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VIET NAM'S INDUSTRIAL DEVELOPMENT - AN ASSESSMENT

REPORT PREPARED FOR THE GOVERNMENT OF VIET NAM
BY A UNIDO TEAM

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Introduction

Viet Nam has attained a stage in its economic development at which manufacturing industry will have to assume a more substantial role. Through a more pronounced industrial transformation, domestic value added can be increased and essential inputs produced for the primary sectors, notably agriculture. Industry should become the leading sector for enhancing the technological capability of the country.

This more accentuated industrial employment process requires a revitalization and restructuring of current manufacturing capacities and a well formulated industrial expansion policy supported by an effective institutional infrastructure and human resource development. International developments in industry need to be assessed so as to ascertain current and emerging prospects for and challenges to Viet Nam's industrial growth pattern.

The Government had set the general framework for the analytical work to be undertaken. At the Sixth National Congress of the Communist Party of Viet Nam in December 1986, guidelines had been established as regards basic directions of economic and social policies:

- Economic policies must be directed towards exploiting rapidly and effectively the existing capabilities and potentialities of the economy. [These include about half of the equipment capacity which has not yet been utilized; the forests, the seas and other natural resources which have not yet been properly exploited; the abundant work force; the underutilized contingent of technical cadres; possibilities of saving energy; etc.];

- International assistance must be put to effective use;

- The economic plans and policies require a rearranging of the structure of production and major readjustments in the investment outlay. [In the next few years focus would be to implement three major comprehensive programmes: on grain and foodstuffs; consumer goods; and export goods.];

- Policies be set up for using and transforming various economic sectors properly, e.g. to permit the use of various economic forms on appropriate technical levels in each link of the production process, in which the public sector plays the leading note.

- The rearrangement of the economic structure must be accompanied by the renovation of the economic management mechanisms;

- Furtherance of the driving force of science and technology;

- Expansion and strengthening of external economic relations.

The industrial sector restructuring is to follow the main directions and objectives of the country's socio-economic development in the 1986-90 period, as adopted by the Sixth National Congress. Thereby the need was recognized of taking into account international experiences and trends in terms of product and production process development, markets, national strategies and policies, corporate structures etc. These developments therefore needed to be surveyed.

It is in this context that the Government of Viet Nam in early 1988 requested UNIDO's co-operation in carrying out an analysis of international trends and driving forces and of the implications and options for the country's continued industrial development. The immediate objective of the project was to contribute to outlining the broad scope, options and modalities for the development of Viet Nam's manufacturing industry in the medium- and long-term perspective.

The study project would thus primarily review current industrial development in the country against the background of the international economic environment and of established national objectives. The study was to provide a basis for the subsequent detailed analyses and eventual design of an industrial strategy of development and restructuring of the manufacturing sector as well as of technical co-operation with multilateral and bilateral agencies.

The study was expected to constitute a first step in a Viet Nam/UNIDO programme of regular policy dialogues, economic analyses, information exchange and assistance in the field of industrial development. The study is thus to lead to further appraisals of the current structure, prospects, resource endowment and strategic options of the country's industrial sector. International co-operation could be conceived to assist in these tasks and - above all - to assist in implementing the defined projects and programmes of the industrial strategy.

A UNIDO Mission to Viet Nam was carried out 8-22 June 1988. It was composed of Herman Muegge and Nils Ramm-Ericson (UNIDO staff) and Jan Annerstedt, Jacques de Bandt, Jan Herin and Hans Schenk (UNIDO consultants). The task of the Mission was to initiate the research work, collect data and consult with high level national policy-makers concerning the perceptions, plans and prospects relating to medium- and long-term industrial development in Viet Nam. The Mission was also requested in a series of Seminar sessions to provide information on the current and perspective trends of world industry and on the present and future challanges to developing countries' industrialization.

This first Mission was followed by a Mission focussing on one particular segment of industry, the agro-industry. It was undertaken 24 October-14 November 1988 by Björn Almquist (UNIDO consultant) and Preben Hjertlund (ESCAP/UNIDO staff).

The Missions undertaken by the UNIDO team to Viet Nam were severely limited in time. Due to time constraints only very few industrial plants could be visited and it was not possible to make in-depth analyses of various complex issues. The limited data base further constrained such endeavours. It is therefore important to note that the present report can only be seen as a very tentative basis for further more detailed work and policy analyses both at the overall economic and industry sector levels and at the branch and plant

levels. Indeed, the aim of this small initial UNIDO project is precisely: to start a process of data collection, policy analyses, plant and industrial subsector assessments and considerations of suitable policies and measures to promote industrial development. This process is continuous and iterative in nature, especially in view of the uncertainty in the economic environment and the complexity of introducing consistent, gradual reforms of the current production system in the country. In any case the report may be an initial step of this process.

This report contains partly some of the presentations made by the team while in Viet Nam on international trends and their driving forces and partly observations and findings based on the discussions and plant visits in Viet Nam. Lists of the persons met by the two Missions are shown in Appendix 5 and 6.

Thus, in a first part of the report some issues are presented of the international context followed by an overview of the country's industry sector and resources. Observations on structural problems and various constraints which, indeed, are crucial for determining the strategic course and policy measures for the continued industrial development process are then made. Two separate chapters deal in-depth with the specific issues of science and technology for industrial development and of agro-industries devlopment, respectively. On the basis of the above the team in the following chapter submits some conclusions and suggestions for enhancing industrial performance and growth. In a final chapter an attempt is made to present a general framework and approach for an eventual industrial strategy formulation, including an indication of the type of policy choices which need to be made.

The members of the two UNIDO Missions wish to express their thanks to the many government officials and industry representatives who devoted their time to often long discussions on various issues. Without their co-operative spirit the tasks foreseen could not have been accomplished in such short time, considering the complexity of the exercise. Special thanks go to the indefatigable support rendered of Mr. Nguyen Phi Hung, Director, Industry Development, State Planning Committee, and his staff, in arranging for the two Missions. Grateful acknowledgement is also made of the support provided by Mr. David Smith, Resident Representative, UNDP, Mr. Nigel Ringrose, Deputy Resident Representative, Mr. J.M. Bonnamy, SIDFA and Mr. Lars Adermalm, Assistant to the SIDFA for the preparatory work undertaken before the Missions arrived and the guidance provided throughout their work in Viet Nam.

Chapter I. The international context

1. THE INTERNATIONAL RESTRUCTURING PROCESS

Whereas until the late 1950s manufacturing production had remained predominantly an activity localized in the developed areas of the world, with a relatively simple geographical division of labour on a global scale, the global pattern of manufacturing production and trade changed from the 1960s onwards and became increasingly more complex. Substantial changes occurred in the relative position of the developed economies through rapid growth of manufacturing and trade in a number of developing countries. Growth of manufacturing in the developing world surpassed the growth in the developed areas since the middle of the 1960s, leading to a significant increase of its share in world manufacturing value added (MVA). High growth rates of the developing world's MVA occurred even in periods of relatively good growth in the developed countries (see Tables 1.1 and 1.2).

Table 1.1. Per cent share of developing countries in global MVA
(based on constant 1980 US $)

1970	9.8
1975	11.2
1988 (projected)	13.8
1989 (projected)	14.1

Source: Industry and Development, Global Report 1988/89, UNIDO, 1988.

Table 1.2. Average annual growth rates of MVA
(based on constant 1980 US $)

	Developing countries	Developed countries
1975-85	4.6	3.0
1985-89	6.7	3.8

Source: As Table 1.1.

This relatively faster MVA-growth of the developing countries as a whole, was to large extent a result of a successful penetration by a relatively small number of developing countries into the international markets of manufactured goods, initially mainly textiles, garments, processed food products and, somewhat later, electronics (integrated circuits). Indeed, over the years 1965-1986 manufactured exports of the developing countries as a whole increased twice as fast as manufactured exports of the industrial market economies during the same period. In 1965 the share of the developing countries in the total manufactured exports trade (of industrial market economies and developing countries) was 8.5 per cent while in 1986 it had attained 15.7 per cent.

The advancement in industrialization in different developing countries is reflected in the respective share of GDP of agriculture and of manufacturing (MVA) over time (Table 1.3).

Table 1.3. Distribution of CDP of agriculture and manufacturing (MVA), in selected developing countries, 1965 and 1986
(percentage)

	Agriculture		Manufacturing (MVA)	
	1965	1986	1965	1986
Bangladesh	53	47	5	8
Korea, Republic of	38	12	18	30
Philippines	26	26	20	25
Thailand	35	17	14	21
Kenya	35	30	11	12
Tunisia	22	16	9	15
Zimbabwe	18	11	20	30

Source: World Bank, World Development Report, 1988.

There are obviously substantial differences in the development of the manufacturing sector within the developing world. The so-called middle income countries - i.e. countries with (1986) GNP per person over $450 - account for the bulk of growth rates. Within the low-income group, India is the dominant manufacturing nation (excluding China) but its share of the world total has remained virtually static. Major growth points, of course, have been the so called newly industrializing countries (NICs), of which four are Asian economies, namely the Republic of Korea, Taiwan Province of China, Hong Kong and Singapore. Their performance is depicted in Table 1.4.

Table 1.4. Manufacturing growth in NICs

	Share of world manufacturing output (per cent)				Average annual growth in manufacturing (per cent)		
	1963	1970	1980	1986	1960-1970	1970-1980	1980-86
Hong Kong	0.08	0.15	0.22	0.29	...	10.1	7.1
Korea, Rep. of	0.11	0.22	0.49	0.92	17.6	15.6	12.5
Singapore	0.05	0.06	0.11	0.12	13.0	9.7	0.9
Taiwan Province of China	0.11	0.23	0.46[a]	...	15.5[b]	11.5[c]	...
Brazil	1.57	1.73	2.03	1.80	...	8.7	-0.6
Mexico	1.04	1.27	1.40	1.30	9.4	7.1	-0.7
Portugal	0.23	0.27	0.24	0.22	8.9	4.5	-0.1
Yugoslavia	1.14	1.25	0.77	0.86	5.7	7.1	3.0

[a] 1977; [b] 1961-1970; [c] 1971-1978.

Sources: Dicken, P., Global shift: Industrial change in a turbulent world, London, 1988: UNIDO data base.

The underlaying force behind the Asian NICs has to large extent been their manufactured exports. It has been estimated that roughly 85 per cent of Taiwan's total exports and 82 per cent of the exports of the Republic of Korea is now in manufactured goods. Moreover, the NICs in general and the Asian NICs in particular have been strongly selective in their choice of manufactured export products or product lines.

Table 1.5 - which covers three of these Asian NICs and Thailand - illustrates the successively lesser relative dominance of the textiles and garments exports and the growing importance in these countries of the exports of metal products and machinery.

Although the share of developing countries of world MVA has grown only rather slowly - but steadily - since 1975 there has been very significant changes in respect of various subsectors of manufacturing, to large extent, as noted above, as consequence of the steeply increased exports of manufactures by some of the developing countries. The share of the developing countries of world industrial production (MVA) in respect of different manufacturing branches in 1975 and at present is shown in Table 1.6.

Within the manufacturing sector of the various countries the relative shares of different subsectors over time reflects advances in levels of industrial development (Tables 1.7 and 1.8). Thus, the growing relative importance of the metal products, machinery and equipment subsectors in economically advancing countries such as India, Republic of Korea and Thailand during the period since 1970 is shown in Table 1.8.

Table 1.5. Growth and structure of exports by group of manufactures for selected Asian countries 1975, 1985
(percentages)

	SITC	Product group	Average annual growth rate of exports, 1975-85	Share in total exports of manufactures	
				1975	1985
Hong Kong	65	Textile yarn, fabric	8.7	9.6	6.2
	84	Clothing	11.2	44.3	35.6
	85	Footwear	10.0	1.2	0.8
	69	Metal manufactures	11.8	2.7	2.3
	71	Non-electrical machinery	27.3	2.2	6.9
	72	Electrical machinery	15.7	12.5	15.1
	83	Travel goods	8.3	2.0	1.3
	86	Instruments, watches	23.5	3.9	8.9
Republic of Korea	0 (part of)	Food products	3.2	5.7	1.2
	65	Textile yarn, fabric	14.5	14.4	8.7
	84	Clothing	14.5	25.4	15.3
	85	Footwear	23.2	4.2	5.3
	63	Wood manufactures	-11.0	5.0	0.2
	67	Iron and steel	22.9	5.1	6.3
	69	Metal manufactures	28.7	2.6	5.1
	71	Non-electrical machinery	30.9	1.7	3.9
	72	Electrical machinery	23.4	9.8	12.4
	73	Transport equipment	42.4	4.1	21.6
Singapore	0 (part of)	Food products	5.9	4.8	1.9
	4	Animal, vegetable fats	21.1	2.3	3.6
	65	Textile yarn, fabric	10.5	2.9	1.8
	84	Clothing	16.4	2.7	2.8
	332	Petroleum products	13.1	40.0	31.3
	67	Iron and steel	9.2	2.0	1.1
	71	Non-electrical machinery	21.4	8.5	13.4
	72	Electrical machinery	20.6	14.0	20.8
	73	Transport equipment	13.1	5.1	4.0
	86	Instruments, watches	10.3	2.8	1.7
Thailand	0 (part of)	Food products	10.4	60.9	39.8
	65	Textile yarn, fabric	17.8	7.2	9.1
	84	Clothing	26.8	4.8	12.5
	85	Footwear	60.5	0.1	1.8
	61	Leather	35.4	0.2	1.1
	62	Rubber manufactures	31.1	0.3	1.0
	63	Wood manufactures	11.8	2.0	1.5
	66	Non-metal mineral manufactures	4.8	2.5	1.0
	67	Iron and steel	30.0	0.5	1.5
	68	Non-ferrous metals	7.6	10.3	5.2
	69	Metal manufactures	15.0	1.0	0.9
	71	Non-electrical machinery	45.8	0.4	3.8
	72	Electrical machinery	33.9	2.1	9.4

Source: Handbook of industrial statistics 1988, UNIDO, 1988.

Table 1.6. Estimated share of industrial output (MVA) of developing countries in world total in 1975 and projected shares for 1988 and 1989
(percentage)

ISIC		Share of developing countries in world total			Average annual growth			
			Projected		Developed countries		Developing countries	
		1975	1988	1989	1975-1985	1985-1989	1975-1985	1985-1989
3	Manufacturing	11.2	13.8	14.1	3.0	3.8	4.6	6.7
311	Food products	16.1	19.9	20.3	2.4	3.0	4.9	4.1
321	Textiles	20.9	24.1	24.8	1.2	2.4	2.3	5.5
322	Wearing apparel	13.2	17.4	18.0	1.2	1.8	3.4	5.6
323	Leather and fur products	14.9	17.2	17.7	0.4	1.6	1.3	4.5
324	Footwear	15.5	20.0	20.5	0.7	0.1	2.5	4.2
331	Wood and wood products	11.1	11.7	12.1	1.5	4.4	3.2	2.3
341	Paper and paper products	8.8	11.4	11.7	3.5	4.7	5.7	7.5
351	Industrial chemicals	8.9	13.5	14.0	3.7	3.8	8.0	6.8
352	Other chemical products	16.1	19.1	19.5	4.0	4.6	6.0	5.5
356	Plastic products	12.0	14.5	14.8	5.8	6.5	7.5	8.7
371	Iron and steel	8.1	14.9	15.5	0.6	1.3	5.1	9.0
372	Non-ferrous metals	8.6	11.4	11.7	2.4	3.3	4.9	5.7
381	Metal products	8.4	12.3	12.6	2.2	3.0	4.8	8.4
382	Non-electrical machinery	4.4	4.7	4.8	4.4	4.4	3.3	9.8
383	Electrical machinery	6.7	10.8	11.2	6.3	5.6	8.3	16.1
384	Transport equipment	7.2	8.3	8.5	2.9	3.9	3.6	6.9

Source: UNIDO statistical data base.

Table 1.7. Structure of manufacturing in selected developing countries, 1970 and 1985
(percentage)

	Agricultural products processing		Textiles and clothing		Chemicals		Machinery and transport equipment	
	1970	1985	1970	1985	1970	1985	1970	1985
Bangladesh	30	26	47	36	11	17	3	6
Korea, Republic of	26	16	17	17	11	9	11	23
Philippines	39	34	8	10	13	11	8	11
Thailand	43	30	13	17	6	6	9	13
Kenya	13	35	9	12	7	9	18	14
Tunisia	29	17	18	19	13	13	4	7
Zimbabwe	24	28	16	16	11	9	9	10

Source: World Bank, World Development Report, 1988.

Within the context of a basic policy aim towards the development of a coherent industrial structure with strong vertical and horizontal linkages, developing countries pursue various routes (or sectoral aims) such as greater processing of domestic raw materials, the build-up of basic industries and the production on essential consumer goods.

Table 1.8. Share of manufacturing branches in the MVA of total manufacturing sector
(per cent)

	Food, beverages, tobacco	Textiles, wearing apparel, leather	Wood and cork products, furniture	Paper, paper products, printing, publishing	Chemicals chemical, rubber, & plastic products	Petroleum refineries, products of petroleum, coal	Non-metallic mineral products	Iron and steel, non-ferrous metals	Metal products, machinery, equipment	Other manufactures
BANGLADESH										
1970	28.9	49.8	-	2.0	12.2	-	0.7	3.8	2.2	0.4
1975	33.4	36.7	0.0	2.6	14.0	0.3	1.8	5.9	5.1	0.0
1980	23.5	42.9	0.5	3.5	16.1	0.4	2.4	4.7	6.0	0.1
1985	21.7	32.7	0.8	3.8	20.2	0.5	2.6	8.8	8.7	0.1
INDIA										
1970	13.6	25.4	3.6	4.2	11.8	1.6	4.5	8.2	21.9	5.1
1975	10.8	19.5	0.7	4.9	17.6	2.6	3.9	13.4	26.2	0.5
1980	9.1	21.3	0.6	4.2	16.6	2.7	3.9	12.0	29.0	0.6
1985	9.6	16.3	0.5	3.4	18.2	3.7	4.5	12.6	30.9	0.4
INDONESIA										
1970	29.7	8.4	3.0	1.4	10.1	39.3	2.4	-	5.5	0.2
1975	33.3	13.7	3.1	2.9	12.1	18.6	4.3	0.9	10.7	0.2
1980	24.5	10.6	5.6	2.3	13.1	22.3	5.6	2.6	13.0	0.3
1985	20.7	11.0	5.3	1.8	12.2	25.2	3.9	9.2	10.2	0.3
REPUBLIC OF KOREA										
1970	23.5	18.0	4.7	6.1	17.3	7.1	8.7	3.3	8.4	2.7
1975	17.7	22.6	2.7	4.0	14.0	5.7	8.3	6.5	16.6	1.9
1980	16.6	19.5	1.7	4.4	15.5	5.8	5.0	7.8	21.8	1.9
1985	15.4	16.6	1.7	4.8	13.7	4.8	4.9	8.3	27.8	2.0

Table 1.8. (cont'd)

	Food, beverages, tobacco	Textiles, wearing apparel, leather	Wood and cork products, furniture	Paper, paper products, printing, publishing	Chemicals chemical, rubber, & plastic products	Petroleum refineries, products of petroleum, coal	Non-metallic mineral products	Iron and steel, non-ferrous metals	Metal products, machinery, equipment	Other manu-factures
PAKISTAN										
1970	39.7	31.4	0.2	2.4	10.7	4.7	3.4	1.5	5.9	0.3
1975	29.7	31.9	0.2	3.0	12.7	4.2	4.0	2.7	10.9	0.7
1980	31.2	21.5	0.3	2.1	13.0	6.7	7.5	4.0	13.2	0.4
1985	35.0	19.8	0.4	2.2	13.9	8.1	7.0	4.3	9.0	0.3
PHILIPPINES										
1970	36.3	10.1	5.2	5.8	11.0	8.1	5.0	4.2	12.4	0.9
1975	47.2	8.3	4.1	3.4	11.8	6.7	3.6	3.4	11.1	0.4
1980	32.0	12.3	5.9	4.7	16.0	5.9	4.5	3.9	14.1	0.7
1985	36.2	14.4	5.2	3.6	12.4	9.1	3.6	1.9	13.0	0.7
SRI LANKA										
1970	41.1	10.7	5.1	2.7	3.4	5.4	2.1	14.7	6.1	
1975	28.1	21.7	1.6	4.2	14.1	6.1	8.9	1.6	12.8	0.6
1980	32.2	13.7	2.0	3.9	11.7	17.9	8.8	1.6	8.5	0.3
1985	35.1	13	2.5	1.4	16.6	9.3	11.2	1.4	6.7	0.6
THAILAND										
1970	47.5	14.3	5.3	3.0	4.9	7.6	4.7	2.1	2.1	8.3
1975	41.1	15.4	4.4	3.0	9.1	5.3	2.9	3.8	11.4	3.6
1980	30.2	17.0	4.1	4.7	9.9	6.4	3.7	4.8	14.9	4.4
1985	28.6	16.3	3.4	4.2	10.0	5.3	4.0	2.6	17.4	8.1

Source: UNIDO Data Base.

2. PROSPECTS FOR CONTINUED INDUSTRIALIZATION

According to above data on world restructuring and growth rates, industrialization of developing countries has proceeded quite dramatically in the past decades. The global recession in the early 1980's, however, meant not only a prolonged halt to industrial growth for large numbers of the developing countries but it also revealed the vulnerability of the established industrial production structures and the uncertainty of basic parameters and conditions in the international environment. Whereas long-term growth prospects for developing countries' industry sector are evidently great, it is for many of these countries less evident how these prospects can be made real and sustainable. The immediate outlook for many developing countries' industrial growth is more favourable than in the recent past but the issue is the build-up of a new strong basis for long-term industrial growth at a time of major constraints and uncertainties.

Developing countries are constrained by heavy indebtedness, low price for their commodities, unstable monetary and foreign exchange markets and fierce competition in partly protected markets for industrial and agricultural products. Developing countries, while hit by deficits in the public budget and balance of payments, are confronted with a formidable structural adjustment pressure for reassuming sustained industrial growth.

This adjustment task consists, firstly, of the rationalization of production structures in the sector as a whole and in major subsectors towards dynamic structures with interaction between industrial companies and linkages between the industrial and the primary sectors. Secondly, individual industrial plants need to be rehabilitated and modernized - or closed/merged - so as to ensure commercial viability and international competitiveness. Thirdly, general technological upgrading and new technological advances need to be undertaken to ensure that industry keeps apace with international developments. This in turn presupposes considerable efforts in creating the required R&D basis, the human skills and the organizational innovations connected with technological development in industry.

The developing countries are thus faced with the dilemma of having to build up a new basis for industrial competitiveness at a time where the required resources are not sufficiently available. The general response of an increasing number of developing countries has been to induce the private industry sector to mobilize its resources and build up its competitive strength. Through deregulation and gradual trade liberalization it is attempted to disentangle market forces from prevailing constraints and to expose industry to international competition. At the same time the importance of an efficient institutional infrastructure to support industry is recognized and efforts are made to revitalize public sector institutions, to promote private services and to strengthen the interaction between academic, industrial and government entities.

Indeed, industrial competitive strength of a company or a country is not a (sole) matter of relatively low wages for low- and semi-skilled labour. Increasingly competitiveness is more a matter of quality of products - including product design, packaging and fashion. Delivery time and quantities as well as various product-associated services are also of growing importance.

For a company this requires high productivity of equipment, greater skills of its manpower, and built-in flexibility of production and the product mix. Through very active market research and marketing at the domestic and international markets and high technological and organizational innovation skills companies seek to identify and respond to emerging niches rather than relying on an assumed stable market for mass-produced goods. Economies-of-scope are obtained through mergers and acquisitions.

For a government the task is to induce companies to acquire the resources needed and obtain crucial technological and market information. Particular attention and support is in most countries given to the small-scale industry sector. This sector constitutes the nucleus for innovative industrial activities and can play an important role in a dynamic industrial structure through specialized subcontracting and supporting production of parts, components and industrial services to the larger industrial enterprises. The government schemes and policies which assist the small-scale industry sector usually cover "incubators" (to create new enterprises), marketing, training, technological information and infrastructure services.

Indeed, as a contrast to the mass-production model, modern industrial production technologies have made production in shorter series, using multi-purpose machinery, more feasible and economic. It is now economically possible for individual business firms to produce in much shorter series, for small and specific markets, with a continuously changing demand structure. The precondition for this flexible specialization in industry is not only a better use of multi-purpose machinery and new ways of organizing the production units. It is also a better skilled work force. This puts the emphasis on training of all groups of the personnel in the company, the diffusion of knowledge and know-how within and around the company, and the management styles and organization of production and distribution of the products.

The new changes at the level of industrial production and in the more diversified and changing markets for industrial goods, imply changes also in the macro-economic setting. R&D policies, innovation policies, industrial policies, foreign trade policies, etc., all have to be revised according to the emerging industrial possibilities. To create general market stabilities is not as important as before - neither for industry, nor for government. Long-term policies for demand management may now be a much less relevant dimension of economic policy. Instead, there is a strong tendency to move the central points in national economic policy-making towards technological change and industrial renewal.

In their relations with industrial firms, government agencies in both industrial and developing countries are now more concerned with the dynamics of industrial production than in creating stability. This implies a new look at the many different inputs to the innovation process, including R&D. Generally, among the industrial countries, governments are not leaving strategic decisions to "market forces" or doing away with state intervention. Instead, many new forms of collaboration between government and industry are now being developed. New policies for industrial flexibility and technological change are devised and attempts are made to combine policies for science and technology and policies for innovation with industrial policy and export policies.

Developing countries, like Viet Nam, should draw its own long-term policy conclusions from these changes in the global pattern of industrial production. Like in other countries, much can be learned as new possibilities are opened by the changes in industrial technologies.

Thus, while in most countries industrial and commercial entities are given an increasing role and responsibility in attaining and keeping their international competitiveness and growth, general policies and specific support measures by the government interact with and support the enterprise-level operations.

Internationally seen, government policies seem to undergo, firstly, a liberalization wave, in which major obstacles for the functioning of product prices, the labour markets, financial markets and international markets for various manufacturers are removed. Secondly, a privatization wave is noticeable in a number of countries in which public enterprises are sold off to private owners for reasons of increased efficiency (and finance). A third phenomenon is the decentralization wave. Large companies tend to change the previous centralized structure of their organization towards decentralized decision-making and increased responsibility of specialized units, affiliates etc. so as to improve performance, initiatives, flexibility and accountability. Similarly many countries, notably industralized countries, seek to decentralize development administration and encourage local initiatives for economic expansion in the various regions so as to provide for a revitalization of the region and encourage industrial innovation and expansion.

A fourth wave is the prolonged but accentuated internationalization wave. Internationally integrated industrial production is being pursued by large, global corporations. Some industrial subsectors are already dominated by a handfull of very large corporations in an attempt to mobilize sufficient resources and to acquire large market shares for the long-term policy to remain market-leaders. International mergers of giant firms are constantly occurring. The tendency towards creation of large regional common markets (EEC, USA/Canada) will probably further induce companies to merge into regional and supra-regional entitites.

For the developing countries' continued industrialization these outlined international developments are of crucial importance. In conceiving industrial strategies both national governments and companies need to make their own observations, assess the implications of these development and to utilize the emerging prospects. The domestic industry's strengths, weaknesses, opportunities and threats need to be ascertained in this context.

Chapter II: Viet Nam's industry

1. MACRO-ECONOMIC PLANNING FRAMEWORK

The Vietnamese economy is organized along socialist lines: large-scale means of production are collectively owned and many resources are allocated through central planning. The State Planning Commission (SPC), an advisory agency responsible to the Council of Ministers, formulates five-year state plans which form the basis for the annual economic plans. The medium-term, five-year plans establish major economic priorities and targets for the period. The annual plans set specific targets for sectoral outputs and investments, mostly in physical terms, and specify the raw materials and other resources to be allocated to provinces, districts or productive units as well as detailed production targets. Financial policies are oriented to accommodating the requirements of the physical plan.

On the basis of general economic indicators and guidelines (provided by SPC) each Ministry, in consultation with the state enterprises under its jurisdiction, draws up its annual plan targets and submits them to SPC. The principal function of the SPC is then to balance the available resources through a complex process of consolidating the economic plans of all the ministries and the localities (local governments). After consolidation by the SPC, the annual state economic plan is transmitted to the Council of Ministers and subsequently to the National Assembly. After passage by the National Assembly, the annual state economic plan becomes a regulation which is mandatory for all concerned (i.e. ministries, localities and production units) in working toward the achievement of the plan targets.

In early 1988 changes in the planning process were implemented for certain enterprises (including holding companies for groups of enterprises) to the effect that plan targets are now formulated directly with the SPC rather than through the intermediary of the responsible ministry.

The localities also formulate their plan targets (on the basis of plans sent to them by the provinces and regions, including local corporations and co-operatives) and send them to the SPC.

The private sector accounts for a significant part of production and trade, in particular in the South, where a great number of private enterprises with up to 50 employees operate. (In the North the private sector enterprises are mostly in the handicrafts and repair/services sectors.) Already in 1979-80, the free circulation of goods was partly restored and small-scale private activities were authorized. Also, a number of locally run public enterprises have been given more authority to set wages and bonuses and to buy part of their inputs and sell part of their output on the free market. An agricultural contract system[1/] has been introduced with positive effects on exports.

1/ A system of two-way contract under which farmers were provided necessary inputs and consumer goods in exchange for the delivery of specified quantities of output and which permitted farmers to sell their above quota production at negotiated prices to the state or in the free market.

2. ECONOMIC STRUCTURE

With a population of 64 million and high population growth, Viet Nam is encountering strong population pressure with resulting problems for the economy. In the course of 20 years from 1955 to 1975 the average annual population growth rate was 3.25 per cent. During the following 10 years a significant reduction of the birth rate was achieved and by 1981-85 it was down to 2.2 per cent. Vietnamese authorities anticipate that by the year 2005 the population will be over 80 million.

The rapid population growth implies that to the country's labour force of currently some 29 million people, over 1 million young people are added every year. Actually, because of the age structure of the population, the labour force growth of 4 per cent per annum in recent years has been almost twice the rate of population growth.

The structure of the Vietnamese economy reflects the dominance of the agricultural sector, essentially based on rice cultivation.[1/] Agriculture accounted in 1986 for about 53.3 per cent of the national income (Table 2.1). The latest employment statistics available - for 1985 - indicate that the agricultural sector's share of the country's estimated labour force was 73.0 per cent (Table 2.2).

Table 2.1. Viet Nam - National income and GDP, 1982-1986

	1982	1983	1984	1985	1986
	(in millions of dong at 1982 prices)				
Agriculture	71,000	76,760	80,020	80,600	81,750
Industry (MVA)	32,710	34,880	38,400	41,150	43,010
Commerce, transportation and communications	2,510	2,680	2,610	2,790	n.a.
Construction	3,580	4,080	4,610	4,770	4,760
Commerce	14,010	14,610	17,660	19,110	n.a.
Gross national income	123,800	133,010	143,300	148,420	153,340
Non-material services	16,090	17,290	18,630	19,290	n.a.
Depreciation	6,190	6,050	7,170	7,420	n.a.
GDP (at 1982 prices)	146,080	155,950	169,100	175,130	n.a.
GDP deflator (1982=100)	1,000	1,520	2,020	4,510	n.a.
GDP at current prices	146,080	238,720	341,580	790,000	n.a.

Source: Data provided by the Vietnamese authorities.

1/ Rice accounted for 86.8 per cent of the foodgrains produced in 1985.

Table 2.2. Viet Nam - Population and labour force, 1976-86
(1000 persons)

	1976	1985	1986
Population	49,160	59,872	61,109
Labour force	19,358	26,025	27,399
- in production sector	n.a.	24,200	n.a.
thereof agriculture and forestry	n.a.	19,000	n.a.
thereof industry	n.a.	2,800	n.a.
- in non-production sector	n.a.	1,800	n.a.
Labour force in the Government sector	2,475	3,367	4,027
- in productive sector	1,716	2,548	2,687
thereof industry	668	870	930
- in non-productive sector	759	1,319	1,340

Source: Data provided by the Vietnamese authorities.

The country is since 1982-83 practically self-sufficient in food. Still food shortages and diminishing per capita foodgrain production are major problems. After increasing at about 3 per cent yearly during 1983-86, foodgrain production actually declined in 1987 by 4.7 per cent due to various factors: adverse weather conditions and insect infestation; shortages of fertilizer and other inputs; and pricing factors.[1/]

One important aspect in this context is the - relatively seen - diminishing level of investment in the agricultural sector, which accounted for 22.3 per cent of total investment in 1976 and 21.4 per cent in the 1981-85 period and was down to 19.7 per cent in 1986. The provision of domestic industrial inputs such as fertilizers, insecticides, and tractors are very limited. Viet Nam has to import annually about 2 million tons of ammonium sulphate, almost all the insecticides, tractors and big size irrigation pumps.

