financial resources, and are reduced, in an uncertain environment, to an extremely short-sighted vision of growth management and strategic planning.

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*When the objective function of the optimization programme does not lend itself to analysis, which is commonly the case when facing non-linearities, the solutions must be extracted by numerical methods. Available algorithms are often based on generalized gradients applications, an approach very close indeed to the one proposed here (see, for instance, F. H. Clarke, *Optimization and Non-Smooth Analysis* (New York, John Wiley, 1983)).

An efficient restructuring process in this context calls for a profound change in the way Government and business operate and formulate particular industrial strategies and policies. The concerns raised in box 3 underscore the need for an effective dialogue to be engaged and pursued between policy makers and the business community. To be productive, the dialogue must result in exchanging reliable (see box 4) strategic information on industrial performance and underlying competitiveness. The quantitative approach outlined earlier in this paper may well provide an adequate and systematic framework for such an exchange of information.

Box 4

Building on commonly shared information, the members of a group start by assessing the strengths and weaknesses of their respective activities, and proceed with the identification of opportunities towards the formulation of group strategies. Yet each individual acting as a rational, profit-seeking economic agent will always compare the outcome of his or her stand-alone strategy versus what would actually be gained from joining the group. An individual will eventually join the group if the pay-off is higher in the latter than in the former case. A perverse behaviour may emerge, where the members of a group will reveal voluntarily distorted preferences in an attempt to trigger higher personal gains. Typically in such instances, private-sector operators invariably claim that they would assuredly become competitive, should the Government ease the prevailing burden of taxation and regulations. It is indeed easier for a firm to bring down the price of its product by lobbying for tax cuts rather than working earnestly on improving its own production function. The effectiveness of the strategic-management-of-industrial-development approach may be seriously jeopardized in the absence of incentive-compatible mechanisms for revealing preferences.

D. Support to restructuring processes through technical assistance

Among developing countries, some enjoy a strong tradition of close interaction and cooperation between State and private operators. These display a well-organized private sector, whose interests are taken up to the policy-making authorities either directly by private lobbies or through powerful institutions.

Meanwhile, others struggle to come to terms with the new challenges raised by an increasing reliance on market economics, and especially the emergence and strengthening of a self-sustaining private sector capable of creating value and thus contributing to the development of the country.

Obviously, the support provided through technical assistance must be adjusted to the precise needs of the recipient country. In particular, the

nature of advisory services expected in countries belonging to the first category above is likely to take the shape of quantitative support to economic analysis and decision-making (as in the industrial master plan of Malaysia described in box 2) in the field of industrial strategies and policies.

On the other hand, assistance to countries that trail behind in terms of internal organization must first concentrate on developing business relations within the country and densifying the economic environment by initiating appropriate consultative mechanisms, possibly through strategic management of industrial development.

Whichever form of technical support is eventually deployed in the formulation of industrial strategies and policies, it is worth stressing that its ultimate impact on economic development crucially depends on the ability of the recipient country to implement its recommendations. As far as technical assistance is concerned, this calls for effective, downstream integration with existing investment promotion and resource mobilization facilities, within or outside UNIDO.

Development strategy for sub-Saharan countries

*Takao Fukuchi**

In the 1980s, the manufacturing sectors in many sub-Saharan countries suffered from low demand and shortage of imported capital goods and intermediate materials. Outputs declined and the share in gross domestic product (GDP) also decreased. The decrease of per capita manufacturing output for domestic use was even more pronounced due to the high population growth. On the other hand, the severely limited supply of manufactured goods became a big bottleneck for the economy. Thus in the 1990s a rehabilitation strategy is badly needed to reverse these declining trends and restore once again the vital contribution of the manufacturing sector. For this purpose, three sub-Saharan countries (Ethiopia, Sierra Leone and United Republic of Tanzania) were selected and quantitative studies were conducted using data of the 1980s to analyse current tendencies and main bottlenecks of the manufacturing sector, and to assess the impact of some important strategies. The present paper summarizes the results of this work. First the current situation of the three countries is surveyed, and then the main features of the models used are discussed. Finally, the results of the simulation experiments of these models are compiled to suggest the long-term effects of the strategies suggested.

A. Features of the three sub-Saharan countries: Ethiopia, Sierra Leone and United Republic of Tanzania

According to Nissan and Caveny [1], the ranking of the three countries was as reflected in table 1. Welfare distance was defined by the distance from the ideal country in the three-dimensional space of the physical-quality-of-life index (life expectancy, infant mortality and literacy). Out of 125 countries, table 1 shows the ranking of countries where the necessary statistics were available.

Based upon welfare distance and per capita GDP, the three countries are in a similar ranking or stage of development. Sierra Leone and Ethiopia were in the lowest quintile group in the ranking by welfare distance index and also by per capita GDP. The United Republic of Tanzania belongs to the lowest quintile in terms of per capita GDP, and to the fourth quintile in terms of welfare distance. This can be confirmed from other points of view. For example, it has been calculated that the Gini coefficients of income distribution were 0.44 and 0.42 for Sierra

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Leone and the United Republic of Tanzania, respectively. It can also be inferred that Sierra Leone and Ethiopia suffer very seriously from internal and external structural difficulties and the resulting economic difficulties (like balance-of-payments problems; shortage of imported fuel, parts and capital goods; low utilization rate and deterioration of productive facilities as well as infrastructure etc.). All three countries need structural reforms, but based upon these findings, the situation in the United Republic of Tanzania is relatively favourable for furthering economic development.

Table 1. Country ranking based on welfare distance and per capita GDP

Country	Welfare distance 1960	Welfare distance 1980	Per capita GDP 1960	Per capita GDP 1980
A. Developing countries				
Afghanistan	123	122	100	106
Bangladesh	98	106	121	119
Bhutan	...	...	120	122
Burkina Faso	122	119	102	111
Chad	117	117	107	120
Democratic Yemen	112	104	122	87
Guinea	120	120	91	94
Lao People's Democratic Republic	89	110	119	121
Senegal	110	118	71	83
Somalia	119	116	90	102
Yemen	118	115	106	85
B. Survey group				
Ethiopia	106	108	118	118
Sierra Leone	121	121	98	101
United Republic of Tanzania	93	75	104	103
C. High-income countries				
Denmark	4	8	7	6
Germany, Federal Republic of	15	21	6	4
Japan	17	3	23	15
Kuwait	48	47	1	2
Netherlands	1	5	9	10
New Zealand	5	18	15	21
Norway	3	4	8	7
Sweden	2	2	4	5
Switzerland	7	1	3	3
United Arab Emirates	73	55	2	1
United States of America	10	9	5	11
Total number	123	122	122	122

B. Impact of foreign capital inflow on domestic saving

The foreign capital inflow will have the direct impact of easing the balance-of-payments deficit by the same amount, thus facilitating additional imports and contributing to the rehabilitation of the economy. One of the important effects is also its impact on domestic savings. By definition, investment (I) is the sum of domestic savings, which is GDP (Y) minus consumption (C), and foreign capital inflow (FI), which equals imports (IM) minus exports (X).

$$I = Y - C + FI = Y - C + IM - X \qquad (1)$$

One of the many empirical studies (Kharas and Levinsohn ([2], p. 783) may be used to clarify the impact of FI on consumption. In that study, consumption was regressed on GDP and FI for time-series data of 26 countries (11 African) for the 1960s and 1970s. Of the three countries considered in the present paper, only Sierra Leone was included. The estimated coefficients (CO, CY, CFI) for six African countries are presented in table 2. For these countries, the T ratio for the FI coefficient was bigger than 1.60.

Table 2. Coefficients of total consumption in selected African countries

Country and period		*Constant (CO)*	*Y (CY)*	*FI (CFI)*
Botswana	(1962-1981)	0.020	0.521	0.233
		(4.10)	(11.80)	(1.73)
Nigeria	(1962-1982)	0.455	0.683	0.572
		(3.75)	(14.70)	(5.77)
Sierra Leone	(1963-1981)	-0.043	1.23	1.36
		(-1.29)	(4.46)	(3.83)
Sudan	(1961-1982)	-0.006	1.018	1.190
		(-1.22)	(9.87)	(4.53)
Togo	(1963-1982)	-5.00	1.030	0.363
		(-5.00)	(5.47)	(2.95)
Zambia	(1963-1982)	0.028	0.518	0.354
		(1.58)	(4.70)	(1.65)

Inserting the result in equation (1), yields:

$$I = Y - (CO + CY(Y) + CFI(FI)) + FI$$
$$= - CO + (1-CY)(Y) + (1 - CFI)(FI) \qquad (2)$$

The possible cases can be classified into three categories based upon the size of coefficient.

Case 1 is the normal case, where CY < 1 and CFI < 1. In this case, the investment increases with GDP. The FI increase results in a less-than-parallel increase of investment. Botswana, Nigeria and Zambia belong to this group.

Case 2 is the excess consumption case, where CY > 1 and CFI < 1. In this case, the consumption increase is more than that of income. The FI increase results in less-than-parallel increase of investment. Togo belongs to this group.

Case 3 is the ultra-excess-consumption (abnormal) case, where CY > 1 and CFI > 1. In this case, the increase of GDP and of FI induces a more than parallel increase of consumption and decrease of investment. Sudan and Sierra Leone belong to this group. In this case, the additional injection of internal or external resources will induce a big increase of consumption demand that cannot be directed into production activities. The main reason would be the tremendous accumulation of potential demand that was pent-up in the past by the shortage of effective supplies.

An attempt was made to estimate the common investment function for the three countries. The variable was specified in per capita terms to assess the influence of population (N). Investment was regressed to previous GDP, FI and supply of capital goods and parts (expressed either by imported manufactured goods (IMMA) or by domestic use of manufactured goods (EDMA)). GDP and capital goods supply were successfully introduced into the equation, but the positive contribution of FI could be confirmed only for the United Republic of Tanzania. The results are presented below. The dummy variables are conveniently neglected. The period covered was 1981-1989.

United Republic of Tanzania:

$$(I)/(N) = -153.07 + 0.4416(Y)-1/(N) + 0.6950(FI)/(N) + 1.140(IMMA/N)-1$$
$$(-2.50)\quad (3.71)\quad (1.90)\quad (2.28)$$

R = 0.9437

Sierra Leone:

$$(I)/(N) = -3.217 + 0.09381(Y)-1/(N) + 0.1963(EDMA)/(N)$$
$$(-0.30)\quad (2.87)\quad (3.67)$$

R = 0.8911

Ethiopia:

$$(I)/(N) = -1.043 + 0.1158(Y)-1/(N) + 0.05048(EDMA)/(N)$$
$$(-0.26)\quad (3.48)\quad (1.52)$$

R = 0.9138

From the above it follows that a positive contribution of FI to investment for Ethiopia and Sierra Leone cannot be expected where the pent-up demand is ready to explode and where it hinders the productive use of additional resources for investment. Based upon this judgement, it was decided that these equations should be used in the comparative study. Thus, the foreign capital inflow has a positive direct impact on investment only in the United Republic of Tanzania, while the indirect positive impact through increasing import exists for all three countries. The different specifications of investment are the main cause of the difference in total effects of FI.

There may exist a two-way impact between aid and saving for some countries. Bowles [3] tested the causality based upon Granger's test for 20 countries including the United Republic of Tanzania for 1960-1981. He concluded that for 10 countries there were no clear causalities, and one-way causality from aid to saving was confirmed for five countries including the United Republic of Tanzania. Following this result, the one-way causality from aid to saving was specified. This point is naturally subject to further study in the future.

The investment equation omits the interest rate. Khatkhate [4] pointed out that the real interest rate is very often negative in developing countries, that the average is -5.13 per cent, and that there is no clear evidence of interest rates affecting macroeconomic variables between higher- and lower-interest countries. His analysis, reflected in table 3, included Sierra Leone and the United Republic of Tanzania in a group with severely negative interest rates.

Table 3. Analysis of the impact of interest rates in selected countries

Country or average	*R(GDP)*	*RFA*	*S/Y*	*I/Y*	*MRCA*	*ICOR*	*Rental/ wage*
A. Countries with non-negative interest rate							
Average	5.42	4.98	16.28	22.53	11.78	24.03	13.73
B. Countries with moderately negative real interest rate							
Average	5.33	5.87	16.50	23.18	12.60	22.77	0.32

continued

Table 3 (*continued*)

Country or average	R(GDP)	RFA	S/Y	I/Y	MRCA	ICOR	Rental/ wage
C. Countries with severely negative real interest rate							
Sierra Leone	2.39	2.41	4.72	12.88	7.49	16.50	0.27
United Republic of Tanzania	4.48	4.90	10.83	18.54	13.41	30.80	0.05
Average	4.00	5.61	16.86	21.95	11.47	19.50	1.90

Source: Neena R. Khatkhate, "Assessing the impact of interest rates in less developed countries", *World Development*, vol. 16, No. 5 (1988), pp. 581-582.

ICOR = incremental capital-output ratio
I/Y = investment-to-income ratio
MRCA = marginal rate of return to capital
RFA = rate of growth of financial assets
R(GDP) = growth rate of GDP
S/Y = Savings-to-income ratio

1. Interest rate

A repressed financial market is commonly observed in developing countries, and the McKinnon-Shaw proposition of positive interest rate responsiveness raised a lot of debate. Gonzalez Arrieta [5] surveyed 15 empirical studies between 1978 and 1984 and concluded that the debate is currently far from settled. In the present paper the interest rate was not explicitly introduced into investment or savings (consumption) functions, partly because the debate is not settled, and mainly from lack of adequate data.

2. Size of countries

The size of population of the three countries in 1981 was 3,353,000 in Sierra Leone, 19,171,000 in the United Republic of Tanzania and 39,443,000 in Ethiopia. Looney [6] analysed the impact of size and claimed that the Government in small countries with a population of less than 5 million is inclined to increase its role and expand expenditure, producing a negative impact on the macroeconomy.

3. Population pressure

The possibly adverse effects of increasing population on saving or investment is usually classified as age-dependency effect, capital-reducing effect and investment diversion effect. "However, empirical

research has not sustained these hypotheses, individually or collectively" (Kelly [7]). Rossi [8] analysed the linking of the rate of growth of consumption to the expected change in the dependency rate for 49 developing countries (including 17 African countries), but a clear relationship was not found. Nyang'oro [9] stressed the corporatist factor in African states which might result in a big investment diversion effect in some countries. Thus no positive or negative effect was assumed for population, which was introduced into several equations partly in order to see the direction of its effects, and partly to define the variables on a per capita basis and facilitate intercountry comparisons of parameters.