The industrial sector, including mining, accounts for a share of about 28 per cent of the national income. [No separate figures have been made available for mining, although it is evident that the sector is relatively important in particular in the North.]

The industrial sector accounted in 1986 for 35.9 per cent of total investment (Table 2.3).

The employment absorbtion of the industry sector is limited compared to that of the agricultural sector. Only about 11 per cent of the total labour force in 1985 was engaged in industry (Table 2.2).

1/ See further Table 2.8 below. In April 1988 the Government reported that the country faced a deficit of 1.5 million tonnes of grain in meeting the basic needs of the population, in particular in the North. The problem is compounded by shortage of bulk transport means from the South.

Table 2.3. Viet Nam - Investment, 1976-1986
(million dongs at 1982 prices)

	1976	1980	1985	1986
By sector:				
A. Production sectors	11,022	14,406	19,356	16,699
Agriculture	2,652	3,038	4,0608	4,050
Forestry	294	439	786	989
Industry	4,087	6,499	7,752	7,336
Construction	687	866	514	305
Transport	2,599	3,036	4,454	3,168
Communications	94	279	141	154
Trade	577	248	1,050	694
B. Non-productive sector	1,786	1,553	5,483	3,860
Public services & house building	659	544	2,067	1,756
Science	172	144	254	137
Education, training	433	410	747	733
Total	12,808	15,959	24,839	20,559
By kind of investment:				
Construction	8,196	8,024	17,875	14,979
Machinery and equipment	3,603	6,662	3,477	2,957
Others	1,009	1,272	3,187	2,623
Total	12,808	15,959	24,839	20,559
By administrative authority:				
Managed by central authority	8,033	11,742	13,807	12,101
Managed by local authority	4,775	4,217	11,032	8,458
Total	12,808	15,959	24,839	20,559

Source: Data provided by the Vietnamese authorities.

3. POLICIES AND STRUCTURAL CHANGES

(i) Policy orientation

The evolution and structural changes which has occurred in respect of Viet Nam's manufacturing sector since 1975 are essentially a result of the economic planning and policy framework.

The post-1975 economic performance of the country has been characterized by large fluctuations in growth rates. Following modest growth of the productive national income during 1976-78 the trend became reversed and both

in 1979 and in 1980 the productive national income actually declined so that by the end of 1980 the availability of goods and services had fallen to 1975 levels, implying that per capita consumption had been considerably reduced.

After the failure to reach the targets expressed in the Second Five-Year Plan (1976-80), the Central Committee adopted a set of "new economic orientations". Among the salient features of this new economic policy approach of 1979-81 was the introduction of the system of two-way contracts for agricultural production; a shifting emphasis from heavy to light industries in the industrial sector; a partial deregulation of production activities by delegating more authority to the enterprise level (including decisions on imports of raw materials and sales on export markets) as well as giving more decision-making power at the provincial level regarding production, foodgrain procurement, distribution and exports.

These new measures immediately generated positive results in the form of remarkable output increases. Real productive national income increased in 1981 and the following two years by over 9 per cent each year, with the industrial sector spearheading the growth achievements. It is noteworthy that the lion's share of the rise in industrial output during these years was primarily generated by the small/medium-scale industries sector.

In 1982/83 the pendulum had again begun to partly swing back in the direction of renewed emphasis on centralizing tendencies. The Council of Ministers stressed the need for unified management norms for industrial enterprises, subject to central control. The Council prohibited private trade in machinery, equipment and other supplies, as a first step. Furthermore, state industrial enterprises would be required to follow compulsory regulations covering, inter alia, value and quantity of goods to be produced, including goods for export, and profits and proportions of profits to be surrendered to the state, including those accumulated in foreign currency when the enterprises produce export goods or participate in export activities. However, export performance suffered and in mid-1984 the monopoly of the foreign trade corporations on the trading of 25 export commodities[1/] was abolished and local companies based in Ho Chi Minh City were allowed to enter into joint ventures with other provinces' export companies.

1/ The 25 export items under control were:

1. Rice
2. Soybeans
3. Cigarettes and tobacco
4. Liquor and beer
5. Sugar
6. Groundnuts
7. Jute
8. Rubber
9. Coffee
10. Tea
11. Frozen and canned fruit
12. Meat
13. Paint
14. Dried and frozen shrimp, fresh and frozen cuttle fish
15. Log and wood flooring
16. Cinnamon
17. Anis flavour
18. Anthracite
19. Tin
20. Apatite
21. Cement
22. Chromite
23. Textiles
24. Products subcontracted by state enterprises
25. Paintings, sculptures antiques

In general terms the industrial development during the 10 years 1975-85 has been characterized, by the government planners, as ineffective and unstable. The state-run enterprises utilized only 40-50 per cent of their productive capacity, to large extent due to serious shortage of energy and raw materials and difficulties of transport and communications. Equipment and technology for production was at low level (or backward), quality of products including products for export was unsatisfactory.

The main causes for this unsatisfactory development were identified as follows:

- There had been many shortcomings in the investment policy. For instance, investments had been scattered into too many projects, without priority and complementarity. Attention had been focussed primarily on main projects while other complementary and logistic aspects as well as raw materials supplies necessary to ensure proper function of the main factories/projects, had not been given sufficient consideration. A number of large projects had been under construction for unduly prolonged periods.

- Timely and adequate adjustments in investment and production structures had not been made in order to cope with on-coming limitations of capital resources, raw materials (especially imported materials) and in the field of energy.

- Insufficient attention had been given to building up export-oriented establishments to earn foreign exchange (necessary for the import of raw materials, fuel and spare parts).

- Production structures had not been properly developed. Production activities had been confined to a specific plant or locality, with insufficient application of specialization and co-operation among producers.

- Science and technology for industry remained week. Almost no advanced technology had been imported to enable production of high quality products of international standard and competitiveness in the international markets. Research had not been applied to and interwoven with the process of production so that little technological progress was achieved in industry.

- Heavy buraucracy and centralization of the administration hampered dynamic development. Not enough encouragement was given to initiatives and creativeness of the production units. Production has unsufficient links with the domestic and/or international markets regarding quality, prices, demand structure, etc.

During 1986, a reassessment of economic policies was made and a framework of economic reforms was approved by the Sixth Party Congress in December 1986. Several measures were to be implemented, including pricing policies and foreign investment. Greater autonomy was given to enterprises which were allowed to mobilize resources for investments as well as to seek foreign capital.

(ii) Structural changes

Growth of industrial production (gross production) was 9.7 per cent in 1987, somewhat better than for 1986, but below the growth figures of 12-15 per cent of the years 1982-85.

Since the early 1980s a relatively faster growth of the light industry or consumer goods sector compared to the heavy industry sector was registered (Table 2.4). In 1980 the light industry sector accounted for 62.3 per cent of the total gross industrial production while by 1987 it was [estimated to be] 69.0 per cent. The employment figures (up to 1986) presented in Table 2.5 also indicate faster growth in the light industry/consumer goods sector. The structural trend towards relatively more light industry was reinforced with a growth in both 1986 and 1987 almost twice as fast for the light industry production as for the heavy industry (Table 2.4). The increase in production in light industries was partly attributable to the greater attention given to this sector in recent years with respect to the allocation of investment - 26 per cent in 1984/86 compared to 20 per cent in 1983 (Table 2.8).

Another significant structural feature reflecting the policy reform actions is the - albeit slowly - increasing share of industries under local management compared with those under central management. In 1976 the total gross industrial production of enterprises under local management was 55.9 per cent, while in 1980 it was 63.5 per cent and in 1987 66.8 per cent (Table 2.6). The relatively weaker growth in 1987 of the centrally managed enterprises of 4.9 per cent, compared to 9.6 per cent for the enterprises under local management may partly be a reflection of shortages of imported raw materials (as the "central" industries are generally more import-dependent than the "local" ones).

The main constraints affecting the manufacturing sector - heavy as well as light industry - are shortages of spare parts, imported material inputs, energy and a weak transportation system. As a result, industrial capacity utilization averaged in 1986 at 50 per cent. It rose somewhat in 1987 but still remained low at about 50-60 per cent.

Average productivity per industrial worker rose in 1987 by about 4 per cent, mainly due to a strong growth in productivity in light industries (Table 2.7).

One important factor of conern is the shortage of energy at present. Installed hydro-electric capacity is 20 million kW. Economic potentiality is 80 billion Kwh, of which 50 per cent is belonging to the Red River system, and 15 per cent to the Dong Nai River system. (Hydro-electric potentiality in the central area and the highlands is small.) Today, only 2 per cent of the country's economic potentiality has been exploited. When the Tri An and Hoa Binh plants come into operation in the early 1990s, 14 per cent of that potentiality will be in use.

Table 2.4. Viet Nam - Structure of industrial production, 1980-88

	1980	1982	1983	1984	1985	1986	1987 (est.)	1988 (plan)
				(in millions of dongs at 1982 prices)				
Gross industrial production	66,925	73,500	83,000	94,000	105,340	112,451	121,400	133,200
heavy industry (Group A)	25,298	25,300	28,300	30,900	34,463	35,862	37,600	40,100
light industry (Group B)	41,627	48,200	54,700	63,000	70,877	76,589	83,800	93,100
By industrial banches								
Energy, combustibles	...	...	5,420	5,484	6,047	7,059	7,714	...
Metallurgy	...	...	1,146	1,212	1,354	1,594	1,567	...
Machinery	...	...	11,006	12,352	14,677	16,178	18,221	...
Chemical industry	...	...	8,004	9,659	11,209	10,815	11,736	...
Construction materials, earthernware, procelain, glassware, wood, forest, products, cellulose, paste, and paper industries	...	...	17,951	19,358	21,065	22,962	23,670	...
Food and foodstuffs	...	...	22,326	25,590	28,906	30,495	32,732	...
Weaving, leather, sewing, dyeing printing and cultural products	...	...	14,008	16,570	17,770	18,385	20,116	...
Other industries	...	...	2,901	3,379	3,927	4,058	5,169	...
				(percentage share)				
heavy industry	37.7	34.4	34.1	32.9	32.7	31.9	31.0	30.1
light industry	62.3	65.6	65.9	67.1	67.3	68.1	69.0	69.9
				(annual growth percentage)				
Gross industrial production		12.9	13.3	12.9	6.8	7.9		
heavy industry		11.8	9.2	11.7	4.1	4.7		
light industry		13.4	15.1	12.5	8.0	9.4		

Source: Data provided by the Vietnamese authorities.

Table 2.5. Viet Nam - Employment in industry, 1976-86

	1976	1980	1985	1986
			(1000 employed)	
Heavy industry (Group A)	298.1	369.7	426.3	439.2
Light industry (Group B)	221.1	273.8	347.4	371.0
Total	519.2	643.5	773.7	810.2
Under central management	311.4	343.2	404.3	416.7
Under local management	207.8	300.3	369.4	393.5
Total	519.2	643.5	773.7	810.2
Food industry	65.6	76.3	103.6	110.6
Textile, leather	87.6	110.3	137.2	144.1
Word processing	63.3	67.0	82.5	81.1
Construction materials	59.5	92.4	97.9	105.9
Ceramics, glass	9.2	16.4	21.4	21.7
Chemical industry	45.5	48.8	64.1	67.1
Metallurgy	22.2	27.8	26.9	25.1
Engineering	99.4	126.4	141.6	148.7
Coal	29.1	34.4	45.0	49.8
Energy	19.2	18.9	23.6	25.7

4. KEY SUB-SECTORS

(i) Metallurgical industries

At present Viet Nam's two iron and steel complexes, one on the North (Thai Nguyen) and one in the South (Bien Hoa), produce only between 60,000 - 70,000 tons of steel per year (Table 9). This is only two-thirds of the level reached in 1979, after which production was affected by war damage to the Thai Nguyen mill in the North and the interruption of coke imports from China. The Thai Nguyen mill has the capacity of 130,000 tons a year of rolled steel but produces at present only 35,000 tons.[1/] Both plants use conventional blast furnace technology which requires imported coking coal.

Viet Nam's reserves of coking coal are, however, diminishing rapidly. In 1972 the Government embarked on a multi-stage plan to substitute coking coal with anthracite which is abundantly available in the country. A 5 ton a day pilot plant was built at the Thai Nguyen complex in the North in 1976 to test the direct reduction processes. Encouraged by results obtained at Sponge Iron India Ltd. (SIIL), it was decided to build a 75 ton per day

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1/ Of the total output of 35,000 tons, 30 per cent are from conventional type of production (coking coal utilization), 20 per cent are from electric blast furnance and 50 per cent from discarded steel.

Table 2.6. Viet Nam - Gross industrial production under central and local management, 1976-87

	1976	1980	1982	1983	1984	1985	1986	1987(est.)
				(in millions of dongs at 1982 prices)				
Gross industrial production								
- under central management	28,841	24,428	26,200	29,100	32,600	35,618	38,423	40,300
- under local management	36,502	42,497	47,300	53,900	61,300	69,722	74,028	81,100
				(percentage share)				
- under central management	44.1	36.5	35.6	35.0	34.7	33.8	34.2	33.2
- under local management	55.9	63.5	64.4	65.0	65.3	66.2	65.8	66.8
				(annual growth - percentage)				
- under central management				11.0	12.0	9.2	7.9	4.9
- under local management				14.0	13.7	13.7	6.2	9.6

Source: Data provided by the Vietnamese authorities.

Table 2.7. Viet Nam - Productivity - gross industrial production per employee, 1983-87

	1983	1984	1985	1986	1987(est.)
	(in thousands of dong at 1982 prices)				
Gross industrial production per employee	43.2	47.2	48.0	49.3	51.3
by sector:					
- heavy industry	27.7	29.8	30.3	30.5	30.8
- light industry	60.7	66.1	67.0	69.4	72.9
by management system					
- central management	100.2	107.1	110.4	117.0	112.1
- local management	33.0	36.4	37.2	37.9	40.0
	(annual productivity growth - percentage)				
Gross industrial production per employee		9.2	1.7	2.7	4.1
by sector:					
- heavy industry		7.6	1.7	0.7	1.0
- light industry		8.9	1.4	3.6	5.0
by management system					
- central management		6.9	3.1	6.0	-4.2
- local management		10.3	2.2	3.6	5.0

Source: Data provided by the Vietnamese authorities.

Table 2.8. Viet Nam - Investment in industry, 1983-86

	1983	1984	1986
	(in millions of dongs, 1982 prices)		
Total investment in industry	7,500	7,800	7,400
thereof heavy industry sector	6,000	5,800	5,500
light industry sector	1,500	2,000	1,900
	(share of total industry investment in per cent)		
heavy industry	80.0	74.0	74.0
light industry	20.0	26.0	26.0

Source: Data provided by the Vietnamese authorities

semi-industrial plant at the same complex as the pilot plant. UNDP/UNIDO is to assist (under project DP/VIE/86/031 "Experimental Production of Sponge Iron") the Institute of Ferrous Metallurgy to adjust for design shortcomings at both plants and in monitoring and evaluating the new process.

It is planned that by 1995 the steel output will have increased to 150,000 tons. This can, however, only be achieved with changed technology. But what technology would be best for Viet Nam? The country has 600 million tons of iron ore reserves. It is envisaged that within a few years time there will be available surplus electricity from the big power projects in the North.

The most important secondary metallurgical industry directly affecting industrial and overall economic development of the country is the foundry industry which provides basic products for the entire engineering industry sector (e.g. engine blocks, new and replacement brake drums, frames for machine tools and for sugar mill and other industrial equipment, construction items, such as pipe couplings, and spare part castings for all operating industries). An in-depth review of the entire foundry sector to identify problems and impediments and to define corrective and remedial action would be called for.

The special type of foundry technology, the so called "investment casting", would be particularly well suited to produce parts, such as inexpensive hand tools, machinery spare parts and other similar products which do not demand very high tolerances achievable only through machining. Such investment casting would meet the country's considerable demand for inexpensive hand tools as well as a great variety of spare parts.

Tin processing. Viet Nam is in the tin belt of South-East Asia and possesses large reserves of tin ore comparable to those of other major tin-producing countries. Generally, the tin ores in Viet Nam are spread over large areas with rather poor beneficiation characteristics. The ores contain other valuable minerals like wolframite, ilmenite, silver and copper which warrants the use of relatively sophisticated technologies, especially in the beneficiation and smelting operations. UNDP/UNIDO is expected to provide technical assistance to the Institute of Non-Ferrous Metallurgy covering applied research in ore beneficiation, metallurgical processing and semi-final metal production (DP/VIE/86/032). The tin output in 1985 was 500 tons. It is expected to reach 700 tons in 1990.

Chromite - The Co Dinh mine has an annual production capacity of 20,000 tons, but produced only 3,300 tons in 1986 due to market limitations.

Bauxite processing. The Government is considering ways and means to establish industrial scale mining and processing of bauxite, from the country's extensive and rich deposits of the ore. The exploitation of the (recently discovered) deposits of bauxite could, together with hydro-electric power that will become available in 1988, form the basis for the establishment of an alumina/aluminium industry. UNDP/UNIDO technical assistance is being provided to assist the State Copper and Aluminium Corporation in establishing in the vicinity of the bauxite deposits, a testing laboratory to serve geological explorations and ore evaluations. Under the assistance project potential variants of industrial processing technology will be looked into and the Government's capabilities will be enhanced for the elaboration of

Table 2.9. Viet Nam - Major industrial products, 1976-88

	1976	1980	1982	1983	1984	1985	1986	1987 (est.)	1988 (plan)
Production goods									
Steel ('000 tons)	63.8	60.3	50.1	50.8	53.2	61.6	64.4	69.1	60.0
Chromium ('000)	...	...	9.9	6.2	4.5	4.1	3.3	...	...
Coal (mn tons)	5.7	5.2	6.2	6.3	5.0	5.7	6.4	6.8	6.8
Cement ('000 tons)	743	633	724	972	1,133	1,503	1,526	1,635	1,830
Bricks (mn pieces)	3,704	2,297	2,240	2,712	2,878	2,932	3,282	3,332	...
Glass and glass products ('000 tons)	35	41	39	40	51	57	54	53	41
Porcelain (mn pieces)	79	101	131	148	155	167	184	185	180
Chemical fertilizers ('000 tons)	435	360	230	289	460	531	516	484	450
Insecticides ('000 tons)	15	8	10	14	15	18	7	12	...
Bicycle tires ('000 pieces)	5,223	4,925	10,133	11,116	15,046	11,559	10,586	12,028	9,000
Bicycle tubes ('000 pieces)	4,864	5,005	6,672	7,671	5,926	6,035	4,501	5,622	7,000
Timber, sawn wood ('000 squ.m)	1,553	1,577	1,295	1,410	1,482	1,441	1,680	...	...
Paper ('000 tons)	75	49	56	57	75	79	90	83	120
Matches (mn packets)	292	251	224	208	208	158	146	138	...
Metalworking machine tools (piece)	...	...	820	850	914	964	1,208	1,190	1,040
Diesel motors (piece)	3,225	3,116	3,600	3,900	5,362	5,312	6,213	6,650	6,500
Electric rotating engines (piece)	10,925	15,112	8,343	8,637	13,271	15,359	15,149	13,846	17,000
Transformers (piece)	547	575	468	364	355	479	447	720	700
Waterpumps (piece)	1,844	1,496	936	507	655	753	850	840	350
Rice mill equipment (piece)	...	...	569	870	1,318	1,196	1,218	...	1,010
Ploughs and harrows ('000 pieces)	...	...	355	352	315	309	297	352	...
Bicycles ('000 pieces)	91.3	137.1	...	...	...	197.3	263.3	...	...
Tractors (12 HP) (pieces)	464	1,600	...	...	...	1,103	1,200	...	...
Textile fibres ('000 tons)	...	...	36	45	53	51	53	...	62
Cotton fabrics (mn metres)	218	179	238	307	364	374	357	357	365
Cotton fabrics for mosquito net (mn metres)	...	...	43	50	64	75	77	...	...
Soap for washing ('000 tons)	...	...	31	26	36	51	50	51	50
Salt ('000 tons)	584	477	550	595	713	676	763	770	700
Sugar ('000 tons)	73	167	239	304	438	401	346	340	450
Fish sauce (mn liters)	...	...	115	134	141	143	145	157	...
Beer (mn liters)	...	...	56	53	84	87	85	83	120
Cigarettes (mn packets)	404	396	694	924	1,062	1,050	1,118	995	900

Source: Data provided by the Vietnamese authorities.

feasibility studies for all aspects of establishing in Viet Nam industrial scale mining and processing of bauxite to alumina. The assistance may include work on opportunity studies for the establishment of an industrial scale aluminium smelter and an industrial scale alumina factory, and a modernization study of bauxite digestion at the COFATA plant near Ho Chi Minh City.

(ii) Building materials industries

Cement production has increased threefold during the 1980s from around 538,000 tons in 1981 to 1,635,000 in 1987 as result of new production facilities having come into operation. The cement programme includes three plants with an annual production each of about 1 million tons. One plant, in the North, using modern dry technology is in operation, a second plant, in the South, using wet technology (under French loan) is to be operational in 1989, and a third plant also using wet technology (capacity 1.2 million tons) is being set up in the North under co-operation with the USSR. The total output is expected to reach 2.6 million tons in 1990.

As there is no limestone in the South, clinker has to be sent from the North.

The brick production capacity is about 4,000 million pieces/year. However, due to shortage of coal only about 3,000 million pieces can presently be produced. Tiles production is 600 million pieces per year. Stone extraction is 113 million cubic metres.

Glass production has varied between 40,000 and 60,000 tons. However, a new sheet glass factory is under construction in the North using floating technology. Its capacity is to be 2.4 million square metres/year.

(iii) Engineering industries

The engineering/metalworking industry sector consists essentially of small and medium sized enterprises. Of the present about 600 enterprises in the sector only 180 have fixed assets of over 200,000 roubles/dollars. Of these 20 enterprises are of medium-to-large size with fixed assets between 4 and 60 million roubles/dollars.

Of the 180 enterprises, 107 are engaged in manufacturing and 73 in repairing. Most of the enterprises are located in main cities. Some of these are under central management, others are under provincial management.

In addition there are about 750 co-operatives, 3,800 other collective groupings and a number of individual families engaged in engineering work all over the country. Fixed assets owned by the state value about 420 million roubles/dollars (see Table 2.10).

Fixed assets in the engineering/metalworking sector belonging to the co-operatives and individuals account for 10 per cent of investment resources in all branches of industry.

Table 2.10. Distribution of fixed assets owned by the state in the engineering/metalworking sector industry, 1986

	In million of roubles/dollars	Percentage share
Central government	307	73
thereof Ministry of Engineering & Metallurgy	113	27
Ministry of Transport	118	28
Provincial government	113	27
Total	420	100

There are about 40,000 machine-tools, out of which 6,000 are for blacksmith works. Most of the machine-tools are for conventional multipurpose utilization of small size, low level of precision and are of '1960s generation'. The structure of the equipment has serious limitations, e.g. it can neither be used for blacksmithing components of 400 kilos, nor for moulding of iron ingots of 3 tons. Heating equipment, testing and measuring devices are in short supply.

The total output of the engineering/metalworking industry sector is 350 million roubles/dollars which represents a share of about 14 per cent of the country's total manufacturing output. State enterprises account for 230 million roubles/dollars and collectives and individuals for 120 million roubles/dollars.

About 300,000 persons are employed in the engineering/metalworking industry sector. Of these some 10 per cent are skilled workers.

The products of the sector range from diesel motors (6-50 HP), electric motors (0.6-100 kW), electric transformers (50-320 KVa), tractors (up to 12 HP), water pumps (pumping capacity of 8000 cubic meters/hour), coast steamers and barges (of 1000 DWT), to machine tools of various kinds.

The main problems of the sector are

(a) Most of the equipment and machinery used by the engineering industries is outdated. Because of the lack of modern machinery the technology used is frequently of low level, impending productivity as well as product quality;

(b) Because of the age of the machinery, constant and very good maintenance is required to keep these in good operational shape; good quality and sufficient spare parts are, however, frequently lacking and often obtainable only through imports; knowledge of modern preventive maintenance and rehabilitative technologies is also lacking;

(c) Most products manufactured are of old and outdated design, including consumer goods, such as radios, as well as industrial machinery, tools and even agricultural equipment;

(d) Many of the production units are not organized optimally as regards plant lay-out, materials flow, work organization, etc.;

(e) Design and application of electronic parts and components, as well as of instrumentation which is essential for process and quality control and testing, is not yet developed; such instrumentaton is frequently missing, contributing to quality problems due to lack of process and quality control;

(f) While the engineering industries in general have well qualified personnel with good knowledge as regards mechanical operations, there are serious weaknesses in the areas of material engineering and material sciences, such as application of paints, coating, electro-plating, heat treatment, hardening and finishing, etc.

Specific areas for attention include the improvement of agricultural machinery and processing equipment, e.g. simple rice drying equipment for rural areas and maintenance of and spare parts production for rice mills.

Other areas include the manufacture of good quality saw milling machinery and production of spare parts for sugar mills and textile mills. One of the most important consumer items in the country is the bicycle. It is produced in large numbers, about 1 million per year, of which a considerable number is exported. While the overall design and manufacturing process of bicycles adequately fulfills the requirements, specific problems exist in areas related to material sciences, e.g. electro-plating and heat treatment.

Tin canning. At present time there are 13 factories which process canned fruit and vegetables, 10 belonging to the state corporation Vegetable and Fruit Export Import Corporation (VEGETEXCO) and 3 belonging to local municipal committees (in Hanoi, Ho Chi Minh City and the Hoang Lien Son Province, respectively). Each of the factories has its own can-making workshop equipped with simple machineries. Almost all use handtools to spray varnish materials on fabricated cans.

The use of uncoated tin materials, the deficient hand-spray coating practice, and/or the use of improper varnish solutions for packaging of acidic foods result in substandard and non-exportable products. The situation in respect of other plants, outside of VEGETEXCO, processing and canning meat, marine and dairy products face similar problems.

The Food Canning Research Institute (FCRI) in Hanoi with branch in Ho Chi Minh City, is mandated to look into the matter.

(iv) Electronics industry

The electronics industry sector is at an embryonic stage of development in Viet Nam. It uses only 0.12 per cent of all investment resources of the country. There are about 20 production establishments in the country. Capacity utilization is low, sometimes only around 20 per cent of the design

capacity. The production is essentially of assembly type on basis of imported parts. Some products are for export, e.g. transistors and resistance condensors, with a total yearly export value of 10 million roubles/dollars. [Total yearly imports of parts and components for the domestic as well as export production is also about 10 million roubles/dollars.] A number of electronic products produced internally, such as loud speakers, amplifiers, are made on experimental basis only, not in long series.

As indicated above, one of the weakest technological areas is related to the manufacturing and utilization of electronic components and instruments. Since modern industry cannot function without electronic process and quality control instruments, it is most important to ensure that adequate capabilities in this field are developed. An institutional base has to be created for long-range development in support of the industry both in manufacturing electronic equipment and components and in their use.

Mastering electronic components and instruments related to materials science technologies is also very important relating e.g. to development of ceramic elements and magnetic materials.

(v) Chemical industries

Viet Nam has a small domestic fertilizer industry (producing phosphate and nitrogenousfertilizers) although most of the required fertilizers, nitrogen, phosphate and potash, have to be imported. It is anticipated that significant fertilizer imports will continue at least until the year 2000.

An urea fertilizer pilot plant based on antracite, established through co-operation with China has a production target for 1988 of 30,000 tons.[1/] A phosphate fertilizer plant based on apatite[2/] now produces about 300,000 tons/year and is planned to be expanded to 500,000 tons/year under USSR co-operation agreement.

Caustic soda domestic production capacity is 25,000 tons/year, including 10,000 tons related to various factories like Bai Bang paper mill.

The country has to import 15,000 tons/year of soda ash.

Rubber products. Some 9 million bicycle tyres are planned to be produced locally in current year, down from the peak of 15 million in 1984. Some 7 million tubes are also to be produced in 1988.

Three local car tyre producers make some 20,000 tons/year of car tyres (in different sizes).

Natural rubber is exported to Hungary and Czechoslovakia (buy-back, as part of the co-operation agreement for the development of the plantations).

1/ It is questioned whether it would be advantageous instead to export the antracite and import urea.

2/ Viet Nam now utilizes No.1 apatite and is planning to utilize No.3 apatite. It is also interested in obtaining specialist guidance on possible technologies for using No.2 and No.4 apatite.

(vi) Agro- and forest-based industries

The average land area by head of population is low: 1 hectare/10 persons. The cultivated areas has increased from 8.25 million hectare in 1980 to 8.56 million hectares in 1985. According to the plan targets there will be a further increase in the future; 9.75 million hectares in 1990, 10.8 million in 1995 and 12.6 million in 2005. The agricultural land area for food crops is only 5 million hectares, of which 4.7 million hectares have been cultivated.

Food grains. The Ministry of Agriculture is responsible for monitoring of the production of paddy and for the operation of 963 rice mills at present million about 14 per cent of total paddy harvest. The country has in the years 1983-87 produced between 15,000 and 16,000 tons rice paddy and around 2,300 tons paddy equivalent of other subsidiary crops (such as cassava, corn and millet) (Table 2.11).

Rice milling requirements are about 17 million tons of paddy increasing to more than 20 million tons. There are some 10,000 rice mills in the country and about 963 of these are government-operated. There is one large mill with a milling capacity of 170 tons per day; It is noteworthy that between 70 and 80 per cent of all paddy is processed in small mills on a village or co-operative level. The existing mill capacity is, however, insufficient to meet the requirements for supply to urban areas in particular. The main problems are poor quality of rice milling equipment, shortage of space parts and as a result, high losses and high percentage of broken rice. Rice drying is another major problem. Jute bags to store and transport are also in short supply; 30 million bags/year are needed.

Food processing and canning industry. There are 13 canneries with an annual production of more than 30,000 tons of pineapple juice, slices and chunks, orange juice, lychees, banana nectar, lemon juice, etc. The production technology is not up-to-date. There is a lack of testing and quality control facilities. [Problems regarding the tin cans (coating, sealing, etc.) have been referred to earlier.]

Sea food is a major item processed for export (as well as local consumption). Potentially there may be landed 1.3 million tonnes fish and 50-60,000 tons shrimp/year. The economic level of catches of fish in the last few years has been 800-900 tons.

Other exported processed food products include rice noodles, jams, lotus seeds, canned mushrooms. The main exporters, such as the Food Products and Packaging Export Company in Ho Chi Minh City, make their own packaging - wood pellets, corrugated cartons, duplex printed cartons, plastic laminates, etc. Packaging problems cause as much as 10-30 per cent of finished product losses (depending on the product).

Large quantities of seaweed, agar-agar, are available in the Binh Tri province. About 100,000 hectares of coastal water areas are available for seaweed production as well as 22,000 hectares of lakes. Some 300 hectares are (1986) in experimental production. The intention is to increase this to 3,000 hectares with possible annual produciton of 3,000 tons of agar-agar and 500 kg of alginate. In total 300,000 hectares of salty and/or brakish waters are used for cultivation of sea food at present.

Table 2.11. Viet Nam - Food grain production, actual and projected, 1976-2005

	1976	1983	1984	1985	1986	1987 (est.)	1988 (plan)	1990 (projected)	1995 (projected)	2005 (projected
Production ('000 tons)	13,413	16,986	17,800	18,200	18,379	17,651	19,000	22,000	25,000	32,000
thereof paddy	11,827	14,743	15,506	15,875	16,003	15,286	17,000	19,000	21,000	26,000
subsidiary crops (in paddy equivalent)	1,666	2,243	2,294	2,325	2,376	2,365	2,000	3,000	4,000	6,000
thereof maise	387	n.a.	n.a.	587	570	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Data provided by the Vietnamese authorities.

Industrial crops include annual crops such as sugar cane, peanuts, soybeans, rush and jute, and tree crops, such as tea, coffee, rubber and coconut.

The production of annual crops is at individual's and localities' initiative, while production of tree crops is under state management. In the production of tea, coffee and rubber co-operation with various CMEA countries is taking place both in the case of rehabilitation of older plantations and in the establishment of new ones. In particular the coffee plantations are relatively well developed, while the new rubber plantations are not yet fully productive (and productivity is low in the older areas) (Table 2.12).

There are six major central state sugar mills in the country and four on a provincial level which process some 5,000-6,000 tons of sugar cane. Total sugar production is about 300,000 tons of which one-third is white sugar. Some sugar mills are very old (1924) but one was built in 1975. The mills have high production losses; in some mills the extraction rate is only 60-65 per cent (of sugar in cane), and their total annual production accounts for only 25 per cent of the national production. The other 75 per cent are processed in small-scale sugar crushing plants and household extraction units where the extraction of sugar is even lower, about 50 per cent.

The present annual per capita consumption of sugar is about 5.5 kg, which is much below the level of average consumption in many developing countries (average in developing Asia 13.6 kg). Molasses is partly used in the production of alcohol and mono-sodium glutamate (MSG). Attention is given to possibilities to increase its use in the production of animal feed.

Lack of cast spare parts is one major problem in the sugar mills.

(vii) Textile industry

The textile industry in Viet Nam, comprising some 20 large mills and some 90 smaller mills with a total of 860,000 spindles and 10,900 looms, is evenly divided between the North and the South. It provides most employment of all manufacturing sectors. Its rated installed capacity is approximately 87,000 tons of yarn and 320 million square metres of cloth per annum[1/] (see Table 2.13). However, only about half of the installed equipment is in operational condition. Two large spinning factories with 100,000 spindles each, were being constructed in 1985/86 - one in Hanoi and one in the Phu Khanh Province. Two major extensions to existing factories in Ho Chi Minh City, totalling 100,000 spindles were completed in 1981. Apart from the recently set up spinning plants almost all machinery and equipment, manufactured by many countries belong to 1950s and 1960s technology. Part of the yarn production is being exported in exchange for raw cotton and other fibre materials, which have to be imported. The industry suffers from an acute shortage of spare parts and trained manpower at all levels. Efforts are being made, under UNIDO assistance, to locally produce some essential spare parts such as shuttles, spindles and pickers.

1/ In addition there are some 20,000 handlooms with an estimated total capacity of 150 million square meters.

Table 2.12. Viet Nam - Industrial crop production and area cultivated, actual and projected, 1976-2005

	1976	1983	1984	1985	1986	1987 (est.)	1990 (projected)	2005 (projected)
Production ('000 tons):								
Jute	28.2	49	50	47	54	56	113	200
Mulberry	n.a.	76	72	55	57	n.a.	n.a.	n.a.
Sugarcane	2,986	5,689	6,567	5,560	4,965	5,323	13,800	23,000
Peanuts	100	126	166	202	211	237	430	640
Soybeans	21	64	69	79	85	96	225	350
Tobacco	23	25	33	38	36	33	44	80
Tea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	280	600
Coffee	n.a.	5	4	12	19	20	10	12
Rubber	40	47	47	48	50	51	144	410
Coconuts	135	518	523	612	711	806	600	600
Cotton	2.1	.a.	n.a.	4.5	4.6	n.a.	n.a.	n.a.
Area cultivated ('000 ha):								
Jute	14	25	20	22	26	31		
Mulberry	n.a.	11	9	7	7	n.a.		
Sugarcane	75	146	165	145	125	135		
Peanuts	97	141	170	213	224	240		
Soybeans	39	97	91	102	106	117		
Tobacco	16	30	36	38	33	38		
Tea	39	49	49	51	58	60		
Coffee	19	26	29	45	66	92		
Rubber	77	115	148	180	202	202		
Coconuts	37	100	119	127	158	177		
Cotton	6.8	n.a.	n.a.	13.8	12.9	n.a.	n.a.	

Source: Data provided by Vietnamese authorities.

Table 2.13. Capacity of major textile mills

Hanoi Fibre Enterperise	Hanoi	8,600 tons/year of yarn
Nhatrang Fibre Enterprise	Phukhonh	10,000 tons/year of yarn
Vinh Fibre Enterprise	Nghetinh	5,600 tons/year of yarn
Hue Fibre Enterprise	Hinhtrithien	5,200 tons/year of yarn
Donguam Fibre Enterprise	Ho Chi Minh City	5,000 tons/year of yarn
Namdinh Textile Enterprise	Hanamninh	60 million m^2/year of fabrics
8/3 Textile Enterprise	Hanoi	35 million m^2/year of fabrics
Vinhphu Textile Enterprise	Vinhphu	50 million m^2/year of fabrics
Vietthang Textile Enterprie	Ho Chi Minh City	30 million m^2/year of fabrics
Thangloi Textile Enterprise	Ho Chi Minh City	25 million m^2/year of fabrics
Phongphu Textile Enterprise	Ho Chi Minh City	12 million m^2/year of fabrics

Source: Data provided by the Vietnamese authorities.

Garments sector. Garment-making is important both in order to provide clothing to the people and for exports. The Vietnamese garments industry is very labour-intensive using semi-automated knitting and sewing. Most of the machines are very old and repair and maintenance is a problem. Consideration is given to local manufacturing of sewing machines, although it may not yet be able to produce some of the essential parts.

There are 13 central management and 14 provincial management enterprises in garment production. In addition there are some 400 co-operatives. The central management enterprises have about 3,200 industrial sewing machines, the local or provincial management enterpriese have about 4,000 machines, while co-operatives and individual households have some 50,000 machines.

The total capacity of the sewing machines in enterprises under central or local management is 70 million pieces/year. They are mainly used for production of subcontracted goods for export. There are 990 knitting machines (of which 460 machines are in the handcraft section) able to produce more than 60 million pieces/year of hoisery, and 134 machines, able to weave 30 million m^2/year of jersey.

It is recommended that an in-depth review of the entire knitting and garment manufacturing sector be made to assess its future potential development for the domestic as well as the export markets and to identify inputs needed to improve quality and increase productivity.

Jute carpet and handicraft co-operatives. A significant number of people are employed in co-operatives producing jute goods, especially in the Thanh Hoa Province. The products range from jute bags and jute carpets to seed mats and other products such as rags, carrying bags, straps, etc.). Most of the work is done manually and introduction of semi-automatic looms, production of which is being established locally, would be of great importance. A limiting factor is availability of jute yarn.

(viii) Leather industry

The tanning and leather products industry is based primarily on cattle and buffalo hides. Pig skin is mainly used for food. There are nearly 6 million bovine animals (3.1 million cattle and 2.8 million buffalo, see Table 2.14) and with a slaughtering rate of 10 per cent some 600,000 hides should be available to the leather industry annually. In general, the quality of hides as well as of tanned leather is not up to desirable levels.

Table 2.14. Viet Nam - Livestock, actual and projected, 1976-88
(in thousands heads)

	1976	1983	1984	1985	1986	1987 (est.)	1988 (plan)	1995 (projected)	2005 (projected)
Cattle	1,595	2,173	2,418	2,597	2,783	2,910	3,100)	7,750	10,250
Buffalo	2,256	2,500	2,549	2,590	2,657	2,753	2,800)		
Pigs	8,958	11,202	11,760	11,807	11,796	12,051	12,500	16,100	20,300

Source: Data provided by the Vietnamese authorities.

In the leather and footwear sector there are 5 central management enterprises and 5 provincial management enterprises with a capacity/year of

raw leather	250 tons
leather (soft)	5 million sheets
footwear	30 million pairs

(ix) Wood processing and paper industries

There are 15-16 million hectares of forest land area, of which 8 million hectare are under forestry. The level of covering is 23 per cent. The forest resource is poor; average timber per head is 9.4 m^3. Sawn-wood product amount to 1.0 million m^3/year.

Wood-processing industries. The country's forestry industry development is faced with a number of specific problems. The long and narrow territory of the country, inadequate infrastructure and shortage of appropriate transport facilities are limiting factors, preventing full utilization of forestry resources. Some 1.5 million cubic metres of wood is exploited annually, mainly large logs, while 250,000 cubic metres of smaller logs, branches and partly rotten wood is left unutilized. At the same time, the furniture industry is underdeveloped and short of raw material.

The government policy focusses on reforestation, improvement of utilization of existing forestry resources and of waste wood in particular.

There are 12 paper mills under central management and 48 under local provincial management. The total production capacity is 200,000 tons of pulp and 210,000 tons of paper per year. Most enterprises are not able to produce at full capacity due to shortages of raw materials and soda. Production of paper by 1990 is estimated to be about 100,000 tons.

5. SMALL AND MEDIUM-SCALE INDUSTRIES

As noted earlier, the development in the 1980s has been particularly fast in the small- and medium-scale industry (SMI) sector (including the handicrafts sector). This sector covers more or less the light industry ("group B" industry) production in the statistics which according to the 1988 plan is to account for 70 per cent of the country's gross industrial production (see Table 2.4).

The size of what is referred to in Viet Nam as small- and medium-scale industries also requires clarification. Many of these enterprises fall in the category of medium-size industries, employing several hundred people, having yearly production values in the order of millions of dongs. This is certainly the case in knitwear and garment manufacturing, in furniture production and in handicraft co-operatives, such as those producing jute carpets and bags. Management functions are generally deliniated along conventional lines, i.e. general management, production management, financial management, etc. In areas of industrial concentration, such as in the larger cities, enterprises range from the very small (handicrafts and repair shops) through medium industries all the way to large enterprises. This is typically the case in Hanoi and in Ho Chi Minh City. It appears, however, that in the provinces most industries are of the small and medium size, including co-operatives. The only truly large industries are those which process local raw materials on a large scale, such as steel plants, cement factories, sugar and textile mills, food canning, etc.

There were in 1986 in the "group B" industry about 1,500 state industrial enterprises of central and provincial (1coal) management and about 6,000 small industry/handicraft co-operatives[1/] mainly of small and medium size with less than 500 workers. The total labour force in "group B" industry is over 350,000 people working in state enterprises. 1.5-1.6 million persons are working in the small industry/handicraft sector, and 0.5 million in co-operatives in the agricultural area.

The production does not provide enough consumer goods to satisfy domestic demand. Average yearly production per capita is as follows for selected products:

1/ The small-scale industries and handicraft sector may be termed the co-operative and non-governmental organization sector, and the Central Council of Co-operatives and Non-Governmental Organizations is the successor of the former Central Union of Co-operatives of Small Industry and Handicraft. This recent change better reflects the mandate of the organization and its future importance in the development efforts of Viet Nam.

Paper	1.3 kg	Cotton fabrics	6.2 meters
Hoisery	0.3 pieces	Porcelain	2.7 pieces
Matches	2.6 packets	Soap	0.8 kg

At present the total output of the small-scale and handicraft sector is about 60 billion Dong or on an average 30,000 Dong per worker. This accounts for 43 per cent of the total industrial output and 60 per cent of all consumer goods turned out in Viet Nam. The sector thus contributes significantly in production for both local consumption and export.

The total export value for 1988 is expected to be Rubles/US$ 140 million which accounts for 18 per cent of total exports from Viet Nam.

According to the new direction formulated for this sector, 400,000 new jobs shall be created every year up to the year 2000. This would be a total of over 4 million jobs adding up to a total number of workers in the small industry and handicrafts sector (the co-operatives and non-governmental organizations sector) to over 6 million.

Based on the new policy direction, the production targets are as follows:

	Workers (million)	Total output (billion Dong*)	Export (million Rubles/US$)
1990	2.4	74	160
1995	4.0	140	320
2000	6.2	240	800
2005	n.a.	320	n.a.

*in fixed prices

The figures indicate an expected improved productivity of the order of 2 per cent/year and an increase in export value of 3 per cent/year during the second half of the 1990s.

The very large portion of the SMI sector is managed by local or provincial authorities (Table 2.6). Particularly in the South, a large number of small industries exist also as co-operatives. Moreover, in the South the small industry sector under private ownership is relatively large, such as in the case of repair workshops and similar activities. There also exist many so called "joint ventures" in the South which are enterprises owned jointly by the state and private entrepreneurs who carry out day-to-day management. A few of these joint ventures have foreign companies as part owners.

As an example of a municipal structure might be given that of Ho Chi Minh City. Directly under the Ho Chi Minh City People's Committee is the Industrial Services Department, with overall management functions over three types of enterprises, namely:

(i) Union of enterprises (separate "informal" enterprises in the same branch grouped together under one legal entity of "union");

(ii) Combinate factories (legal entity consisting of various production units, e.g. an electro-mechanic combinate making fans would consist of one workshop specialized in moulding, one in mechanical production and one in electrical parts and assembly);

(iii) Independent factories (larger enterprises).

In the case of a union of enterprises the Industrial Services Department is responsible for their economic management (e.g. meeting of plan targets) on basis of an annual production plan. The factories are at the same time under technical guidance from respective ministries (and "central" union of enterprises) which provide technical standards, etc. For the combinate factories only the nature and assortment of products are centrally directed. In the case of the independent factories only the nature of the products is centrally governed.

The Ho Chi Minh City People's Committee has 140 factories - in all categories - with about 30,000 workers. The production consists of 92 products under centrally planned production targets and 100 products (not necessarily different from those subject to central production targets) for which the local government (Ho Chi Minh City) has given targets, which include targets using excess capacity (after fulfilment of centrally planned targets) which may be used for exports or local consumption.

Small industry and handicraft production account for a very significant part of Viet Nam's industrial production. The co-operative sector, which dominates the small industry and handicrafts production, also contributes significantly to the country's exports; 26 per cent of the exports derive from co-operatives.

The activities of all co-operatives is directed and controlled by the Central Union of Co-operatives. The Union also provides services in the fields of purchasing, marketing, management, technical assistance and training.

The co-operatives are entitled to fix themselves the wages for their workers, in relation to the benefits accured through the selling of the products. Each co-operative is managed by a "team" consisting of managers of different sections: production, supply, finance, accountancy, etc. Co-operatives usually produce goods in response to customers' orders. Sometimes the whole production or part of it is used to satisfy state organs' requirements through subcontracting arrangements. Each co-operative can use its surplus work capacity for the production of goods for the free market.

The present constraints affecting production co-operatives arise from lack of raw materials, electric power, productive equipment and machinery spare parts as well as want of managing personnel and skilled labour.

The shortcomings in the small industry and co-operatives sector are compounded by the fact that, generally, there is no formal training for the development of skilled workers. Most workers are self-learned. There is a very limited number of technicians working in the co-operative sector. The productive equipment is mostly self-made and has often deficiencies in speed/capacity and accuracy and is leading to ineffective use of the workers time. International assistance would in this context be particularly useful in the development of designs and drawings of equipment and model machinery in accordance with local manufacturing capacity.

The structure of the Haiphong small industry and handicraft sector is illustrative. It is composed of 286 co-operatives comprising 30,000 workers. The value of the output nearly equals that of the Haipong's public sector (non-cooperative) industry.

The 286 Haiphong co-operatives are distributed among branches as follows:

	Per cent
Metallurgy	1.15
Equipment production	11.28
Electric, electronics products	1.94
Metal products	16.30
Chemicals, rubber, plastic products	6.40
Glassware	5.10
Textile, leatherware	21.04
Word processing	8.30
Food stuffs	15.25
Building materials	6.90
Other trades	6.34

6. MINERAL RESOURCES FOR INDUSTRY

Although the mineral resources of Viet Nam are quite varied and numerous, they are generally not so large in quantity.

Projected petroleum production is 15-10 million tons per year. Reserve of natural gas is estimated to be larger than that of petroleum in many areas.

Estimated coal reserve (at the Quang Ninh coal basin) are about 2 billion tonnes. There is 400-500 million tons peat in the Cuu Long Delta area and 100 million tons long flame coal in the Lang Son area.

Explored iron ore reserves are of the order of 650 million tonnes of which 500 million tons at the Thach Khe mine.

Other ores of significant importance include: titan ore (15-20 million tonnes of estimated reserves); mangan ore (3 million tonnes of estimated reserves); chromite (19 million tonnes of estimated reserves).

A laterite bauxite mine with reserve of 7 billion tons has been discovered in the South. 500 million tons have been explored, in which the Dac Nong mine has 150 million tonnes (250 km outside Ho Chi Minh City).

Rare earth: In the West-North area, there are reserves of 20 million tons of oxide with 6 million tons of fluoxite, 20 million tons of baryte.

Tin ore estimated reserves: 135,000 tons

Lead zinc, copper, nickel ore: Small reserves and limited production.

Apatite

- Estimated reserves in Hoang Lien Son area are in billions of tons.

- Explored reserves of I, II and III type ore are 480 million tons. Reserves of IV type ore are more than 300 million.

- Research has been made to enrich the III type ore. Research for enriching of the IV type ore is urgently needed.

Materials for contruction: Rich in the North but limited in the South. Materials for porcelain, glassware etc. are available in many areas.

7. INTERNATIONAL TRADE IN THE CONTEXT OF MANUFACTURING

(i) Exports

In the early 1980's the total exports of commodities and manufactured products to both the non-convertible area (CMEA- countries) and the convertible area grew strongly. In 1982 and 1983 exports grew at an annual rate of about 20 per cent. An important factor in growth was the easing in 1980 of restrictions on the local enterprises - principally based in Ho Chi Minh City - which then began to export to the convertible area significant amounts of marine and agricultural products and some light industrial goods.

During 1984-85 the export growth in particular to the non-convertible area slowed down. By 1986 growth of total exports was down to only 5 per cent. Exports recovered in 1987 but the average growth rates of total exports in the last two years remains much below the growth levels of the early 1980's (Tables 2.15 and 2.16).

(ii) Imports

More than three quarters of Viet Nam's imports come from the non-convertible area, about 95 per cent of which are capital and intermediate goods. Imports from the convertible area include a much higher proportion of consumer goods - about one half in 1987.

Centrally managed enterprises account for most of total imports - particularly those from the non-convertible area. The locally managed enterprise trade more extensively with the convertible area (Tables 2.17 and 2.18).[1/]

The two largest single components of imports are petroleum products and fertilizer; both have increased markedly over the past five years.

During the 1980s the locally managed enterprises have become increasingly significant transactors, particularly with respect to the convertible area. Although they accounted for only 8 per cent of total imports in 1987, their share of imports from the convertible area was 38 per cent.

1/ There are some 22 locally managed enterprises undertaking import/export activities under the control of local garments (municipalities); most of these enterprises are in the South, particularly in Ho Chi Minh City. There are 28 centrally managed enterprises that are authorized to undertake import/export activities, they do so under direct supervision of the Ministry of Foreign Trade.

Table 2.15. Viet Nam: Major exports by commodity and by area of destination, 1983-87

	1983	1984	1985	1986	1987
	(In millions of US dollars)[a]				
CENTRAL ENTERPRISES	538	595	636	665	720
Coal	28	26	40	34	12
Convertible area	22	22	35	29	10
Non-convertible area	6	4	5	5	2
Rubber	30	31	30	30	28
Convertible area	5	7	2	2	6
Non-convertible area	25	24	28	28	22
Tea	14	14	20	17	16
Convertible area	3	3	5	4	2
Non-convertible area	11	11	15	13	14
Coffee	5	10	16	16	28
Convertible area	--	--	2	2	24
Non-convertible area	5	10	14	14	4
Wood flooring (all non-convertible area)	10	13	12	12	19
Marine products	40	49	80	82	73
Convertible area	40	49	60	70	73
Non-convertible area	--	--	20	12	--
Agriculture and forestry products	125	165	170	140	198
Convertible area	35	50	50	35	38
Non-convertible area	90	115	120	105	160
Handicrafts and light industrial goods	286	287	268	251	221
Convertible area	69	75	72	45	10
Non-convertible area	217	212	196	206	211
Petroleum (all convertible area)	--	--	--	--	30
Unclassified	--	--	--	83	95
Convertible area	--	--	--	--	77
Non-convertible area	--	--	--	83	18
LOCAL ENTERPRISES (all non-convertible area)	50	70	110	120	160
Marine products	20	25	20	25	40
Agricultural products	26	39	70	75	100
Handicrafts and light industrial goods	4	6	20	20	20
TOTAL	588	665	746	785	880
of which: Convertible area	224	276	336	307	430
Non-convertible area	364	389	410	478	450
	(In per cent of total)				
Proportion of exports to:					
Convertible area	38	42	45	39	49
Non-convertible area	62	58	55	61	51
Proportion of exports from:					
Central enterprises	91	89	85	85	82
Local enterprises	9	11	15	15	18

[a] Valuation of the ruble is at par with the US dollar.

Sources: Data supplied by the Vietnamese authorities.

Table 2.16. Viet Nam: Volume of selected exports by area of destination, 1983-87
(In thousands of metric tons)

	1983	1984	1985	1986	1987
Coal	700	550	500	752	300
Convertible area	550	460	400	550	182
Non-convertible area	150	90	100	202	118
Rubber	35	35	36	36	41
Convertible area	5	6	4	6	6
Non-convertible area	30	29	32	30	25
Tea	12	11	12	11	10
Convertible area	2	3	2	2	2
Non-convertible area	10	8	10	9	8
Coffee	5	4	8	18	27
Convertible area	--	1	2	5	12
Non-convertible area	5	4	7	13	15
Wood flooring (all non-convertible area)	55	32	40	46	40
Marine products	10	25	35	...	...

Sources: Data provided by the Vietnamese authorities.

Table 2.17. Viet Nam. Imports, 1983-87

	1983	1984	1985	1986[a]	1987
	(In millions of US dollars)[b]				
BY ORIGIN					
Total imports	1,310	1,560	1,590	2,155	2,191
Convertible area	330	468	459	453	465
Non-convertible area	980	1,092	1,131	1,702	1,726
Consumer goods	145	198	252	339	314
Convertible area	110	168	181	239	234
Non-convertible area	35	30	71	100	80
Capital and intermediate goods	1,165	1,362	1,338	1,816	1,877
Convertible area	220	300	278	214	231[c]
Non-convertible area	945	1,062	1,060	1,602	1,646
BY TYPE OF ENTERPRISES					
Central enterprises	1,240	1,470	1,463	2,069	2,026
Consumer goods	125	180	200	288	244
Of which: Food grains	(10)	(70)	(87)	(85)	(60)
Other	(115)	(110)	(113)	(100)	(80)
Capital and intermediate goods	1,115	1,290	1,263	1,867	1,782
Machinery and equipment	(140)	(110)	(200)	(722)	(548)
Fuel and raw materials	(975)	(1,180)	(1,063)	(1,018)	(1,234)
Local enterprises	70	90	127	126	165
Consumer goods	20	18	52	51	70
Production goods	50	72	75	75	95
	(In per cent of total)				
Proportion of imports from:					
Convertible area	25	30	29	21	21
Non-convertible area	75	70	71	79	79
Proportion of imports by:					
Central enterprises	95	94	92	94	92
Local enterprises	5	6	8	6	8

[a] The large increase in recorded imports from the non-convertible area reflects the adoption by the authorities of a more comprehensive coverage to include imports wholly financed by long-term loans from that area.

[b] Valuation of the ruble is at par with the US dollar.

[c] Include $30 million imports for the joint Soviet-Vietnamese petroleum venture.

Sources: Data provided by the Vietnamese authorities.

Table 2.18. Viet Nam: Volume of selected imports, 1983-87
(In thousands of metric tons, unless otherwise specified)

	1983	1984	1985	1986	1987
Rice	30	320	400	528	402
Corn and corn flour	30	--	--	--	--
Edible oil	--	--	--	--	--
Cotton textiles (in millions of meters)	11	29	20	27	34
Petroleum products	1,800	1,700	2,000	2,028	2,413
Fertilizers	1,200	1,600	1,500	2,059	1,679
Raw cotton	50	38	50	54	64
Cotton yarn	4	2	3	7	9
Steel	280	280	300	350	453
Sugar	80	70	--	55	96
Trucks (in thousands of units)	4	4	3	4	...
Tractors (in thousands of units)	1	...	1	--	...

Source: Data provided by the Vietnamese authorities.

Chapter III. Observations and issues

As was pointed out above, the Mission's task was to carry out initial consultations with decision-makers and staff in various government authorities and enterprises and to use available data on the Vietnamese industrial sector in order to identify major issues and make some observations on the prospects of and constraints to the country's industrial development in the medium to long-term time perspective. The background is the determination of the government to accelerate industrial growth and to increase industrial efficiency. By using international experience and comparisons with other countries' industrial strategies and performance the government wishes to introduce measures to improve the plant performance and rationalize overall industrial structures so that industry can assume a leading role in the socio-economic development process.

It is within this framework that the Mission presents some observations on Viet Nam's industrial performance. These observations are admittedly sketchy and based only on the very fragmented information which could be gathered during the short time of the Mission's work in the country. They should therefore be seen as a first impulse for further thinking and deeper analysis rather than as a consistent set of proposals.

The observations are presented in two sections. The first concerns overall economic and industrial issues and the second plant level issues. Obviously these are two set of discussions of the same problem and need therefore to be seen as interlinked.

1. STRUCTURAL AND DECISION-MAKING ISSUES

The Mission's first major observation is the prevalence of severe supply problems in all economic sectors. Agricultural products, manufactures and infrastructure are not available in sufficient quantities to permit the launching of a more dynamic growth process. On the other hand the country is richly endowed with raw materials, has a motivated and skilled human resource base and has enormous prospects for food production and food exports through enhanced agricultural and fishery output and processing of this into higher value added products. Manufacturing industry should be able to assume a key role in producing inputs to the agricultural sector and processing the commodities. At present it is not fulfilling this role in any satisfactory manner, neither in terms of quantity nor quality. The reasons for this are manifold and interconnected.

In international comparison, the performance of installed manufacturing capacities is very inefficient with obsolete equipment, poor organizational structures, lack of maintenance and repair, lack of cost and quality consciousness and with little efforts to increase the technological level of products and production processes. The specific plant level observations will be presented in greater detail in the next section but at this stage some underlying issues can be discussed at the policy-making level.

The Mission believes that not sufficient attention is given by the government to induce and support the required revitalization/rehabilitation of existing plants. The apparant approach pursued by the policy-makers is to try to relieve supply problems by creating new production capacities, mainly in the basic industry subsectors, and by installing pieces of new equipment and machines in operating plants. This more physically-oriented investment process seemingly disregards, firstly, the high opportunity costs of new heavy investment with long gestation periods as compared with reinvestment in key, existing enterprises and, secondly, the potentially very high returns thorough rehabilitation and modernization programmes of operating plants. Thirdly, without such comprehensive rehabilitation as well as a built-in, continuous cost-efficiency control system (including preventive maintenance) the installation of new pieces of equipment would prove uneconomic and possibly even counter-productive. Existing production capacities are so inefficient that plants have large deficits and swallow a large part of the country's available investible resources. Significant capital destruction would continue if existing, installed capacities are not utilized and maintained in an optimum way. The scarce financial and raw material resources should thus be allocated on these principles of economic returns rather than on the apparently prevailing quantitative considerations and targets.

In this context there seems to be a strong orientation by the centralized planning system towards large-scale projects and towards basic industries, such as fertilizer, aluminium and petroleum. In the short run development, given the scarcity of investible resources, this orientation seems not optimal. The long gestation periods, high capital intensity, large import content of investment and production may in many cases aggrevate rather than alleviate current overall structural and supply problems. A major issue is the methological approach in the present planning system in terms of the relation and procedures of macro planning versus project planning.

A related issue is the lack of attention by the planning system on the choice and improvement of technology for industry. In many cases investment projects and equipment procurement seem not formulated on the basis of thorough choice and selection of equipment and technology. It is doubtful if precise calculations of alternative production processes and equipment were undertaken in terms of investment costs, maintenance and repair costs, and performance in terms of economic criteria.

Many agro-processing plants had not been properly planned with the result that they have an over- or underinvestment in equipment. On the whole, Vietnamese enterprises seem not sufficiently qualified in the procurement of plant and equipment. Many examples were seen of new but outdated equipment and obsolete know-how being purchased from foreign suppliers, possibly due to the availability of a credit line, thus from the outset creating a technologically inefficient production capacity.

It is, indeed, necessary to open up the awareness and possibilities of choices for cost efficient technological alternatives and for alternatives of suppliers. It is also crucial to enable/induce companies to carry out proper cost calculation of production and on this basis introduce technological and organizational measures and reinvest for increased performance and cost efficiency.

Thus, there is little dynamism in the industrial sector for pursuing technological improvements. Whereas in other countries dynamic enterprises are the essential driving force for technical improvements, this seems not to be the case in Viet Nam. Whereas large public enterprises should have had a lead role in technology they are fixed on their existing structure of production of employment, product mix, etc. They do not generate innovation and instead of being in the forefront they are blocking technological progress. There is a great need therefore to give companies greater leverage and awareness of technical innovation benefits and challenges.

This issue is primarily a matter of concern for the government policy-makers in formulating the economic environment, incentive systems and accountability of company performance.

The structure of government policy and decision-making for resource allocation to and operational matters of industrial enterprises is a highly relevant issue in this context. Even when an investing company is aware of technological alternatives the company is faced with severe administrative obstacles to source the most suitable equipment. Indeed, there seems to be a lack of awareness in central bodies of technological alternatives when negotiating with foreign entities.

The Mission noted the fact that a very large number of officials are directly involved in the decision-making processes relating to industry - ministries, enterprise managers, planners and others. There seems to be little transparency in this process and it is difficult to see if any particular part of the system is finally responsible for the decision with appropriate accountability of risks and results. The government administrative machinery seems little conscious about requirements, preferences and responses of the consumers (or end-users). The same seems true about production results which are not scrutinized in terms of costs. As a result, allocation from the very narrow financial resource and foreign exchange base is more a matter of a struggle between major enterprises and between the various ministries than of decisions based on cost-benefit analyses.

In this context the time dimension of decision-making should be mentioned as well. Since the functional division of decision-making amongst ministries in the central government seems unclear, unfocussed and scattered - for one major plant seven different government authorities were said to be involved - it is extremely time consuming to arrive at a final decision. This problem affects not only the domestic companies, their investment and production and thus the supply situation of the country but also the utilization of foreign loans and other co-operation offered to Viet Nam. Some examples were noted of extreme delays in the implementation of industrial investment projects causing severe economic losses. Indeed, the Mission noted that various (concessional) loans were not utilized due to this problem. In future the increased international orientation of Viet Nam's industry will certainly necessitate significantly quicker decisions so as to enable the country's productive system to respond timely and utilize emerging opportunities on the demand and supply sides. Also in the agricultural sector this need for timely decisions and responses are called for. On several occasions - so the Mission understands - agricultural products for exports were shipped at a wrong time which resulted in unacceptably low quality of the products at the final destination.

Admittedly, the Mission had only very limited insight into the precise relationships between individual enterprises and the relevant authorities. In a centrally planned economy, central government authorities by definition play a crucial role in determining economic activities and resource allocations. In any case the plant visits made suggest that the degrees of interference are very high, but that the forms of intervention vary substantially from case to case. What seems clear, seen from the standpoint of the functioning of the firms, is that the degrees of initiative and of responsibility of the firms are much reduced. Their participation in the decisions is limited, and they can have no guarantee as to the consistency of the decisions taken. The reduction of initiative and responsibility is so much so that they seem to be abandoning the essentials of management. This together with the extreme distance from economic rationality criteria, is possibly the explantion of the kind of indifference for the concrete production problems and for the opportunities for improvements (short of renewing completely the equipment) which has been observed.

A crucial issue underlying most of the above observations is the price system. The current system tends to result in a fixation of structures and technical and other performance of companies. The "cost +" price is not a stimulation for rationalization, such as technical change for materials saving, efficient production, maintenance and repair, etc.

The question of a well-functioning price system should therefore be seen as a matter of priority attention. In the field of finance, the Mission noted that further development in public enterprises is hindered by a lack of self-financing and by the limitations of the current functions of banking system. The banking system seems centrally controlled and seems to handle transactions as an administrative entity rather than supporting services of a development agency to entrepreneurial activities.

2. INDUSTRIAL INTEGRATION

A major feature of the Vietnamese industrial sector is its low degree of integration both within this sector and with other sectors. In some other South East Asian countries (and certainly in industrialy advanced countries) a major factor of competitive strength and efficiency of the manufacturing sector, is the close network of specialized industrial enterprises - small-, medium- and large-scale. Through this industrial integration it has been possible to utilize the domestic market dynamics and the mutually supporting impulses for technological and organizational improvements of individual companies for further developing a rational and highly efficient production structure of the manufacturing sector.

In Viet Nam there seems to be a lack of communication and exchange between the industrial companies. As far as the Mission could see, larger enterprises operate in relative isolation of other units and tend to be selfcontained.

Few linkages seem to prevail between enterprises in terms of subdeliveries etc. beyond what has been administratively conceived through the central planning system. Enterprises seem to passively follow imposed

decisions rather than actively searching for new opportunities of beneficial exchanges of products, parts and components. In the capital goods subsectors such as machinery and equipment used by industry, many Vietnamese enterprises seem to certainly have the technical capacity to produce a range of general purpose and also specialized machines for the domestic market. However, the Mission understood that ample opportunities for such deliveries were foregone due to lack of communication and information, particularly through specifications contained in investment proposals and - above all - the formulation and deliveries of complete plants and equipment through foreign co-operation and assistance agreements. The lack of utilization and build-up of domestic engineering consultancy capacities may be one major reason for the lack of information on and the lack of using existing or potential capabilities for equipment deliveries by domestic enterprises. Domestic procurement of plant and equipment is not well developed.