C. Importance of the manufacturing sector

The usual input-output relation into manufacturing (MA) and other (NMA) sectors will now be decomposed. The corresponding technical coefficients submatrices are A11, A12, A21 and A22. The final domestic demand vector is decomposed into YMA for manufacturing and YOT for the other sector, and exports and imports are divided into EXMA and IMMA for the manufacturing sector, and EXOT and IMOT for the non-manufacturing sector. Thus:

$$XMA = A11(XM) + A12(XNMA) + YMA + EXMA - IMMA$$
$$XNMA = A21(XM) + A22(XNMA) + YOT + EXOT - IMOT$$

Now based upon the severe shortage in the supply of MG, the level of domestic final demand (or domestic use, YMA) is limited from the supply side. MG exports and imports are supposed to be predetermined. To simplify the discussion, A12 is assumed to be zero.

$$YMA = (I - A11)(XMA) + IMMA - EXMA$$

The net output (or value added) of the manufacturing sector (MAV) is estimated in the present model. MAV is interpreted as (I-A11)*(XM). The relation above can then be expressed as:

$$YMA = MAV + IMMA - EXMA$$

When the supply of MG for domestic use is restricted in this way, how is the level of final demand decided? Two cases are defined. In general, the relation between the level of final demand (C, consumption; I, investment; X, exports) can be expressed as follows (for convenience, YNA, YNMA, C, I and X are interpreted as scalars):

$$YMA = b1(C) + b2(I) + b3(X)$$
$$YNMA = c1(C) + c2(I) + c3(X)$$

In case 1, the coefficients (c1,c2,c3,b1,b2,b3) are fixed. If a set of values of (C,I,X) satisfies the former equation, YNMA is decided from the latter equation. In the United Republic of Tanzania, the former relation (between MAV, C, I and X) fitted the data well; the determination coefficient was 0.9998 in regression without a constant term. This case was thus adopted for the United Republic of Tanzania and consumption was calculated as follows (I and X are predetermined):

$$(C) = (YMA - b2(I) - b3(X)) / b1$$

In case 2, final demand for MG can be partly substituted by non-MG. When the level of YMA is compressed, b1, b2 and b3 can be smaller than normal values. Thus, the former equation cannot be used. In this case, YMA is introduced into the equations to explain different types of final demand (like C and I). The sum of YMA in these equations is expected to exceed unity. This treatment was adopted for Ethiopia and Sierra Leone.

In both cases, GDP can be defined by (C+I+X) minus imports. The non-manufacturing value added is decided by GDP minus MAV. Thus, in the present model, the manufacturing output (value added) is decided from the supply side, and non-manufacturing output (value added) is decided from the demand side. Some two-sector models for developing countries treat one sector as supply-determined and the other as demand-determined. For example, Rattso [10] specified agriculture as supply-determined and non-agriculture as demand-determined for India, interpreting agriculture in India as still the dominant production sector, and capacity utilization in the manufacturing sector as low and variable.

Manufacturing output may be recognized as being severely restrained by limits on imported inputs, but the limited supply of manufactured goods for domestic use severely restrains the level of final demand. In this sense, the specification above fits well the current situation of the three countries. This relates to the import compression of exports referred to by Khan and Knight [11], who pointed out that export performance depends on the supply of imported inputs, and that imports are constrained by export earnings. They used data for 34 countries (including seven African countries), and empirically verified the relation. This mechanism is embedded in the present model: MG imports stipulate the production and export of MG.

D. Model of an economy with a manufacturing sector depressed by foreign currency constraints

An econometric model with 12 equations was constructed for Ethiopia, Sierra Leone and the United Republic of Tanzania (see Fukuchi [12] and [13]). This model was estimated separately for the three countries

based upon the time-series data of the 1980s at 1980 prices, and explains five manufacturing variables and seven macroeconomic variables as follows:

Endogenous variables

C	Consumption
EDMA	Domestic use of MG
EMANU	Employment in MG sector
EXR	Exchange rate
GDP	Gross domestic product
I	Investment
IMMA	Import of MG
K	Capital stock
MAV	Net output of MG
MG	Manufactured goods
NMAGDP	GDP of non-MG sector
PCON	Consumer price index
XMA	Export of MG

Exogenous variables

EXS	External saving
IMOT	Non-MG import
N	Population
TIME	Time trend
XOT	Non-MG export
YW	World income

Basic specifications are as follows:

XMA = F ((YW)-1, (MAV)-1, (EXR)-1/(PCON)-1, (TIME))
IMMA = (XMA)+(XOT)-(IMOT)+(EXS)
MAV = F ((K)-1, (IMMA)-1)
EDMA = (MVA)+(IMMA)-(XMA)
EMANU = F ((N), (MAV)-1, (EMANU)-1)
I = F ((N), (EDMA), (GDP)-1, (EXS), (IMMA)-1)
K = F ((K)-1, I)
C = F ((N), (EDMA), (GDP)-1, (C)-1, (IMOT), (I), (XMA)+(XOT))
GDP = (C)+(I)+(XMA)+(XOT)-(IMMA)-(IMOT)
NMAGDP = (GDP)-(MAV)
PCON = F ((N)/(N)-1, (PCON)-1, (C)/(EDMA), (GDP)/(N), (TIME))
EXR = F ((PCON), (IMMA)+(IMOT)-(XMA)-(XOT))

As capital stock is defined for the whole economy, the coefficient in the MG production function expresses the product of the MG share and productivity, assuming that a constant share of investment was directed to the MG sector. As mentioned above, the specifications of investment and consumption functions differ by countries.

As specified, MG exports depend upon MG output, world growth and the exchange rate. Lall and others [14] checked the importance of capital intensity, the role of large firms, the concentration ratio and the skill level (measured by average wage) as the determinants of MG exports based upon MG subsectoral cross-section data from Kenya (147 sectors) and the United Republic of Tanzania (98 sectors). For the United Republic of Tanzania the results were inconclusive, except that skill negatively influences the revealed comparative advantage. But it is not clear to what extent the average wage reflects skills content. This exercise suggests that estimating the subsectoral export function is much more difficult. Thus the function was estimated on aggregate terms.

In the MG export function, the income elasticity of world demand was specified as unity for Ethiopia and Sierra Leone, while it was estimated as 0.82 in the United Republic of Tanzania. The price elasticities vary among the three countries. Marquez and McNeilly [15] calculated the import elasticities of developed countries for 1974-1984; long-run income elasticity for non-oil imports was 1.87 (Canada), 1.99 (Germany), -0.17 (Japan), 0.81 (United Kingdom of Great Britain and Northern Ireland) and 2.15 (United States). The price elasticities vary also. Because of the wide variety, the specification can be more or less supported. Rittenberg [16] estimated the elasticities of 41 developing countries using 1960-1980 data. The elasticity of world income was 1.096, which is near the specification of unity in the present paper.

The agricultural sector was treated as exogenous due to limited time, without denying the importance of this sector. State policy, drought and internal conflict are factors that have combined to produce a long deterioration of the agricultural sector in Ethiopia. Combining the MG and agricultural sectors and discussing development strategies are important tasks for the future.

E. Comparison of the effects of external impacts: population increase and foreign capital inflow

The effects of external shocks based upon the in-sample simulations (1981-1990) are assessed by means of the models discussed as reflected in table 4, which shows the initial values (part A) the result of a population increase of 1 million after 1980 (part B), and the result of increasing external savings by 30 million United States dollars (US$) after 1981. Each elasticity was calculated by the ratio of two changing rates.

Table 4. Impact of increased population, gross domestic product and external savings

Item	*Unit*	*Ethiopia*	*Sierra Leone*	*United Republic of Tanzania*
		A. 1981 values		
Population	Million	39.44	3.35	19.17
Per capita GDP	US$	110.0	390.9	265.0
GDP	Million US$	4 339.0	1 311.0	5 080.3
External Saving	Million US$	241.2	133.4	431.3
		B. Population increase		
Change	Million	1.0	1.0	1.0
R (population)	Percentage	0.0253	0.2982	0.0521
GDP change	Percentage	-2.2	-20.2	-22.3
R (GDP)	Percentage	-0.0200	-0.0511	-0.0841
Elasticity (GDP)	Percentage	-0.793	-0.171	-1.615
GDP change	Million US$	-10.4	171.1	-404.1
R (GDP)	Percentage	-0.0024	-0.1305	-0.0795
Elasticity (GDP)	Percentage	-0.095	0.437	-1.526
		C. External savings increase		
Change	Million US$	30.0	30.0	30.0
R (external saving)	Percentage	0.1243	0.2247	0.0695
GDP change	Percentage	2.3	18.2	13.1
R (GDP)	Percentage	0.0209	0.0465	0.0494
Elasticity (GDP)	Percentage	0.168	0.207	0.710
GDP change	Million US$	113.1	73.4	337.5
R (GDP)	Percentage	0.0260	0.0559	0.0664
Elasticity (GDP)	Percentage	0.2097	0.2491	0.9551
External saving (1981-1989)	Million US$	622.6	18.2	759.7
R (external saving, (1981-1989)	Percentage	0.04817	--	0.03948
Elasticity (GDP)	Percentage	0.433	--	1.252
Elasticity (GDP)	Percentage	0.541	--	1.682

A population increase of 1 million after 1980 resulted in a decrease in per capita GDP of 1.61, 0.79 and 0.17 per cent in 1990 in the United Republic of Tanzania, Ethiopia and Sierra Leone, respectively. In the United Republic of Tanzania and Ethiopia, the investment diversion effect was big, and GDP greatly decreased. In Sierra Leone, the negative effect was rather minor. The absolute value of GDP increased in Sierra Leone, but naturally the main part of this increase was absorbed by the growth of non-MG sector.

MG values are shown in table 5. Because of the increase in external savings by US$ 30 million, the share of manufactured goods in total imports was as follows in 1981: 0.8861 (Sierra Leone), 0.7945 (United Republic of Tanzania) and 0.7730 (Ethiopia).

Table 5. Estimated MG values for 1981

Country	*Total*	*MAV*	*IMMA*	*EDMA*	*XMA*
	A. Absolute change in US$				
United Republic of Tanzania	55.5	31.0	24.6	54.8	0.7
Sierra Leone	36.3	8.9	27.4	35.9	0.8
Ethiopia	31.9	9.0	22.8	32.2	-0.3
	B. Percentage change				
United Republic of Tanzania	2.2	1.2	1.0	2.1	0.0
Sierra Leone	9.0	2.2	6.8	8.7	0.2
Ethiopia	0.6	0.2	0.5	0.7	-0.0

As expected, the effects of increasing external savings was biggest in the United Republic of Tanzania, less in Ethiopia, and smallest in Sierra Leone. Pines [17] claimed that in Africa as a whole, imports were near the critical level required to secure the downward trend of the debt-export ratio (or to secure solvency), based upon the parameter values of the 1980s. This means that additional imports had to be financed by a new injection of resources. The results of the present study suggest that the effects differ from country to country, and that effective use of aid presupposes internal stability (and effective internal management).

F. Impacts of total factor productivity growth (TFPG)

The technological advance represented by TFPG is one of the important sources of economic growth from the supply side. An attempt was made to clarify the direct and indirect effects of TFPG by comparing the results of projections until the year 2000 with and without TFPG. Three projections were calculated with TFPG of 1, 2 and 3 per cent. The assumed growth rates of other exogenous variables differ by country as indicated below in table 6, part A. The effects of TFPG were assessed by differences between projections, hence this procedure is not expected to result in a big error of measurement. Since external savings, which equal imports minus exports, were negative for Sierra Leone in 1989, US$ 20.81 million were annually added after that year (see Fukuchi [13]).

Table 6. Projection differences and impact of TFPG of 1, 2 or 3 per cent

Country	*Ethiopia*	*Sierra Leone*	*United Republic of Tanzania*
A. Assumed growth rates for 1990-2000 (percentage)			
Population	2.9	2.5	3.2
World income	3.0	3.0	4.2
Other exports	3.0	3.0	4.5
Other imports	2.5	2.5	3.2
External saving	3.2	.. a/	4.5
B. Projected values for 200 (growth rate R (X) for 1989-2000)			
R (GDP); TFPG = 1, 2 or 3 per cent			
(1)	2.13	4.64	4.26
(2)	2.62	5.08	4.77
(3)	3.13	5.33	5.33
R (GDP/N)			
(1)	-0.74	2.09	1.03
(2)	-0.26	2.51	1.52
(3)	0.23	2.76	2.06
(GDP/N) (US$)			
(1)	91.78	333.52	271.68
(2)	96.37	348.20	286.10
(3)	101.47	356.97	302.82
R (MAV)			
(1)	1.45	5.53	2.83
(2)	2.59	7.90	4.17
(3)	3.75	9.12	5.55
(MAV)/(GDP) (Percentage)			
(1)	11.89	7.09	5.58
(2)	12.79	8.66	6.10
(3)	13.73	9.54	6.64
Per capita MG for domestic use (EDMAN, US$)			
(1)	32.71	78.27	57.69
(2)	34.12	84.76	59.97
(3)	35.72	88.69	62.62
C. Effects of TFPG (average of (3)-(2) and (2)-(1))			
R (GDP)	0.50	0.36	0.54
R (MAV)	1.15	1.80	1.36
Increase of (GDP/N)	4.84	11.72	15.57
Increase of EDMAN (US$)	1.50	5.21	2.46

a/ See text.

Macroeconometric models are usually specified according to Keynesian theory, which stresses that the overall activity level is determined by the demand side, and this feature is in contrast to the computable-general-equilibrium (CGE) model, which stresses the demand and supply balance by the price mechanism. Thus TFPG results in a decrease in production and an increase in unemployment according to the microeconometric model while production increases in the CGE model (see, for example, Capros and others [18]). Market pull versus technology push is an old question, and they complement each other. In the model used in the present study, net output of manufacturing (MAV) is determined from the supply side and thus accelerated by the increase of TFPG. The increase of MAV further stimulates the increase of GDP. Therefore in the model used the increase of TFPG favourably influences overall economic growth.

It follows that the increase of TFPG by 1 per cent will result in:

(a) An increase in the MVA growth rate by 1.80 per cent (Sierra Leone), 1.36 per cent (United Republic of Tanzania) and 1.15 per cent (Ethiopia). The average increase in the growth rate in the three countries is 1.44 per cent, of which 1 per cent is the direct effect and 0.44 per cent is the indirect effect, based upon the repercussions in the manufacturing sector (through increasing output, investment etc.) and in the overall economy (through increasing GDP etc.);

(b) An increase in the GDP growth rate by 0.53 per cent (United Republic of Tanzania), 0.49 per cent (Ethiopia) and 0.30 per cent (Sierra Leone). The average increase in the GDP growth rate in the three countries is 0.47 per cent;

(c) An average increase in per capita GDP and per capita manufactured goods for domestic use by US$ 10.7 and US$ 3.1, respectively.

It also follows that the future level of per capita GDP:

(a) Would be US$ 318 and US$ 86 without TFPG in Sierra Leone and Ethiopia, respectively, in the year 2000, and US$ 356 and US$ 101 with TFPG of 3 per cent. The past highest level was US$ 404 in Sierra Leone (1982) and US$ 110 in Ethiopia (1983). With TFPG of 3 per cent, per capita GDP increased by US$ 38 (or 11.9 per cent of US$ 318) and US$ 15 (or 17.4 per cent of US$ 86). But as a result of high population growth rates and for other reasons, Sierra Leone and Ethiopia could not recover the past highest levels, even with 3 per cent of TFPG and 3 per cent of world growth;

(b) Would be US$ 256 without TFPG, and US$ 286 and US$ 302 with TFPG of 2 per cent and 3 per cent, in the United Republic of Tanzania (2000). The past highest level was US$ 276 (1981). Favourable

world growth of 4.2 per cent was assumed; thus per capita GDP by 2000 would exceed the past highest level with TFPG of 2 per cent or more in the United Republic of Tanzania.