The second dimension of the lack of integration concerns the communication and linkages between the agricultural and industrial sectors. These linkages need to be substantially strengthened in view of the predominant importance of the agricultural sector in the country's economy and its large need for equipment and other vital inputs from the manufacturing sector and the need for more industrial processing of agricultural products. These issues are examined in particular detail in Chapter V of this report. One major problem which can be mentioned here again is the difficult structure and complicated decision-making process of the government administration. If a more dynamic overall development process is to be achieved and cross-sectoral issues are to be increasingly addressed, there is a clear need for corresponding rationalization of the administration.

A third dimension of integration are the linkages between the industrial production system and the research and development capacities in the country. The Mission notes in this context that the significant, existing and potential, R&D capabilities of academic and other research institutions in Viet Nam are not utilized in any major degree for development, acquisition, adaptation and upgrading technological processes and products in the manufacturing sector. In a special chapter (Chapter IV) this problem is treated in greater detail.

A fourth dimension of the economic and industrial integration is the regional development issue. As is well-known, differences in tradition, commercial outlook, natural resource endowment and the geographical situation between provinces in northern and southern Viet Nam tend to cause a different entrepreneurial approach and behaviour. Undoubtedly the general business environment and business structures in the southern provinces are more conducive to entrepreneurial development, utilization of internal and external trade opportunities and the generation of industrial growth in consumer goods industries. In the course of the expected acceleration of industrial growth in the country as a consequence of new strategies and policy approaches as well as consumer-oriented industrial development, there is a high probability of more rapid industrialization in the south. Thus, a danger exists that this development will tend to aggravate the regional disparities and create a North/South economic disequilibrium. The geographical distance and the lack of physical infrastructure between the northern and southern provinces in terms of transport, telecommunication etc. constitute a barrier to the spread of developmental impulses and the build-up of complementarities. To

counteract such centrifugal economic forces and prevent a possible dualism is indeed a major issue for the formulation of an industrial strategy and regional development programme.

3. INDUSTRIAL COMPETITIVENESS

Although not enough information is available on overall and subsector industrial competitiveness nor on the structure and level of specific production costs, there are clear indications that the international competitiveness of Viet Nam's industrial production is quite low. From the observations made and the (sketchy) information gathered it is evident that both quality-wise and cost-wise a major part of industrial production is not competitive. The poor quality of products, the inefficiency of production and high external costs seem to be partly compensated by an artificially low price setting so as to enable the meeting of export and domestic demand. In these instances large deficits rather than surpluses are created in enterprises.

This problem cannot be solved by simply lowering the exchange rate. Nor is the issue of improving competitiveness a matter of lowering wages. In fact the Mission noted that the current wage rates are already excessively low from many points of view. An attempt to lift the competitive strength of Viet Nam's industry through sharp and possible continuous devaluations and wage reductions would in the opinion of the Mission turn into a vicious circle and bring industrial efficiency even lower down. The lack of competitiveness is seen rather as a structural and organizational problem at the macro level with the corresponding micro level implications. Only by creating a more competitive environment, accountability of individual enterprises and a realistic cost/price calculation basis can a revitalization and greater productivity be induced - and thus competitiveness attained. The drain on national resources to support deficient enterprises and export prices can then be halted and turned into productive uses.

4. THE FOREIGN EXCHANGE SHORTAGE

The Mission noticed in all its consultations with officials and company representatives that the current shortage of foreign exchange is considered a major constraint to industrial production and development. Most enterprises are severely obstructed in their operations due to problem of obtaining imported equipment, spare parts and raw materials. The vicious circle is well-known: increased export earnings can be attained only through more efficient production apparatus which in turn presupposes significant imports.

The underlying issue is obviously the macro-economic financial framework, the import dependency and disequilibria in the industrial sector. Two other, more "operational" issues, however, need also to be considered: First, the handling and rational allocation of foreign exchange earnings according to economic criteria; and, second, the formulation of industrial investment projects which minimize foreign inputs.

On the first issue the Mission notes the paradoxical situation that inspite of the severe shortage of foreign exchange for the country's development process, a widespread and apparently quite significant internal circulation and hoarding of foreign exchange is taking place. Industrial enterprises quote not only in Dong but also partly in US dollar and pursue the peculiar practices of "exporting (against dollar) on the domestic market". Enterprises thus attempt to obtain required foreign exchange from other Vietnamese enterprises for purchasing part of foreign inputs for which central allocations do no suffice. The acquired imported raw materials and parts are then stockpiled in the companies. This practice certainly appears non-optimal in its consequences from monetary and terms of trade point of view. The key question in the context of an industrial strategy is, though, the negative consequences of such more or less arbitrary exchanges for the industrial performance, structure and operational surplus. Since no apparent reference is established to international prices nor to any other economic performance criteria it is likely that productive enterprises are transferring and thus loosing part of their value added, and/or that they underbill (some of) their products. However, foreign exchange is not earned nor used according to national economic cost/benefit criteria.

The Mission noted a certain autonomy of provinces and locally managed companies in the use of generated foreign exchange earnings. This "degree of freedom" is not necessarily an efficient allocation in terms of the national economic development. These are new central systems at the local level which will mix up resource allocation and use risk taking autonomy and the pricing and surpluses generation at the company level.

International co-operation - bilateral and multilateral - is seen as additional "pot" for allocation of foreign inputs to requesting entities. Again, this "pot" seems not to be used as developmental concept on basis of optimum allocation. Moreover, there is a possibility that foreign donors largely determine the content of their own programmes and assistance projects. This results, in many cases in technology choices and technology packages which are not conducive to fostering structural integration and efficiency of the domestic industry sector.

The rational handling of foreign exchange has to be seen as a highly essential matter in the new five year plan period. It has to be made consistent with the targets and general objectives set for the industrialization process and be seen as a prerequiste for the industrial strategy. The Mission noticed a certain prevailing bias in the project planning system towards large-scale projects with relatively large foreign inputs and long gestation periods. However, at this stage of the economic and industrial development of the country the build-up of inter-industrial linkages and thus of a higher domestic integration should be given high priority along with the measuring of enterprise performance according to cost/price - competitive criteria.

5. PLANT LEVEL OBSERVATIONS

The Mission visited only a limited number of industrial plants in the agro-processing, textiles, clothing, tyre, agricultural equipment, tractor and other metal working, electronic components and electronic assembly

industries. There are obviously great differences among these subsectors and the visted plants and the observations made are based on a rather small sample. Undoubtedly some observations are possibly too generalized and not valid for a broader range of plants. Nevertheless the following synthesis may reflect some of critical issues which would call for attention at the level of policy making.

(i) The decision-making framework

From the discussions held at the plants visited, the Mission got the impression that the decision-making framework for the company management was extremely narrow. The major parameters were seen as given and there was apparently no scope, no information, no challenge nor any inducement for the company to assess and improve company performance, productivity, response to customer's views for product quality etc. Companies did not seem to take any major decisions about product mix, technology changes, prices, purchases etc. They seem to be cut off from market information and information about competition and new business opportunities. The framework for the operation of the enterprises is essentially technical and decisions are taken on the basis of a priori technical norms and coefficients and not on economic criteria. Cost elements are added up and prices adapted or deficits increased. Because of the absence of sanctions or threats, the enterprises do not relate costs to prices and can continue to operate with deficits. In the absence of motivation, the enterprises have no interest in searching for and adopting better solutions for various parts of the production process. Because of the absence of reference to the end users of the product and to competitors the enterprises do not see the need for nor the possibility of defining a long-term strategy.

Wages and prices appear to be determined exogenously and imposed to the firm, at least to a very large extent. While some degrees of freedom remain - this is likely to be the case for the definition and, more so, for the calculation of the premia - it is not at all clear how important these degrees of freedom left to the firms might be in general and in specific cases.

Prices are said to be fixed on the basis of technical norms, without it being possible to know the basis on which those norms are calculated. If the norms are essentially based on past experience, two main questions arise: (i) to what extent can the firm appropriate the results of any improvement made compared with the fixed norms and has thus any interest in making such improvement? (ii) on the basis of what kind of experience or progress are these norms adapted upwards? There seem to exist no clear and certainly no systematic relation, nor in the mind of the managers, nor in fact, between wages, wage unit costs, total costs and prices.

Some (not confirmed) information obtained by the Mission suggests that all the state enterprises have very large deficits: this means that in day to day business life prices have in fact little relation with costs.

In the case of exports, prices seem not fully discussed or negotiated, but appear imposed by the foreign partner. Because of the absence of systematic cost accounting, the exporters do in any case not have at their disposal the necessary information as concerns the various cost elements required to conduct such negotiations on a commercial basis. Although the

Mission did not have systematic information, the prices seem, generally, to be extremely low. This may reflect partly the relatively low real or perceived qualitative levels. However, because of the absence of the cost accounting data, the firms tend to accept prices imposed by the partner.

Because of all kinds of stipulated norms, which have to be applied and thus controlled, the accounting department has apparently to make huge amounts of verifications and calculations: this is essentially technical accounting. But on the other hand, because of the external determination of wages and prices and because of the absence of any concept of cost-related prices, economic accounting principles and practices seem not to be used.

As price mechanisms are non-existent, the firms lack this essential relation with the market. But the absence of market relation goes further than that. On the one hand, most firms do not have a sales department, and deliver the products to some intermediate organization. For that reason they lack any kind of seller/user relation. But on the other hand, this is also so at the level of principles: the firms have to care for the norms set by the administration and cannot focus on the needs and experiences of the users. Indeed, the Mission observed no preoccupation by company managers as concerns the performances of the products at the users level. In such circumstances there can be little interest for the product as such, for the quality of the product, for possible improvements which might make the product better suited for actual or alternative uses, for the definition and design of new products, etc.

Several of the remarks made earlier indicate that the companies' production process is, in most cases, poorly managed and organized. This affects most of the factors or elements involved: technology (choices, degree of mastership), labour and work organization, learning, maintenance, quality, etc. The way the production process runs is not the result of a designed and implemented organization. There are no obvious reasons, in terms of available resources, why the production process is organized so inefficiently. The firms seem to have the necessary personnel and skills. The reasons have to do with the working principles of the system, in the framework of which the firms are functioning. The firms are under no pressure or have no obligation to care for the systematic organization of their production process or of the various activities and functions which have to be performed, and as a consequence, they even seem to lack the necessary concepts for doing so.

This all means, that the situation should not be viewed simply in terms of the necessity to improve the organization under its various aspects and thus to increase by various degrees the general organizational level. The situation must be viewed in terms of a necessary move from a no-organization situation to a systematic organization of the various aspects of the production process: this move is a prerequisite for the attainment of what can be called industrial performances.

(ii) Technical issues

Old equipment

Because of the long war period and of the actual economic situation, installed equipment is in most cases, very old. The equipment is often the one that was originally installed, and which has never been replaced. In some

cases it was observed that the equipment which has been installed more recently is second-hand. Although this may seem a priori to be a good solution, the second-hand machines are also quite old, occasionally excessively old. In the absence of information on the prices paid for this second-hand equipment, it is, however, difficult to make any assessment of the costs and benefits of that kind of solution.

Technology

The production techniques used are thus accordingly traditional and simple. The technological levels are in most cases quite low. In all cases, the management was of the view that with the necessary financial means, they would renew their equipment and thus switch to more advanced technologies.

This raises questions as concerns the criteria used for the choices of technology. The firms do not seem to have a set of precise criteria for making such choices. Cost considerations are apparently not important. Instead, technical efficiency seems the main criteria. Obviously, the prevailing problems cannot per se be overcome by installing new hard ware for a more advanced technology. Besides, even at very low technological levels, with unsophisticated machinery, companies are obviously short of mastering and maintaing the simple technologies used and not able to organize the production process in any satisfactory efficiency.

Maintenance of equipment and buildings

Due to poor maintenance, the equipment and factory premises are generally in a rather poor shape.

This low level of maintenance is usually attributed to the difficulty in obtaining the necessary spare parts and materials. This is obviously the case. There do not seem a priori to exist important deficiencies in terms of skills and capabilities. But the main reasons seem on the one hand to be the absence of any well organized system for the maintenance of the equipment, and on the other hand a visible lack of interest for solving the technical problems. There seems partly also be an illusion that only with new machinery all technical problems would be solved.

Production lines

Most workplaces lack proper organization of a production line in form of successive stages of the production process and/or of the division and succession of tasks to be performed.

As far as the Mission could see the tasks performed by the workers are in most cases performed outside the framework of an organized chain of operations; as a consequence, each worker is doing his job without any reference (quality, time, etc.) to the possibilities and requirements of the other, upstream and downstream, operations or to the end-product. The workers have specific tasks which they are more or less able to perform rightly, but they are not integrated in an organized efficient production process.

This situation is also reflected by the fact that in most cases middlemen do not seem to exist for the sake of work organization. The causal relation may work both ways: because of the absence of any formal organization of the production process, no middlemen would seem to be necessary to enforce such an organization; but on the other hand, the absence of middlemen seems to make it next to impossible for such an organization to be implemented.

Complementary to this, the Mission found no perception of the production process in terms of the corresponding cost structure. The hypothesis may thus be made that the reason, or one of the reasons, why the production process is poorly organized is that the level of cost consciousness is very low. The consequences of this low level of organization result low productivity levels.

Untidiness and dirt

The Mission found most visited plants to be very dirty. There does not seem to exist any system or even any preoccupation for cleaning the workplaces. As a consequence, the workplaces are dirty in all respect: floor, machines, walls, outside the building, air, etc. Beside the psychological and hygienic consequences, it must be stressed that this general dirtiness has necessarily a negative impact on the materials used and thus on the quality of the products. This also affects in many cases the maintenance and functioning of the equipment: in many instances, the grease seen in various pieces of equipment was a doubtful mixture of grease and dirt.

Nobody - neither at the level of the managers, nor at the level of the workers - seem to care for the material situation of the workplaces. Clear examples are not only the rather systematic absence of paint, but the fact that in many cases very elementary repairs are simply not made. The floors are very often untidy. Typical is the fact that in many cases where pieces of equipment have been scrapped or simply removed, the floor has not been evened out or made neat again.

Safety

Safety and health regulations do not seem to exist or are for various reasons, not applied in the various workplace.

Waste

Without having had the possibility to really assess the amount of waste, the Mission noted that it seems to be very substantial in most cases. Even if some of the waste seems to be attributable to errors made by workers, these errors are probably due more to the organizational deficiencies than to an intrinsic lack of capabilities of the workers.

(iii) The labour force

Disproportionate indirect workers

The Mission had little possibility to observe and to evaluate the activities of indirect workers. On the basis of the information obtained, these indirect workers appear to represent very high - one could say, abnormally high - proportions of the work force when one takes account of the fact that these enterprises have usually no commercial and marketing department, have underdeveloped maintenance departments, and seem to have poor accounting systems, while research activities are considered separately.

As concerns higher level employees, their numbers as well as, generally speaking, their training levels, seem to be relatively high. What is striking is that these cadres seem to have only rather distant relations with the production process itself and with the installed equipment.

It should be added that the numbers of indirect workers is still much higher, if one takes account of the apparently very large numbers of external administrators which take care of specific firms.

The lack of middlemen

The consequences of the apparent absence of middlemen is that the workers seem to be to a large extent left to themselves. The Mission observed, on occasion, situations in which workers were doing wrong or useless operations, without having being able to discover the error and to do otherwise the next time. The absence of middlemen has also, as already indicated, the consequence that the workers do not have the possibility to relate their activity with that of other workers within the production process.

The training of the workers

As for availability of human resources, there is clearly a large output of trained people and Mission met numerous highly skilled people at all levels. However, apparently these skills were not always directed/allocated to the right place. Therefore, there are often significant skill gaps in various functions at company level.

The Mission was informed that most of the workers have been trained on the spot, although on the basis of different levels of basic or professional training. However, it has not been possible to evaluate the level of previously acquired training. It has likewise not been possible, in the course of short visits, to evaluate the levels and degrees of adaptation of the training of the several categories of workers.

As concerns the shopfloor workers, nothing particular can be said as concerns their training or skill levels. Of course, their training should and could be easily improved. No attempt seems to be made in order to foster the accumulation of know-how at the level of the shopfloor workers.

As already indicated, the faults which have been observed seem to be due more to organizational deficiencies and to the absence of advising middlemen. It seems at the same time quite obvious that the motivations of the workers are poor, but how can it be otherwise, taking account of the low levels of wages and thus of basic needs satisfaction.

From the standpoint of industrial development, the accent must be put on several training requirements:

- Specific training in management both in order to train required number of managers and management cadres and to diffuse management principles in various training programmes.

- Training of technicians in order to satisfy basic operating and maintenance requirements.

- Training in business or cost accounting, again both for developing a group of specialized accountants and for the diffusion of the required cost consciousness and concepts through the whole system.

- Training of middlemen, on the basis of which the production process and labour could be systematically organized.

- University training in different fields corresponding to the existing or potential industrial activities.

Another aspect has to do with mobility. Because of skill and competence scarcities, questions have to be raised and solved as concerns the optimal use of available human resources. These questions have, for example, to do with rules, incentives and motivations for mobility.

Chapter IV. Science and technology for industrial development

Science and technology constitute an essential basis for the renewal and continuous upgrading of industrial production processes and products. As indicated in Chapter I, the international production system is undergoing a very dramatic technological innovation development through which competitive patterns and established production and trade structures are rapidly changing. Indeed, a country's future competitive strength is to a large extent determined by its scientific and technological innovation capabilities. Countries need therefore to mobilize and effectively direct their scientific resources in support of industry and in accordance with processed industrial strategies. Internationally significant efforts are undertaken both on the national level, industry level and on the level of regional groupings such as the European Communities. The issue addressed in the context of Viet Nam's long-term industrial development strategy is

(i) how the country is currently equipped with institutions and human resources in the field of science and technology,

(ii) how these capacities are organized, managed and reutilized,

(iii) how future challenges could be met by in overall capacities and efficiency.

From the outset it must, however, be admitted that the gross national expenditures on R&D and the flow of funds within the Vietnamese R&D system at large cannot be elaborated here due to lack of data and lack of systematic overview of all R&D performing units. For most sectors figures and other facts on research and related activities are incomplete and statistically inconsistent. Because of this no detailed international comparisons, for analyses of the economic functions of Vietnamese R&D and related activities, can be made. Available data on the national R&D system in Viet Nam presented here are, thus, not always comparable with international R&D statistics.

1. THE SIZE AND INSTITUTIONAL SET-UP

Research and experimental development (R&D) in Viet Nam is performed by a large number of institutions, laboratories and other units. The majority of these units are financed through the state budget, but provincial and local administrations as well as individual enterprises in the business sector also provide funding for Vietnamese R&D.

Institutionally, the national system for research and experimental development (R&D) in Viet Nam cover:

- Laboratories and other R&D units placed under the different sectoral ministries. In western industrial countries these specialized units correspond to industrial laboratories within firms or corporate structures. In Viet Nam, however, industrial firms rarely build their own facilities for development work.

- Those university and other higher education departments, which perform research as part of their normal activities. Far from all academic departments at Vietnamese universities have the personnel, equipment and other resources to perform research. Within the higher education sector there are also separate R&D institutes.

- A small number of specialized R&D institutions at the national level. The most significant is the National Center for Scientific Research of Vietnam (or, as it is usually abbreviated: the National Science Center). It is a center for advanced basic research only in two areas: mathematics and theoretical physics. In all other areas, the National Science Center should better be described as a center for applied research and experimental development. As such there are no national centers of a kind that exists in other countries.

About 20,000 scientists and engineers (as full-time equivalents) were involved in scientific and technological research activities only in the first two of the three sectors mentioned.[1/] 6,200 of these R&D scientists and engineers were employed by departments within the higher education sector, and the remaining 13,800 performed industrially oriented R&D activities within units under the sectoral ministries. A conservative estimate for 1985 would be that 1,300-1,500 R&D scientists and engineers (as full-time equivalents) were employed by the three major national R&D institutions. If this estimate is correct, Viet Nam directs nearly 2/3 of its R&D scientists and engineers to specific industrial or other economic goals, by way of the sectoral ministries, while nearly 30 per cent of the same highly qualified category of its work force perform research in an academic setting. Even if the estimate above is too low, it would be fair to say that a clear majority of Vietnamese R&D scientists and engineers are involved in industrially oriented research and experimental development.

Official R&D data from the mid-1970's and onwards shows that until the early 1980s the total number of R&D scientists and engineers (as full-time equivalents) in Viet Nam has grown slowly from 11,200 in 1976 to a little more than 13,000 in 1982. In the last five years the total number seems to have expanded more quickly.

Similar quantitative indicators for the distribution of R&D technicians and other supporting personnel in the mid-1980's are not available. However, an indication of the overall number of R&D technicians in Viet Nam could be derived from Table 4.1. There were, in the early 1980's, 8,900 R&D technicians (in full-time equivalents). No detailed data is available for more recent years. If the other categories of auxiliary R&D personnel such as secretaries and other administrative staff, transportation workers, etc. are included in the total R&D support staff, Viet Nam employed 12,000 in 1978 and 17,400 in 1982.

Generally, the growth in total R&D personnel in Viet Nam has not been among R&D scientistis and engineers, but among the R&D support staff. According to official statistics for 1978, the total number of R&D personnel in Viet Nam was a little more than 25,000 (in full-time equivalents); in 1982 the total figure has been estimated to 30,400. As shown in Table 4.1, Viet Nam, as many other developing countries, has a large pool of highly qualified manpower to draw upon, if it should want to expand its R&D system.

1/ Based on Viet Nam's reporting to UNESCO.

Table 4.1. R&D personnel in Viet Nam, 1982

	Total	Of which: Postgraduate degree holders	Scientists & engineers	Technicians
Total R&D personnel	697,430	5,934	248,223	443,273
- of which engaged in R&D				
- subtotal	21,907	957	12,078	8,872
- in per cent	3.14	16.12	4.86	2.00

Source: "Statistical Data 1930-1984", Hanoi: Statistics Publishing House, 1985 (in Vietnamese).

As for R&D manpower, available data on gross national R&D expenditures in Viet Nam is yet incomplete. Within the State Commission for Science and Technology it was recently estimated that the country uses 0.7 per cent of its gross domestic product on R&D (see Table 4.4). However, this relative figure is probably a little high, but since there is no available data from a national statistical survey of the nation's R&D resources, there is no alternative figure at hand.

Total government expenditures on R&D estimated for 1985 is totalling 498 million Dong. Only about 6 per cent of the government's R&D funding is channeled to academic research, which may imply that researchers at Vietnamese universities and other higher education institutions are not so well equipped with scientific instruments and library facilities and that they have much less supporting staff than their colleagues employed by the other ministries. The remaining 94 per cent of the state R&D budget is divided equally between the sectoral ministries on the one hand and the national R&D institutions and some other specialized institutions on the other. This implies, in turn, that the best staffed and most well-equipped R&D units in Viet Nam are not to be found in industry, but in the so-called general service sector, which includes the national R&D institutions (see following section for details).

Unfortunately, the economic base for Vietnamese R&D is - at least partially - being eroded along with the growth of problems in the economy at large. Insufficient funding, lack of advanced instruments and specific scientific equipment, and limited access to international science and technology have forced the R&D institutions, regardless of their main objectives and formal responsibilities, to move towards experimental development work, testing and standardization. Under these circumstances, scientific research cannot be given a high priority.

In the short-term perspective, this may be positive for the diffusion of existing technologies for industrial renewal. In the medium-term and long-term perspectives, the concentration on the "D" in R&D can give harmful effects on industrial and other economic activities. A country cannot choose

Table 4.2. R&D personnel in Viet Nam, 1982
(in per cent)

Scientific field	
Natural sciences	14.4
Engineering	42.5
Medical sciences	8.4
Agricultural sciences	18.7
Social sciences	16.0
Total	100.0

Source: "National seminar on science and technology policy", Hanoi, 20-21 November 1986 (in Vietnamese).

Table 4.3. Composition of R&D personnel with postgraduate degrees, 1985
(in per cent)

Scientific field	
Natural sciences	35.3
Engineering	33.6
Medical sciences	5.8
Agricultural sciences	6.6
Social sciences	18.7
Total	100.0

Source: "National seminar on science and technology policy", Hanoi, 20-21 November 1986 (in Vietnamese).

Table 4.4. Gross national expenditures on R&D as percentage of GDP, (estimates)

Year	
1965	0.49
1970	0.67
1975	0.54
1980	0.44
1985	0.70

Source: Estimates by the Institute for Science Management, State Commission for Science and Technology, Hanoi, 1988.

Table 4.5. Allocation of R&D personnel (university graduates only) by economic sector, 1984
(in per cent)

Economic sector	
Education	32.0
Economical science	17.0
Medicine	9.0
Agriculture, forestry and fishery	7.2
Machiinery building	7.0
Construction	6.4
Natural sciences	5.0
Others	16.4
Total	100.0

Source: "40 years of Development of Higher and Secondary Education", Report by the Ministry of Higher and Secondary Education, Hanoi, 1985, (in Vietnamese).

among different options for industrial innovation, nor build its competitive strengths, if it does not have a minimal capacity to generate its own technological and scientific results nor provide advanced training of highly qualified experts in science-based technological fields.

Another problem is the lack of close interaction between the various parts of the institutional system. The three main parts or sectors of Viet Nam's national R&D system should have close links to each other. In practise, however, the system operates very much according to its three separate components. According to the official policy, applied research and experimental development should be performed by the ministerial labs. The universities are primarily producers of highly specialized manpower, including well-trained scientists, while the National Science Center has the prime responsibility for the most advanced forms of research. In practise, however, the system works a little differently.

With a small research community, the many R&D institutions in Viet Nam should be easy to connect by informal means. The transparency of the system, for the specialists working inside, is usually considered high. But strict administrative procedures and rules for decision-making are barriers to collaboration.

The three national institutes

Advanced technological and scientific research, comparable with that of most other countries, is supported by way of three national institutes led by directors with the rank of vice-ministers. The institutes have a high degree of freedom of maneuvre, although their work is scrutinized by the State

Commission for Science and Technology. Their work plans are not subordinated the Ministry of Higher Education or other sectoral ministries, but there are many functional linkages between the national institutes and the different ministries.

The National Science Center for Scientific Research of Viet Nam, is the biggest single R&D institution in the country. It has 33 laboratories and institutes and 3,400 persons employed[1/]

The southern branch of the National Science Center pursues its own policies and masters its own affairs, although a substantial share of the budget (primarily the salaries) is paid from Hanoi. It has very close working relations with the Ho Chi Minh City Committee for Science and Technology and with the City's Industrial Service Department. Through R&D contracts both the Committee and the Department channel resources to the Center.

It is easy to distinguish between research at the National Science Center and at the applied research in the sectoral R&D institutes under the different ministries. The Science Center is better equipped and has better trained personnel. The Centre functions primarily as a conglomerate of units and programmes for applied research and experimental development.

In search for more research funds the National Science Center has increased contracting with industry. The Center's activities have become more applied, and directed to the particular needs of industrial firms. As there is no national institution in contemporary Viet Nam that systematically performs basic research over a wide set of research areas, the scientists at the National Science Center are encouraged by its president to pursue advanced basic research while working outside of Viet Nam

The National Institute of Technology was established to become the center for Vietnamese "hich tech". The Institute has been generously funded, but its research activities have hardly begun.

The third national center is the National Institute of Atomic Energy. Its activities have not yet become a technological basis for atomic energy development in Viet Nam, but the budget of the Institute should provide a good start for a new technological field.

The three national centers operate independently. There are no formal couplings between them, but the informal links are many. As the National Institute of Technology begins to operate, it is likely that the National Science Center will put more emphasis on its original tasks to further scientific research. It is even possible, though not advisable at this stage of development of the R&D system in Viet Nam, that the National Science Center will try to attain the work profile of an academy of sciences with a fully-fledged R&D system. As a scientific academy with a relatively large autonomy and its own research laboratories, the risks are great that the

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1/ About half of these are supporting personnel, including technicians. Some 700 are PhDs or have a corresponding academic qualification; of these are 100 employed as professors. An estimated 1 000 employees are researchers with lower academic degree. For 1988, half of the total budget will be used for salaries.

Center will not interact closely with other R&D institutions nor give substantial contributions to industrial innovation. This should indeed be given utmost consideration.

The ministerial R&D establishments

Viet Nam is heavily dependent on imported technology. Most advanced machinery installed has been delivered from other countries.

Engineering and R&D capabilities for maintenance and technological upgrading are, however, to be available in the ministries. The experience in using modern technology varies though, between subsectors. In one ministerial area, individual enterprises may have production engineers organized in engineering teams. In enterprises under another ministry, highly specialized engineers are only involved in simple machine repair. These tasks should instead have been performed by technicians or skilled workers.

Industrial R&D and related activities should be carried out by specialized R&D institutes in each ministerial sector. The ministries are encouraged by the State Commission for Science and Technology to develop their institutes and thereby create a better basis for technical improvements in production. These institutes, closely related with the sector and subsector plans and accompanying industrial investments by the individual ministry, should compensate for the lack of R&D and engineering capacity within the enterprises. In other countries such institutes are usually called branch research institutes and are contributing to the general, not the company-specific development of industrial production processes. Little is done to generate new products; the focus is put on improvements in the industrial production.

Generally, the industrially-oriented R&D in Viet Nam is conducted under the auspices of the sectoral ministries. But the degree of specialization of R&D work is low and the orientation of the R&D units involved is more towards minor technical improvements and engineering capabilities. The beginning of a structure is observed in which individual companies seek a long-term relation or contract with a group of R&D scientists and engineers in an industrial research unit. The purpose is to avoid creating a separate and costly unit within the firm, while at the same time get the flexibility and other benefits of an advanced engineering (and research) capacity as if it was an "in-house" arrangement. This type of structure which is similar in kind with the French Société d'engineering de la recherche industrielle, can be an important part of the country's technological upgrading if properly organized and commercially operated.

Among government policy-makers in Viet Nam, a radical shift in the industrial R&D structure is being considered. This would mean that the equipment and personnel of many of the R&D institutions and units under the sectoral ministries are transfered to individual enterprises in order to integrate R&D with the companies' plans and daily workings. The government's intention would be to boost industrial engineering and R&D at the plant level. But such new arrangements might be premature. The industrial enterprises would probably not be ready to create separate R&D units to use the new expertise in optimal ways. Furthermore, firms, who then would not have the opportunity to receive R&D specialists, will loose the options now

available at the branch level. A better way would be tc give government incentives to some of the technically most advanced enterprises in setting up their own engineering facility or, even, a small R&D department. The experience later to be drawn from such specific experiments under different sectoral ministries could provide incentives to a long-term policy shift.

2. THE STATISTICAL BASE

The difficulties in providing a systematic, overall picture of Vietnamese resources devoted to R&D and innovation are significant. Current policy-measures are discussed and applied without a proper knowledge of the available resources, on the system of R&D and related activities.

The real challenge is the data on outputs from the R&D system. It is easier to count the numbers of scientists and engineers in research, than to quantify what comes out from the laboratories and libraries. Here, quantifications are more difficult to attain as statistical methods are less developed. From a policy viewpoint, however, the overall flow of resources devoted to R&D activities as well as the results should be mapped and better understood. As a small scale experiment, it could prove very useful to try out different kinds of output indicators in Viet Nam as a way of investigating the impact of science and technology on the economic and social development in the country.

In Tables 4.1-4.5 above some of the available input indicators are summarized and in Table 4.6 patents is given as an example of an output indicator. In Table 4.7 calculations have been made of relative costs for technology transfer according to the source of funds. It is shown that the direct costs for foreign equipment are paid by loans from abroad. All seven statistical tables are examples of policy-relevant quantifications.

Table 4.6. Payments for technology transfer to Viet Nam: Estimated share for technology within total costs for imports of equipment
(in per cent)

	1976-1980	1981-1985
Foreign loans	56	71
Foreign aid	31	18
Foreign trade	9	5
World Bank	4	6
Total	100	100

Source: Institute for Science Management, State Commission for Science and Technology, Hanoi, 1988.

Table 4.7. Patents, filed and granted, in Viet Nam, from 1 January 1982 to 30 October 1987

	Total	Resident	Non-resident
Patent applications filed	367	360	7
Patents granted	35	33	2

Source: Institute for Science Management, State Commission for Science and Technology, Hanoi, 1988.

For future planning purposes and the elaboration of national and sectoral priorities R&D statistics, based on international definitions and standards for data collection should be processed and distributed. Such planning-related responsibilities could rest with the national statistical office or with a relevant unit within the State Commission for Science and Technology.

More information on the country's available R&D resources should be made generally available and policy-oriented analytical studies should elaborate the possibilities of a more effective use of these resources. Decision-makers at all levels, including members of the Council of Ministers, should be provided with appropriate opportunities to be fully aware of the technological and scientific dimensions in their respective areas of activity. Series of monthly seminars, one-day workshops, annual roundtable meetings and other training schemes should be tailored to industrial, government and other decision-makers to provide new facts and insights and to create a wider frame of reference for Viet Nam's industrial policy. Elements of such discourses on Viet Nam's innovative potential and related training activities emerged before 1986 as the Council of Ministers prepared its science and technology strategy. Some of the ad hoc working groups are still meeting for discussions on long-term issues. It could have constructive effects on the quality of planning and decision-making, if the central government stimulated a new round of talks in these or similar ad hoc working groups on the earlier issues and on new problem areas. Specialists from other institutions and from different types of enterprises should become deeply involved in the process of generating new types of innovation policy for the country.

Indeed, gradually more institutions in Viet Nam are getting involved in decisions that promote innovation through modern technology, such as industrial enterprises, central government and provincial agencies, financial institutions, scientific and engineering institutions, thus broadening the institutional responsibilities for industrial innovation. However, this presupposes not only a better knowledge of alternatives and the effects of science and technology, but also a growing capacity to make strategic decisions while solving short-term problems of a complicated nature. The building up of a proper information base and information flow among all actors is thus an essential dimension of the science and technology advancement.

3. KEY ISSUES AND POLICIES

The interaction of institutions at the level of government, science and technology is more and more considered to be important for the economic performance of the country. Much is therefore done to introduce the scientific and technological dimension in existing and future plans for the economic development.

Up to 1986 a series of initiatives were taken to move scientific and technological activities closer to industrial production. The second phase, was be the build-up and efficient functioning of the R&D system itself. To this end propositions were formulated for improvements of Viet Nam's R&D policy, summarized in reports from working groups as well as in a final report. It is, however, difficult to evaluate the real impact on the country's R&D policy of this large-scale policy appraisal and analysis. Work continues in a newly created Institute for Science and Technology Strategy within the State Commission for Science and Technology and in a number of working groups.

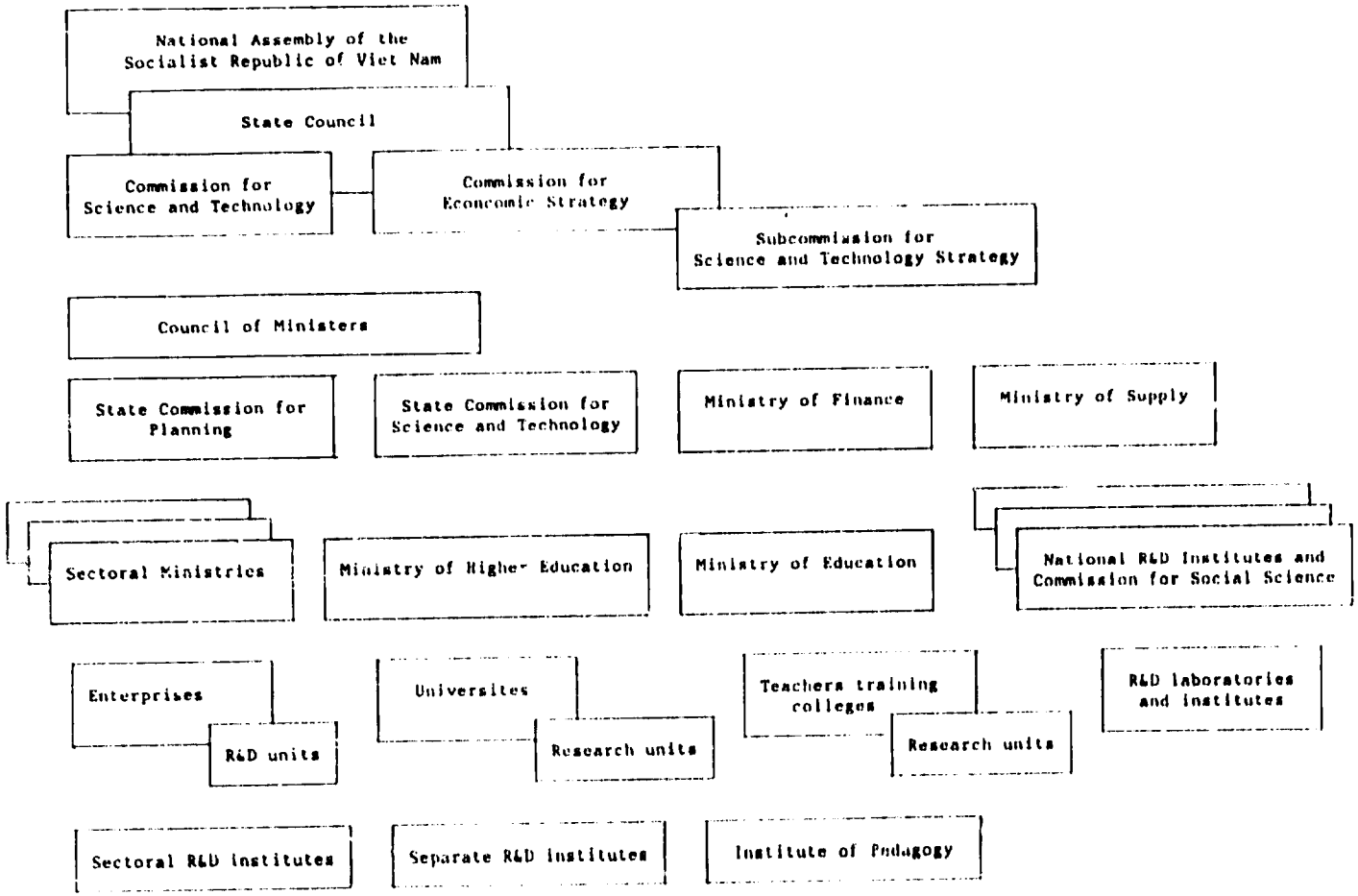
The key instrument for creating a national R&D policy and coordinate the sectoral interests is the State Commission for Science and Technology. Its prime function is to make the necessary plans for scientific and technological development for the entire country, regardless of sectoral interests. Its responsibilities include the overall control of major R&D programs and projects in the country and the Commission prepares the laws and other important legal documents on science and technology for the Council of Ministers and for the State Council. The international cooperation in science and technology as well as the importation of technology for industrial purposes are areas of special concern.

Within the State Commission for Science and Technology, the biggest single unit is the Institute for Science Management. This is both an administrative and policy-generating institute, which recently established its own company for economic consulting and engineering to complement its normal activities within the government structure. The engineering company, called Concetti, signed its first contracts with industry in 1988 and has already established links with engineering and other consultancy firms in industrial countries. It follows initiatives taken by the Ho Chi Minh City government's Industrial Service Department, which has stimulated the creation of a large engineering program, called Technology and Development, involving nearly 300 engineers, economists and other specialists on a part-time or full-time basis in the southern provinces of Viet Nam.

New emerging issues of policy deliberation concern problems in the general promotion of indigenous technology and, more importantly, how to better use foreign technology. The diffusion of industrial know-how and technology is slow and inefficient, and the question arises how expert knowledge could be transferred more easily between industrial enterprises, how technical incentives to investments in improved technologies should be fostered, etc.

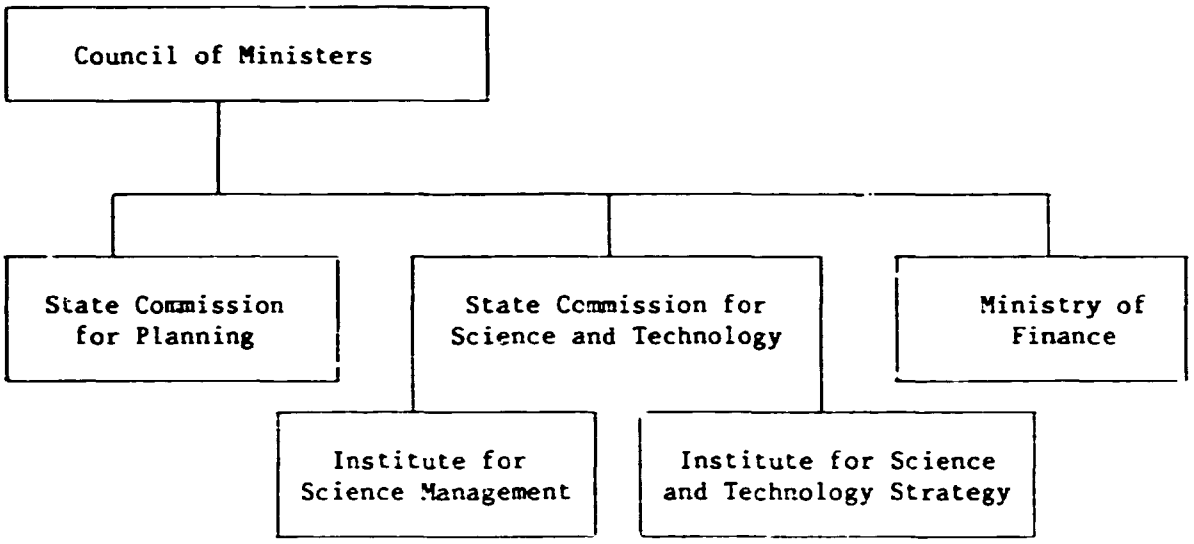
What is lacking in this policy process at a high government level are more systematic efforts to review new policy measures that could better promote the utilization of modern technology for industrial purposes.

Planning and performing science and technology in Viet Nam: Selected institutions at the national level



Note: This organizational presentation shows five formal levels of planning in Vietnamese R&D: 1. Within the National Assembly and its council and commissions; 2. By the Council of Ministers; 3. At the level of cross-sectoral ministries; 4. By the sectoral ministries; and 5. Among the R&D performers.

Ministrial R&D planning: The State Commission for Science and Technology



Connected with this issue is the problem of the management system in the different types of companies which have difficulties in coping with technological innovation. Other basic issues concern the national price policies, which do not stimulate the use of new technology for innovation, since prices of industrial products are usually set only according to simple calculations of standard costs. The public enterprises are often technologically conservative and play the role of "insurance companies" for well-known technologies. The administrative and financial barriers to technological improvements due to the ways banking is centralized and foreign currency is controlled in today's Viet Nam.

The build up of the relations between the R&D system and the industrial sector of Viet Nam, has through decrees by the Council of Ministers become easier. Thre are possibilities for individual scientists and technologists to sign contracts with any type of economic unit, including private firms, and R&D units and industrial companies can share extra profits from technological improvements. This is an important move in the policy framework and should be pursued.

It is of national interest that all major government interventions in the economy are based also on an understanding of their possible effects on technical change and industrial innovation. It should be generally recognized that innovation and other industrial changes are part of processes that are complex due both to the technology itself and to the modes of management, the patterns of organization, the styles of work, the areas of location, etc. In this respect, industrial production is a social activity. Hence, the criteria of choice among technologies are not only economic but also social.

To influence and guide industrial change and innovation in Viet Nam, the users of technology for production, be they industrial enterprises or agencies in central, provincial and local governments, must be more actively involved. The intensity of interaction is varying substantially between different

sectors of government and different branches of industry. Government officials must cooperate more closely with technical specialists in industry. Efforts should be made to better introduce science and technology as an active component in investment decisions and policy-making. Cross-sectorial planning and decision-making should not be avoided.

The producers and disseminators of technology and technical and related scientific information should be supported on a broader scale. Generally, in Viet Nam, experimental development activities in industry should have better conditions. Industrial R&D activities at the company level are rare, the maintenance of specialized equipment for experimental development is poor and the active use of highly skilled specialists is low. Laboratories within sectoral ministries, being important components of the country's scientific and technical infrastructure, should be upgraded. Engineering services and other consultancy activities, technical libraries and information services should be better promoted and marketed.

Science parks

In many industrial countries, "science or research parks" represent an institutional attempt to solve the difficult problems of coupling scientific and technological activities. By providing better facilities for technology-intensive companies in the vicinity of a technical university or other research center, informal contacts between scientists and engineers are expected to stimulate the development of new products and processes. In many countries, concentrated central and local efforts to bring together new and old firms, R&D institutions and related facilities have led to spectacular growth of industrial activities in a particular region or area.

So far there are only a few developing countries which have embarked on the establishment of science parks. Taiwan Province of China is the most advanced case; its Hsinchu Science Park has, within just seven years, attracted more than 70 research based companies of both foreign and domestic origin, predominantly in the electronics industry. The Republic of Korea provides another example. There the focus is more on the interaction of big public and private research institutes and related industrial production within a so-called Science Town approach (located in Daeduk).[1/] In these and other cases science parks have been employed in more advanced developing countries as instruments aimed at accelerating the transformation of their industrial structure twoards research-intensive high tech areas of production (such as industrial electronics; bio-engineering; new materials).

Obviously, the development context of Viet Nam is quite different and less sophisticated production technologies will continue to play an important role in the foreseeable future. Nevertheless, the country's industrial progress could greatly benefit from the establishment of research-industry links at an early stage. Considerable science and research capacities and related human skills are available in the country. The efficacy and efficiency of these resources could be increased by pooling them and giving them a clear directive as regards perceived priority areas for future

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1/ For details cf. UNIDO, Export Processing Zones in Transition. The Case of the Republic of Korea, PPD.84, 10 June 1988, pp. 49-51.

industrial research and commercialization efforts. A strongly targeted approach is called for in view of the limited resources available. One potentially promising target area might be research into the opportunities and constraints of processing industries based on Viet Nam's local agricultural and mineral resources.

It would need to be borne in mind, however, that the establishment of viable and productive research-industry links in general and that of science parks in particular involve a long-term commitment. They may bear fruit only after 5-10 years and considerable expenditures on the required infrastructure are involved. Their success depends on a number of important preconditions, including a good research and teaching structure in the selected priority area of science, an attractive location (particularly if the attraction of foreign partners is intended) and at least a small group of persons possessing both the professional research competence and the commitment and desire to promote the project.

For Viet Nam, financially modest, but still ambitious experiments with research parks , outside of the two metropolitan areas, should be considered. In the middle part of the country, there are several city areas, where combinations of industrial enterpreneurship and research and technological activities could be stimulated by government action. Viet Nam could learn from the international experiences and find its own way of creating local centres for industrial expansion.

Probably, some lessons can be drawn from the university-industry relations i Viet Nam during the 1980s.[1/]

In a significant number of scientific areas, Viet Nam does not lack the expertise necessary to provide for an effective economic use of the scientific results, but the way in which the national R&D system is organized makes the transfer of relevant information difficult. This information problem can be formulated in other words: The size of particular R&D efforts within the country may very well be big enough, but the relevant segments of the industrial structure are not effectively coupled with the R&D projects and programmes.

It is proposed that a feasibility study be carried out on the possible establishment of a Viet Nam "science town" or "park", through which R&D resources can be concentrated, collaboration be directly built up with production and foreign, specific co-operation be obtained in critical areas.

Technology acquisition

The most serious limitation to the scientific development in Viet Nam is not the lack of funds, nor poor equipment, but the relative isolation from the international scientific community. Contacts between scientists and other R&D

1/ In recent years, the National Science Center has tried the same way of to work with ministries and industries. In 1987, some 20 research collaboration contracts were signed by the National Science Center in Hanoi and industrial companies and the number of research contracts is increasing. During the first half of 1988 already about 30 contracts were finalized, regulating cooperative efforts between the Center and different industrial firms or branch organizations.

specialists outside of the CMEA are few and restricted. The stimulation from abroad is weak. This needs to change, not only in the search of scientific results from abroad, but also in the attempts to search for technical stimuli in advanced industrial product areas.

In order to monitor international technological and scientific changes and to gather, process and disseminate this intelligence to the Vietnamese research and development community, it is important that the government helps make the diffusion process as efficient as possible. This is a manpower-intensive activity which requires specialists and access to some of the major international centers for R&D. Unconventional (though legal) ways and means to attain this objective should be devised both within the country and abroad. Like the major industrial countries such as Japan and the USA, to save time and costs, Viet Nam could probably better use its compatriots studying or working abroad to form effective networks, which could provide freely available relevant scientific and technological information. Several networks of this type are already in existence. It is important that they are stimulated more systematically and guided also by industrial development objectives.

Within Viet Nam, the national and provincial libraries and documentary services for scientists, engineers and other specialists are being improved steadily. But there are still many restraints in acquiring and distributing relevant books and other documents. Especially foreign research material, including books and important scientific and technical journals, are in shortage. This can be compensated for, at least partially, by a service which provides summaries and review articles, annotated acquisition lists, etc. For a country with foreign currency restrictions library and information policies should be devised for the purpose of collecting and disseminating up-to-date scientific and technical data in foreign languages. Also, a more effective distribution of foreign patents descriptions and other technical data is a necessary tools in building indigenous innovative capabilities.

National priority should be given to participation by Vietnamese scholars in international scientific collaboration. Much information can be gained from R&D scientists and engineers engaged in close working relationships at research institutions in other countries, both in the South-East Asian region and elsewhere. Given the limited foreign currency available to Viet Nam for this type of international collaboration, funding should be channeled to those areas in which the Vietnamese scientific community is already strong. In this way the marginal costs for the collaboration will be low, but the positive effects on R&D in Viet Nam might be big.

It is proposed that a series of specialized scientific symposia be arranged in Viet Nam with international participants and that this issue of increased international co-operation be addressed. On this basis various collaboration programmes and institutional twinning arrangements can be formally established.

Training and organizational issues

During most of the 20th century, Viet Nam has had to rely on foreign institutions for the specialized training of its most qualified researchers. France, as a colonial power, has provided training for the older generations

of Vietnamese scientists, while, after 1954, in the northern regions, the USSR has been the most obvious recipient of young scholars wanting a specialized training. The USA, during the 1950s and 1960s, provided similar opportunities for persons in the southern regions.

Today, the majority of the highly-qualified personnel in the National Science Center has received training in the USSR and other Socialist countries, which also have provided the necessary finance. The next grouping are those trained only at Vietnamese institutions. A small number are educated in the Netherlands, the Federal Republic of Germany and other western European countries, usually funded through fellowships. Multilateral institutions like the International Institute of Physics in Trieste and the International Atomic Energy Agency (IAEA) in Vienna have been instrumental in giving additional high-level training.

This background description of the top specialists at the National Science Center has to be somewhat modified to cover also the universities and other institutions of higher learning. Starting in the 1950s, Viet Nam has sent substantial shares of its future scientists to the USSR and the eastern European countries, where they have joined what corresponds to Master's or PhD programs. Most of them have returned with foreign academic degrees. However, they represent far from all academic teachers. The clear majority has only Vietnamese academic degrees.

For both the universities and for the National Science Center the overwhelming majority of R&D supporting personnel has been trained within the country. However, a number of technicians, documentalists and others have also been abroad to improve their special skills. The total numbers of graduates as well as of students enrolled in higher education institutions in Viet Nam are summarized in Table 4.8.

Table 4.8 Higher education in Viet Nam, 1976-1986

Academic/ year	Number of universities and colleges	Number of		
		Teachers	Students	Graduates
1976 - 1977[a]	39	8,599	71,328	9,200
1977 - 1978	61	12,255	135,104	17,262
1978 - 1979	80	15,271	150,380	20,862
1979 - 1980	84	16,523	149,768	22,901
1980 - 1981	87	17,602	153,897	25,651
1981 - 1982	95	18,509	149,292	29,184
1982 - 1983	92	18,369	139,331	33,086
1983 - 1984	93	18,118	128,732	33,610
1984 - 1985	94	18,984	125,736	27,900
1985 - 1986	97	18,827	126,179	25,561

[a] Northern Viet Nam only.

Source: "Annual Statistics, SRV, 1985", Hanoi: Central Statistical Board, 1987 (in Vietnamese).

For the further development of the country's R&D system it is necessary to set both quantitative and qualitative targets for the education and specialized training of R&D personnel.

Compared with newly industrializing countries in Asia, Viet Nam still has a relatively low share of well-trained specialists at the top level. A quantitative goal could be to put a larger share of highly trained persons in academic and other important positions within the national R&D system.

For the near future, there will probably be no restrictions in sending more persons abroad for specialized research training. But to secure a better base for scientific and technological work, attention should be given to the R&D system's own ways of renewal. This presupposes, inter alia, more resources and a better organization within the country for the training of young researchers. Special programs should be designed to help universities or groups of universities and other research institutions to better educate its R&D scientists and engineers. Like in industrial countries, national agencies could stimulate local initiatives to attain a more diversified and formalized research training, and, as a consequence, to develop new specialties and combinations of already existing. Experiments with multidiciplinary and policy-oriented research training should also be made.

To further improve the quality and effective use of the most highly-qualified personnel, internal mobility and migration of specialists between different types of research units should be stimulated.

At both the regional and international levels, Viet Nam should try to find the proper means to actively participate in post-graduate training of both young and senior researchers. Among industrial countries, specialized training outside of the home country is a common way of improving the quality of national expertise. Recurrent training of highly-qualified specialists in collaboration with other nations would also make a more effectively use of resources in other countries and of the international scientific community.

To make more effective use of the highly qualified manpower, it should become a government task to stimulate the formation of national and South-East Asian associations of specialists in different technological fields and sectors of society. A limited number of such organizations already exists, but more such specialized organizations should be set up. Usually, among the industrial countries, these associations are created to establish higher professional standards. This is certainly very important for a developing country as well. However, there are other and more important objectives.

At the national level Viet Nam still has a weak technological infrastructure and has to rely on informal channels of communication between professionals working in different parts of the country. Encouraging national and regional associations could help consolidate already existing as well as the new institutions for R&D, testing and standardization. The continuous exchange of experience and know-how through informal and voluntary networks could make the diffusion of innovations more effective without raising the transaction costs substantially. With well-functioning organizations of this type, it will be easier to communicate and cooperate with colleagues in different parts of Viet Nam and, as a natural outgrowth, with relevant groups of specialists in other countries.

Within the country, with the help of the professional associations, migration by specialists between industries and between sectors could be made easier, so that the present concentration of highly qualified manpower to the metropolitan areas of Hanoi and Ho Chi Minh City would be more balanced.

The government's policy-makers could even ask the professional associations to assist in implementing specific policies for innovation and generally strengthen the relationship between Vietnamese scientists and engineers and their colleagues in neighboring countries. Here, the means to implement policies could be through the association's newsletters, workshops and training programs, consultancy work and "travelling experts", documentalists etc. Accordingly, the government should provide not only minimum funding to secure continuity in the routine activities of the associations, but also the economic incentives to engage the members in a variety of policy supporting services.

It should be of national interest to expand the expertise of the policy-making community for Viet Nam's industrial development and, for this purpose, the professional associations could be used in a number of ways. Retaining the general interest of the associations to systematically improve work standards and foster a common work ethic among its members, the associations could be helpful in assessing and evaluating R&D and innovation programs and policies. They could also develop constructive alternatives to the current planning and policy-making. In order to improve the use, adaption and modernization of imported technology and science, the associations should be asked to make more systematic use of their international contacts.

Chapter V. Agro-, forestry- and fishery-based industrial development

Viet Nam is very richly endowed with national resources which so far have only partially been exploited or utilized as a basis for the country's industrialization. Quite evidently Viet Nam's future economic development will to a prederminant extent be determined by the availability of domestically produced raw materials and by the ability of its industry sector to efficiently process these raw materials and provide inputs to the primary sectors. The formulation of an industrial development strategy for Viet Nam would indeed need to be focussed on identifying and building on potential linkages between the secondary and the primary sectors, above all the agricultural, forestry and fishery sectors.

In this chapter an attempt is made to stocktake major features of these sectors and their current and prospective linkages with manufacturing. This review is to be seen as a first step in what later in this report shall be described as "filière" approach for an industrial strategy. This implies that a series of specific development programme for a longer-term perspective would be designed on the basis of various existing or potential development chains from the raw material production until final consumption goods with material and non-material inputs at each segment of the chain. To this end the mission decided to present in its report most of the data and information obtained although obviously these are available in better coverage in the various ministries. Indeed, the Mission believes it is essential that such data collection and presentation across the various sectors be seen as a first step for an envisaged strategy formulation and for enhanced international co-operation.

1. AGRICULTURAL AND RELATED INDUSTRY PRODUCTION

Present situation and plans for development

Agriculture is the mainstay of the economy of Viet Nam. It provides food for the population, raw materials for agro-based industries - some of this for export - and it provides job opportunities for the majority of the Vietnamese people.

According to the State Planning Committee, food production should be increased from the 1985 level of 18.2 million tonnes of rice equivalent to 25 million tonnes by 1990, 36 million tonnes by 2000 and should reach the plan target of 45 million tonnes by 2010.[1/] This substantial increase in food production, in addition to the future growing demand for industrial crops for processing, is a tremendous and challenging task for the agricultural sector. It will require essential inputs to increase the productivity of farmers through extension services, credit facilities, improved crop varieties and animal stock and modified agricultural technology. Modern techniques, adapted

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1/ A special note regarding food supplies to large urban population centres is given in Appendix 1:1.

to the particular conditions in Viet Nam, need to be used for tilling the soil, irrigating the [illegible], harvest the crops and reduce the losses during and immediately after harvesting.

The agricultural sector provides 50 per cent of the national income. In 1986 72.3 per cent of the total social work force, or 16.6 million people, were engaged in agriculture, working on 325 state farms, 16,743 production co-operatives, 39,529 production collectives and 1,794,415 households (30.7 per cent of the total number of households).

The average size of the state farms is approximately 1,000 hectares, and that of production co-operatives and production collectives approximately 150 and 40-50 hectares, respectively.

The cultivated area has increased from 8.25 million hectares in 1980 to 8.56 million hectares in 1985. In 1990, 1995 and 2005 the total arable land will be 9.75 million, 10.8 million and 12.6 million hectares, respectively, according to the current development plan.

Table 5-1 gives the past and projected total production of paddy and paddy equivalents where subsidiary crops such as maize, cassava, potatoes and sweet potatoes are included. One paddy equivalent equals 1 kg of maize or 3 kg of tubers.

Table 5-1 also shows average production per capita which has increased about 2.4 per cent per annum between 1980 and 1985.

Table 5-1. Total production of paddy

	Actual production		Projection		
	1980	1985	1990	1995	2005
Total food production (paddy equivalent)	14,406	18,200	22,000	25,000	32,000
Paddy	11,657	15,875	19,000	21,000	26,000
Subsidiary crop	2,749	2,325	3,000	4,000	6,000
Average kg feed products per capita	268	304	330	342	376

Source : Ministry of Agriculture and Food Industry

Appendix 2 gives the production figures for all major crops except paddy in 1985 and the projection for 1995 and 2005.

In general, the production targets for most of the industrial crops are exceedingly optimistic also in the light of the improvements in agricultural

output which have been experienced recently. The growth of agriculture in the past has been 1.6 per cent per year during 1976-1980, and 4.8 per cent from 1980-1985. This should be compared with the plans up to 1995 which envisage an annual growth of approximately 20 per cent per year, for instance for soybeans, sugar-cane and pineapple.

Similarly, the production of slaughter animals in terms of live weight will have to increase on an average by 12 per cent/year in the period 1985-1995.

There are no substantive statistics available for 1987 and an assessment of the performance in the late 1980s cannot be made. However, in the light of the existing constraints, shortage of inputs such as fertilizers, pesticides, fuels etc., the present system of trade in agriculture, lack of easily available credit facilities for co-operatives, collectives and households, the Mission is of the opinion that the envisaged growth of the agricultural sector output can hardly be attained.

The future development of agriculture is focused on an orientation towards a more commercial attitude. The policy is summarized as follows in four basic targets:

- Self-sufficiency in food, viz. 350-400 kg/capita and year.
- Increase in tropical crops to ensure sufficient raw materials for the export-oriented food processing industry.
- Substantial increase in investments in R&D for agriculture and agro-industry.
- Job opportunities for the whole population, improved standard of living and gradual expansion of rural development, including services in these areas.

Industrial establishment will be directed to rural areas, hence a decentralization from the main cities.

Input supply

To fully evaluate the constraints affecting agricultural growth will require in-depth studies of all aspects of input and support such as seed, genetic improvement of stock, resources and capacities for research, extension services for dissemination of innovations and new techniques etc. The Mission made only a tentative assessment[1/] of the supply situation of agricultural equipment, fertilizers and pesticides. The findings are presented below.

1/ See, among others, Appendix 1:2 which provides a brief note on the Tien Giang Province and its agro-industrial development. Notes regarding specific enterprises are given in Appendices 1:3 to 1:15.

(a) Agricultural equipment

Farming in Viet Nam currently uses almost entirely traditional methods. Draft animals are used for soil preparation but hand tools are also used for seed bed preparation. Planting, weeding, harvesting, and for paddy also threshing, cleaning and drying, are hitherto manual tasks. Although they are invariably hard-working, the productivity of the farming population is low. An increase in productivity is essential for both improvement in the standard of living for the individual households and fulfilment of the plan targets for agricultural production.

Agricultural machinery, equipment and tools are manufactured by state enterprises on central and provincial levels under the Ministry of Engineering and Metallurgy. Co-operatives and other enterprises under the Central Council of Co-operatives and Non-Governmental Organizations also play an important role. Manufacturing in the public sector is not co-ordinated and monitored on a national level, hence detailed information on manufacturing capacity is not available. R&D is focused on a 50 kp four-wheel tractor, vegetable oil extraction units, hand tools, etc. (ref. Appendix 1:13). The present product range manufactured by state enterprises includes a two-wheel 12 hp tractor (2,500 units in 1987), pumps, carts for draft animals, rice cleaning machines, rice driers, rice mills, etc.

Apart from being labour-saving, the appropriate equipment also shortens the time to complete different tasks. Timely soil preparation and subsequent planting gives better yields. If the harvesting procedure can be speeded up, losses due to weather conditions could be reduced. The appropriate cleaning and drying facilities could further minimize post-harvest losses. The returns from efforts to reduce the post-harvest losses will be substantial. Experiences from other rice producing countries should be exploited for development of systems suitable to Viet Nam. Initially, comprehensive literature studies would be a cheap instrument to identify possible alternatives. The scope of using solar energy should be considered. Appendix 3 gives some basic meteorological information.

It is concluded that the lack of equipment and the limited existing registered capacity for manufacturing of agricultural equipment constitute a considerable constraint for increased agricultural production.

(b) Fertilizer

The present fertilizer consumption in Viet Nam is approximately 1.5 million tonnes of nitrogenous fertilizer, 1 million tonnes of phosphate fertilizer and 100,000 tonnes of compound fertilizer. The application of fertilizer is about 35 kg of fertilizer products per hectare.

The nitrogen fertilizer plant producing urea has a designed capacity of 110,000 tonnes per year but for several years the actual production has been around 30,000 tonnes, giving a utilization rate of 27 per cent. (See Table 5-2). The mixing plant, with a capacity of 100.000 tonnes per year is fully utilized, using urea, single super phosphate and potash.

Viet Nam is producing three types of phosphate fertilizers, i.e. single super phosphate, thermo phosphate and natural phosphate powder. Single super

Table 5-2. Fertilizer production

Fertilizer type	Per cent N	Per cent P_2O_5	Per cent K_2O	Cap.[1] T/yr (.000t)	Prod.[2] T/yr (.000t)	Utilization per cent	Total tonnes N	Total tonnes P_2O_5	Total tonnes K_2O
Urea	45	-	-	110	30	27	13,500	-	-
Compound	5	10	3	100	100	100	2,300	1,650	300
Single super phosphate	-	16.5	-	400	340	85	-	56,100	-
Thermo-phosphate[3]	-	15.5	-	200	95	47.5	-	14,725	-
Natural phosphate powder	-	10	-	90	90	100	-	10	-
TOTAL							15,800	72,485	300

Notes. [1] Designed capacity in tonnes per year
[2] Production target for 1988 in tonnes per year
[3] 10% Mg is included in the product

Source: Information provided by the Vietnamese authorities

phosphate production has a designed capacity of 400,000 tonnes per year. The production target for 1988 is 340,000 tonnes or a capacity utilization of 85 per cent. The plant was designed and constructed and is managed with assistance from the Soviet Union. It is operating without major difficulties. The processing line for thermo phosphate has a designed capacity of 200,000 tonnes per year and, has for several years, been at around 50 per cent of capacity utilization. In 1988, the production target is 95,000 tonnes giving a utilization rate of 47.5 per cent. The low capacity utilization of the thermo phosphate plant, producing at about 50 per cent, is mainly because of its dependency on raw materials, which have to be imported and problems with the coal used in the process. The production of fertilizer is well below the local demand. Projections show a further increase of fertilizer demand and the Vietnamese Government is planning to increase production.

The third type of phosphate fertilizer produced is natural phosphate powder where Viet Nam uses around 90,000 tonnes every year for direct application to the fields. The urea plant was designed and constructed in close cooperation with China, and the low capacity utilization is mainly due to problems with the coal used for processing and shortage of spare parts, mainly from China.