As mentioned above, TFPG of 1 per cent results in an average increase of growth rates of manufacturing output by 1.44 per cent and of GDP by 0.47 per cent, and is an important policy instrument for furthering growth. Many factors can contribute to TFPG. Kwon [19] pointed out that TFPG was 2.95 per cent in the manufacturing sector of the Republic of Korea in 1961-1980, and shifts of cost function, scale economies and increased capital utilization contributed to TFPG by 44.6, 38.1 and 17.3 per cent, respectively. Geroski [20] used data of the United Kingdom, and pointed out that domestic entry and innovation positively affect productivity growth. Rebitzer [21] pointed out that a loosening of labour markets exerts a significant and positive effect on productivity growth, and, on the basis of United States data, immobile labour will diminish this effect. Jaffe [22] stressed technological opportunity, market demand and the spillover effect of research and development as important to productivity growth, on the basis of United States data. The mechanism of enhancing TFPG differs from country to country, but these institutional and economic factors could accelerate TFPG.

G. Summary and conclusions

The long-run effects of external shocks such as population growth and increased external savings (aid) and TFPG were assessed in order to clarify structural restraints and growth possibilities in three sub-Saharan countries (Ethiopia, Sierra Leone and United Republic of Tanzania). An econometric model of 12 equations was applied using data from 1980-1990. The results clarified the big burden of population pressure and the usefulness of external savings and TFPG as external and internal development tools. The experiments suggested that TFPG efforts accompanied by a favourable world environment are the necessary conditions for further successful industrialization and economic development of the three countries concerned. Those countries face a wide range of political, social and economic reforms in the 1990s. The combined use of the econometric model and other models of wider scope may be an interesting area of future work. One possibility is the CGE model, and another is a comprehensive socio-economic model like that suggested by Scholing and Zimmermann [23].

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Manufacturing industry in Indonesia: dualism and production linkages

*Tulus Tambunan**

There has been an emphasis on industrialization in Indonesia since the introduction in 1969 of the country's first five-year plan, Repelita I. Until the end of the 1970s, however, the Government paid little attention to small-scale industries (SSIs). Most of the available resources were allocated to medium- to large-scale modern industries and were concentrated in and around urban areas. This had led to a growing dualism in the structure of the manufacturing sector in Indonesia, with, on the one hand, development of a small number of medium- to large-scale industries (MLSIs) using modern technology and highly skilled workers and organizing their activity formally, and, on the other, development of a large number of small industries using old machineries, primitive tools and equipment and unpaid workers and organizing their activities informally. The major focus of the present paper is on the contrasting industrial performance of SSIs and MLSIs. First, some figures on growth patterns of SSIs and MLSIs in terms of number of establishments, employment and value added are presented and analysed. Secondly, differences in productivity between SSIs and MLSIs at the two-digit-level of industrial classification are examined. Thirdly, production linkages of both size groups of industry, especially of SSIs, are assessed. Finally, some conclusions and suggestions for further research are drawn.

A. Some data and analysis

In Indonesia, SSIs are a significant and frequently dominant component of the manufacturing sector in terms of the number of establishments as well as employment. Based on the official classification made by the Central Bureau of Statistics of Indonesia, the source of most of the data used in this study, SSIs are units of production (establishments) using 1 to 19 workers. This can be divided further into cottage and household industries (CHIs), using 1 to 5 workers (mostly non-paid family members), and small factories, using 6 to 19 paid as well as non-paid workers. Units using 20 and more workers are classified as MLSIs.

In tables 1, 2 and 3, some aggregated Central Bureau of Statistics data by size group of industry on employment, number of establishments and

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value added are presented. From the tables it can be seen that CHIs are dominantly present in the manufacturing sector in terms of employment and the number of establishments, but the tables also show that their shares have declined over time. In 1974, CHIs accounted for about 80 per cent of total manufacturing employment, but by 1986 this figure went down to around 53 per cent. In contrast, the shares of MLSIs in total manufacturing employment have increased from 13 per cent in 1974 to around 33 per cent in 1986. The small factories also strengthened their position in the manufacturing sector in terms of employment, although their role is still very small when compared to the CHIs and especially to the MLSIs.

Table 1. Employment in manufacturing by size group of industry 1974/75, 1979 and 1986

Type of industry	*1974/75*	*1979*	*1986*
MLSIs	661 704 (13.49)	870 019 (19.37)	1 691 726 (32.60)
Small factories	343 208 (7.00)	827 015 (18.41)	769 923 (14.84)
Cottage and household industries	3 899 855 (79.51)	2 794 833 (62.22)	2 727 250 (52.56)
Total	4 904 768	4 491 867	5 188 889

Source: Central Bureau of Statistics, *Census of Industry, 1974/75, National Industry Statistics, 1987*, and *Home Industry Statistics,1986* (Jakarta, 1974/75, 1986 and 1987).

Note: Figures in parentheses show the percentage distribution.

Table 2. Number of establishments by size group of industry, 1974/75, 1979 and 1986

Type of industry	*1974/75*	*1979*	*1986*
MLSIs	7 091 (0.55)	7 960 (0.52)	12 765 (0.83)
Small factories	48 183 (3.74)	113 020 (7.35)	94 509 (6.18)
Cottage and household industries	1 234 511 (95.71)	1 417 802 (92.14)	1 422 593 (92.99)
Total	1 289 785	1 538 782	1 529 867

Source: See table 1.

Note: Figures in parentheses show the percentage distribution.

Table 3. Manufacturing value added by size group of industry in current prices, 1975 and 1986
(Billion Indonesian rupiahs)

Type of industry	*1975*	*1986*
MLSIs	631.8 (77.8)	10 197.3 (80.6)
Small factories	97.4 (12.0)	899.4 (7.1)
Cottage and household industries	82.6 (10.2)	1 555.7 (12.3)
Total	811.8	12 652.4

Source: See table 1.

Note: Figures in parentheses show the percentage distribution.

In terms of number of establishments, it can be seen that the shares of CHIs have slightly declined from about 96 per cent in 1974 to 93 per cent in 1986, whereas the shares of both MLSIs and small factories have increased between 1974/75 and 1986.

During this period, employment in MLSIs was greater than in small factories, although much lower than total employment in CHIs. In comparison with small factories, there was a significant increase in the number of persons engaged in MLSIs. While the number of these relatively modern and well-established industries increased by about 80 per cent from 1974 to 1986 (or 5 per cent annually), there was a 156 per cent increase in the number of employed people (or 8 per cent annually). The increase in the number of workers in MLSIs at a faster rate than in small factories indicates that the former units of production are playing an increasingly important role in labour absorption, although they are still relatively more capital-intensive than small factories and CHIs.

Employment in MLSIs has been created, to a significant extent, through the establishment of new enterprises, especially in the 1980s. Massive foreign investments and a wide range of economic reforms, which provided relatively more facilities to large well-established businesses than to small relatively poor units, are suggested by some analysts as the major impulses to the growth of MLSIs in the 1980s (Poot, Kuyvenhoven and Jansen [1] and Kuyvenhoven and Poot [2]). It should also be borne in mind that over time, many small factories must have grown into medium-scale industries, causing a reduction in the number of small factories and adding to the number of MLSIs.

Thus, as Anderson points out, based on the results of his study on SSIs in a number of developing countries, the recorded growth of output

and employment in MLSIs can be divided into: the growth of once small firms through the size structure; and the expansion of already large domestic and foreign concerns ([3], p. 914).

From the tables above it can be concluded that the figures do appear to offer evidence for the notion of dualistic development patterns in the industry of Indonesia, with the growing MLSIs and SSIs engaging in the same activities but with different characteristics and performances. The evidence, however, does not seem to support Anderson's proposition that CHIs tend to decline in favour of large and more efficient industrial units in the course of an industrialization process [3]. Even though their share in total manufacturing employment has declined, the CHIs still have a significant number of establishments and level of employment in absolute terms.

Indonesia is industrializing, but the overall spatial development and economic patterns of the country do not, as yet, suggest that an industrial transformation is occurring. Still, many CHIs, even in a modern city like Jakarta, are not giving way to modern firms because they are still enjoying what is called "natural" protection. Most CHIs sell their products only to local markets that are unserved by large firms or isolated from imported goods, and they still have their own traditional clients that come mostly from low-income groups. There is also a tendency for CHIs and small factories in Indonesia to survive and even grow, although the country is in the process of modernization of its economy. SSIs in developing countries are very important for the poor section of the population. Thus, as long as income distribution in Indonesia is still uneven, with the majority of the population in the country claiming only a small part of the country's national income, then many people from low-income groups will still need SSIs, either to meet their need for inexpensive consumer goods or as an important source of income.

It is very possible that the picture of growth and decline for CHIs (in terms of the number of establishments and employment), shown in tables 1, 2 and 3, is caused, to a large extent, by differences in time reference periods of different surveys. The 1986 figures are point estimates for the month of January, whereas the 1974/75 figures represent the average annual number of establishments and persons employed. These differences in time reference period are important, because the activities of CHIs are highest during the agricultural slack season (from August to October), and a considerable number of people who are normally engaged in agriculture work in CHIs. During the agricultural peak season (December and January), production in CHIs is at its lowest and seasonal workers and small farmers return to agriculture (White [4] and Hart [5]). However, revised figures indicate that the seasonality adjustment to some extent weakens the trend towards a deterioration of the position of CHIs, but by no means does it reverse it (Philipsen [6]).

In value added it can be seen that the share of SSIs in total manufacturing value added (MVA) is much less significant when

compared to their share in employment, reflecting their relatively low productivity. In 1986, the share of CHIs in total MVA was greater than that of small factories, whereas in 1975 it was lower. The share of CHIs in 1974 was about 10 per cent, while that of small factories was 12 per cent. In 1986, the share of CHIs was 12.4 per cent, as compared to 7 per cent for small factories. One interesting finding from table 3 is that the nominal growth of value added was higher for CHIs (1,783 per cent) than for MLSIs (1,514 per cent) and for small factories (823 per cent).

However, for a number of reasons there is some doubt about whether this truly reflects the actual development of the industries in terms of productivity or potential earnings. They include the fact that the price structure might be different among the size groups, and annual production values and costs (and hence nominal value added) of an industry may be affected not only by annual rates of national inflation, but also the different rates of inflation between rural and urban areas, depending on the structures of the economy. This would lead to variable production values among different industries, or even within industries of the same size in different locations. In addition, the value added figures in table 3 have not at all dealt with the problem of extensive underreporting of value added and output, especially in SSIs. Entrepreneurs in small factories and CHIs often do not have records of their income and expenses. Data relating to capital, value added, output and sales are often based on guesswork. Assuming that underreporting of value added is greater in the case of the CHIs than small factories (and MLSIs), than the value added growth figure for the CHIs in table 3 should only be seen as an indicator that their value added has grown rapidly as compared to that of small factories and MLSIs (Philipsen [6]).

By adjusting the figures with the wholesale price index for each particular year, the real growth of value added (average per annum) can be estimated for MLSIs, small factories and CHIs, that is 15.1 per cent, 9.4 per cent and 16.7 per cent, respectively (Poot [7]). These results show that even in real terms, the growth of value added has been considerable in all three size groups, and the CHIs still perform better than the other two size groups.

B. Differences in productivity and earnings: a sectoral analysis

The above analysis has only concerned aggregated figures. In this section some data on employment, value added and the number of establishments at the two-digit level of industrial classification are presented.

From table 4 it can be seen that in almost all industries except wood products, MLSIs accounted for a significant part of total MVA in 1974/75. It can be expected that in all industries they have consolidated or strengthened their position in 1986.

Table 4. MVA by size group and industry, 1974/75 and 1986
(Percentage share in industry total)

Industry	Year	MLSIs	Small factories	CHIs	Total
Food, beverages and tobacco	1974/75	78.3	8.8	12.9	100.0
Textiles, wearing apparel and leather	1974/75	84.4	7.3	8.3	100.0
Wood, wood products and furniture	1974/75	30.2	16.9	52.9	100.0
Paper, paper products, printing and publishing	1974/75	93.3	5.0	1.7	100.0
Chemicals, rubber and plastic products	1974/75	93.3	5.0	1.7	100.0
Non-metallic mineral products	1974/75	54.2	14.7	31.1	100.0
Fabricated meta products and machinery	1974/75	89.8	5.8	4.4	100.0
Other 1974/75	79.4	15.5	100.0		
Total	1974/75	77.9	8.7	13.4	100.0
	1986	80.0	6.7	13.3	100.0

Source: See table 1.

Note: Individual industry data not available for 1986.

Table 5 shows employment in manufacturing by size group and industry. Tables 5 and 6 have the limitation that a large number of CHIs have been classified as "other industries" in 1986. Care should therefore be exercised in drawing firm conclusions from these tables.

Table 5 shows that only in the category of "other" industries and in paper, paper products, printing and publishing have MLSIs lost some ground to CHIs in terms of employment. In other words, the contribution of the CHIs has declined in industries where MLSIs have gained importance. Small factories showed a mixed picture in 1986, as they experienced a lower share in certain industries, while they were able to increase their share in others.

Table 5. Manufacturing employment by size group and industry, 1974/75 and 1986
(Percentage share in industry total)

Industry	*Year*	*MLSIs*	*Small factories*	*CHIs*	*Total*
Food, beverages and tobacco	1974/75	18.2	10.3	71.5	100.0
	1986	25.9	15.9	58.3	100.0
Textiles, wearing apparel and leather	1974/75	40.8	13.0	46.2	100.0
	1986	51.1	17.4	31.5	100.0
Wood, wood products and furniture	1974/75	2.4	16.9	52.9	100.0
	1986	16.6	9.7	73.7	100.0
Paper, paper products, printing and publishing	1974/75	62.8	23.0	14.2	100.0
	1986	62.1	21.3	16.6	100.0
Chemicals, rubber and plastic products	1974/75	79.5	11.8	8.7	100.0
	1986	86.2	8.7	5.2	100.0
Non-metallic mineral products	1974/75	9.0	17.1	73.9	100.0
	1986	15.4	20.2	64.4	100.0
Fabricated metal products and machinery	1974/75	47.6	18.9	33.5	100.0
	1986	58.7	12.8	28.5	100.0
Other	1974/75	14.5	9.5	76.0	100.0
	1986	2.9	4.4	92.7	100.0
Total	1974/75	19.3	10.0	70.7	100.0
	1986	30.4	13.8	55.8	100.0

Source: See table 1.

However, based on this evidence, it is still difficult to affirm that in the future all CHIs in those industries will be wholly outcompeted by MLSIs (or small factories), because, as was noted, many CHIs in certain regions or locations are still being naturally protected.

The establishment figures in table 6 give an almost identical picture. In terms of the number of establishments, CHIs have gained importance in only three industries. While the MLSIs have lost some importance in the category of other industries and in paper, paper products, printing and publishing, the small factories have lost importance in those industries where CHIs have made progress.

The figures suggest that CHIs and to a lesser extent the small factories are losing ground in some manufacturing subsectors, and to some

extent displacement by MLSIs has taken place during the period under review. There is also some indication that within the small industry segment a sectoral transformation has occurred in terms of both employment and value added. However, it is difficult to draw firm conclusions from these figures because the data are still too aggregated.