Viet Nam has a large reserve of phosphate rocks, estimated at more than 2 billion tonnes, with an industrial reserve of 400,000 million tonnes. This can be divided into 4 categories - depending on the P_2O_5 content:

Grade I	32 per cent of P_2O_5	10 per cent of total reserve
Grade II	20-24 per cent of P_2O_5	]
		] 70 per cent of total reserve
Grade IV	8-10 per cent of P_2O_5	]
Grade III	15 per cent of P_2O_5	20 per cent of total reserve

It is planned to increase production of phosphate in the north from 400,000 to 500,000 tonnes per year of single super phosphate. A new plant in the south with a capacity of 100,000 tonnes of single super phosphate per year is also to be set up. The plant in the north is implemented in close co-operation with the Soviet Union, while the plant in the south is designed by Vietnamese engineers using imported equipment. Both projects are intended to be commissioned by 1990. For 1995 the General Department for Chemistry has planned to commission a new factory, either in the north or in the south, with a capacity of 500,000 tonnes per year of single super phosphate, but preferably in the south where 50 per cent of the phosphate fertilizer is used.

For the nitrogen fertilizer, the Government intends to increase the actual production at the urea plant to 600,000 tonnes per year in 1990 by using better quality coal. The increased offshore exploration in the south, with scope of producing 1 billion cubic meters of natural gas by 1990, have made the Government explore the possibility of investing in a plant with a capacity of 600 tonnes of ammonia per day. This gives the option of producing either 600,000 tonnes of ammonium phosphate per year or 270,000 tonnes of urea per year. A state enterprise in Ho Chi Minh City is trying to obtain the approval for constructing its own urea plant, using its own financing sources.

Actual demand for fertilizer for 1988 is projected at 1.5 million tonnes of urea and 1 million tonnes of phosphate fertilizer. On top there is a demand for 100,000 tonnes of compound fertilizer. The difference between demand and actual local production will be met by imported fertilizers.

(c) Plant protection

Viet Nam with its tropical climate is conducive to heavy infestation by insects, weeds and plant fungi. The crop losses are evaluated by the Ministry of Agriculture at about 20 to 25 per cent, but in recent years even higher, due to pests destroying the total crop in many regions. Viet Nam still relies on import of the active ingredients for pesticides for its eight mixing plants (two units in the north, two units in the central area and four units in the south) with a total capacity of 40,000 tonnes per year. In the past, pesticides accounted for 75-80 per cent of the production and herbicides and fungicides for 20-25 per cent.

Most of the pesticides include M. Parathion, Diasion, Carbofuran, Metamiclophes, Morocrotaphes, Sumishion, Lumicidin, Sherpes and Dimshoate. Only two herbicides are used, 2,4 D amine and ester. Common fungicides are Kitasin, Zineb, Miresan, Validacin and copper oxychloride. The most popular formulations are solution and emulsifiable concentrate, wettable powder and granulated products.

Viet Nam also imports formulated products, and after 1988 the total value of import for plant protection accounts for US$ 20 million. In 1988 the estimated production of formulated products will only reach 25 per cent of the total capacity due to problems with spare parts and hard currency for import of raw material.

The largest formulating company in Viet Nam is the Southern Pesticide Company with a total capacity of 30,000 tonnes per year (see Appendix 1:11). The Southern Pesticide Company has a Research and Production Center providing technical management assistance on production technology, quality control and safety problems, not only to the three Southern pesticide companies, but to all eight blending units in Viet Nam.

The centre is also engaged in the research of using local raw material for the production of pesticide active ingredients. "Rubber oil" and vegetable oils could be used for producing surfactants and emulsifiable substances, but also mineral resources could be changed into inert ingredients for pesticide formulations. At the moment the center is producing small quantities of a dual purpose agent for treatment of paddy seeds. The company aims at a production of 500 tonnes per year with their present low technology production methods. One of the problems for the pesticide industry in general is the simple technology and equipment used for production; quality control is far from satisfactory and there seem to be no rules and regulations for the safety of the workers and the handling and disposal of the waste.

The equipment at the Research and Production Center at the Southern Pesticide Company servicing other factories in the country is outdated and basic documentation, manuals and handbooks for the formulation and production date back to between the 1950s and early 1970s. The centre receives no technical information, research documents or scientific information from anywhere. They operate in complete isolation from the outside scientific world.

With a minimum use of one kg of active ingredient per hectare per year, the need of active ingredients is 10,000 tonnes per year equivalent to 30,000 tonnes of formulated product. The projection for 1995 shows a demand of 40,000 tonnes per year of formulated products.

Viet Nam has plant varieties which could be used to extract active substances for the production of pesticides. Research and experience are being undertaken but it still remains to formulate the pesticides in detail, continue tests on a larger scale and adopt the appropriate techniques for industrial production.

The Research and Production Center is responsible for the future strategy of introducing human and environmental protection in all areas of the society. The numerous disasters in the past caused by accidents or human errors in connection with handling and processing of crop protection agents are a note of warning.

Pricing and payment

The price for the producer is determined by the Price Commission. The price of rice, the major commodity, is increased largely in steps according to the inflation rate. From that point of view, rice is comparatively safe to use as a barter commodity.

Whether or not the price for the producer is reasonable cannot be assessed easily. The barter system has penetrated down to the farm level. Paddy is delivered according to a quota in exchange for inputs which have been supplied during the cropping season. Fertilizer and pesticides are in this context overruling all other input costs but the actual value is difficult to determine, at least for the producers of farm commodities.

Co-ordination between the price level for e.g. pig feed and slaughter pigs is non-existing and the rearing of pigs is a poor production alternative today. This would indicate that prices are set without due consideration to the cost of production and the rationale in leaving a margin for the producers as an incentive to continue, and possibly expand, the production.

Sugar-cane is at present evaluated at the equivalent of 200 kg of paddy per tonne. 50 per cent of this is paid with paddy in some areas, in other areas 30 per cent. The rest is made up from the value of fertilizers supplied during the season by the sugar factory and cash. The interest in growing sugar-cane is decreasing and presumably not without reason. Other alternatives are better and the sugar industry is left without sufficient raw material supplies.

The barter principle is used universally. The system may have certain advantages in a period of roaring inflation, but is inflexible, leaves few, if any, alternatives to the farming community that has to generate sufficient funds for small-scale investments to improve the efficiency of all operations.

It is concluded that the present barter system is not conducive to better performance of agriculture. The system also tends to increase the interest of many enterprises engaged in receiving and distributing farm produce to enter the fertilizer trade. These enterprises should rather devote their resources in product development, manufacturing/processing and marketing of their products.

Conclusions and recommendations

The Mission believes that the plan targets for increased agricultural output by 1995 and 2005 are over-optimistic. Although it was not specifically investigated, the mission has obtained the impression that the resources to provide sufficient extension services to agriculture need to be strengthened.

The productivity of the agricultural sector is low and the Government is well aware of the need for additional quantities of fertilizers and pesticides in particular. However, it is vital to introduce improved agricultural practices including gradual adoption of suitable implements and equipment to increase productivity, crop yields and reduce harvest and post-harvest losses to order to reap the full benefit of increased fertilizer application.

There are no credit facilities easily available to the farming community. In a period of dynamic expansion, the provision of credits is vital for development of an individual farm enterprise - state owned, co-operative, collective or household. Failure to make these investments, which are essential in a responsibility system, would seriously hamper development.

Furthermore, the current pricing policy, the lack of co-ordination between different commodity price levels and the system of payment do not provide any incentives for increased agricultural production.

On the basis of its observations the Mission recommends that measures be taken to:

- Strengthen the extension capacity with a view of dissemination of improved agricultural practices.
- Increase, and extend, the manufacturing capacity of agricultural equipment and tools.
- Strengthen the resources, within the framework of international co-operation, for development of suitable equipment for paddy harvesting/drying (follow-up of Cuu Long Post Harvest Pilot Project VIE/86/012/A/01/12).
- Set up the appropriate credit facilities for farming enterprises.
- Review and modify the pricing policies and the system of payment to comply with the requirements for flexibility and to provide incentives for increased production of quality commodities.

2. AGRO-BASED PROCESSING INDUSTRIES

Overall situation

There are only 128 food processing enterprises registered by the Ministry of Agriculture and Food Industry but the list is not complete (see Appendix 4). For the vegetable oil, animal feed and fibre processing branches, for instance, only overall capacity figures are given. Many smaller enterprises, especially on a provincial level, are not included and the co-operative and non-governmental sector is heavily engaged in different kinds of food processing.

The Ho Chi Minh City Food Company which is a provincial state enterprise has 1,700 partner enterprises, mostly rather small, engaged in a wide range of food stuffs manufacturing and processing.

No complete register exists. It may be summarized, however, that there is a fair number of medium-size and small enterprises in the food processing subsector in addition to the registered larger state enterprises. They are concentrated in particular in the Ho Chi Minh City area, to some extent in Hanoi and also in other larger urban centres, here mostly for local consumption. Rice milling operations are by far the most common.

(a) Rice milling

The present rice milling capacity in central and provincial state enterprises is 2.4 million tonnes, which basically supply the urban areas. In

1987 the total production of paddy was 17.5 million tonnes, hence the 963 registered state-owned rice mills processed 14 per cent of the total harvest. Other sources claim that 70-80 per cent of the paddy is processed in small mills on a co-operative or village level. There is no information available on total processing capacity but it is reasonable to assume that the rural rice milling capacity is gradually increasing as required and that the actual throughput very often could be higher by simply operating the units for longer hours.

The larger and medium-sized rice mills are getting old, the mechanical installations are worn out and are kept running with minimum maintenance. Spare parts are sometimes short in supply but local workshops appear to make the most essential parts.

There are no overall statistics showing the capacity utilization of the state-owned rice milling enterprises. In view of the average poor state of repair of the plants, it is safe to assume that capacity utilization may be 70-80 per cent and that the capacity quoted in Appendix 4 is probably what is actually milled, hence the very exact figure.

To cope with the future paddy quantities according to the plan target, about 200 rice mills with an average output of 10 t/shift, operating on two shifts, will have to be installed and put into operation in the rural areas every year between 1990 and 2005 (see Table 5.3).

Table 5.3. Projection for rice mills rehabilitation, 1990-2005

Year	1990	1995	2000	2005
(1) Rehabilitation of existing "urban" rice mills	==========			
(2) New "rural" mills 200 x 10 t/shift/year	==========	==========	==========	==========
(3) "Urban" mills 600 t/24h	7	13	25	
Total capacity (million tonnes)				
"Rural"	15.6	16.8	20.8	
"Urban"	3.4	4.2	5.2	
TOTAL	19.0	21.0	26.0	

On the assumption that the central and provincial state rice mills are rehabilitated soon, the 80 per cent average capacity utilization will be maintained in the early 1990s, falling gradually to 70 per cent during the latter part of the 1990s with an ultimate capacity utilization of 30 per cent. This scenario takes into account that some mills will have to be closed down after a certain period of time, due to unacceptable technical performance and economic inefficiency.

Therefore, up to 2005, 45 new rice mills with a capacity of 180,000 t/year will be needed. These mills would have an average capacity of 600 t/24 hours:

early 1990s	7 mills
middle 1990s	13 mills
end 1990s - early 2000s	25 mills

The rehabilitation of the existing rice mills should focus also on the quality performance of the equipment. Rural mills supplying processed rice to the cities have up to 30-40 per cent broken kernels. Particles of rice are also lost in the process. According to assessments made in the UNDP/FAO Post-Harvest Protection Project (VIE/86/012/A/01/12), the overall milling recovery is anticipated to increase by 10-20 per cent if a mill is properly rehabilitated. For the country as a whole about 2 million tonnes of rice per year could thus be salvaged for human consumption. Head rice recovery is expected to increase by 3-5 per cent and final mill output is expected to increase by a minimum of 15 per cent.

Storage facilities for paddy are reportedly sufficient for the present level of production but it is expected that the standard leaves much to be desired. However, the above-mentioned UNDP/FAO project embraces all aspects of rice post-harvest activities from harvesting-threshing-drying to storage-pest control-processing. The very important issues of grading and quality control, also with reference to pricing systems, are included. This is a basic work of tremendous importance for future activities to make rice handling more efficient.

In summary, it is essential to determine a realistic investment plan for rice milling facilities to process paddy according to the plan target.

The rehabilitation of existing rice mills, the manufacturing of new equipment for both rural and urban mills, the very strong need for future supply of spare parts and periodic expert maintenance services to the rice mills provides a substantial basis for industrial development in the steel manufacturing subsector.

Different avenues for implementation may be considered such as licence agreements including technical assistance, joint ventures where the foreign partner supplies certain qualified components according to predetermined principles for costing and subsequent pricing of the final equipment.

(b) Animal feed processing

Presently, the overall feed processing capacity as presented in Appendix 4 is 480,000 tonnes per year but, depending on the technical standard, the maximum practical capacity is considered to be 420,000 tonnes per year. Three feed processing plants belong to the Ministry of Agriculture and Food Industry, whereas 37 are operated by provincial authorities[1] or by

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[1] A detailed note on the Ho Chi Minh Food Company is given in Appendix 1:3 as example of a provincially managed enterprise. Appendix 1:7 provides a review of the Huong Cana Animal Feed Plant.

districts. Other districts have small grinders for animal feed.

The feed industry suffers from inadequate equipment for milling, proportioning and mixing; in general the feed processing plants or units are unable to produce animal formula feeds of acceptable quality and uniformity. A large number are beyond the state where it is a sound technical and economic proposition to invest money for rehabilitation. The industry as a whole operates at below 60 per cent of its maximum practical capacity.

Raw material supply is invariably inadequate from a quantitative point of view and also the quality of the ingredients is substandard. The fish supplied to the plants are often contaminated with sand, up to 30-40 per cent, and sometimes have a high salt content. The oil cakes are extremely uneven with frequent high fibre content, the ingredients are degraded during storage by moisture, pests, rodents etc.

Laboratory facilities are non-existing, even in the one plant that was built in 1980, and samples, whenever they are taken, have to be transported to a central laboratory.

The feed processing industry is vital for improvement of the performance of the livestock subsector, especially pigs and poultry. If properly equipped and managed, it would be an efficient instrument for introduction of better feeding practices and thus for improving and nutritional standard of the animals.

At present about 12 million pigs are slaughtered per year. This will be increased to 14 million by 1990, 16.1 million by 1995 and 20.3 million by 2005 according to the plan targets. The corresponding figures for poultry are about 90 million at present, increasing to 140 million, 175 million and 245 million for the years 1990, 1995 and 2005, respectively. The majority of the pigs and poultry are kept and fed in a traditional manner using feed that is available on the farm.

The ambition of the Government is to expand exports of pork and pork products. This is not a realistic proposition if the pigs cannot be reared efficiently, also with regard to the feed conversion ratio.

On the assumption that the feed conversion ratio is improved from the present 5-7:1 to 4:1 in the middle of the plan period and reaches 3.5:1 by 2005, and taking into consideration an improved performance of the breeding stock as a result of better management, the total demand for pig feed is estimated at 5.6 million tonnes for 1990, 5.2 million for 1995 and 6.4 million tonnes by the end of the period in 2005 (Table 5.4).

Estimates of feed requirements for poultry production are carried out in a similar way arriving at an estimated total demand for commercial pig and poultry feeds of 2.4 million tonnes for 1990, 3.4 million for 1995 and 5.7 million tonnes for 2005.

Table 5.4. Estimated demand of commercial feeds

	Pigs			Poultry		
	1990	1995	2005	1990	1995	2005
Estimated total feed demand (million tonnes)	5.6	5.2	6.4	0.77	0.93	1.43
Assumed percentage of commercial feed (%)	40	60	80	20	25	40
Estimated demand of commercial feeds (million tonnes)	2.24	3.12	5.12	0.15	0.24	0.57

Conclusions

It must be stressed that the feed industry cannot develop satisfactorily if the ingredients used are of low quality. The linkages to other agro-based industries and also to the fishery-based industry and the agricultural sector must be appreciated to their full extent. If the oil cakes are inferior for one reason or another, if the fishmeal is salty, has a high ash or high fat content, or if the feed grain is contaminated, quality feed cannot be produced. In addition to rehabilitating existing processing installations for vegetable oil, the present source of fishmeal, sun-dried fish, should be discarded and trash fish and offal should be used for high quality fishmeal, in existing or new fishmeal processing plants.

Moreover, the pricing system must be linked to the quality of the commodity and minimum requirements of all ingredients established.

Future development of the animal feed industry should be based on a concept with a main, central feed processing plant where pre-mixes, concentrate mixes and complete formula feeds are processed. These are supplied to smaller feed mixing plants which are of simpler design, easier to operate and require less investment per tonne processed feed. The central feed processing plant should be provided with competent staff for feed formulation experts, and laboratory personnel in addition to administrative, economic and technical personnel responsible for the different departments.

The staff of the central feed plant should have the responsibility to assist the managers of the mixing plants in planning the routine sampling and analysis of local feed ingredients, formulation of compound feeds for different classes of livestock and poultry in the supply area and provide suitable pre-mixes and/or concentrates as necessary.

The pre-mixes provide the necessary mineral ingredients including trace elements and vitamine supplements in addition to some diluters. Pre-mixes are added to a feed at a rate of approximately 5 per cent depending on the detailed composition. The concentrate mix also includes protein supplements to make up the final formula feed when added to the main portion of the mix,

i.e. the grain or energy part of the ration. The ratio at which a concentrate mix is included in a formula feed depends on e.g. if only a protein supplement of animal and/or fish origin is included or if a protein of plant origin is also added. Thus, the concentrate is added to the bulk of the feed at a rate varying largely between 10 and 20 per cent.

Concentrates can also be formulated to compensate nutritional deficiencies in e.g. rations based on fibre crops.

The main feed mixing plant may have a capacity of 20 t/hour or more and the satellites should be able to mix 5-10 t/hour. The ultimate capacities will have to be determined from one area to another. One advantage of a system like this is the flexibility where future expansion of activities should be considered already at the planning stage of each scheme which may serve one or several provinces.

Assuming that each scheme will ultimately incorporate one main feed plant of 20 t/h and 10 satellites each with a capacity of 5 t/h, the national demand of feed processing capacity may be met as follows:

		Capacity	Cumulative capacity
		(in million tonnes)	
1989-1993	3 schemes	1.26	1.26
1994-1996	4 schemes	1.68	2.94
1997-2001	4 schemes	1.68	4.62
2002-2005	3 schemes	1.26	5.88

The strategy for development of the feed processing industry is closely linked to the ambition to increase the supply of animal protein to the population and to the targets for export of meat and meat products. However, these targets cannot be met unless adequate provisions are made for supply of qualified formula feeds to permit livestock and poultry production to be competitive in an international context. Here again quality and cost of production are the major criteria since the aim is to exploit market opportunities world-wide.

(c) Vegetable oil processing

At present the vegetable oil processing industry is to a large extent geared towards extracting oil for export, in particular from coconuts, ground-nuts, soybeans and cashew nuts. Local consumption is limited to comparatively small quantities of cooking oil, shortening and margarine. About 15,000 tonnes of crude vegetable oil per year is used for these products.

The overall capacity for mechanical extraction is quoted at 55,000 tonnes of crude oil on an annual basis. There are two solvent extraction plants, none of which are in operation. The one in Tan Binh, built in the mid-1970s, has not been used since 1981[1/] and the other one, established in 1987 using Indian equipment, is reportedly not in operation. The overall

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[1/] See Appendix 1:8 providing a note on the Tan Binh Vegetable Oil Factory.

solvent capacity is 70 t/24 hours of input material, or about 90,000 tonnes per year. Both plants will be rehabilitated according to the existing plans.

Based on Appendix 4, the oil processing industry is operating at about 50 per cent of its designed capacity and 60 per cent of its maximum practical capacity.

The performance of the mechanical extraction equipment is not satisfactory; 11-12 per cent residue fat are lost in the expellers. It is thus estimated that 6,000-7,000 tonnes of crude vegetable oil is lost annually at present since the solvent extraction plants are not operable.

There is a constant deficiency of oil-bearing seeds and instructions have been given to the state farms in the south to expand the cultivation of coconut in particular.

A number of small oil crushing units are operating on a provincial level but there is no information regarding the total capacity of these provincial units. They reportedly process 3,000-5,000 tonnes of oil per year which is delivered to the Tan Binh factory.

The total national refinery capacity is 35,000 t/year but since only 15,000 tonnes are refined for domestic use and only crude oil is exported, less than 50 per cent of the available capacity is used.

The technical standard of the new vegetable oil processing factory which was established in 1987 is not known except that the solvent extraction plant is not operating. Other facilities have a technical standard which belongs to the pre- and post-World War II period and are generally not in a good state of repair. This, in combination with the lack of raw materials, is sufficient to explain the poor capacity utilization.

Premises and equipment for processing of shortening and margarine leave much to be desired both regarding techncial and hygienic standards.

The future plans for the vegetable oil processing industry are unclear. Whether or not the refinery capacity is going to be increased depends on the future market situation. Present buyers of crude oil have pointed out that they would rather import the oil-bearing seeds. This is an indication that new markets will probably have to be identified.

Vegetable oil is in short supply in many developing countries where it is used in the traditional diet. Soybeans, a major source of edible oil, is produced at very competitive costs in the Americas, both North and South. Malaysia is a large producer of palm oil which is exported at competitive prices.

The comparative advantages of producing crude or refined edible oil in Viet Nam will have to be identified and substantiated to justify expansion of the industry purely on these grounds.

The close linkage to the feed processing industry on the other hand gives another message.

Based on the estimated demand for commercial animal feeds 1990-2005 (see Table 5.4) and assuming that formula feeds include on an average 15 per cent oil cakes, the demand for this ingredient is estimated at 360,000 tonnes for 1990, 510,000 tonnes for 1995 and will reach 855,000 tonnes by 2005. In addition, some oil cakes are not suitable to be included in the feed for monogastric animals, at least not in large quantities. E.g. palm oil kernels, cotton seed and coconut are therefore not attractive for the feed industry. The residue fat must be low to avoid adverse effects on the compound feed. Thus, a large portion of the oilcake from the mechanical extraction process should be subject to solvent extraction to reduce the residue fat to some per cent and mechanical extraction should result in as low a residue fat as possible, preferably not more than 6-7 per cent.

On the assumption that the oil cake recovery rate is on average 60 per cent of the requirement of oil-bearing seeds, suitable for the feed industry, the total demand of this type of raw material would be 600,000 tonnes in 1990, 850,000 tonnes in 1995 and 1.4 million tonnes by 2005.

The plan targets for production of oil-bearing seeds and the recovery of oil from rice bran will naturally be another element in the decision process on the future strategy for investments in the vegetable oil processing industry.

Table 5.5 presents the anticipated production volumes, split up between raw material suitable for pig and poultry feed (preferably soybeans), and coconuts. These could probably be used to some extent in certain pig feeds, but a better use which should be considered is for cattle that is raised for beef. The Animal Husbandry Research Institute which conducts development studies on beef production in Viet Nam should be consulted on this issue.

Table 5.5. Plan target for oil-bearing seeds, 1990 - 2005
(in '000 tonnes)

	1990	1995	2005
Soybeans	165	225	305
Ground-nuts	350	430	640
Coconuts	600	600	600
TOTAL	1,115	1,255	1,590

Source: Ministry of Agriculture and Farm Industry.

If the existing central oil extraction plants are rehabilitated and capable of operating at full capacity, they would only be able to process 20 per cent of the oil-bearing seeds to be produced by 1990 according to the plan target.

One important reason for poor capacity utilization at present is stated to be lack of raw material. Before deciding in more detail on the investment requirements, the current situation regarding actual oil-seed production should be reviewed and realistic projections made for the period 1990 to 2005.

The Mission submits the following proposed guidelines for future strategy for development of the vegetable oil processing industry:

Phase 1

(i) Rehabilitation of existing central processing industries including mechanical extraction plants, solvent extraction plants and refineries.

(ii) Rehabilitation of the processing department for shortening and margarine at the Tan Binh factory.

(iii) Investigate in detail the comparative advantages from a marketing point of view focused on the actual production costs and quality of products.

Phase 2

(i) Rehabilitation of existing oil crushing units on provincial and district levels, aiming at improving the crushing performance resulting in a lower residue fat content in the oilcake.

(ii) Based on the results from the suggested review of the current oil-seed production, formulate a project for investment in new installations; establish a number of complete vegetable oil processing factories where part of the refinery capacity, defined as a result of 1(iii), is utilized for processing crude oil supplied from province and district crushing units. The oilcakes should be retained locally and used in province or district satellite feed mixing plants; a high retained degree of co-ordination is essential to benefit from linkage effects.

Phase 3

(i) Establishment of vegetable oil processing factories according to the plan derived from 2 (ii) above.

(ii) Establishment of oil crushing units in areas of soybean and ground-nut production, in particular.

Depending on the market outlook and the subsequent economic analysis, investment in refineries may not be economically sound. Care should be exercised to avoid over-investment in this branch.

(d) Sugar-cane extraction and processing

The sugar industry has presently six central state factories and four on a provincial level with a total installed capacity of 11,000 tonnes of sugar-cane per 24 hours. Due to various deficiencies the maximum practical capacity is considered to be 8,600 tonnes. Only one plant out of the 10 has been subject to inspection and the technical standard reportedly reflects fairly well the situation of the sugar industry as a whole. A detailed account of the findings is presented in Appendix 1:5.

In summary, the installations for extraction of the juice are of simple design, ruggedly built and appear to work without major disturbances but, however, with low efficiency. The evaporation and crystallization departments and the filtration section are very old and in a bad state of repair, wasting a considerable amount of energy. Future rehabilitation efforts should concentrate also on suitable measures for heat recovery in the process.

The sugar produced by the 10 sugar factories account for 25 per cent of the domestic demand. From that point of view the small-scale sugar crushing plants and household extraction units are of greater importance for the domestic supply of sugar.

The recovery factor in the industrial plants is 15:1 on an average whereas the small manual units use 20-25 kg of sugar-cane to get 1 kg of sugar. This would imply that the total extraction in the sugar factories (sugar and molasses) accounts for about 80 per cent of the sugar content in the sugar-cane while the equivalent figure for the non-industrial units is of the order of 50 per cent.

From a national point of view an increase of the industrial processing of the total sugar-cane production should be aimed at. The industry suffers from insufficient supply of input raw materials, hence the period of operation could generally be extended. A major reason appears to be the price of the sugar-cane to the producer which makes the cultivation of sugar-cane less attractive. The cultivation area is surprisingly widespread and the transport distances are far too long for bulky materials like sugar cane which, in addition, has a fairly low sugar content, reportedly 11-13 per cent as a maximum.

The future development of the national sugar industry, as quoted by the Ministry of Agriculture and Food Industry, is based on domestic consumer demand and demand for the processing industry which is expected to expand exports. The quality of the refined sugar will also be improved.

Some of the shortcomings of the sugar industry, presented in this report, are not new to the Ministry. This relates, for instance, to the very widely spread procurement areas. Stable raw material supply areas will be established as one of the first actions. In addition, a system of quality payment should be introduced based on sugar content and probably also the time of delivery to promote extension of the harvesting period.

The supply of spare parts is going to be improved but there is no information regarding the practical initiatives that have to be taken or a time schedule for implementation of the spare parts programme.

The investment programme for new installations is based on the projections of demand in the coming years. Thus, for 1990 the total quantity of industrially processed sugar and molasses is quoted at 600,000 tonnes, for 1995 at 900,000 tonnes and for 2005 at 1.5 million tonnes.

- Investments in existing factories to permit continued operations until 2005 and later - total capacity 11,000 kg of sugar-cane/ day.

- Establish 10 new factories by 1995 - total capacity 15,000 tonnes of sugar-cane/day.

- Establish further 36 plants up to 2005, bringing the total national capacity to 35,000 tonnes of sugar-cane per day.

This figure indicates that some old installations, now in operation, are phased out at that time and that the average capacity of the above-mentioned 36 plants is smaller than the ones established earlier.

Given that the period for harvesting of sugar-cane is extended to 150 days on average per year, the total processing capacity in 1990 will be 1,65 million tonnes of sugar-cane, in 1995 3.9 million tonnes and in 2005 5.25 million tonnes. Total production of sugar-cane according to the plan targets amount to 10.2 million tonnes for 1990, 13.8 million tonnes for 1995 and finally 23.0 million tonnes by 2005. Hence, out of the total production of sugar cane, 15 per cent will be subject to industrial processing in 1990, 28 per cent in 1995 and 23 per cent by 2005, a lower but probably also more uncertain figure.

Conclusions

The plans for future action to alleviate and develop the sugar industry provides a background for incorporating the investment requirements within the context of an overall strategy for development of the food industry. It should be stressed again, however, that modifications of the pricing policy and the system of payment to the producers are essential and that this instrument should be used to promote a sufficient and stable supply of sugar-cane.

The present ratio between industrial processing and non-industrial processing of 1:3 will be maintained for the time being. If no actions are taken to improve the recovery of sugar in the non-industrial processing units, the national losses in sugar will be substantial and are estimated at about 200,000 tonnes per year during the early and mid-1990s, approaching 400,000 tonnes per year in the beginning of the 2000s.

The above provides justification for reviewing the policy framework for the sugar industry as a whole.

(e) Fruit and vegetable processing

Presently Viet Nam grows a wide range of tropical fruits some of which are processed in the 13 processing plants which are now in operation.[1/]

1/ A note on the Linh Xuan Canning Factory is given in Appendix 1:4 and on the Hanoi Fruit and Compot Canning Factory in Appendix 1:6.

They have a total capacity of 45,000 tonnes per year, mainly canned and frozen products. The industry is extremely labour intensive. This has the advantage of flexibility of production but is also very much dependent on the motivation of the workers to obtain an acceptable output from the operations. The quality of e.g. diced products is not uniform which does not appeal to the international consumer. The hygienic conditions and the working environment are invariably of low standard and packaging is often simple and sometimes inadequate from a preservation point of view.

Yet, the processing of fruits and vegetables is to a large, and increasing, extent oriented towards export. The export hitherto has been within the framework of co-operation and trade agreements with socialist countries where apparently the quality requirements are less pronounced. It is likely that this also reflects on the price, but the processing enterprises rarely know exactly what they get.

A common constraint is deficient supply of raw materials and, not seldom, irregularity of supplies. The reasons for this differ but the pricing policy and system of payment provides very few incentives to the producers of fruits or vegetables. This is also the likely reason for the apparent uninterest in supplying first grade raw material.

The future development of the Vietnamese fruit and vegetable processing industry rests with its capability to upgrade the processing facilities and introduce modern technology. This will ultimately reduce the labour intensity which is the price that will have to be paid to improve product quality and overall hygiene.

It would be decidedly wrong to try to replace current export markets with other markets. The long-term strategy should rather be to maintain existing business contacts but produce products which are attractive world wide. This would enable the Vietnamese fruit processing industry to exploit market opportunities in an effort to fetch better prices for its products. Top quality products, competitive prices and delivery on time are three essential elements for success. Product development must be incorporated in the overall strategy and assessments of market trends must be obtained through extensive market research.

The Ministry of Agriculture and Food Industry has envisaged an expansion of the fruit and vegetable processing industry to a total output of 100,000 tonnes per annum by 2005. However, the ultimate processing capacity, product range etc. will have to be based on internal investigations to identify areas of production, type of raw materials and cost of production.

Choice quality products can only be produced from fresh, high grade fruits and vegetables. It is thus reasonable that the processing industry takes an early initiative to promote the supply of first class raw material. Selection of varieties, improved cultivation practices in combination with the appropriate pricing system with premium price for high quality and minimum requirements are important considerations.

(f) Slaughtering and meat processing

The slaughtering and meat processing industry incorporates at present only slaughtering, butchering and freezing of meat, partly for exports and partly to maintain a minimum revolving reserve of meat in large urban areas.

There are 10 slaughterhouses with freezing facilities. Total designed slaughtering capacity is 50,000 t/year and maximum practical capacity, taking into account the present condition of the slaughterhouses, is considered to be 40,000 t/year. Pigs account for 90 per cent of the total slaughter, or at present about 18,000 tonnes of the total, quoted at 20,000 tonnes. With the exception of the slaughterhouse in Tien Giang Province and the Vissan Slaughterhouse in Ho Chi Minh City which are described in Appendix 1:2 and 1:9[1/] the slaughtering facilities in Viet Nam are reportedly below standard technically and hygienically. Although the two plants visited are of a reasonable standard they do not comply with e.g. the EEC norms.

The domestic consumption of meat and meat products was 8.7 kg/capita in 1985. The increase over the plan period 1990-2010 is illustrated in Table 5.6.