Table 6. Number of manufacturing establishments by size group and industry, 1974/75 and 1986
(Percentage share in industry total)

Industry	*Year*	*MLSIs*	*Small factories*	*CHIs*	*Total*
Food, beverages and tobacco	1974/75	0.5	5.3	94.2	100.0
	1986	0.7	7.4	91.9	100.0
Textiles, wearing apparel and leather	1974/75	1.4	3.9	94.7	100.0
	1986	1.5	8.0	90.5	100.0
Wood, wood products and furniture	1974/75	0.1	1.0	98.9	100.0
	1986	0.2	2.8	97.0	100.0
Paper, paper products, printing and publishing	1974/75	7.6	22.9	69.5	100.0
	1986	5.3	20.5	74.2	100.0
Chemicals, rubber and plastic products	1974/75	11.8	18.2	70.7	100.0
	1986	12.5	20.5	67.0	100.0
Non-metallic mineral products	1974/75	0.5	7.7	91.8	100.0
	1986	0.8	9.1	90.1	100.0
Fabricated metal products and machinery	1974/75	2.6	15.7	81.7	100.0
	1986	3.1	12.3	84.6	100.0
Other 1974/75	0.33.1	96.6	100.0		
	1986	0.1	1.2	98.7	100.0
Total	1974/75	0.6	3.7	95.7	100.0
	1986	0.8	5.7	93.5	100.0

Source: See table 1.

Table 7 shows a great variation in productivity and capital intensity between SSIs and MLSIs within industries as well as between SSIs in different industries. Labour productivity - value added per worker (VA/L) - of MLSIs is higher than that of SSIs in all industries. This can be explained by the fact that the former group of industries use

relatively more capital-intensive production techniques as compared to the latter group. As also expected, CHIs (for which unfortunately no data are available) have the lowest labour productivity reflecting their high share in employment and their low share in MVA.

Table 7. Value added per worker (VA/L), value added per unit of capital (VA/C) and capital per worker (C/L) by size group and industry, 1986 a/
(Million Indonesian rupiahs)

	VA/L		*VA/C a/*		*C/L b/*	
Industry	*SSIs*	*MLSIs*	*SSIs*	*MLSIs*	*SSIs*	*MLSIs*
Food, beverages and tobacco	0.90	5.31	0.73	1.00	1.22	5.30
Textiles, wearing apparel and leather	0.99	3.44	2.29	1.33	0.43	2.58
Wood, wood products and furniture	1.05	5.28	1.29	1.27	0.82	4.17
Paper, paper products, printing and publishing	2.25	4.91	1.63	0.54	1.38	9.16
Chemicals, rubber and plastic products	2.08	5.63	2.84	0.86	0.73	6.58
Non-metallic mineral products	0.68	5.96	2.26	0.55	0.30	10.84
Basic metal industries	-	46.58	-	1.44	-	32.36
Fabricated metal products and machinery	1.28	7.10	1.61	3.08	0.80	2.31
Other	1.00	2.95	3.48	0.20	0.29	14.99
Total	1.00	5.53	1.19	1.07	0.84	5.17

Source: See table 1.

a/ No data available for 1974/75, and no data specified for CHIs and small factories.
b/ Per unit of horsepower.

However, many have criticized the use of VA/L as a measure for labour productivity in small industries (especially in CHIs). According to Islam [8], value added per man-day would be a more appropriate measure of labour productivity, but reliable information on this issue is not available. It may be expected that, by using the measure suggested by Islam (if the data are available), the difference in labour productivity between different size groups of industries is somewhat smaller than that

shown in table 7, but nevertheless it remains still significant (Philipsen [6]).

The substantial differences in productivity levels exist largely because of the differences in the degree of mechanization, the opportunity in gaining economies of scale favouring MLSIs, and the irregularity and part-time nature of work in SSIs, especially in the very traditional CHIs. Furthermore, the underreporting by entrepreneurs in SSIs, especially in CHIs that do not keep systematic records, different price structures in rural and urban areas, and the fact that some proportion of output, especially in CHIs, may be for self-consumption, and is therefore not included in the reported value of output and value added, may cause productivity in SSIs to be understated (World Bank [9]). It could also be that most workers in SSIs had been working below their potential because of their low skills, especially in CHIs.

With respect to capital productivity, it is expected that VA/C or energy used would be higher in SSIs than in MLSIs, as shown in table 7 (with the exception of food industries and fabricated metal products, machinery and equipment). This may be explained by the fact that SSIs use less capital per worker than do MLSIs.

From the above ratios, the last column in table 7 shows the calculated capital intensities of SSIs and MLSIs. This capital-labour ratio shows that, as expected, SSIs are very labour-intensive production units, with capital intensities in every industry lower than those of MLSIs.

Finally, table 8 shows average earnings per worker by size groups of industries. SSIs are seen as an important income generator, either as primary or secondary sources, or as permanent or temporary sources, for thousands of people, especially in rural areas, in Indonesia. This is the most important reason why the Government of Indonesia should support the development of SSIs in the country.

Not only the figures in table 8 but also a number of case-studies indicate that wages and incomes vary between SSIs and MLSIs, between small factories and CHIs, and from one activity to another within particular size groups of industry. For example, in developing countries, food preparation, bamboo-weaving, and mattress-making are traditional activities with low remuneration. Such activities are usually carried out in household-based units (CHIs) employing only family labour. Their average weekly incomes range from 5,000 Indonesian rupiahs (Rp) to Rp 6,500, depending on the market size they serve. Most producers are not able to meet increased demand because of, for example, lack of capital. They can therefore hardly increase their incomes, even when large demand exists. In such a market situation, they will first respond by increasing their prices if it is possible without losing their consumers; but after that they have nothing left to sell, and the extra income from the increased prices is for the most part not enough to provide the capital needed to continue their activity (Smyth [10]).

Table 8. Average earnings per worker in manufacturing industries by size group, 1974/75 and 1979
(Market prices in thousands of Indonesian rupiahs)

Industries	*Year*	*Size groups of industry*			
		MLSIs	*Small factories*	*CHIs*	*Average (all sizes)*
Food, beverages and tobacco	1974/75	110.41	38.37	2.85	21.66
	1979	271.81	61.80	11.82	58.76
Textiles, garments and leather	1974/75	116.44	31.66	1.66	34.25
	1979	269.93	82.45	8.05	66.96
Wood and wood products (including furniture)	1974/75	171.67	83.10	1.36	5.56
	1979	377.95	132.61	9.43	45.67
Paper, paper products, printing and publishing	1974/75	176.64	52.31	12.45	111.90
	1979	494.24	151.87	..	396.54
Chemicals, coal, petroleum, rubber and plastic products	1974/75	175.69	42.67	11.79	132.29
	1979	563.21	131.26	..	501.44
Non-metallic minerals (excluding petroleum and coal products)	1974/75	183.52	59.77	6.66	27.10
	1979	456.21	90.17	13.77	87.27
Basic metal products	1974/75	264.08	..	..	264.08
	1979	1 000.61	..	..	1 000.61
Fabricated metal products, machinery and equipment	1974/75	231.03	62.23	11.33	111.51
	1979	550.04	119.47	70.59	296.84
Other	1974/75	352.64	34.90	4.65	41.38
	1979	273.25	94.40	38.14	54.26
Average	1974/75	140.99	47.49	2.57	24.39
	1979	368.82	84.72	13.59	95.68

Source: Central Bureau of Statistics of Indonesia, *National Industry Statistics, 1986* (Jakarta, 1986).

But CHIs are also found in industries with reasonable earnings and even with growth potential (and hence higher incomes), such as wood and metal products. These have relatively low economies of scale but high earnings and growth potential (and hence higher incomes), as in textiles, leather and non-metallic mineral products, in which about 20.1 per cent of CHI employment is found, with lower, but not dismally low, average earnings.

Incomes also vary among different size groups of industry within the same branch. Small factories and MLSIs, being more developed than

CHIs, earn more in all manufacturing industries for a number of reasons, among them skills and investment (Van Dijk [11]).

A case-study in Aceh using a sample of 110 CHIs and 71 small factories reveals that yearly family incomes (defined as revenue of the units minus cost of hired workers, material and operations) are much higher in small factories than in CHIs, whereas the imputed profit rate (calculated by deducing from the owner's income an equivalent labour income based on the average wage of hired workers in the sample as a whole) in CHIs is higher than in the small factories (Arian, Cohen and Dongelmans [12]). The existence of significant differences in yearly incomes and profit rates indicates a high degree of segmentation in SSIs in terms of employment, assets and value added.

The case-study also found that the average income per man-day worked by the owner, permanent labour and temporary labour in SSIs varies from one industry to another. The average owner's income per man-day worked is relatively high in food and beverages and low in salt-making. This low value, according to the investigators, reflects the low value added per man-day in the salt-making sector, which is quite labour-intensive (Arian and Dongelmans [13]). It is also found that permanent labour is paid relatively much better in textiles and garments than in salt-making and wood products (such as furniture). The average income per man-day in the latter subsectors is low because many CHIs fall within them (for instance, bamboo products).

Finally, the results of the case-study show that in SSIs the income per day of temporary labour does not differ significantly from the average pay of permanent labour. In industries such as wood products and non-metal products, the income of temporary workers is higher than that of permanent labour.

From table 8 it can be seen that the average earnings per worker in MLSIs were Rp 141,000 in 1974; they increased to Rp 1,377 million by 1986. In small factories, on the other hand, they were Rp 47,500 in 1974; they rose to Rp 298,500 by 1986. Corresponding data for CHIs are only available for 1974/75 and 1979. In 1974/75 the average earnings per worker were Rp 2,600, and in 1979 they were Rp 13,600. One important reason for the average earnings in CHIs being the lowest is because their productivity is very low, reflecting the fact that in CHIs skills of workers (mostly the wife and children) are very low, and they use hardly any modern technology or new machines.

However, as discussed above, it is questionable whether the evidence shown in table 8 reflects the actual developments of the industry in terms of potential earnings. Especially in the case of CHIs, it is difficult to collect data on profit or net earnings. The owners of these small family industries may not distinguish clearly between business and non-business accounts. Moreover, entrepreneurs in CHIs often do not have records of their income and expenses. Data relating to income and expenses are often based on guesswork (Philipsen [6]).

C. Production linkages: an input-output approach

Many studies show that in developing countries an important source of demand for goods of SSIs stems from their forward production linkages with other industries in the domestic economy. Whereas an important source of inputs for production in SSIs comes from their backward production linkages with other industries. The studies found that two sectors that have existing or potentially strong production linkages with SSIs are agriculture and MLSIs.* A number of input-output studies in developing countries incorporating SSIs show that these production linkages between SSIs and agriculture are quite significant.** Johnston and Kilby [14] and Mellor [15] argue that production linkages between SSIs and agriculture are an essential ingredient in a "rural-led strategy of growth", and certainly it is important as a supply factor for the growth of many SSIs, especially in rural areas, in developing countries.

Forward production linkages of SSIs to agriculture in developing countries consist mostly of simple traditional tools, machines and equipment for agriculture and of many other farming inputs reflecting intermediate technology, such as improved implements, irrigation pumps and motors, and power tillers. These so-called rural input linkages between SSIs and agriculture are likely to be higher in Asia than in Africa, where irrigation (with its requirements for pumps and construction inputs) and the use of intermediate farm equipments are much less extensive.***

Backward production linkages from SSIs to agriculture (forward production linkages from agriculture to SSIs) reflect further processing from agricultural crops to final agricultural products such as food (for instance, small food-processing industries). Such production linkages are frequently quite significant in a number of developing countries, and there is evidence (for example, from Thailand) that value added generated in these agricultural-output-oriented SSIs is significantly larger than value added generated in SSIs providing agricultural inputs (World Bank [23]). A study of Falcon [24]**** shows that in West Pakistan crop flows from agriculture to small processing industries are much larger than the flows to large-scale processors. Yet many other empirical studies, such as that of Miller [25] on production linkages between agriculture and small-scale palm-oil-processing in eastern Nigeria and those of Timmer [26]

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*See, for example, Johnston and Kilby [14], Mellor [15] and Liedholm and Mead [16].

**See three important studies on this subject: Byerlee [17]; Mellor and Mudahar [18] and Krishna [19].

***For empirical studies, see Cartiller [20], Child and Kaneda [21], Johnston and Kilby [14] and Kilby and Liedholm [22].

****Unfortunately, there are not many recent studies (for example, from the 1980s) on this issue in developing countries. That is why the studies presented here date from the 1960s and 1970s.

and Spencer and Byerlee [27] on small rural rice mills and production in Indonesia and Sierra Leone, respectively, show the same evidence. All these findings indicate that not only local (rural) SSIs are more important than MLSIs for agriculture, but agriculture itself is also a crucial growth impulse for the rural SSIs. The sector seems to be more important than MLSIs for the rural SSIs in developing countries. The extension of production linkages between agriculture and rural SSIs, as also argued by Mellor [15] and others, is very important as a base for the rural industrialization process in developing countries.

The second important sector that has strong existing and potential production linkages with SSIs, especially those located in or near urban areas, comes from MLSIs (interindustry relationships). Most available studies discuss forward production linkages from SSIs to MLSIs in terms of subcontracting (or vertical disintegration) and, to a lesser extent, other kinds of arrangements such as franchising and ancillarization (Späth [28]). Limited evidence indicates that the subcontracting of SSIs with MLSIs is quite prevalent in Asia, especially in Japan, Republic of Korea and Taiwan Province, and also, to a lesser extent, in countries like India, Indonesia and Thailand,* whereas it is rare in Africa, probably due to the smaller markets as well as to the tendency of foreign-owned import substitution firms to import a large share of their input from abroad instead of using domestic or local inputs (Page and Steel [35]).

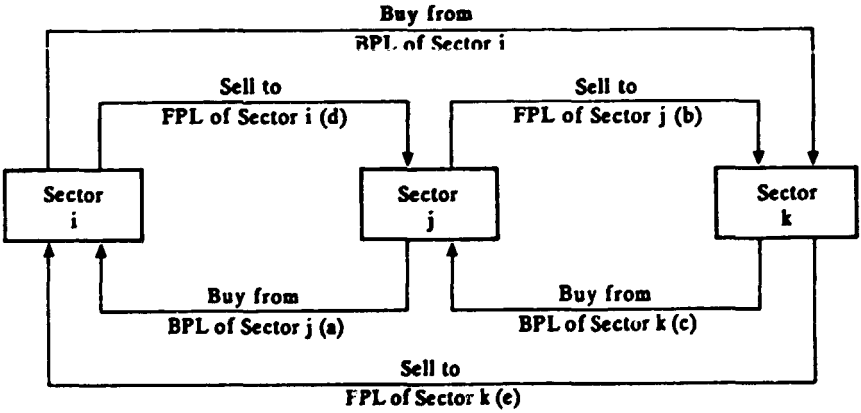
MLSIs, especially the large ones, are in many developing countries being increasingly heralded as being the necessary supporters for SSIs, transferring various resources, such as working capital, technical know-how, equipment and material, and providing access to domestic, and to a certain extent, to export markets through such production linkages. Such relations may provide benefits to SSIs in terms of growth, not only through their demand side but also through their supply side (Mead [36]). Many governments in developing countries have therefore launched special incentives to encourage the production linkages, either through official cooperation such as those mentioned above, or through market transactions in the products, between both size groups of industries (Cawthorne [37]). But such arrangements also have some negative aspects. The affiliation between MLSIs and SSIs bears the danger of control on one side and dependence on the other. Such asymmetric exchange relations controlled by the parent firms (MLSIs) or the use of SSIs for buffering costs and risks inhibit viable development for SSIs (Cawthorne [37] and Späth [28]).

*For studies in specific branches of activity, see Vepa [29], Watanabe [30], Lall [31], Mead ([32], [33]) and Smyth [34].

D. Intersectoral linkage analysis: backward and forward

Within the framework of an input-output model, production by a particular sector has two kinds of economic effects on other sectors in the economy. If sector j increases its output, this means there will be increased demand from sector j for intermediate or capital goods produced by other sectors in the economy. This is the direction of causation in the usual demand-side model, termed backward production linkage. Thus, the basic idea of the backward production linkage can be formulated as follows: it is to trace output increases which occur in "supplying" sectors when there is a change in the sector using their outputs as inputs. On the other hand, increased output in sector j also means additional amounts of product j that are available to be used as inputs to other sectors for their own production. That is, there will be increased supplies from sector j (as a seller) for the sectors which use good j in their production. This is the direction of causation in the usual supply-side model, termed forward-production linkage, as shown in the figure.

Backward and forward production linkages



Source: T. Tambunan, "A production linkage analysis: the case of small-scale industries in Indonesia", Oeconomic Paper No. 2, *Oeconomic Bulletin* (Rotterdam, Erasmus University, 1991).

BPL = backward production linkage
FPL = forward production linkage

In this simple description of an economic system with only three sectors, it can be seen that, for instance, the forward production linkage of sector j (which sells goods to sector k) is the backward production linkage of sector k (which pays for the goods in money; thus b=c). It is also the same for the connections between i and j. For sector j, its forward production linkage (b) plus the forward production linkage of sector k (e) gives its total output (direct plus indirect) effects.

1. Backward production linkages

In its simplest form, a measure of the strength of the backward production linkages of sector j (that is the amount by which production in sector j depends on inputs from other sectors) is given by the sum of the elements in the jth column (in an input-output or a matrix table) of the direct-input coefficients matrix (or technical coefficient matrix A), namely $\Sigma\ a_{ij}$. Since the coefficients in A are measures of direct effects only, this is usually known as the direct backward production linkages:

$$DBj = \sum_{i=1}^{n} a_{ij}$$

In most cases, however, both the direct and indirect (or total) effects of an impulse are of greater interest. The elements of the so-called Leontief inverse matrix incorporates both direct and indirect connections between sectors. Therefore, a more useful and comprehensive measure of the backward production linkage of sector j would be given by the sum of the elements in the jth column of the direct and indirect coefficients matrix or input inverse, $(I-A)^{-1}$, where the elements can be noted as a_{ij}. Thus, the total backward production linkage for sector j is:

$$DBj = \sum_{i=1}^{n} a_{ij}$$

These are the output multipliers for each sector. They measure the total impact on gross output when final demand for the jth sector changes by unit and all other final demands are set to zero.

2. Forward production linkages

When examining forward production linkages, the crucial relationship is that between output of sector, for example i, and its uses

by other sectors. If this relationship is fixed so that each sector distributes its output in fixed proportions to other sectors, then a direct output coefficient matrix (B) is created by dividing the intermediate deliveries by their respective row total. The sum of the elements in the ith row of this direct-output coefficient is given by $DFi = \sum b_{ij}$. Thus, the direct forward production linkage is:

$$DFi = \sum_{i=1}^{n} b_{ij}$$

Similarly, a measure of the direct and indirect effects (that is total forward production linkages) of sector i is given by the sum of the elements in the ith row of the output inverse matrix, $(I-B)^{-1}$, whose elements can be denoted as b_{ij}^*. Thus, the total forward production linkage is:

$$TFI = \sum_{j=1}^{n} b_{ij}^*$$

When value added in the ith sector increases by unity, this will induce forward impulses throughout the economy as using sectors respond to the stimulus.

3. Empirical findings

In order to examine the production linkages of SSIs with other sectors in the economy of Indonesia, use is made of an Indonesian input-output table of 1985 (at producers' prices), with 13 aggregation sectors, in which the manufacturing sector is divided into, on the one hand, SSIs and, on the other, MLSIs.

In table 9, the input structures of both SSIs and MLSIs are shown. It can be seen from this table that the majority of SSIs in Indonesia are basically agro-processing activities, as 78 per cent of their total intermediate inputs come from the agricultural sector. Manufactured inputs of the SSIs delivered by the MLSIs amount to almost 10 per cent of their total intermediate inputs. Only 19 per cent of their total manufactured inputs are delivered within the SSIs. Table 9 also shows that the MLSIs are the second important sector after the agricultural sector, followed by the commerce sector, for the direct backward production linkages of the SSIs.

Table 9. Input structure of SSIs and MLSIs in Indonesia, 1985
(Percentage)

Origin	*SSIs*	*MLSIs*	*Share of imported inputs*
Intermediate inputs			
Agriculture	66.11	16.56	6.1
Mining	0.23	2.31	30.98
Manufacturing			
SSIs	1.97	1.60	..
MLSIs	8.36	30.46	46.66
Oil-refining	0.80	1.79	12.67
Liquefied natural gas	..	..	..
Electricity	0.23	0.78	..
Construction	0.08	0.23	..
Commerce	4.41	7.74	0.17
Transport	1.42	2.81	0.33
Public administration	..	..	..
Other services	0.17	0.72	19.26
Total intermediate inputs, A	84.55	66.44	20.75
Gross value added			
Wages	4.45	7.97	..
Operating surplus	8.31	21.79	..
Depreciation	2.09	3.40	..
Subsidies	...	-3.08	..
Indirect taxes	0.60	3.48	..
Gross value added, B	15.45	33.56	..
Total, A and B	100.00	100.00	..

Source: Central Bureau of Statistics, *Indonesian Input-Output Table 1985* (Jakarta, 1989).

In table 10, the output structures of both SSIs and MLSIs are shown. In regard to intermediate demand, it can be seen that the majority of SSIs are activities oriented towards construction (intermediate) goods. The second important market, after the construction sector, for SSI goods in Indonesia is the commerce sector, followed by MLSIs. In contrast with experiences in many other developing countries, the agricultural sector is not so important as a client for SSI goods. From total intermediate demand for SSI goods, only about 7 per cent goes to the agricultural sector. This share is very small indeed as compared with 27 per cent and 21 per cent for the construction sector and MLSIs, respectively. In terms of market location, table 10 shows that SSIs are more domestic- or local-market-oriented than MLSIs.

Table 10. Output structure of SSIs and MLSIs in Indonesia, 1985
(Percentage)

Destination	*SSIs*	*MLSIs*	*Share of exports in manufacturing output*
Intermediate inputs			
Agriculture	1.25	6.20	5.43
Mining	0.22	0.85	58.50
Manufacturing			
SSIs	2.00	3.50	2.90
MLSIs	3.80	30.50	12.10
Oil-refining	0.03	0.30	12.90
Liquefied natural gas	0.01	0.11	105.50
Electricity	0.06	0.33	..
Construction	5.00	18.11	..
Commerce	4.00	3.00	6.90
Transport	0.30	0.92	9.00
Public administration	..	..	..
Other services	1.40	6.10	0.40
Total intermediate demand	18.27	70.44	..
Total final demand	81.73	29.66 a/	..
Total output	100.00	100.00	..

Source: Central Bureau of Statistics, *Indonesian Input-Output Table 1985* (Jakarta, 1989).

a/ Net final demand (that is, minus imports).

E. Conclusions and suggestions for further research

This study based on aggregate data and a small number of case-studies has shown the obvious dualism in the manufacturing industry of Indonesia. The number of SSIs are still significant, despite heavy competition and other pressures from MLSIs and imported goods as a result of industrialization and the modernization process, and they provide the bulk of employment in the manufacturing sector of the country. However, within SSIs there has been a decline over time in the share of CHIs in employment and the number of establishments. In that connection, it would be interesting to know whether the decline was an inevitable consequence of industrialization or of a macroeconomic policy biased against CHIs and in favour of MLSIs and to a small extent, small factories. There is a need, therefore, for further research to explore the extent to which macroeconomic and micro-economic policies may have contributed to such a decline.

The analysis in this paper shows that disaggregated figures (though data presented here are still rather aggregated and limited) can reveal more than highly aggregated ones. It shows that there were differences in labour and capital productivity, factor intensity, and in average earnings per worker between small factories, CHIs, and MLSIs, indicating differences in the efficient use of resources between the size groups. However, there is still a need for further study at a more disaggregated level, in cases where, for example, the performance of CHIs in terms of productivity is relatively high in some branches of industry while relatively low in others, or higher or lower than small factories in the same branches, to determine the extent to which such differences can be explained directly by current sector-specific policies, or indirectly by current macroeconomic policies. Such policies are expected to have a strong influence on the markets for inputs as well as for outputs of SSIs.

A sectoral study is also required as a tool to understand differences in the performance of SSIs in different industries, because the development and growth of SSIs in an industry depends, to an important extent, on the development and growth of the industry itself. The study gives a rather clear picture showing agriculture as the most important sector in supplying inputs to SSIs (such as food-processing industries) in Indonesia. This evidence indicates that the growth of SSIs depends strongly on growth in agriculture. The policy implications of this are that government incentive measures supporting the agricultural sector can be as effective as (or even more effective than) specific SSI-oriented policies (such as extending credits to small entrepreneurs at very low interest rates) for the development and growth of SSIs. But unfortunately, in terms of the output structure of SSIs, the agricultural sector shows a very disappointing result, indicating the possibility that the ongoing green revolution in Indonesia generates greater demand for (intermediate and capital) goods produced by MLSIs and, to a certain extent, for imports. Hence, there is a need for further research, inciuding surveys of rural SSIs to find out why the direct forward production linkages from SSIs to the agricultural sector are so small. What policies are responsible for this, and what are the experiences of entrepreneurs in rural SSIs having production linkages with the agricultural sector?

From this linkage analysis it can be concluded that SSIs still have (potentially) significant effects on the economy as a whole. The agricultural sector plays an important role for the total backward production linkages of SSIs and the construction sector for the total forward production linkages of the industries. However, this evidence is based on data collected at one period. What the policy makers in Indonesia need is an analysis of the dynamic process of establishing production linkages between SSIs and the other sectors. To obtain this kind of information, field surveys plus periodic input-output data collection are required. It is important to know what policy as well as non-policy factors may have strong influences, negatively or positively, on the creation and the

continuity of production linkages between SSIs and other sectors of the economy.

Intersectoral linkages play an important role in the new industrialization strategies being introduced in developing countries. Through production linkages, SSIs can contribute more effectively to meeting the urgent needs of developing countries, including the creation of more productive employment, improved income distribution, more efficient industrial processes, increased exports of manufacturing goods, and rural industrialization. Table 11 summarizes the pattern of production linkages in Indonesia in 1985.

Table 11. Total backward production linkages (TB), total forward production linkages (TF), and total production linkages (TP) in Indonesia, 1985

Sector	*TB*	*Rank a/*	*TF*	*Rank*	*TP*	*Rank*
Agriculture	1.37	11	1.93	4	3.30	7
Mining	1.20	12	1.87	5	3.07	11
Manufacturing						
SSIs	2.21	4	1.29	10	3.50	4
MLSIs	2.23	3	2.24	1	4.47	2
Oil-refining	1.90	5	2.14	3	4.04	3
Liquefied natural gas	1.45	9	1.00 b/	12	2.45	12
Electricity	2.54	1	2.20	2	4.64	1
Construction	2.30	2	1.13	11	3.43	6
Commerce	1.47	8	1.61	8	3.08	10
Transport	1.87	6	1.62	7	3.49	5
Finance	1.38	10	1.83	6	3.21	8
Public administration	1.00 c/	13	1.00 b/	12	2.00	13
Other services	1.75	7	1.45	9	3.20	9

Source: Central Bureau of Statistics, *1985 Input-Output table of Indonesia* (Jakarta, 1985).

a/ Sector with the highest production linkages is ranked first.
b/ Has no forward production linkages with other sectors.
c/ Has no backward production linkages with other sectors.

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Methodological complexities in relating firm or plant size to economic efficiency

*Albert Berry**

The confrontation between the long-standing belief that economies of scale are widespread and important and the more recent variants of the "small-is-beautiful" theme has led a number of analysts to attempt to throw empirical light on the character of the cost curves relating size to costs and productivity, and hence on the potential contribution which may be expected of smaller firms [1]. As specialists in the industrial organization of developed countries have long been aware, such evidence can be hard to interpret and hence potentially misleading [2]. The complications impeding straight-forward interpretation are probably even greater in developing countries.

Some of the more serious of those complications are reviewed here. Three themes are emphasized: the need for accurate data on hard-to-measure variables, the need to interpret statistical observations in the light of an adequate understanding of the simultaneous determination of size structure and of efficiency (including possible size-related determinants of efficiency), and the need for different types of statistical evidence depending on exactly what policy (or other) question is being asked. While the difficulty in meeting all these conditions naturally weakens the policy conclusions that can be drawn from available studies, it does not render them irrelevant. It is important, however, that the next round of research in this area go beyond what has been achieved thus far, with a view to providing clearer conclusions and guidelines for policy makers and implementers.

The main contending ideas, which have helped to fuel the debates around the relative merits of units of various sizes, are: that economies of scale are quantitatively significant in many industries and that larger firms contribute more to growth through a greater tendency to save and a greater capacity to improve their technology; that small units, although they may be less efficient than larger ones, create more jobs and hence more income for people towards the bottom of the income distribution scale; and that small units are in fact often more efficient, for example, because the prices of labour and capital to which they respond more closely reflect the scarcity of those factors** than is the case with large firms. Many participants in the discussion of size think of smallness as

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**That is, the cost of labour to them (often their own labour) is low while that of capital is usually high.

a proxy for labour-intensity, so that at heart the debate involves the relative merits of more labour and more capital-intensive technologies. Others have concluded from this that is misleading to frame so much of the broader discussion in terms of size. In this paper, however, the importance of understanding how size is related to the economic characteristics of firms is taken as incontestable. It is clear that many economic policies inherently favour certain sizes over others. From a positive perspective, it is evident that different approaches or institutions are often needed to interface effectively with different size groups. Size is a much more manageable way to categorize firms for separate targeting by different credit or technical assistance institutions than, for example, a less easily measurable criterion like labour-intensity.

Analysis and debate on the relationship between size, efficiency, and employment has mainly involved the agricultural and the manufacturing sectors. Since the manufacturing results are more controversial, that sector is used as the basis for this discussion. Too little attention has been paid thus far to services.

Many studies of how factor intensities and productivities vary by size of firm are undertaken at the level of the industrial branch, some at the level of manufacturing as a whole, and few if any for the economy as a whole. The issue involved can be illustrated by asking whether it is more enlightening to know how factor intensity and factor productivity vary with size among automobile producers only or among all producers of means of transportation, including bicycles.* The answer depends partly on the structure of demand; if there is considerable flexibility so that many people treat the alternative forms of transportation as viable substitutes for each other, then comparisons within the wider category are likely to be meaningful; otherwise this is less so. Rigidity in factor supply may also preclude the shifting of output composition in response to relative price changes and diminish the interest of size-efficiency comparisons among firms producing a fairly heterogeneous range of goods. Normally, however, such shifting is possible to at least some degree (partly through international trade); hence size-related differences in efficiency or factor intensity which showed up at the aggregate level (for example, for the manufacturing sector as a whole) but not (or less) within the narrower group (such as textiles) remain more relevant the greater the flexibility of production composition.