Table 5.6. Per capita consumption of meat and estimated total quantities, 1985-2010

	1985	1990	2000	2010
Total population (million)	60.0	66.4	78.8	86.5
Meat consumption (kg/capita)	8.7	11.2	13.2	20.9
Total meat production (million tonnes)	0.522	0.744	1.040	1.808

Source: Committee of Science and Technology

The current volume of exports is not known but is probably of the order of a few thousand tonnes, mostly pork to the Soviet Union, Singapore and Hong Kong. The meat for export is merely packed in plastic bags without separating cuts of different qualities, which in the qualified markets are paid for at different prices.

It is concluded that only a fraction, about 4 per cent, of the total meat production was slaughtered in the registered slaughterhouses in 1985. Industrial slaughter at present is quoted at 10 per cent. The figure is still very low and substantial quantities of meat supplied to urban areas must be slaughtered elsewhere.

1/ See also Appendix 1:10 on the Swine Rearing Corporation, Ho Chi Minh City.

For future development the following issues are to be considered. Export of meat, and pork in particular, is seen as a future source of earning foreign exchange. In 1990 38,000 tonnes are expected to be exported, increasing to 100,000 tonnes by 1995. Figures for the plan target for meat production, estimated dressed carcass weight, domestic consumption and margin for export are given in Table 5.7.

Table 5.7. Estimated margin for meat export, 1990-2005

	1990	1995	2005
Plan target (live weight meat, '000 tonnes)	1,043	1,308	1,845
Estimated dressed carcass weight (75% average of live weight, '000 tonnes)	782	981	1,384
Domestic consumption ('000 tonnes)	744	881	1,234
Per capita consumption (kg)	11.2	11.2	14.3
Margin for export ('000 tonnes)	38	100	150

Source: Ministry of Agriculture and Food Industry

It is assumed in Table 5.7 contrary to the information in Table 5.6, that the per capita consumption of meat remains at 11.2 kg until 1995 and then increases to 14.3 kg by 2005, leaving 150,000 tonnes for export. However, this is not consistent with development targets for improvement of the standard of living. If the export is retained at the 1995 level, there will be room for a per capita increase to 14,8 kg of meat, which falls short of the plan target by 6.1 kg.

The long-term strategy for investments in slaughterhouses must also include the aim to increase industrial slaughter. Population increases in urban areas weighs heavily in the assessment of slaughtering capacities. Structure and location of future increased livestock production must be investigated and required technical and hygienic standards should be determined.

In addition, the future prospects and options for export must be reviewed in detail, considering markets and market demand and the present and likely future competition. The table indicates that the future margin for exports is debatable and should be reviewed carefully. Major export markets would be the socialist countries presently importing meat from Viet Nam and big population centres like Hong Kong and Singapore. Western European countries and the Americas are not believed to be future markets. Japan, on the other hand, may be interested. The standard of the future slaughterhouses will then have to be determined, based on the requirements of these countries, keeping in mind that the technological standard improves substantially the productivity of the industry. Moreover, the design should be foresighted and

allow for future improvements, should the market prospects, or requirements, change in a medium-term perspective.

Introduction of further processing of various products is essential to add value to the export and create job opportunities. Domestic demand for such products is believed to be limited for quite some time, so this secondary meat processing industry will be largely export oriented. The initial product range should be identified at an early stage to form a basis for determination of suitable processing lines and basic equipment. The hygienic standard should be high.

(g) Other food industries

Sections (a) to (f) above have dealt with the different branches which have been studied and for which background data and information has been obtained. The food industry as a whole is a complicated subsector of the manufacturing sector with linkages important for a successful evolution. The pattern in Viet Nam is as yet rather simple. However, to complete the picture on the present situation, the following short presentation is appropriate for a number of existing branches.

In milk processing there is at present one plant for production of condensed milk based on imported milk powder and fat since local production of milk is very limited. The capacity is 175 million cans (397 gr) per year and 20 million cans are produced annually to satisfy the domestic market. A dried milk plant with a capacity of 6,000 t/year was completed to 95 per cent in 1975 but has never been commissioned, nor have any take-over certificates been issued. The differences of opinion between Viet Nam on the one hand and the suppliers on the other have not been settled.

In beverage processing the total beer production is expected to reach 150 million liters by 1990, increasing to 250 million liters by 1995. Soft drink manufacturing is reportedly quite considerable but no figures are available. A substantial increase is expected in the 1990s.

Distilleries use molasses, cassava, sweet potatoes and maize as a base for producing alcohol. Total capacity is quoted at 16,000 t/year with 96 per cent of alcohol content. About 40 per cent, or 6,400 tonnes, are used as technical alcohol or for medical purposes and 60 per cent for consumption.

Starch glucose production is covered by two plants have a combined capacity of 5,000 t/year using cassava as the only raw material base.

For tea processing the plan targets for 1990, 1995 and 2005 are 180,000 tonnes, 280,000 tonnes and 600,000 tonnes per annum, respectively. Available processing facilities have a capacity of 700 t/day of fresh tea leaves. In addition, pre-processing is carried out in the production areas. These units can handle 15-20 kg/day. The equipment, mostly of USSR origin, uses old technologies and future imports will be based on CTC methods (cutting-threshing-curling). This equipment will be procured in India.

3. FISHERY-BASED PROCESSING INDUSTRIES

Natural resources, raw material supply

The sea surrounding Viet Nam and accessible to Vietnamese fishing vessels is estimated at about 1 million sq.km. These waters have a very rich marine fauna. About 1,700 different species of fish have been identified, 2,500 species of molluscs, more than 1,600 crustacean species and also at least 600 species of seaweed, some of which can also be harvested and utilized in processing industries.

The total fish resources in Viet Nam are divided into four main areas[1/] along the coast and inland:

1 - From 100 m depth and outward
2 - From coastline to 100 m in deptn
3 - Coastal cultivation of sea foods
4 - Fresh water fishing including fish farming.

The Viet Nam fishing fleet can presently utilize only the second area where the total fish resources are estimated at 3-4 million tonnes, with a harvesting potential of 1.3 to 1.4 million tonnes per annum. Two estimates regarding the total marine fish resources in the first area are available. One study suggests 6-7 million tonnes and the other has arrived at 2-3 million tonnes with a harvesting potential of 1 million tonnes. Viet Nam is, however, not fishing in the first area, unknown quantities of fish are harvested by others.

In 1976, a total of 1 million tonnes of fish were caught in Viet Nam, 70 per cent from the sea and 30 per cent from fresh waters. This quantity was adopted as a plan target for the period 1975-80. However, the catches in the sea dropped from 610,000 tonnes in 1975 to 390,000 tonnes in 1980 with similar decline from 210,000 tonnes to 160,000 tonnes for fresh water fish. The system of relying on state and co-operative enterprises to meet the demand was unrealistic and turned out to become a type of subsistence occupation. Since 1981, a reorientation has taken place implying that the production system starts from the individual fishermen serviced by state enterprises which also collect, process and market the fish. With the new system, the catches started to increase. In 1987, they amounted to 870,000 tonnes and will exceed 900,000 tonnes in 1988 with expectations to reach the target of 1 million tonnes in 1990. In general terms, the ratio between marine and fresh water fish is maintained, the target for the later being set at 500,000 tonnes from lakes, rivers and fish farming.

The importance of cultivated fish and sea foods is expected to increase in the future. 300,000 hectare of salty and/or "brackish" waters are used for cultivation of sea food at present.

1/ From an administrative viewpoint, fishing is divided into three zones:

Zone 1 From 17 degrees north to the Chinese border
Zone 2 Between 17 and 12 degrees north
Zone 3 From 12 degrees north to the border of Kampuchea.

Efforts will be made to interest foreign partners in participating in the expansion of cultivation of fish and other sea foods, especially shrimp, o.. an industrial scale.

While embarking on large scale commercial fish cultivation, the necessity to consider conservation of the environment is fully realized. In fact, a major policy issue is to coordinate development efforts in all sectors, agriculture, forestry, fishery and industrial, to ensure that negative ecological effects are not created by one sector which are detrimental to the development of another. It goes without saying that this should apply also to the population which must be protected from pollution.

Fishing capacity

The national fishing fleet has a total of about 50,000 boats with motors and about 10,000 which are man-powered. Over 70 per cent of the motor-powered fishing vessels have less than 22 hp engines, with some of up to 140 hp and very few with 200-400 hp. Many of these are quite old with an estimated average age of around 15 years. The main methods used for catching fish include trawling, pure seiners, gill nets and deep nets. Pelagic species reportedly account for 67 per cent of the total catches. The total work force engaged in fishing amounts to 214,000 but due to deficient fishing boats and equipment 12-15 per cent have to stay ashore. There is no information available regarding the number of state enterprises still engaged in fishing, but they are reportedly not very successful.

There is an awareness of the large percentage of small fish landed. The quantities of fish of suitable quality for export is comparatively low but the traditional methods of drying fish and produce fish sauce probably reduces the present negative effects. However, regulations exist, e.g., with regard to fishing methods and mesh size of the equipment used in an effort to reduce the catches of juvenile fish of different species. Enforcement and control that the regulations are adhered to has not been effective hitherto.

Improvement of the fishing fleet is essential regarding vessels, equipment and fishing methods. This is also part of the strategy in order to utilize the potential of the waters to create job opportunities, to increase the supply of fish and fish products for the domestic market, and to increase the quantities of fish for export.

The processing industry

Seaprodex, the National Union of Viet Nam Fishery Producers and Import-Export Corporation is the apex organization for the fish processing industry which is also the owner of 12 out of the total 65 food processing plants in the fishery sector. They are located along the coastline in 22 different provinces but with a concentration of 20 plants in the Ho Chi Minh City area. Out of the 53 plants not owned by Seaprodex, 2 belong to Ho Chi Minh City and the rest to provincial authorities. In addition to this, there are two fish meal plants, one in Hai Phong in the north and one in Rach Gia in the extreme southwest. Technical assistance to the entire fish industry is provided by Seaprodex which is also responsible for overall production and investment plans. These have to be approved by the administrative council. The members

in this council represent branches, professional management groups, production groups and transaction groups.

Export of fish products is done through Seaprodex which is also an importer since barter trade is almost universal. Processing of frozen products for export is done in 60 plants, while 5 plants are specializing in dried products.

The freezing capacity ranges from 1 or 2 tonnes to 30 tonnes per day in each plant and the total national freezing capacity for fish amounts to 350 tonnes per day. Only contact freezers are used requiring 4-5 hours for freezing in most of the plants although as much as 8 hours are necessary in some of them.

A system of about 100 ice-making plants produces 1,800 tonnes of ice per day. The capacity of each plant varies considerably where the large ones have imported installations and the low capacity units use local equipment or installations assembled from parts of foreign origin. At present, the ice-making capacity meets only about 50 per cent of the requirement.

The processing of the seafood prior to freezing is entirely manual. All plants have premises for filleting fish for instance, but considerable quantities are frozen after cleaning only. Based on 300 working days per year, the total maximum output from the fish freezing industry is approximately 100,000 tonnes of final products per annum.

The dried seafood products are prepared from, e.g., fish and shrimp which have been cleaned and dried previously by the fishermen. The procedure for preparation of the fish includes sorting, dry brushing, washing, roasting, rolling (using cut-rollers), ultra-violet radiation and packing. Total annual production volume of dried sea products is approximately 14,000 tonnes. Quality control is carried out from random samples of the final product but not on the line.

Each fish processing plant is equipped with cold stores of varying capacities. They are of Japanese or Scandinavian origin and can accommodate a total of 8,000 tonnes of products.

Canning of fish on a pilot scale has been established with the assistance of UNIDO. This product is intended mainly for the domestic market.

The local cottage type processing includes cleaning and drying of fish and shrimps in the open air for supply of semi-finished products to the dried fish industry. There are no specific figures for the annual output but this ought to correspond reasonably well with the total production from the industrial dried seafood industry, viz. at least 15,000 tonnes per year, taking into account some losses in the process. In addition there are unknown quantities sold to the feed processing industry for milling.

Fish sauce is processed in the traditional manner using mostly trash fish. This is a process where fish and salt are used in the ratio 2:1. The product is cured in the sun and left to ferment several months before the liquid is drained off and filtered.

It has been estimated that the annual production approaches 100,000 tonnes of fish sauce per year.

These small-scale ventures are mostly private, some are co-operatives. They are important not only as suppliers of semi-finished dried products but also since they provide a large number of job opportunities and a reliable income to the small-scale entrepreneurs.

Conclusions and recommendations

Recently, a joint venture agreement was signed between Seaprodex and Seaprimfico from the Soviet Union. The agreement includes elements of counter-trade and is focused on four areas: (i) exploitation of the sea resources, (ii) sea transport of export products, (iii) marine cultures, and (iv) fishery services including supply of fishing equipment, fuel, machinery, consumer goods and fertilizer. Lobana, an Australian private investor with long-lasting ties with Seaprodex, has also concluded a joint venture agreement geared towards boosting exploitation, cultivation and processing of marine products and development in other economic sectors. Discussions with other potential partners have also been initiated. This shows that joint ventures are seen as an essential element in obtaining foreign funds for future investments which should be associated also with transfer of technology. This would be required to improve the quality of products as well as widening the type of products for export, governed largely by market requirements. As regards fishing vessels, there is expected to be an orientation towards techniques using refrigerated vessels, especially in more distant waters.

The creation of job opportunities, provision of sufficient food and processing of products for export is guiding the future actions. Expansion of international economic relations is, however, hampered by the inflation which has harassed Viet Nam for so long. A reasonable and early settlement of this and related issues is vital for a sound pluralistic development of the industry.

In the absence of a strategic plan for fishery and fish industrial development investments hitherto have been made on an ad hoc basis in areas believed to be most urgently in need of improvement. It is therefore essential that a sector study be made at the earliest possible occasion.

4. FOREST-BASED INDUSTRIES

Present raw material supply base

A total area of 15.6 million hectares are considered forest land but only half of it, 7.8 million hectares, actually carry trees. According to the Ministry of Forestry, the total quantity of trees of different age groups is estimated at 565.6 million m^3 (solid), an average of 72,5 m^3/hectare. Average annual growth is quoted at 2 m^3/hectare/year for natural forests, 3 m^3/hectare for eucalyptus and pine and 15 m^3/hectare per year in intensive agro-forestry plantations. The afforestation programme hitherto has covered 160,000 hectares annually planted with eucalyptus or bamboo. Until the year

2000, industrial planting is intended to be increased to a maximum of 200,000 hectares per year, including 20,000 hectares for fuel wood and 40,000 hectares for agro-forestry using eucalyptus species. Although the fuel wood forestry will be extensive, improved varieties are to be used for planting.

It is expected that agro-forestry eucalyptus plantations will be harvested after 10 years followed by about three crops with 8-year intervals grown from coppices. In addition 500 million trees per year will be planted on a village level; assuming an average of 2,400 trees per hectare, private sector afforestation will cover about 200,000 hectare annually.

The annual felling amounts to 1,5 million m^3 distributed as follows on major product groups.

Items	m^3
Sawn products	1,000,000
Pulp	200,000
Pit props	100,000
Poles etc	100,000
Miscellenous	100,000

The present allocation of wood to the pulp industry represents an average per capita consumption of paper of 0.9 kg. The first target for the pulp and paper industry is to supply twice the present quantity, or 1.8 kg per capita per year.

The existing plans envisage the annual felling to increase to 2.5 million m^3 from 1995 and 4.2 million m^3 from the year 2000. In reality, the prospect of providing the plan target quantities may prove not to be realistic. According to the Report of the UNDP/FAO Forestry Programming Mission (VIE/085/003), forestry in Vietnam is in a crisis situation, with rapidly diminishing natural resources that are below the limits necessary for sustained productivity and environmental protection. Plantations so far have not been very successful and the average survival rate is estimated at 40 per cent.

The natural forestry resources are reportedly being lost, or badly degraded, at a rate of 150,000 to 200,000 hectares per year. In addition, limited sampling suggests that the volume of the standing timber is decreasing at a rate of 7 per cent per year due to overcutting.

Industries

There are 600 saw mills in Viet Nam with a capacity of 2,000-3,000 m^3/year for each unit if operated two shifts per day. They are reportedly not provided with mechanical feeding of the logs. Studies by FAO of the saw mills in Viet Nam concluded that " all saw mills seen are in a very poor condition. The majority of mills are beyond economical use". The setting is simple and the quantity of the sawn timber with regard to uniformity of dimension is not up to standard, and wastes are above what is normally accepted. Although the saw milling capacity is sufficient, the supply to the secondary wood industry suffers from unreliable supply of timber. The major reason for this appears to be insufficient logging and transport capacity from

the felling area. Another reason may be the lack of adequate and timely planning.

The present output from the saw mills indicate that they generally operate during one shift only or less.

The pulp and paper industry under the Ministry of Light Industry has a total capacity of about 200,000 tonnes/year.

Bai Bang, which was built in the late 1970s and early 1930s in cooperation with SI A, has a designed capacity of 55,000 t/year but is only achieving 30,000 tonnes. Some ten old mills produce currently 40,000 t/year and a new paper mill of French design at Ten Mi is expected to be commissioned in 1989. The designed capacity is 48,000 t/year. Provincial enterprises produce 30,000 tonnes of paper annually but no detailed information is available. The present overall capacity utilization of the pulp and paper industry is about 50 per cent.

The pulp and paper industry suffers from raw material shortage like several of the other forest-based industries. In addition, the supply of essential chemicals, such as caustic soda, is irregular and insufficient.

The total population is expected to reach 66.4 million by 1990. Existing capacity in the pulp and paper industry is sufficient to supply 3 kg of paper per capita, given the availability of inputs. Adequate quantities of pulp wood is secured according to the plan for annual harvest from the forests. The reality may be different. The reasons for shortcomings in supply of raw materials to virtually every branch of forestry-based industry is not clear.

There are various plywood, veneer and chipboard plants in the country. Plywood is produced in three plants, each with a capacity of 6,000 m^3 timber input per year. The present capacity utilization is 30 per cent mainly due to shortage of timber. The reason for this may also be associated with logging, transport and/or planning problems. One of the plants was built in 1958 using equipment from Czechoslovakia and the other two are of American manufacture, presumably established in the early 1970s.

Three veneer plants with French installations were put up in 1979. The capacity of each plant is 3 million m^2/year using timber with a diameter of minimum 60 cm. At present only 30 cm diameter logs are available which accounts partly for the unsatisfactory utilization of the plant estimated at 40 per cent. Other contributing reasons are general shortage of logs and lack of spare parts.

A chipboard plant was supplied from Czecoslovakia in 1978. The installed capacity, 10,000 m^3 of input/year, was utilized at 60 per cent until 1980, or for a maximum of two years. Production ceased due to the lack of timber. The plant was later remodelled and is now used for making bamboo mats.

As regards secondary wood industries, like furniture, the plants have inefficient production lines and are generally equipped with old machinery.[1/] Little insight into this subsector has been gained by the

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1/ See note on the Phu Lam Export Furniture Manufacturer in Appendix 1:14.

Mission from visiting manufacturers of wood products. It would appear, however, that although the wood working machinery is of old design they are frequently operated quite successfully. The production lines as a whole are in need of appropriate rehabilitation measures, using the existing machines whenever possible.

Modern concepts of material handling and process flow would have to be introduced and considerable effort should be directed towards improved design and assembling systems to attract a wider international market. This is believed to be a branch where co-operation with overseas furniture manufacturing companies would be of mutual interest.

Conclusions

The forest-based industry is operating with low capacity utilization. A general feature is shortage of raw material. The reasons for this appears to be over-assessment of the forest resources, insufficient or improperly utilized logging and transport equipment and lack of adequate and timely planning.

Saw mills are of low technical standard with low capacity utilization, frequently producing timber of sub-standard and creating too much waste in the process.

In order to utilize the limited forestry resources better also in a short-term perspection, rehabilitation of existing saw mills, including replacement of some equipment, is called for at earliest possible occation.

Chapter VI. Conclusions and suggestions

(a) INTRODUCTION

When an attempt is made here to formulate some suggestions to the Vietnamese policy-makers, the background and the limitations of the Mission's task should be reiterated. The basis for this initial attempt to highlight some crucial issues, problems and strategy considerations for the country's revitalization of its industrial development process, obviously is the government's determination to launch a new industrial strategy. With an increased performance and a well-designed expansion of the industrial sector a major improvement in supplies and a higher overall economic growth is to be achieved. This inducement of a dynamic industrial development process implies

- breaking the passivity of production units;
- challenging the prevailing industrial structures and decision-making basis;
- identifying major supply problems and industrial growth constraints;
- inducing growth impulses and responses;
- achieving higher productivity and competitiveness;
- encouraging entreprenurship on the basis of accountability, rewards and risktaking;
- increasing the commercial relations with and industry's orientation towards the international economy.

All this presupposes in turn analyses and assessments of industry's performance, prospects and constraints and a reassessment of the industrial policy framework in a longer-term time perspective and in an international context. Comparative studies are called for on the Vietnamese industry versus international developments. On this basis an industrial strategy and a supporting set of policy measures would be conceived.

The Mission sees as its task to contribute to this work by providing some initial conclusions and suggestions and assist in launching the more comprehensive, iterative strategy formulation process.

In doing so, the Mission applies its international experience to assess the current performance of Viet Nam's industry. Using the - admittedly few - plant level observations as a starting point, main findings can be examined as to their causal links with overall sector and policy issues. The recommendations made are necessarily sketchy and preliminary and presented in the form of a list of issues rather than as a design of a complete system, as that certainly is the prerogative of the policy-maker. Some of the key questions are thereby intentionally avoided: by which measures, at which level should an industrial revitalization process be started? Which consecutive order of gradual reforms should be followed? Which deregulations, which controls are critical for industrial growth and for national socio-economic objectives?

This chapter covers first some suggestions concerning required changes at the enterprise level and leads over to certain conclusions regarding the enterprise relations with the government administrative machinery. A particular section is devoted to the agro-, fishery-, forestry-based industries which are seen as core industries for an industrial strategy. Finally an attempt is made to outline same principles for policy measures in support of industrial development.

(b) THE ENTERPRISE LEVEL

Following the observations made at the plant level it is quite obvious that any significant improvement of the enterprises' performance and of the utilization of invested capital in their productive capacitities requires

- updating, upgrading and overhaul of installed equipment;
- introduction and build-up of effective preventive maintenance and repair systems of equipment and premises;
- adaptation/redesign of factory layouts, production lines and internal materials handling systems;
- creation of quality awareness and effective quality control;
- improvement of physical working environment and safety rules application.

To this end it is essential to increase through special financial and other incentives, skill-up-grading and awareness and motivation training and to create well defined cadres of production workers according to functional parts of the production process, and maintenance crews, quality control staff and technical middlemen.

Better cost accounting and cost control of individual operational departments are needed to be a basis for cost-calculations, reinvestments in new machines, depreciation of installed machines and overall accountability of the enterprise.

Management functions and skills need to be reviewed as a matter of priority. The accountability of a manager and the challenge of a non-renewal of the appointment are fundamental pre-conditions for improved company performance reducing deficit payments and inducing a developmental outlook.

Generally speaking, the working principles must be changed in such a way that the enterprises might be induced to have a systematic management approach. With other words, the logic on the basis of which the firms are functioning must be changed. Instead of referring to a series of stipulated rules by which the product is defined, the technical norms and coefficients are fixed, and the price administratively determined and through which given cost elements are added up to determine prices, the firms have to introduce and maintain a positive relationship between price and costs. This needs to be done either through improving product specifications or quality, or through improving efficiency and reducing costs. The firms will do so, of course, only if they are obliged to, because of their responsibility to face some kind

of (market) pressure, and/or because they are motivated by the possibility to take advantage of any positive margin between price and costs. Beside the necessity to have the capabilities and conditions for doing so, the rules of the game must give them the required degrees of freedom for making the necessary choices and taking the necessary measures and steps toward higher efficiency solutions.

As was pointed out the most obvious organizational deficiencies to be addressed concern the relationships of research with production activities, the physical infrastructure and the logistics of the plants, the production process in the strict sense and the organization of labour, the learning process, the activities of indirect workers, particularly the information and accounting systems, the maintenance of the equipment, quality control, the relations with consumers or users, and the marketing activities in general. The systematic organization of the various interlinked activities, must allow the firm not only to attain higher level performance, but also enter a process of progressive, systematic improvement. The dynamics of progress is what really matters. Performance targets - in terms of productivity, cost elements, quality, etc. - should be fixed, and, according to the previous proposition, the possibility to appropriate part of what has been produced should be dependent on the performances thus realized.

To ensure proper management training, schools and programmes should be set up aimed at improving basic management skills, such as book-keeping, production and logistics management, administrative and work organization, personnel management and marketing, including export-marketing. Collaboration may initially be sought with foreign institutions. The system to be set up should distinguish between small enterprise management and management of large diversified public enterprises.

In order to start a concrete process of rehabilitating industrial plants, it is suggested that a limited number of plants be selected for detailed diagnosis and subsequent overhaul in the technical, technological organizational and conceptual sense. The procedure may be as follows:

(i) Preliminary selection of, say, ten major plants which belong to agro-industry subsectors and are of particular developmental importance;

(ii) Review of these companies;

(iii) Selection of some five priority companies;

(iv) Detailed diagnosis of these companies through teams of specialists from international - multilateral - sources and domestic consulting groups;

(v) On the basis of diagnostic reports, design of detailed rehabilitation programme involving, inter alia, new investments, reorganization, maintenance systems, training, product adaptation, and market research. Basic prerequisites for government policy measures and other external support would also be defined;

(vi) Consultation with foreign government and commercial entities to assist in implementing the rehabilitation programme.

(c) GOVERNMENT - ENTERPRISE RELATIONS

To enhance efficiency and productivity throughout the system and to introduce dynamic elements into it, would imply redefining the function and role of the state and of the firms, and their relations. For the functioning of the enterprises state interference is obviously excessive and arbitrary. The firms are left without minimal degrees of initiative and action and of responsibility. The relations between the government administration and the firms need to be reassessed; The objective, however, would not be just to reduce direct state interventions and to increase the autonomy of the firms, but to concentrate the activity of the various actors on what they can best perform. It is necessary to introduce more economic rationality in choices and decisions, and to build up a system of motivation and responsibility, likely to lead to behaviours towards industrial performances and progress.

This implies, for the administration to move away from centralized determination of quantities and prices. Mechanisms and procedures have to be designed and implemented both in order to allow for more consideration for quality and user-related aspects of products and in order to allow prices to reflect supply-demand relations and to be used as references for production decisions and cost calculations. It means also moving towards a more structural and long-term approach, consisting in developing and managing the resources (technology, training, learning and know-how, conservation of natural resources, infrastructure, energy, maintenance). It is on this basis that an industrial strategy may be defined and the production system as a whole or complete production subsystems be reorganized (instead of interfering in the management of particular production units).

Only through such overall changes providing the firms with the necessary degrees of autonomy and responsibility, will they have the possibility and obligation to systematically organize and manage their production activity according to economic performance criteria.

The institutional and physical infrastructural environment within which the enterprises are trying to function must be improved on several counts. While it is not possible to expect the enterprise to have good performances in the absence of minimal requirements as concerns the resources and services which the environment is able to supply and while the enterprises do not have the means and resources to compensate for these weaknesses at the level of their environment, it is the clear responsibility of the State to care for the systematic development of the necessary complementary resources and service activities and functions.

The necessity of improving the physical infrastructure is very obvious: this is a prerequisite for interindustrial relations and integration and for industrial efficiency and competitiveness. Taking account of geography, this appears to be a particularly important condition also for North-South integration of industrial activities.

The second dimension is the need for banking services. An improved performance and expansion of industry implies a new and increasing role for the banking system and, more generally, improved banking services for

enterprises. Short-term and, more so, medium- and long-term banking credit must play an active developmental role, which implies both responsibility and risk taking, and thus involvement in investment decisions, for the banks.

The third dimension concerns training. The necessity to make available for the enterprises the appropriate skills and capabilities, both quantitatively and qualitatively, is obvious. This implies a better assessment of the supply/demand condition as they exist at the enterprise, level, taking account of the necessity to develop, at that level, various technical and management capabilities. A more dynamic outlook and response by the training system is here of high priority.

The fourth aspect concerns the distribution system. In order to be able to produce user adapted and new products, to promote sales and to be able to take into consideration after-sale needs and services, and to be obliged to reduce costs (for example, by reducing raw material contents) through systematic value analyses, the enterprises need to base their activities on a well-adapted distribution system. This means a system which not only cares for deliveries and shipments, but which functions according to market oriented rationality criteria.

The fifth aspect concerns access to required inputs (both domestic and imported raw materials and semi-manufactured products), equipments and spare parts. Since for imported products, foreign exchange constitutes the major constraint the management of foreign exchange should be improved so as to optimize the allocation of this scarce resource, in accordance with priorities as selected within the framework of an industrial strategy. The principles and mechanisms for allocating foreign exchange among activities and enterprises, for transfering foreign exchange among enterprises, for making choices as concerns technology and production techniques, for giving priority to domestic resources and inputs need reexamining and revising.

In a longer term perspective the issue of foreign exchange is obviously connected with the build-up of industrial competitiveness. Instead of passively adapting prices and wages to excessive external competitive pressures, in the framework of in-bond schemes, strong bases for external competitiveness must be progressively built.

Building up industrial competitiveness requires a selective and voluntary approach. Under uncertain and changing conditions at the international level, it is not possible just to refer to static comparative advantages criteria. Specific targets have to be selected, on the basis of existing and potential opportunities and constraints, in order to organize the necessary learing process and to progressively build the various elements which are needed in order to reach a sufficient level of competitiveness. This is the strategic aspect of the problem to increasingly expose enterprises to these challenges and provide the institutional support to encounter them. International co-operation opportunities must be used in the same perspective. Thus, instead of using international co-operation on an ad hoc and centrally defined basis, without referring to a consistent set of criteria, international co-operation should be part of the strategic outlook of the enterprise and of the entire production and support system.

At the national level, Viet Nam has established institutions for standardization, measurements and testing. These institutions and procedures are modelled after those of the industrial countries. A weakness, however, is that the important functions of these institutions to improve national industrial standards and to monitor changes in standards in other countries are not very known among industrial firms in Viet Nam. For outside observers, it is difficult to analyse if this has caused major problems in production at the company level, or if solutions typically have been worked out within the firm and between the firm and its suppliers and customers. For the future, the systematic promotion of standards and norms have to be given high priority. This is, in fact, a precondition for a coherent industrial strategy.

A vital dimension of and precondition for the functioning of an industrial production system in an economy and of the competitive strength of the system is, finally, the research and development capacity and its integration with the production units. As was observed in some areas of Viet Nam's industry there are close links between research under sectoral ministries and in the university sector and the enterprise sector. However, this is not a typical situation. More often, industrial firms have to rely on their own resources and on personal links to highly skilled specialists that could contribute to improvements of production processes. In other countries, engineering and other consulting firms provide companies with specialized knowledge, needed in the continuous strive to modernize production and to raise work productivity and the quality of products, etc. At this stage of Viet Nam's economic development, it is a task for the central government to help build proper engineering capacities and make them available to all types of firms. Already, there are examples to follow, both in the south and in the north, but a wider variety of skills within these units, such as production engineers, organizational specialists, business economists, maintenance consultants etc., are needed.

The flexibility attained in the individual industrial firm by using -- more systematically -- engineering and other specialists cannot be underestimated. The diffusion of experiences between different types of firms and the improvements in know-how among groupings of similar firms can also be stimulated by better organizing the country's engineering capacity and linking it with the industrial strategy. It is recommended that consideration be given to the systematic build up of domestic consulting engineering capacities, consisting of a centre for industrial technology and engineering and affiliate units across the country. Through this consultancy capacity, the significant know-how, and skilled people now available in the country could be utilized to service industry, in particular in investment studies, choice of technological processes, equipment assessment and selection and technical advisory services to existing industries. The services provided should be paid for by the companies concerned so that the consultancy capacities can become self-supportive. In the build-up period however, a fund may be established and certain expertise provided by bilateral/multilateral assistance programmes. It may be possible to establish a twinning arrangement between the "Vietnamese Industrial Technology and Consulting Centre" and foreign relevant entities. It may also be possible to have collaboration with foreign academic institutes which could provide on a voluntary basis inputs to the work of the Vietnamese centre.

Having but a few advanced laboratories in each field of science and technology, Viet Nam has to give special attention to the diffusion of technology and know-how from these institutions. Technical libraries,

documentation centres etc. seem to be well-staffed and, at least in some major areas, well-furnished with recent literature, journals and other relevant documents. However, the procedures for supplying companies and other production units with information concerning their respective technical field could probably be made more efficient. Documentalists should visit leading companies to get a first-hand view on what type of information is usually needed. Company engineers and skilled technicians should be alerted about the fact that there are libraries, which could furnish technical information on patents, specialized machinery, etc. Documentalists could work as consultants while improving the channels of communication between large industrial firms and laboratories and, later, extent it to small and medium-sized business firms that tend to have an even weaker base for technical information.