Whatever the breadth of the sectoral categories within which they are made, efficiency comparisons among firms involve attaching prices to the inputs and outputs used by each. Use of the actual market prices paid by each firm may lead to quite different results from the use of, for

*A dilemma arises when product categories are defined in such a way as to reflect similarity of materials more than similarity of product use. It is then necessary to regroup products by potential substitutability in use for an analysis such as the present.

instance, some estimate of social opportunity cost of inputs. Such pricing issues are complicated, as will be seen below.

The following discussion focuses on the inevitable limitations of *ex post* cost and profit data as indicators of the economic performance of firms. The inadequacy of such data suggests the merits, both for the researcher and for the field worker, of complementing it with what can be learned from the so-called "survivor technique" of assessing efficiency* (the idea that it is the economically fittest which survive), and from *ex ante* engineering evidence. Combining insights from different approaches is likely to provide a much more solid basis for policy than relying on any one alone.

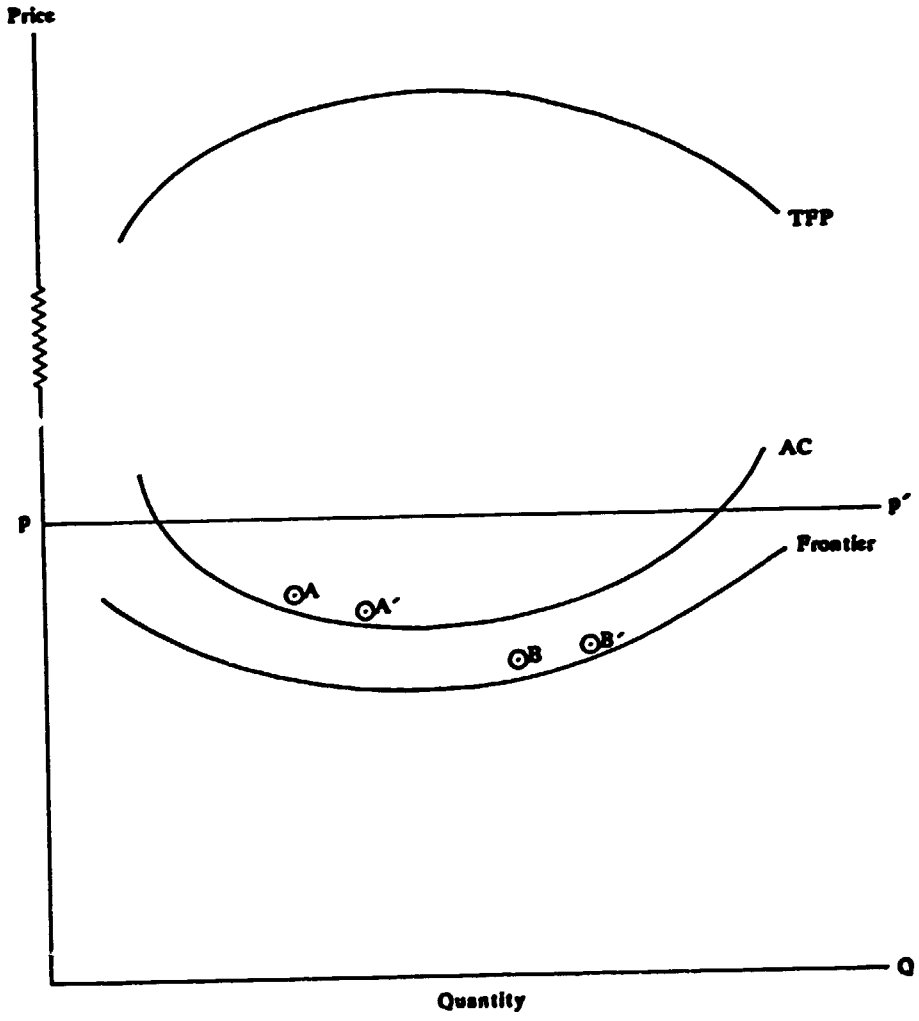
A. The simplest comparisons and the limited help they provide

The simplest conceptualization of why efficiency may vary with size (and the oldest element in economists' discussions of industrial organization and of optimal firm size) involves economies and diseconomies of scale. However, size-efficiency correlations could also result from factor or product price differentials, externalities, growth, disequilibria and a whole host of other possibly relevant factors. In trying to measure economies of scale with *ex post* data, the hope is to perform a sort of engineering experiment in which all firms producing a given good are basically identical except in size, so that any relationship between size and productivity is due exclusively to size. In such an experiment the resulting observations (one for each firm) would all lie on and therefore trace out the long-run average cost curve (AC of the figure), making it possible to directly deduce the impact of size on costs. The presence of other determinants of costs (location, for example, or capacity of the enterprise) does not greatly complicate this interpretation as long as those other determinants are uncorrelated with size, since they would then simply create a range of cost figures for the firms in any given size category. Instead of tracing out a curve like the solid line AC, they would define the sausage shaped from around the solid line, and that form would still indicate clearly enough any tendency for average costs to rise or fall with increasing size.

Unfortunately for any hopes of such a "clean and simple" interpretation of *ex post* data for the firms in a given industry, the processes of competition and growth complicate matters. The observed size structure reflects a complicated causal process which has implications for the interpretation of any statistical association between size and cost and

*For an early discussion, see J. R. Saving, "Estimates of optimum size of plant by the survivor technique", *Quarterly Journal of Economics*, vol. 75, No. 4 (November 1961), pp 569-607.

Relation of cost structure to size of production



AC = average cost
TFP = total factor productivity

efficiency. One important determinant of size structure is the character of market competition. If a given market were perfectly competitive, firms would not be expected anywhere but at the bottom of the AC curve, except for short periods, since the firms that were there would drive out the ones that were not. Where some product market imperfections facilitate the continued existence of above-minimum-cost firms, by preventing the competitive process from culling them out, the AC curve estimated from observations like those of the figure would provide a good deal of technical information on economies of scale. An intermediate case would arise if market forces screened out some but not all of the highest-cost firms (for example, those with average costs above the line pp′ representing the price of the goods). A regression line fitted to the observations below pp′, the only ones that would survive for any length of time, would be flatter. Similarly high-cost firms (whether towards the bottom or the top of the size range) were culled out (like AC*). This result would be accentuated if firms with costs just below the level P (and hence profits just barely enough to make the enterprise worthwhile) tried harder, thereby bringing their costs below what they would otherwise be.

Before considering in greater detail how size and cost structures are determined, and the complexities these processes create for the interpretation of statistical cost data, it is useful to distinguish the different issues on which statistical information might throw light. Many analyses focus on the question of which sizes achieve the lowest overall cost (highest total factor productivity* in economic terminology). This question is pertinent to the decision on which size categories should receive any additional resources whose allocation to the sector or industry in question can be controlled by public policy (for example, through the credit system). Thus if the data make it clear that medium-size firms are systematically able to achieve lower costs than others, policy should be designed to encourage the creation of that sort of firm. Two other distinct policy contexts where the information on how costs are related to size would be helpful should be noted. First, if a fairly wide range of profit levels persists in the industry (for example, all the firms under the line pp′ survive), the shape of the AC curve may also be useful in the decision as to which firms should be helped or serviced and how. If the evidence suggests that for any specific firm there exists a relationship between size and average cost taking the same shape as AC (but lying a constant distance above or below AC depending on whether the existing observation for that firm is above or below AC), and that size can be changed (perhaps at some costs), the firms most benefiting from an infusion of resources would be those at size ranges where the AC is most steeply downward sloping or, more precisely, where the corresponding

*Total factor productivity is the inverse of average cost when the price of each factor reflects its true social scarcity.

marginal cost curve - not shown here - is lowest. New resources would allow firm A to lower costs (moving to A´), whereas if firm B grew to B´ it would become less efficient. It is, in other words, the marginal rather than the average productivity of additional resources which should determine the allocation of those resources. Finally, if the causes of the gap between a firm's costs and those of the most efficient firms of its size (those lying on the curve labelled "frontier") can be influenced by credit, technical assistance or other types of public policy, resources should be directed to those firms suffering such inefficiency according to where such inputs are judged to be most productive. If the nature of the likely improvements involves less efficient firms imitating best practice, resources would be concentrated on them rather than on the more efficient firms. Needless to say this would not always be the case.

It is important that the three different types of policy issue alluded to be carefully distinguished from each other, since the cost data most relevant for one are not equally relevant to the others.

B. Determinants of size structure: the growth process

The fact that the size distribution of firms is not determined by a random process has, as noted above, various complicating implications for the interpretation of size-specific data. At least three processes are worth noting. First, when growth depends on efficiency there are two competing interpretations of any observed difference in costs across size categories. If there were no technically and organizationally based economies of scale (involving, for example, minimum size efficiency because of indivisibilities of the equipment used), but low-cost firms (those closest to the frontier in the figure) were able to grow faster than others, a positive relationship between size and efficiency would be observed in any statistical analysis, but its source would be efficiency leading to size rather than larger size being the source of greater efficiency. Where there are also true economies of scale, the factor just cited will make the data exaggerate them, and if the true cost curve is U-shaped, it is likely both to steepen and to extend the downward sloping portion and to decrease the slope of the upward sloping portion.

What are the policy implications of a situation where large size is associated with efficiency because the efficiency permits growth to a larger size? Since the larger firms do tend to be more efficient, even though it is not because of their size *per se*, an anti-large-size policy would obviously be inappropriate. Nor should policy be overly concerned with firm growth, since efficiency is an effective source of growth. The important thing is that the efficient firms not be lost from the game because they happen to start small; an effective "policy" would involve identifying the firms currently suffering (for example, from poor access to inputs) due to small size, and helping them to prosper and grow.

The tendency of firms to grow (or shrink, but most grow) not only complicates size-efficiency comparisons, but in one sense reduces their significance. Firms that are small now will not necessarily remain so. In that case, efficiency comparisons of firms currently differing in size should focus on average efficiency differences over time to see who comes out best.* Although the limited available knowledge of firm dynamics makes such an exercise difficult, when duly complemented by sensitivity analysis it is worthwhile.

C. Problems with prices

Development economics literature has from the beginning emphasized that factor market imperfections could create differences between the market price of factors (what the firm employing them pays for their use) and their social opportunity cost (SOC) - what the economy pays in terms of lost productivity somewhere else when they are employed in their present use. The normally greater labour-intensity of small firms has been widely linked to the belief that the actual (private) wage they face is lower than for larger firms, while the SOC of labour is presumed to be the same for both groups, perhaps equal to the wage faced by the small firms and certainly lower than that of the larger firms. Though this distinction between private and social prices is an important one, it may be equally important to recognize differences in the SOC of a given factor across firms or groups of firms. Such differences are certainly present, but it may be extremely difficult to measure accurately in the presence of the market imperfections that create them.**

The true SOC of putting a resource into any particular use depends on all the ramifications, both direct and indirect, of its use there. When there is a range of observed (market) prices for a given factor (such as unskilled labour), it is likely that some units of the factor (some workers) have a different SOC from others, in which case the opportunity cost of unskilled labour in a given use depends on where it (the labour) comes from, that is, which workers get the new jobs. Thus, the SOC of the sort of immobile female labour that might be drawn into subcontracting activities carried out in the house might, because of the limited alternatives of such labour, be much lower than the SOC of women with the same skills but able to work outside the home. The more detailed is

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*For a further discussion, see Cortes, Berry and Ishaq, pp. 168-169 [1].

**In the absence of such imperfections, private and social costs would be the same in the first place, hence there would be no interest in the question of resource misallocation nor any need for cross-firm comparisons of costs, factor productivities or other such measures of economic performance. Note the parallel to the empirical estimation of the shape of cost curves; the efficiency implications of economies of scale are clearest when resources are perfectly mobile among firms, but the economies are not empirically observable in that case.

the understanding of labour and capital market functioning, the more precisely can the true (social) costs of any given type of production be. From a practical perspective it is important to assess the likely merits of SOC pricing in project analysis, and this is especially true in the context of small enterprises because the factors they use tend not to be part of the more organized or formal labour and capital markets, making it less clear what their SOC is likely to be. In general, because small firms often appear to use "immobile" factors (labour that has to work in the home, capital that cannot be easily transferred to alternative uses), the SOC of their inputs may be very low. It would understate their true efficiency or contribution to the economy if in the evaluation of their performance, factors are costed either at some SOC estimated for the economy as a whole, or at average observed market prices. The ideal is always to use firm - specific SOC, but since it would normally be implausible to estimate these, the best practical option may be to simply rely on the (differing) prices actually paid by the various types of firms.

In short, in an economy characterized by serious enough imperfections that doubts exist about the validity of costing factors at markets prices, there may be no simple alternative to the use of those market prices, and this for at least two broad reasons. To begin with, although the first-best factor prices that would exist in the absence of the imperfections in question may be a matter of some interest and may even be calculable, they generally do not constitute the relevant SOC of those factors unless the whole economy can be moved to that first-best allocation of resources.* Second, as noted above, the SOC of any factor varies across firms for both natural and policy-induced reasons.

Often the actual price of a factor probably reflects SOC rather well. One source of economic efficiency is to be able to draw on socially cheap

*Suppose there are certain quantum measures of quantities of output, labour, capital and other inputs. As just noted, the application of market prices to those quantities to calculate economic efficiency has little meaning, since to be a measure of social efficiency as well as of profitability it requires the assumption of perfect markets for these inputs and outputs. But with perfect markets, inefficient firms would not be expected to survive, so there would be no need to check for efficiency in the first place. It is true, however, that data on profits would be of interest to distinguish between those firms only covering current costs and likely to fold in future and those covering all costs. Efficiency measures thus owe their interest to the presumption that not all markets are perfect. But when the same price is applied to all units of a factor, regardless of which type of firms is using them (for example, the SOC cost in some average sense), then the question being asked is: "What would be the relative efficiency of the observed firms if the shadow price applied were a true measure of the social opportunity cost for all of that factor?" It must be remembered that the resulting ranking of firms by efficiency would not generally be the same as that which would result if the firms actually faced those social prices, and that the social prices that would obtain in the absence of imperfections would generally differ from those now obtaining, the latter being a function of the imperfections themselves. In short, there is little or no meaning to applying the same SOC across the board, when the imperfections are of such a character that differences will remain for the foreseeable future.

resources. Thus the firm whose entrepreneur is a genius at buying cheap second-hand machinery may not look efficient when capital is measured at new replacement cost or even at the average cost of used machinery of that type, but the entrepreneur may be efficient.* The same argument holds for the small rural industrialist who takes advantage of lower-cost labour than that available in urban areas. A firm cannot be adjudged economically less efficient than another solely because it has an inferior ratio of physical outputs to physical inputs, if the two firms operate in partially isolated factor markets. There is no question that many small producers owe their economic survival and efficiency to lower factor prices that reflect lower SOCs. Many such firms would not be efficient if factor markets were perfect. But until significant changes are made to factor or product markets, they are efficient. Any measurement technique which labels them as "inefficient" is thus misleading.

It is with the factor entrepreneurship, whose heterogeneity across individuals is universally recognized, that the difficulty of assigning proper (and differing) SOC to different firms is most acute, with the result that attempts to cost it in efficiency calculations are very rare.** Accordingly, firms that would be adjudged economically efficient based on high profits and high output-to-input ratios may not be so, because their high-quality entrepreneurial inputs have not been properly evaluated. The opposite no doubt holds for many apparently inefficient firms. Where a firm has a strong profit performance only because of superior entrepreneurship, policy should not be geared to basically supporting that firm or type of firm, but to supporting that entrepreneur in applying his or her skills to full advantage.

Because efficiency is such a subtle concept under serious factor market imperfections, the survivorship test takes on particular value. More generally, the complications reviewed above underline the importance of simultaneous consideration of firm efficiency measured by output-to-unput ratios, firm survival (or existence), firm profits and market imperfections. If a firm is surviving, then evidence (for example, on total factor productivity) purporting to show that it is socially inefficient must, to be convincing, be accompanied either by evidence that it has negative profits (and is thus in a transition phase towards exit), or that market imperfections are creating a cost-lowering bias in its favour. If neither is the case, it would be reasonable to presume that the firm is indeed efficient due to use of lower SOC factors than other firms. In a world of very imperfect information, two consistent pieces of data

*Unless the entrepreneur's cheap purchases simply reflect the fact that the situation is one in which the entrepreneur, had he not made the purchase someone else would have done so and put the machine to the same use.

**Cortes, Berry and Ishaq, chapter 3 [1], assigned an SOC based on the earnings predicted for each individual by an earnings function taking account of their education and experience. But this gives at best a very rough approximation of entrepreneurial capacity.

are a reasonable requirement before the efficiency of any existing firm or group of firms is called seriously into question.

An important implication of the above discussion is that frequently outlays (payments) of different firms on a given factor (such as labour) may be a better indicator of how the SOC of that factor varies across the firms than the relative quantities, since differentials in prices paid may fairly accurately reflect differentials in SOC. In the case of output, its heterogeneity across firms producing the "same" item (but often with quality differences) leads most analysts to accept value (whether value added or value of production) as a better measure of output than number of units produced, and thus implicity to accept the assumption that where product price varies across firms the true or social value of the product varies in the same way. In short, the fact that the existence of market imperfections makes it desirable in principle to measure firm efficiency using factor (and perhaps product) prices different from those of the market does not necessarily imply that a better estimate of SOC prices than the market prices can in practice be found. It might, for example, be counterproductive to apply a common shadow price of labour across all firms instead of using actual wage bills as a measure of SOC if the wage bills, although they are generally not the same as the SOC of labour (the usual assumption being that they overstate it), contain much valid information on how the SOC of labour varies across firms.

D. Complementarities and substitutabilities across groups of firms

Comparisons of economic efficiency across relevant economic units have meaning only if the units or categories being compared are substitutes - both on the demand side and on the factor use side. Where, to go to the other extreme, two categories of firms are perfectly complementary on the production side, there is meaning neither to efficiency comparisons between the two nor to comparisons between either of them alone and any other categories. For comparison with other categories, the two must be lumped together as one category.* Thus where small labour-intensive producers are tenable only when they subcontract to large capital-intensive ones, it is the combined factor productivity (or, if the focus is on employment and income distribution, it is the combined average capital intensity) of the two which is relevant, not that of either the small or the large alone. Considerable information on the input-output structure of the economy is thus necessary before the policy

*Complementarity among groups of firms may also be present through externalities, as distinct from the market-based ties cited here.

implications of economic differences across firm sizes can be seriously assessed.

A similar issue arises with respect to public sector expenditures that support or are complementary to the economic activity of various groups of firms. Expenditures that affect the productivity of most groups of firms in similar ways are not pertinent to this discussion. Those which assist some firms much more than others are relevant; such resource costs should be lumped together with private costs of the supported firms in cross-group comparisons of efficiency and factors intensities.

E. Relevance of how size is measured

To the various conceptual difficulties already discussed in the assessment of the relationship between firm size and economic efficiency must be added the more prosaic but nonetheless important question of how size should be measured in the first place. The most common indicator, because it is the most widely available, is number of workers.* On the other hand, government programmes often distinguish firms according to levels of capital stock. Given that the labour-capital ratio (L/K) is a major concern of size-related programmes and policies, and that though it is significantly correlated with size it still varies considerably within any size category, the ranking of firms can be rather different according to which of these measures is chosen, and the observed relationship between capital-intensity (K/L) and size can vary strikingly.** Use of employment to measure size tends to downplay the increase in K/L with size, since firms with high L are classified as large even if in other respects they are less so, and firms so capital-intensive that output and K are high although employment is low are classified as small. Though it is for the variable K/L that the relationship to size is most sensitive to which of these two alternatives is used to measure size, factor productivities are also relatively sensitive.

Two other definitions of size are of interest, one occasionally employed and the other not. Level of output is a less biasing measure than either L or K, and is sometimes used. The best measure from a conceptual point of view is "total inputs" (which might or might not be measured to include purchased inputs as well as L and K). Its advantage over output lies in the fact that since output can be viewed as the combined result of total inputs and the level of technical efficiency (x-efficiency), large firms as measured by output will tend to be efficient

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*It could be argued that, even if it is preferred to measure only labour inputs, the number of workers would not be as good an indicator as total labour costs, which would weight workers of different skills by their different wages.

**See the examples provided in Cortes, Berry and Ishaq, pp. 118 and 265 [1].

ones, in part by definition, since their efficiency raises their output. Use of total inputs allows the question to be asked whether size *per se* is associated with high levels of efficiency.

F. Summary and practical implications

It is evident from the above discussion that finding and interpreting useful evidence on relative economic efficiency is a subtle matter. Comparisons of total factor productivity, as it is usually measured, across groups differing in size, sector or other respects do not by any means settle the issue of who is more efficient than whom.

First, even when the focus is on a single characteristic like size, it is nevertheless essential to take account of other determinants of economic performance (such as location, juridical form and access to certain inputs) in order to separate the causal effects of size from the effects of those other determinants. More detailed information on firms has permitted some advance in this direction in recent studies. In those seen by the author of the present article, size has generally not emerged as an important direct explanatory factor,* but indirect effects have not yet been adequately probed. The practitioner who must assess the merits of a given type of support activity for small firms will have some of those factors in mind; others may be suggested by the literature.

Second, since the SOC of a given factor can vary considerably across firms or groups of firms, a firm is not necessarily inefficient even if the ratio of its output quantum to input quantum is low. Most comparisons of efficiency involve applying the same SOC of a given factor to all units across all the firms, for want of detailed information. Thus a firm which is technically inefficient (in the sense of having poor output-to-input ratios) will be given a negative assessment even if it has achieved economic efficiency by specializing in the employment of atypically low cost units of the factors it requires. The methodological challenge posed by the variation of the SOC of a factor across firms is daunting. The situation necessitates the simultaneous use of other types of information to determine questions of relative efficiency. The survivor technique is useful, and a direct attempt to understand the nature of market imperfections is important in order to provide independent evidence of how, for example, the SOC of a factor may vary from firm to firm.

Third, the complementarities and substitutabilities that link groups of firms are key to whether differences in size efficiency really matter

*Thus Little, Mazmudar and Page, p. 201 [1], report that with the presence of such other correlates of firm technical efficiency as employee experience, capacity utilization, literacy of entrepreneur and extent of labour turnover, the firm size variable emerges positive and significant for only one industry (machine-tool manufacturing) of the five they studied.

(when groups being compared produce substitutes) or do not (when they produce complements). Although understanding of the character of these relationships is seriously incomplete at present, only a good understanding of them will permit persuasive conclusions to be reached on the advantages of assisting certain groups through policy.

The roadblocks posed by each of these three categories of problems make it unlikely that micro-economic evidence and analysis alone will provide strong conclusions on how firm size structure affects important economic outcomes li' growth and income distribution. Attempts to relate economic perfc ıance to observed differences in size structure from country to country or over time are needed to complement such micro-economic work. The *ceteris paribus* problem, where the assumption that factors are like may be invalid, is obviously severe, but whether more severe than the problems involved in the more micro-economic work is unclear.

Although the above discussion emphasizes that many efficiency calculations may understate the true performance of small firms, it must also be stressed that in some industries at some stages of development such firms may have little real potential, and programmes to support them without regard to the context which determines that potential are doomed to waste scarce public resources. Programme designers need to be able to draw more heavily than at present on better research on what the promising contexts are. Programme implementers need continually to ask themselves what it is that provides reason to believe that small firms can be competitive, and to play on those advantages. Researchers, in their turn, need more direct feedback on institutional determinants of success in p ɔg ımmes designed to support smaller firms.

References

1. See, for example, Carl Liedholm and Donald Mead, *Small Industries in Developing Countries: Empirical Evidence and Policy Implications*, International Development Paper No. 9 (East Lansing, Michigan State University, 1987); Ian M.D. Little, Diplak Mazmudar and John M. Page Jr., *Small Manufacturing Enterprises: a Comparative Analysis of India and Other Economies* (Oxford, Oxford University Press, 1987); and Mariluz Cortes, Albert Berry and Ashfaq Ishaq, *Success in Small and Medium-Scale Enterprises: The Evidence from Colombia* (Oxford, Oxford University Press, 1987).

2. F. M. Scherer, *Industrial Market Structure and Economic Performance* (London, Houghton-Mifflin, 1980), pp. 90-95.

The re-emphasis on small enterprises: a review article

*S. Nanjundan**

The oil crisis of the second half of the 1970s has had profound long-term effects on both developed and developing countries. In the former, a process of restructuring of economies has taken place over the last decade and a half based on optimizing factor use (energy, material, capital and labour), reducing costs and improving productivity and efficiency, leading to growth and higher incomes in the 1980s. The technological revolution engendered by the microcomputer and miniaturization has aided the restructuring process by underlining the advantages of flexible manufacturing methods *vis-à-vis* mass production. Furthermore, globalization of financial markets and internationalization of manufacturing - assisted by computer-integrated but decentralized management technology - have enhanced the importance of the services sector.

In the developing countries (except for the newly industrializing countries (NICs), on the other hand, the oil crisis has - among other factors - led to a cumulative chain of balance of payments crisis, production crisis, lowering of efficiency and productivity, lower incomes and enhanced poverty. Structural adjustment programmes assisted by the International Monetary Fund and the World Bank have sought to improve the situation through more appropriate macroeconomic, fiscal, trade, industrial and agricultural policies, oriented to the market mechanism, the private sector and the entrepreneur.

Through restructuring processes, both developed and developing countries have been experiencing a resurgence of the role of small-scale enterprises though by different routes. The books reviewed below discuss recent experiences in several countries with a view to providing guidance for policies and their practical application to developing country situations.

A. Book reviews

Small and Medium Enterprises: Technology Policies and Options, edited by A. S. Bhalla (London, Intermediate Technology Publications, 1992), is based on an international seminar on the subject organized at Guangzhou, China, in November 1987, by the Centre for Science and Technology for Development of the United Nations Secretariat. In

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addition to the seminar report and an introduction, the volume is divided into the following three parts: "Favourable policies and programmes"; "Building technological capabilities"; and "Institutions and Infrastructure". Of the 18 chapters in the volume, 8 relate to developed countries (Canada, Finland, France, Germany, Italy, Netherlands, Norway and United States of America), and the 10 remaining to China, India, Kenya, Malaysia, Mali, Nigeria, Philippines, Republic of Korea and Rwanda. China, the host country, contributes four chapters relating respectively to technological transformation of small- and medium-scale enterprises (SMEs), experiences in Zhejiang Province, changes in Guangdong Province, and cooperation between research institutes and educational institutions.

The paper on the former Federal Republic of Germany relates to information technology and the institutional mechanism for its transmission to SMEs, with a useful review of the successful emergence of an interlinked structure of large-, medium- and small-scale enterprises in the State of Baden-Württemberg. The technological and quality standards achieved by SMEs is due to a self-supporting SME structure; regional and local integration of training, advisory and technology transfer functions; and appropriate mental attitudes to work (diligence, business ethics, quality consciousness).

The Italian experience of innovation in traditional industries through clustering of enterprises in an industrial district, provision of technological and commercial services to them, and realization of the advantages of collective agglomeration are critically examined in the context of increasing internationalization of production. It is stated that the rejuvenation of traditional industries is a concrete possibility, requiring the application of new technologies, in order "to develop a new unique specialization, carving new market niches for higher-quality products". Interrelated innovative policies are outlined under the headings "National macroeconomic policy", "Policy for industrial sectors", "Industrial policy for small and medium firms", "Regional policies", and "Policy for industrial districts".

United States experience in the development of "business incubators" to nurture innovative technology in micro-enterprises is commended for adaption by developing countries, since "they reduce the working capital requirements of new businesses by providing tenants with centralized support services, access to seed capital, and accounting, marketing and consultancy services on payment of costs ...", and "they generally established entrance requirements ... and exit stipulations ...".

Another paper examines the risk-financing investments of the Government of Finland and its contribution to the growth of technological capabilities of SMEs. High-risk loans are preferred to equity investments, since the former bring forth complementary investments by banks and private investors.

Bhalla makes a special contribution to the subject by analysing the innovation potential and technology requirements of small rural and urban producers in Bangladesh, Ecuador, India, Kenya, Mali, Rwanda and Sierra Leone. One conclusion is that the flexibility enjoyed by small enterprises could be exploited to advantage through the use of information technologies. The potential of small enterprises to innovate could be utilized in an appropriate policy environment.

An examination and comparison of national policies in Canada, France, Netherlands and United States indicates that tax and wage subsidies are offered for innovation stimulation and research and development. In China, a set of guidelines has been introduced to promote technological modernization, relating to equipment replacement, product development, energy saving, waste reduction and recycling. Measures adopted specifically for SMEs in China relate to collaboration between research institutions, universities and SMEs.

This volume rightly distinguishes between three types of technological capabilities required at the firm level, namely production capability, investment capability and innovation capability. Government agencies, development consultants and non-governmental organizations interested in SME development will find numerous relevant analyses on technology policies and options. However, in the light of subsequent writings on flexible manufacturing systems versus mass production by, among others, Bhalla himself, the present reviewer missed a critical examination of the recent paradigm in this volume.

The second volume under review, *Small-scale Production: Strategies for Industrial Restructuring*, edited by Henk Thomas, Francisco Uribe-Echevarria and Henry Romijn (London, Intermediate Technology Publications, 1991), is complementary to the first volume in many ways. It considers the flexible specialization paradigm. Besides including country reviews or case-studies of SME development in Colombia, Ghana, Hungary, India, Indonesia and Yugoslavia, the thrust of the book is "towards a theory of policy interventions", including issues relating to regional development, rural development, appropriate technology, labour standards and the non-governmental development organizations. It is contended that recent developments in policy as well as technological conditions are setting the stage for an increased role for small-scale production. Thus, the area of small-scale enterprise constitutes in itself a valid policy subject (as against the conventional approach focused on scale analysis), and the subject is considered in its wider and developmental setting. A small-scale industry strategy should be integrated within the framework of the economy as a whole, ensuring compatibility between macroeconomic or mesoeconomic interventions and microeconomic interventions. "In order to reap the full benefits of a more favourable macropolicy environment, it is essential to stimulate instruments and institutions that are able to overcome scale disadvantages

in input and output transactions, redirect patterns of technological progress, and influence skills development."

The quality of employment generated in the small-scale sector, that is, labour conditions and welfare, warrants consideration. Since the small-scale sector is far from homogeneous, a disaggregated analysis (down from the micro-economic to the mesoeconomic level) is needed. The difference in behaviour between different subsectors (small, micro-economic, informal etc.) have implications for policy-making.

Finally, long-term structural changes in production markets, together with the new information technology, have profound implications for production organization. "There are signs of increasing segmentation of markets, shifts towards flexible production systems and increased externalization of subprocesses, all of which are fundamentally altering relative importation of internal and external economies of scale, thus significantly enlarging the role of small-scale producers in the overall production systems ..."; "major innovative analytical approaches are needed ..."; and "the efficiency question needs to be extended beyond ... individual small-scale units, towards a broader analysis of agglomeration and scope economics that clustered small firms may enjoy as collectivities." It is recognized in the book, however, that successful experiences of flexible specialization have taken place only in some developed countries and some NICs, and that "the capacity to create and develop small and medium production networks independently of large-scale nucleii in LDCs is still unclear and little is known about the conditions to make them viable".

Nevertheless, the implications of flexible specialization are analysed with reference to developing countries. Flexible specialization typically involves cooperation between different firms that makes them effective on a collective level rather than individually. For collective efficiency to be an engine of growth in developing countries, a structural market approach or development of subcontracting would be required. In a labour surplus economy, however, there is the danger of "sweat labour" arising from cut-throat competition.

The two main findings of country case-studies presented in this volume are that: macroeconomic and mesoeconomic policy framework is significant in defining the quality and quantity (employment and growth) of small enterprise development; and the heterogeneity of the small-scale range calls for well-defined and appropriate differentiation in policies and measures, and for government non-involvement in this field.

The third and fourth volumes under review are practically focused and deal with questions of "how do" and not so much with "what do" and "why do".

Opening the Marketplace to Small Enterprise: Where Magic Ends and Development Begins, by Ton de Wilde and Stijntje Schrems, with the collaboration of Arleen Richman (London, Intermediate Technology Publications, 1991), recognizes that the magic of the market-place does

not work for those who cannot enter it, namely the rural poor in developing countries. Concrete actions are required to enable them to take the initial steps to help themselves. Six such actions involving the intervention of local organizations are described in case-studies. Appropriate Technology International (Washington, D.C.) and its local chapters had direct involvement in these cases. The underlying theme is that people who do not now have a place in the market could enter it in a sustainable manner through the provision of innovative technical, institutional and financial assistance. New markets are created by creating demand pull, thus making rural production self-sustainable. There are three broad categories of innovative assistance: financing potential buyers; enhancing the quality of the product; and providing access to markets and inputs. The cases relate to Cameroon, Colombia, Dominican Republic, Indonesia, Kenya and United Republic of Tanzania. New directions lie in mobilizing the economic might of the informal sector through creating a new ethos, or new value system, that balances the material and social aspects of life, combining poverty alleviation with income generation, sharing both worldly goods and spiritual resources. The prescriptions are thus reminiscent of E. F. Schumach, and combine economic with non-economic goals of development.

In *Their Own Idea: Lessons from Workers' Cooperatives*, by Malcolm Harper (London, Intermediate Technology Publications, 1992), Malcolm Harper has collected and cogently and succinctly written up case-studies on workers' cooperatives. They relate to Kibbutzim in Israel, Mondragón in northern Spain, three failures in the United Kingdon of Great Britain and Northern Ireland, four cases in India, two in Zimbabwe and one each in Botswana, Dominica, Fiji, Ghana, Jamaica, Nigeria and United Republic of Tanzania. The most important lesson is the success engendered by voluntary cooperation and the extent of involvement and participation. Outside advice should offer choice from options available rather than be prescriptive. Financial assistance should avoid subsidization, cost-consciousness should be developed, and markets should not be reserved exclusively or buyers forced to buy irrespective of quality. Assistance should be temporary and cost-effective. Cooperatives should become independent and self-reliant in the not too long run.

B. Concluding remarks

There are still unresolved questions related to the re-emergence of small enterprises. Collective agglomerations of enterprises adopting flexible manufacturing methods and deriving the advantages of external economies of scale and scope could be merely a different (horizontal) organizational form to the vertically integrated megafirm. In developed countries, firms such as the latter have been reorganizing, hiving off departments, devolving and decentralizing to reduce overheads, to reduce

the power of labour unions and to take advantage of micro-computers and telecommunications networking. While employment in SMEs as defined in developed countries (a ceiling of 300 to 500 workers) has increased, in many cases total employment in manufacturing has decreased, labour absorption having mainly taken place in the services sector. As regards developing countries, it is unclear whether they can rapidly develop the knowledge- and skill-intensiveness required in flexible specialization, or whether they could undertake the coordinative and cooperative efforts required in industrial districts as in Italy. After all, the fact that Southern Italy has not been able to emulate the northern region of the country is evidence of the role of human qualities and business ethics in success. It could well be that, apart from NICs, developing countries will move more and more towards mass production of a labour-intensive type through transfer of second-hand equipment from developed countries, leaving the latter to derive the advantages of small-scale production and flexible specialization!

SOMMAIRE

Modifications structurelles et développement économique de l'Egypte : de la planification à la politique d'ouverture

M. A. Elkhafif et A.A. Kubursi

L'Egypte a connu depuis 1952 deux régimes économiques opposés. Dans les années 50 et 60, le gouvernement du Président Gamal Abdel Nasser s'est donné pour objectif de mettre en place un secteur public fort associé à une économie dirigée. Dans les années 70 et 80 au contraire, le gouvernement a appliqué une politique d'ouverture (Infitah) qui met davantage l'accent sur le rôle du secteur privé et sur celui de l'investissement privé, tant national qu'étranger. Depuis que cette nouvelle politique est appliquée, le secteur privé s'est révélé davantage prêt à investir dans les services que dans les industries de biens de consommation. La part du total des investissement revenant au secteur public a, entre temps, diminué. Cette situation semble résulter des difficultés d'ordre structurel qu'ont rencontré certaines industries de biens de consommation, notamment celles où primait l'investissement public (textile et confection, par exemple). Les insuffisances de l'investissement public dans ces domaines n'ont pas été suffisamment compensées par une augmentation des investissements privés ou étrangers.

Il ressort de l'analyse présentée dans l'article qu'entre 1966/67 et 1983/84 on n'a guère enregistré d'amélioration de la conjoncture économique. Le relèvement des moyennes pondérées générales des éléments directs et indirects de la production, des multiplicateurs des recettes et des multiplicateurs de l'emploi n'a été que marginal. Il faut en conclure que plus de 10 ans de politique d'ouverture, ou bien n'ont pas suffit à assurer la relance, ou bien n'y sont pas parvenus.

Elaboration de stratégies et de politiques industrielles dans le cadre de la restructuration économique : premières impressions

Philippe R. Scholtès

Dans une économie qui se mondialise toujours davantage et se caractérise par l'expansion rapide des échanges internationaux de biens, de services et de facteurs de production, le succès de toute activité de production dépend de l'aptitude à réagir rapidement et efficacement aux

pressions de la concurrence nationale et extérieure. Les ressources importantes dont disposent la plupart des pays développés à économie de marché et leur utilisation selon une politique industrielle rationnelle favorisent l'adaptation progressive et raisonnablement harmonieuse des tendances de la fabrication aux possibilités du commerce international. Les pays moins favorisés, qu'entravent des dizaines d'années de mauvaise gestion, sont actuellement engagés dans un effort pénible mais inévitable de restructuration. L'article a pour objet d'étudier comment l'élaboration de stratégies et de politiques industrielles d'ensemble pourrait faciliter ce processus d'ajustement.

Stratégie de développement pour les pays d'Afrique subsaharienne

Takao Fukuchi

L'un des aspects des stratégies de modernisation industrielle des pays africains qui ont une économie stagnante ou en déclin consiste à identifier les principaux obstacles qui s'opposent à leur expansion. En partant d'un modèle relativement simple et en exploitant les données statistiques disponibles, on a procédé à des essais de simulation pour l'Ethiopie, la Sierra Leone et la République-Unie de Tanzanie. Ces essais révèlent l'importance quantitative de plusieurs facteurs limitatifs. Des modifications appropriées des politiques sont proposées.

L'industrie manufacturière en Indonésie : dualisme et liens de production

Tulus Tambunan

L'étude fait ressortir, d'une part, la dualité de la structure du secteur manufacturier indonésien et, d'autre part, l'importance extrême de la petite industrie du point de vue du nombre des établissements et de la création d'emplois dans le secteur manufacturier. Une constatation capitale est que la productivité de la main-d'oeuvre et du capital varie, non seulement selon la taille des entreprises dans la même branche d'activité industrielle, mais encore à l'intérieur du groupe de la petite industrie.

L'étude révèle aussi que, pour ce qui est des relations amont de la production, l'agriculture est le secteur le plus important pour les petites industries rurales, alors que pour les relations aval l'importance primordiale, s'agissant des biens produits par les petites entreprises, revient à la construction.

Complexité méthodologique inhérente à l'établissement d'un rapport entre les dimensions d'une entreprise ou d'une usine et son rendement économique

Albert Berry

L'intérêt qui s'attache au rendement économique relatif des petites entreprises a conduit à de nombreuses tentatives d'évaluation quantitative de ce rendement. L'exposé souligne les problèmes que pose cette évaluation (souvent dus à la difficulté d'estimer le coût social des facteurs utilisés par des entreprises de dimensions différentes), la nécessité de déterminer les incidences de variables parfois liées à la dimension (telles que la capacité d'entreprise) et la nécessité de retenir les critères de performance les mieux adaptés aux considérations de politique générale à prendre en compte. Il convient de ne pas perdre de vue, parmi les critères de performance, les éléments fournis par le profil de survie des entreprises.

Nouvel accent sur les petites entreprises : revue de presse

S. Nanjundan

L'article examine les quatre ouvrages suivants : Small and medium Enterprises: Technology Policies and Options; Small-scale Production: Strategies for Industrial Restructuring; Opening the Marketplace to Small Enterprise: Where Magic Ends and Development Begins; et Their Own Idea: Lessons from Workers'Cooperatives.

EXTRACTO

Cambio estructural y desarrollo económico de Egipto: entre la planificación y la política de puertas abiertas

M.A. Elkhafif y A.A. Kubursi

Desde 1952 Egipto ha experimentado dos regímenes económicos contrapuestos. En los decenios de 1950 y 1960 el objetivo del Gobierno del Presidente Gamal Abdel Nasser fue crear un sector público dominante en el marco de una economía dirigida. En los decenios de 1970 y 1980, en cambio, el Gobierno siguió una política de puertas abiertas (Infitah), que destacaba más el papel del sector privado y de la inversión privada, tanto nacional como extranjera. Bajo la nueva política el sector privado se mostró muy dispuesto a invertir en servicios, pero mucho menos inclinado a invertir en las industrias productoras de bienes de consumo. Entretanto, disminuía la participación del sector público en el total de inversiones. Al parecer, esta situación acarreó dificultades estructurales en algunas de las industrias productoras de bienes de consumo, sobre todo aquellas en que no predominaba la inversión pública (como las de productos textiles y confección). Los aumentos de la inversión privada o extranjera no alcanzaron a compensar el déficit de la inversión pública en esas actividades.

El análisis que se ofrece en el artículo muestra cómo entre 1966/67 y 1983/84 mejoró muy poco el rendimiento global de la economía. La media ponderada global de los efectos directos e indirectos de la producción de la economía, de los multiplicadores de ingresos y de los multiplicadores de empleo sólo ha registrado un incremento marginal. Esto da a entender que más de diez años de política de puertas abiertas no han sido suficientes o no han servido para aportar mejora real alguna al rendimiento de la economía.

Formulación de estrategias y políticas industriales en el contexto de la reestructuración de las economías: algunas ideas preliminares

Philippe R. Scholtès

En una economía de alcance cada vez más global caracterizada por la rápida expansión del comercio internacional de bienes, servicios y factores, el éxito de cualquier actividad productiva viene a depender de

la capacidad para reaccionar rápida y eficazmente ante las presiones competitivas, ya sean nacionales o foráneas. Al contar con dotaciones de recursos favorables y guiadas por una política industrial sensata, las economías de mercado más desarrolladas pueden ajustar, de manera gradual y sin mayores tropiezos, las estructuras manufactureras a las oportunidades del comercio internacional. Países menos afortunados, paralizados durante decenios por una gestión poco acertada, se hallan ahora enfrascados en un penoso pero inevitable esfuerzo de reestructuración. El propósito de este artículo es explorar las posibilidades de facilitar ese proceso de ajuste mediante la formulación de estrategias y políticas industriales de amplio alcance.

Estrategia de desarrollo para los países subsaharianos

Takao Fukuchi

Uno de los aspectos de la estrategia de rehabilitación industrial para los países africanos cuyas economías están estancadas o en retroceso consiste en identificar los principales puntos de estrangulamiento que dificultan la expansión. Sobre la base de un modelo bastante sencillo en el que se utilizan los datos estadísticos disponibles, se elaboran experimentos de simulación para Etiopía, la República Unida de Tanzanía y Sierra Leona. Esos experimentos ponen de relieve el peso cuantitativo de varios factores limitativos. Se proponen los cambios de política pertinentes.

La industria manufacturera en Indonesia: relaciones entre dualismo y producción

Tulus Tambunan

El estudio revela una estructura dualística del sector manufacturero de Indonesia y muestra que las industrias pequeñas son muy importantes, tanto por el número de empresas como por los puestos de trabajo que crean en el sector manufacturero. Una de las conclusiones importantes es que la productividad de la mano de obra y del capital varía no sólo entre grupos de industrias de distinto tamaño de la misma rama, sino también dentro del propio grupo de las industrias pequeñas.

El estudio muestra asimismo que a nivel de las concatenaciones de producción regresivas la agricultura es el sector más importante para las pequeñas industrias rurales, mientras que en términos de concatenaciones de producción progresivas la construcción es el sector más importante para los bienes que produce la pequeña industria.

Dificultades metodológicas para establecer una relación entre el tamaño de una empresa o planta industrial y el rendimiento económico

Albert Berry

El interés por el rendimiento económico relativo de la pequeña empresa se ha traducido en numerosos intentos de evaluar su rendimiento cuantitativamente. Esta monografía subraya que esa medición está plagada de dificultades (debidas muchas de ellas a la complejidad que entraña el juzgar cuál es el costo, en términos de oportunidad social, de los factores utilizados por empresas de distintos tamaños) y pone de relieve la necesidad de puntualizar los efectos de variables correlacionados a veces con el tamaño (como la capacidad empresarial) así como la importancia de elegir los métodos de medición del rendimiento que mejor se adapten a la cuestión política concreta considerada. Es preciso tener en cuenta las pruebas que suministran los esquemas de supervivencia de la empresa, junto con otros métodos de medición del rendimiento.

Se vuelve otra vez a la pequeña empresa: artículo de recensión

S. Nanjundan

Se reseñan cuatro libros cuyos títulos son los siguientes: *Small and medium Enterprises: Technology Policies and Options* (La pequeña y mediana empresa: Políticas y opciones tecnológicas); *Small-scale Production: Strategies for Industrial Restructuring* (Producción en pequeña escala: Estrategias de reestructuración industrial); *Opening the Marketplace to Small Enterprise: Where Magic Ends and Development Begins* (Abriendo mercados a la pequeña empresa: Donde termina la magia y empieza el desarrollo); y *Their Own Idea: Lessons from Worker's Cooperatives* (Aplicando su propia idea: Lecciones de las cooperativas de trabajadores).

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