The Mission has seen a small number of examples where high technology installations in traditional industries have proved to be technically successful. The experimental use of x-ray chromatography while continuously devising the proper mixture of inputs in producing cement in Viet Nam is one such example. Having expertise in several advanced technological areas, such as new materials, laser technology, and microelectronics, it could prove economically profitable in Viet Nam to screen existing large technical investments for production bottleneck problems, quality control techniques, measurements and standardization, etc., while looking at advanced technical devices to solve such problems. This would not imply less job opportunities, since these functions have to be performed by highly skilled personnel, but could save the company from losses due to inherent technical weaknesses in production.

As a way of securing a good knowledge base for future investments, Vietnamese decision-makers should be concerned with limited and well-defined organizational and technical experiements while setting up and evaluating industrial investments. Old and well-known equipment can be complemented - within the same company - by technically more advanced systems of production so as to gain experience with alternative ways of producing and create incentives for improving the more traditional ways of producing. This in-house experimentation could also, in the long-run perspective, serve as a starting point for the company's R&D unit.

It is often the case, when industrial investments are planned, that choices are made according to what is required by existing and well-established technologies. In some extreme cases, Viet Nam's international partners have recently supplied companies with newly made production equipment that represent technology which is twenty or even thirty years old. In certain areas this may prove to be an economically sound investment, since production will be robust, procedures for maintenance are well-known and the training of personnel can be arranged according to ideas that are already well-functioning in other countries. In other areas, such as food processing, state-of-the-art technology could save a Vietnamese company from problems of upgrading the equipment, attaining hygenic standards required for exports, economizing the energy consumption, etc. There is no general rule to be followed in chosing the most appropriate technology for industrial production. But the decision-makers at all levels have to be more aware of the alternatives available and force themselves and others involved to make the criterias for choice explicit. A serious mistake in picking the most relevant production equipment could lead to problems that may be difficult to overcome even in a long-term perspective.

(d) THE AGRO-, FISHERY- AND FOREST BASED INDUSTRY

These subsectors are seen as strategic industries for the continued industrial development process and require therefore particular attention in the more detailed subsectoral analyses which would need to follow this first assessment.

As was pointed out in Chapter V the technical standard of manufacturing installations in these subsectors is frequently simple and in a poor state of repair. Production performance in terms of output and quality of product is not up to standard. In some cases the production is maintained reasonably well from a capacity point of view due to the ability of the personnel involved. Supply of raw material is a common problem which has a detrimental effect on production.

In the work on the formulation of an industrial strategy, rehabilitation and expansion of the agro-, forestry- and fishery-based industry should be based on categorizing the industries depending on their main orientation.

Category 1. Industries mainly producing inputs to the agricultural sector, the supplies of raw materials to the food processing industry. This category includes e.g. the manufacturing of agricultural implements and equipment, thus not strictly an agro-based industry but important for both development of agriculture and food industry. Animal feed processing is also included here.

Category 2. Agro-, forestry- and fishery-based processing industries handling and processing commodities primarily for domestic consumption. This category includes e.g. rice mills, slaughterhouses and saw mills.

Category 3. Agro-, forestry- and fishery-based processing industries oriented mainly towards export. This category covers e.g. fruit and vegetable processing industries, fish processing and secondary meat processing industries to mention a few.

The appropriate location of each industry is important and the backward and forward linkage effects should be considered. Agro-centres could be established on a provincial level. This would incorporate, e.g. rice mill, vetable oil crushing unit and a satellite feed plant. They could have common media supply, transports etc., hence reduce total investment and facilitate easy co-ordination.

Efforts should be made to enter into business relations with overseas manufacturers, capable of and prepared to provide technical assistance to Vietnamese enterprises and sub-contract the manufacture of various components at conditions acceptable to Viet Nam.

Examples of areas which should be investigated more closely in order to obtain a better basis for overall strategic planning of the agro-, forestry- and fishery-based industries include:

- policies related to future development of the sugar industry where the future non-industrialized extraction of sugar incures substantial losses;

- priority, justification for the future vegetable oil processing industry;

- priorities of the slaughtering and meat processing industry: increased domestic consumption or export, and associated dimensioning of the livestock subsector;

- problems associated with logging, transports and technical standard of the saw mills including recommendations for rehabilitation measures; and

- fishery sector (study);

The following general observations are applicable to several or all of the enterprises reviewed.

- Vietnamese enterprises are unqualified in procurement of plants, equipment and installations. In the past and at present it appears as if technical solutions presented are not subject to critical assessment regarding merits and dismerits and no alternative suppliers are approached. If a line of credit is granted from a prospective supplier country, Viet Nam is an easy prey. There are numerous examples of equipment and technical solutions that were outdated already at the time of supply.

- Many processing industries have not been properly planned, resulting in over- or under-investment in equipment.

- The present barter system adopted at all levels is detrimental to agricultural and agro-industrial development. There is at present no cost consciousness at any level. Managements in the enterprises visited were unable to give an account of current cost of manufacture or processing. The system is inflexible, giving few - if any - choices to invest in improvements. There are no incentives for the enterprise or the individual for improved performance and cost effectiveness.

- Under present circumstances costing of production and economic management is not possible. This is vital for a development process where enterprises should be expected to grow, invest, provide additional job opportunities and hence increase productivity and standard of living.

- Pricing policy and associated barter system [see (iii) above] lack co-ordination and awareness of basic production requirements; there exists no differentiation of product or commodity prices regardless of quality. Adoption of such models are essential to ultimately promote high standard products competitive on the export market.

- A favourable economic environment must be created, combined with the appropriate obligations, responsibilities and leeway for personnel at all levels, to carry out their duties in a manner they deem appropriate without interference from the outside.

(e) POLICIES

The above observations and recommendations point to the need to change the managerial and corporate behaviour of large companies which now operate along the lines of companies having a monopolistic status. The major principles of a changed status which would trigger off a process of increased productivity and expansion was outlined above to entail government policies to enable

- autonomy of corporate decisions but also risk-taking;
- guidance, inducement by government policies but not a special treatment of or interference in companies;
- provision of efficiency incentives to companies through surplus (profit) generating possibilities;
- a change of the prevailing price system to better reflect scarcities and needs, to provide incentives for increased production of quality products and to avoid uneconomic and unefficient internal barter trade;
- a more targeted and performance-related employment system to enable companies to assign competent staff to specialized functions and to replace managerial staff;
- provision for skill upgrading and career development inside companies;
- the establishment and promotion of independent company audit firms and consultancy groups to facilitate efficient and legally correct company behaviour; and
- the direct involvement of academic research institutes in product and process upgrading in individual companies.

In order to start a process in which the autonomy and responsibility of individual enterprises be increased, the elaboration of a time table and chain of activities for interrelated deregulation and changed control mechanisms would be necessary so as to ensure non-disruptive and consistent developments. One basic vehicle for this is indeed the design of an industrial strategy in which particular subsector approaches, regional approaches and macroeconomic issues can simultaneously be treated. As to the latter, it obviously contains issues such as the price system, the credit system, the foreign trade and exchange system, labour market matters, taxation, foreign direct investment regulations etc. which fall somewhat outside of the scope of the present Mission and would warrant special attention in a separate exercise. Thereby, international experience should be utilized to identify the stages and timing of a deregulation process. For instance, one socialist developing country started by liberalizing various, previously fixed, prices for food products (notably vegetables and fruits) and achieved after a first price explosion rapid increases in production and supply. From there the country moved to tackle financial and foreign exchange issues according to a publicized deregulation programme.

As was pointed out, the major basis for such a programme would be for the government to define an industrial strategy. This is necessary for setting in motion a growth process for which the very limited resources are mobilized and efficiently allocated and in which the efforts of the various "agents of growth" are directed towards a genuine accumulation process.

The main rationale for such a strategic approach is, firstly, that the industrialization process is not spontaneous - at least not in the actual development stage of the world economy and for less developed countries within relatively short time horizons. Secondly, because of the low level of the country's development, resources are very scarce and the capabilities relatively low; for this reason not only are mobilization and co-ordination requirements stronger, but the state has to try to compensate wherever available resources or capabilities fail short. Thirdly, current market and price mechanisms can only to a limited extent serve as indicators for the necessary decisions to be taken by the various actors in a longer time perspective. The state has, therefore, to define the preferred development path and to create correspondingly the required conditions. Through the elaboration of an industrial strategy the country's strength, weaknesses, opportunities and threats concerning its industry in the international context can be more systematically assessed.

Fourthly, the strategy provides a vision and general framework for building up a broader and more systematic international co-operation for industrial development. Given the country's vast resources and significant industrial and agricultural development potentials as well as the large domestic market, its geographical location etc., there is a substantial and growing interest by foreign entities both public and private, academic and commercial to establish various forms of co-operation in the industrial development process. However, such enhanced and more consistent co-operation is apparently hampered by the absence of a clear concept and vision for industry and of other basic principles and preconditions for co-operation.

In the elaboration of an industrial strategy the role of the industrial sector in its interaction with and stimulation of the agricultural sector would need to receive main attention. As was described in greater detail above there is a need to extend and improve the manufacturing capacity of agricultural equipment and tools (including development of equipment for paddy harvesting and drying). Food processing including meat processing needs to develop the products and value added for both the domestic and export markets. Forestry resources need to be systematically built up to meet current and future needs for industrial processing (the 50 per cent utilization of current pulp and paper industry capacity is a clear indication of the problem of raw material supplies). Also the fishery and fish industry would require a systematic analysis in the context of an industrial strategy.

As one particular measure to constitute part of the implementation modalities of the envisaged industrial strategy, the creation of a special economic zone in Viet Nam could be considered. While it is true that employment in export processing zones (EPZs) and special economic zones worldwide accounts only for a negligible amount of overall industrial employment, in some countries they play a major role as industrial employer: in Mauritius they account for approximately three quarters of the total and even in some bigger countries such as Malaysia and Tunisia they generate about one quarter of all manufacturing employment.

EPZs differ very much in terms of their objectives, organization, management, economic environment etc. and so does their performance. Some have been remarkably successful, others have failed in reaching their objectives depending on how, when and in which context they have been established and operated. With many foreign investors eager to set up companies in Viet Nam, the country could take advantage of a very favourable international climate. The task ahead would be to clearly define the role and function of an EPZ within the national economy and to create a general atmosphere of reliability and stability as regards the terms and conditions under which foreign investment would be welcome. Together with the creation of the required physical facilities (factory and office buildings, roads, water and energy supply, telecommunications etc.) this may be expected to induce a substantial inflow of foreign resources into the country.

China provides an interesting example of a socialist country having recently introduced liberal foreign investment laws within the new "open door" policy. In 1980 the country established four so-called special economic zones (Shenzhen, Zhuhai, Shanton, Xiamen) which have been very successful indeed attracting investment, creating industrial employment and bringing in new production technologies. In China a phased approach has been adopted in the course of which several areas have been successively opened up to foreign investment: in 1980 the four special economic zones, in 1984 14 coastal cities and in 1985 three further delta zones on the coast. A similar approach would appear to be suitable for Viet Nam. Firstly, it would allow concentration on those areas most likely to attract investment and, secondly, it would enable the country's policy-makers to use these limited areas as test cases for innovative policy schemes which they may not wish to introduce on a broad scale immediately.

Following the example of other countries, Viet Nam could establish a special economic zone on its territory which would involve the following:

(a) The provision of facilities for an efficient export oriented industrial activity.

(b) The ability of establishing cost efficient and cost-conscious industrial activities.

(c) The ability to carry out international sourcing and obtain other inputs for export oriented production.

(d) The ability to attract foreign direct investment into Viet Nam in a geographically determined area in which administrative procedures for industrial licences, foreign trade arrangements, etc. would be handled without red tape by one particular designed authority in the zone. In addition it would be possible to better monitor these industrial investment and production activities.

(e) The achievement of a demonstration effect to foreign entities to become more involved in the Vietnamese industrial process.

(f) The achievement of a demonstration effect to the Vietnamese industrialists as to the efficient operation, costing and processing of production.

(g) The possibility of attracting further investment resources from Vietnamese living abroad.

It is, in addition, considered that by locating such a zone in the middle of the country such as in the Da Nang area such a zone would contribute to alleviating some of the pressures that may create a certain disequilibria on economic activities between the Northern and the Southern provinces of Viet Nam. The idea being that such a zone would eventually gradually be integrated into the domestic economy through subcontracts and subdeliveries. Experience from other countries show that such zones may indeed constitute a strategic growth pole for a modernization effort in industry for the particular country.

Chapter VII. A framework for formulating an industrial development strategy

INTRODUCTION

In order to illustrate the policy choices and main elements which would need consideration when preparing an industrial development strategy this chapter attempts to present a possible framework and format for strategy formulation.

Obviously it is an illustration only since there exists no one particular model or typology of national strategies. An industrial strategy can generally be described as an outline of a development course to reach set objectives over a period of say 10-20 years by providing guidance to the various decision-making actors concerning resource mobilization and allocation. A strategy can thus be seen as providing a "vision" of the desired development process and consistency for the measures to be taken. Depending on the type of prevailing (or desired) socio-economic system, a strategy can be more or less ambitious or detailed and can be the basis for medium-term and short-term (more or less) comprehensive devlopment plans or as a non-comittant, general perception of prospects, challenges and desired responses by the various actors in the period concerned.

While it is here, therefore, avoided to try to set some kind of definition of the type of strategy relevant or recommended for Viet Nam's industrial development, this strategy framework is used to arrange the above observations and recommendations into a structure and to specify the issues and options for which policy decisions will have to be made. This chapter thereby also serves as a general guidance for the analytical work that subsequently has to be carried out to enable such decisions.

1. INDUSTRIAL DEVELOPMENT STRATEGY FORMULATION: CONCEPTS AND APPROACHES

Viet Nam's industrial development at a turning point: The need for a perspective analysis and a long-term vision

Viet Nam is a centrally planned economy based on socialism. Production is largely in the hands of the state and major inputs and outputs are defined according to Five-Year Plans. A new Four-Year Plan is currently being conceived to be covering the period 1991-1995

The manufacturing industry sector was assigned a lead role for economic growth but has in recent years failed to attain the set objectives with low capaicty utilizaiton, low level of productivity and competitive strength and lack of innovation, industry did not generate a dynamic growth process, could not satisfy domestic demand and did not achieve any significant exports.

On the basis of the reassessment of economic policies initiated in 1986, the government is also re-examining the framework for industrial development. With the obvious need to increase efficiency and growth of the sector new

approaches and measures have to be conceived taking into account structural weaknesses and further prospects and challenges in the domestic and foreign economies. To this end an industrial strategy is formulated.

Possible development goals: some hypothetical alternatives

Building a strategy implies making choices between alternative goals for development. In principle these fundamental choices are to be made by the political decision makers. It is then the task of the economic planners to calculate or estimate the implications of these choices and to build up sub-systems which satisfy the chosen goal in an optimal way.

In reality strategy-making is an iterative process in which policy-makers and planners make a series of assumptions, build up options and adjust these according to constraints and the economic environment. A strategy is formed which reflects a mix of goals and assumptions and the perception and views of the various actors involved in the industrialization process.

Hypothetically, there are a large number of choices of major strategy goals. Some of these choices and their characteristics in terms of resources, market orientation, scale of production, location, technology etc. are briefly illustrated below.

(a) Industrial development to contribute to rapid overall economic growth (optimum growth strategy)

A strategy based on this objective focusses on effective resource allocation so that investible and human resources are directed to industrial subsectors, activities and projects which would together yield the highest rates of returns. This in turn presupposes commercial cost/benefit analyses for new investments as well as modernization and upgrading of existing production capacities. The attainment of high efficiency of industrial production is the key target. To this end exposure of industrial companies to internal and external competition and a general outward orientation is required. Foreign direct investment, imports of components, equipment and final products, acquisition of foreign know-how, the use of modern management methods and a strong export focus would be further elements of this strategy.

Employment would need to be reduced in some overstaffed plants and far-reaching autonomy of companies would be a major prerequisite for reaching rapid growth. The locational pattern of industrial establishments would probably accentuated prevailing regional disparities as those locations would be preferred which have a relatively efficient structure.

(b) Maximum contribution to meeting the basic needs of the population (basic needs strategy)

An industrial strategy for meeting this objective would direct resources towards the production and domestic supply of

- basic food items;
- standard clothing;
- construction materials for housing; and
- basic medicines and other products for the health system.

Some of the major characteristics or preconditions for implementing this type of strategy would be:

- heavy emphasis of agro industry;

- priority allocation of investible resources to the particular product groups and their backward linkages (agriculture, fishery, building materials, tc.);

- pre-investment studies with emphasis on efficient production and distribution systems for those particular products which satisfy the basic needs;

- pricing policies and wage policies which allow for high domestic demand of the masses of the population of the basic products;

- foreign trade policies primarily directed to support domestic production for domestic needs;

- small scale industry to play a significant role.

(c) Resource-based industrialization objective (resource based strategy)

This strategy would aim at optimum exploitation of the domestic natural resources in the agricultural, fishery, forestry and mining sectors and for industrial processing of these resources for both domestic and foreign markets.

Major characteristics of the pursuance of this strategy would be:

- Accelerated exploration and exploitation of mineral desposits including natural gas and petroleum;

- Emphasis on promoting cash crop production including fruit and vegetable plantations;

- Detailed fishery surveys and systematic build up of catching and fish farming capacities;

- Forestry surveys, systematic reforestation with selected species;

- Priority allocation of investible resources with domestic processing of natural resources;

- Intensified international co-operation for acquisition of modern, large scale equipment, know-how and financial resources as well as international marketing of processed commodities;

- Export orientation of food, minerals and wood products processing industry;

- Increasing level of energy demand and continued build up of energy generation;

- Less impact on employment and small-scale industry development;

- Specialized high skill requirements for the various processing industries;

- R&D directed to modern technological processes;

- Due to large capital outlays for investment projects especially in the mineral based industry (capital intensive processes, large economies of scale, and long gestation periods), capital investment projects may be large but limited in number.

(d) Maximum employment generating industrial development (employment strategy)

An industrial strategy focusing on attaining maximum productive employment in the country would de-emphasize efficiency and international co-operation and would concentrate on labour-intensive production processes. Some of the particular features to be discerned are:

- Small-scale industries would pay a major role;

- Pre-investment studies would use low shadow prices for labour costs;

- Low degree of international co-operation except for the purpose of establishing export enclaves with foreign companies;

- Selected export-oriented activities with labour-intensive production and assembly processes with imported components and new materials (in-bond), such as electronics assembly and garment production;

- Low technology or appropriate technology would primarily be applied in industry, except for export-oriented assembly plants;

- Rural industries would be developed;

- Decentralized decision-making, banking and distribution would be called for.

Considerations for a strategy mix

The above random illustrative examples of alternative strategy goals could be used as a first guidance to differentiate and clarify the priorities and their implications.

There is obviously no one single simplistic goal to be pursued. For instance, basic needs strategies have elements of natural resource-based industrialization. In practice an industrial strategy is necessarily a mix of variuos goals, policy considerations and allocation patterns. Many choices

cannot even be made once-for-all but need to be assessed in an interative and/or disaggregated process. There is also no absolute solution but rather a space of maneuvering, for instance in the following categories of choices: Market-orientation (import-substitution vs. export promotion, selection of main export target markets); government role (market-oriented industrial development vs. direct government intervention; private vs public ownership); technology choice (efficient, modern or large-scale technology vs. "appropriate" or "intermediate" or smaller-scale technology; as a special case: the role of high technology); industry scale (large-scale industry vs. medium- and small-scale industry); product lines (light vs. heavy industry; basic needs goods vs. goods for urban higher income groups; subsector priorities and linkages); integration (national - with other economic sectors - vs. international integration of industrial production; regional integration); factor intensity (labour vs. capital intensity in production; related to this: resource-based industrialization).

As a basis for determining the choices and the strategy mix, the structure of the economy, the economic system, the international trends and driving forces and various resources and constraints need therefore from the outset to be diagnosed and assessed.

(a) The general framework

In the case of Viet Nam the general framework for a strategy is to be seen in its socialist system, with strong public ownership and government planning. It is also to be seen in the particular context of:

- The aim to pursue a rapid industrial transformation.
- The endeavours to enlarge the scope, form and direction of its international industrial co-operation, including the attraction of foreign direct investment, foreign trade with non-traditional product groups in new markets.
- The endeavours to increase efficiency of industrial enterprises by decentralizing decision-making and allocating more autonomy to enterprises.

(b) Assessing the strengths and weaknesses of the base for industrial restructuring and expansion

A diagnosis of the overall economical and industrial weaknesses as a further requirement for narrowing down the strategy devices may show.

- A complex government administrative machinery which is too rigid to enable substantive, quick responses to needs for decisions and resources allocations.
- Very low efficiency and level of technology in industry.
- An organizationally weak industrial system with too little incentives for efficiency increases and dynamism.

- A non-transparent system of pricing, foreign exchange allocation and competitiveness.

- Acute foreign exchange scarcity and large external debt services obligations.

- Certain regional imbalances in terms of productive capacities and growth capabilities.

- A growing population pressure.

- Being a late-comer in the fierce international competition.

- Certain international isolation.

(c) Strengths

The overall economic strengths may be:

- Large human resources with ample availability of highly competent skillful and hardworking industrial workers;

- Large natural resources in the mineral and agricultural sectors;

- Growing energy supply and untapped further sources;

- Large and growing domestic market;

- Location in the world's most dynamic region;

- Basic research and development resources in advanced technological fields;

- Ambitious policy makers, and, a determination for industrial development with new policy-makers and international co-operation.

The methodology proposed

The approaches suggested for the formulation of an industrial strategy can be outlined as follows:

- A set of detailted subsector and strength/weakness/opportunities/ threats diagonoses of the country's industry versus the international production systems.

- The "filière" approach to identify chains of development in industry and across-the-board constraints and requirements.

- An iterative diagnostic approach of current structures, performance and prospects with an iterative elaboration of the strategy.

- A direct involvement of all concerned actors in the diagnostic and formulation of work.

- A built-in rolling-forward approach and flexibility.

- A narrowing down of possible inconsistencies between current short-term plans and the strategy.

- A systematic, parallel build-up of a strategic and analytical statistical data base.

The time dimension

As a time horizon for the industrial strategy a 15 years strategy is proposed, covering the period 1990-2005.

Three phases of gradual change and decreasing accuracy of definition of measures can be distinguished:

1990-1995 - with focus on rehabilitation of existing capacities;
1995-2000 - with focus on the build-up of integrated production and institutional support networks;
2000-2005 - with focus on major expansions through new ventures.

2. DIAGNOSIS OF THE CURRENT ROLE AND STRUCTURE OF MANUFACTURING INDUSTRY IN VIET NAM

As an initial information base for assessing the prospects and constraints of current industrial capacities the following analyses would need to be undertaken:

- Overview of the manufacturing sector and its role within Viet Nam's economy.

- The manufacturing sector - its growth, recent trends and structural changes, e.g.

  - heavy/light industries
  - consumer goods/intermediate goods/capital goods

- Trade in manufactures - the domestic market
  - exports (by product and by destination).

- Basic characteristics of Viet Nam's manufacturing sector (statistics as well as qualitative analysis):

  - Size, regional distribution of enterprises, by subsector.

  - Inter-industry linkages, availability of supporting industries.

- Degree of import dependence (raw materials inputs, machinery and spareparts, oil).
- Capacity utilization, by subsector, if possible.
- Technological level, modernization needs, by subsector.
- Employment and productivity, skills intensity.
- Product quality, product development capacities, design, packaging.
- Ownership/management pattern.
- Indication of competitiveness in terms of price, quality, packaging, market penetration, etc.

3. THE RESOURCE BASE AND THE ECONOMIC ENVIRONMENT FOR VIET NAM'S INDUSTRY

An assessment and perspective analysis of the resource base for industry in a longer term perspective and a review of the overall economic environment which currently prevails are further fundamental preconditions for and parts of a strategy formulation process.

(a) The resource base

Human resources. Size and distribution of labour force in industry, including potential and projected growth of the industrial labour force, skills availability and gas, technical education/training; population trends, employment processors.

Agricultural resources. Present and projected future production of food crops and other cash crops (e.g. rubber and cotton) and their utilization in further processing in Viet Nam. Acreage under cultivation, projected increase of acreage (e.g. through irrigation schemes) and yields per acre. Present and projected livestock and other animal products, including hides and skins, domestic sales/exports.

Marine resources. Present and projected catches, farming, etc. localization, domestic sales/exports.

Forestry resources. Forest reserves, location, types of wood (including bamboo and rattan) in relation to potential industrial use, annual outtake, replanting, timber production/domestic use/exports. Potential for use of rubber tree wood.

Mineral resources. Known reserves, production, degree of local processing, exports, use in local industry (present and projected).

Energy resources. Present and projected for 1990, 1995 and 2000.

	Known reserves	Production	Imports	Exports
Oil				
Gas				
Coal				
Electricity				

Plans (including time schedule) for hydro projects and their location and for gas development.

Characteristics of coal and peat reserves, including location.

(b) The economic environment

- Policy (reform) package and instruments (actual).

- Financial issues: resources (domestic, external), investment pattern, envisaged foreign direct investment, international aid co-operation (financial), foreign exchange allocation to industry.

- Institutional support.

  Technical services
  Information
  Export services (marketing, credit, etc.)
  Standardization and testing services and facilities
  R&D

- Physical infrastructures. Road, rail and shipping network for internal integration of economic sectors, for supplies for industry distribution of industry products; for export/import needs; for closer regional development. Availability of industrial areas, industrial estates etc.

4. IDENTIFICATION AND SELECTION OF PRIORITY AREAS: "FILIERES"

On the basis of analyses of prevailing production structures and policies and assessments of prospective developments and constraints a first attempt is generally made to translate overall objectives into industrial priority activities. In the case of Viet Nam these activities are suggested not to be singled out as clusters in various separate industrial subsectors but that instead the so-called "filière" - approach be applied. This approach entails utilizing specific production chains of interdependent activities which cut across a member of industrial subsector and other sectors to build up mutually supporting interlinkages of growth. Such a selected chain or "filière" would cover as a first dimension the various successive stages of transformation of a segment of the economy starting from a particular raw material and ending up with a particular end product for consumption.

As a second dimension all essential complementary activities are included such as specific capital goods, training and research, banking, transport, distribution and export services as prerequisites for the viability and dynamic expansion of the "filière" - core activities.

The reason for applying the "filière" approach in this case is firstly that the current production system and the industrial network are very poorly developed and hardly integrated. It seems necessary to formulate an international development policy package to induce specified, desired future linkages rather than to expect spontaneous development of complementary activities.

The second reason is that for the current industry structure to be able to attain the selected strategic goals, a systemic approach is needed. By this approach potential synergetic forces are utilized through specially identified and supported links between the relevant actors/activities. Thus, rather than relying on a project-by-project approach and await a gradual build-up of inter-linkages, such networking is from the outset assessed and induced.

In this context, the third reason for the applying the "filière" approach can be indicated. It is believed that only through such a systemic approach and its anticipated benefits for overall development can the major prevailing organisational problems be defined, recognized and explicitly tackled. The current static and fixed structures can only be challenged through a clear demonstration of the overall needs and potential benefits.

The application of the "filière" approach for industrial strategy formulation presupposes a decision of how many and which of specific "filières" have to be selected to arrive at a meaningful analysis and strategy.

This selection decision would be an interative process based on both anticipated overall effects and on an assessment of the scope for interaction by the concerned actors, through proximity of current and future activities etc. In the case of Viet Nam, focus in the selection of "filière" would ideally lie within the agro-industry field. This would involve various industrial inputs to selected areas of agricultural production (fertilizers, pesticides, agriculture machinery - including tractors, pumps and transportation -) various types of agricultural processing equipment for food and feed production and a range of industrial services in support of technoligical, skill, organizational and various technical and institutional developments. A first basis for the elaboration of such "filière" is contained in Chapter V above ("Agro-, forestry- and fishery-based industrial development").

Following an initial selection of "filières" to be considered for the strategy, detailed data collection and analysis would be carried out of relevant resources, requirements constraints and costs/disadvantages of th enational and economy, covering:

- required natural resources or raw materials
- investment and capital goods requirements
- technological requirements
- skill requirements

- financial requirements (fixed assets, working capital)
- transport requirements
- foreign exchange requirements.
- institutional infrastructure requirements.

The requirements could be contrasted with analyses of possibilities or opportunities of Viet Nam in terms of specific (absolute or comparative) advantages for developing such production activity:

- availability of basic resources
- already existing production capacities and facilities, in this or in complementary activities
- availability of specific human resources and capabilities
- availability of technical capacities and know-how
- inter-industrial linkages
- competitiveness and export potential.

The benefits of "filière" specific development would then be able to be assessed in terms of its relative contribution to the general socio-economic objectives of Viet Nam such as:

- employment
- contribution to satisfying basic needs
- overall economic growth effects
- foreign exchange earnings
- contribution to agricultural development
- contribution to regional development.

In the data collection and analyses thus would need to cover information on existing structures and working conditions, comparative information from foreign countries, technical information and prospective information. To obtain at least part of this information, and to undertake the analyses the expertise of actual and potential actors would need to be ascertained in a concerted action.

In the characterization of the "filières" the time dimension needs to be takeen into due account. Some problems can only be solved and some disadvantages may disappear or be overcome only in the long run. Also some advantages may be disappearing (e.g. some export potential). Thus, rather precise indications are needed as concerns the relative ease or difficulty with which the various production chains could be developed in the long run and their relative contribution to the socio-economic objectives of the country.

Also the capacities for managing and monitoring such "filières", and the current and potential development facilities in the complementary activities, will need to be considered. Once the list of priority "filières" has been decided, alternative scenarios of their path of development that for each "filière" are to be constructed. Choices are to be assessed as concerns variables such as technology, size of plants, work organization, location,

stages of production with which to begin, status of the firms, origin of financial resources.

The alternative scenarios will show

- the expected levels of output
- the investments to be made in the complementary activities (research, transports, etc.)
- the investments and production capacities to be developed
- the required resources at different points of time
- the technical and organizational modalities of the production process
- the objectives to be obtained in terms of economic performances (output, employment, productivity, competitiveness, accumulation, etc.)

The exercise can also be split into two parts, one consisting of studying the ways and means and deciding what is considered to be the optimal modalities for developing the "filière", the other consisting of defining the scenarios in terms of quantitative and performance targets for different time horizons. This will require in any case some iterative process between those two parts.

To arrive at the most likely scenario these different scenarios are evaluated in terms of macro economic constraints which are likely to prevail at different points of time during the 15 year period of the strategy. Also the macro economic consistency has to be checked, starging with the most ambitious scenario. If inconsistencies do appear - e.g. the required resources of a kind are clearly larger than those which are likely to be available - more modest scenarios have to be chosen, until all scenarios seem to be feasible under the constraints foreseen. In due course, these constraints will appear to be more or less stringent, in which case the implementation of the strategy will have to be adapted.

The operational content of the strategy has in any case continuously to be adapted to chaging conditions and circumstances. It will thus always be possible, some years later, to introduce more ambitious scenarios for the development of the priority "filières" or to enlarge the number of "filières".

This exercise will be essential when elaborating that part of the expected long-term development of the "filière" which has to be realized in the medium-term, i.e. within the framework of the next Five-Year Plan.

5. FUNCTIONAL DIMENSIONS

In the "filières", the organization of production, the management of the individual companies, the mobilization of finance for new investments, the effective use of the most appropriate technology, etc., are interconnected dimensions of most industrial activities. Any industrial strategy has to be

linked to all these dimensions and any policy for industrial development and renewal should treat these dimensions as important areas for policy-making.

The above brief exposition of the Vietnamese economy suggests that organizational and management matters would rank high on the list of priorities, especially the "filière" strategies set high demands for organizaitonal effectiveness and efficiency.

As each "filière" structure has its peculiar characteristics, both internal and external organizational issues have to be investigated in the framework of the particular chain. These issues concern:

- the organizational form: With the growth of companies from small to medium size (2-400 employes) a multi-divisional form structure is often superior to a function form structure. With larger company size the strategically oriented activities should appear in a new functional division of organization;

- the internal autonomy: Evidence suggests that the effectiveness of many organizations improves as hierarchical routes of command are minimized, which has consequences for both the required level of schooling for middle managers, supervisors and the workforce generally and the degree of authority to be assigned to these personnel;

- the external autonomy: The same principles apply to the relations that (sub) departments in the different organizational structures entertain with other art of the chain, in the sense that they should be allowed to deal directly with their equivalents in other organizations, i.e. without interference of more generally responsible personnel or departments.

It seems that modernization of the organization at the company level amounts to a formidable task for the existing system in Viet Nam. The changes require more professionalism of the existing management personnel, and therefore schooling. It should be considered to promote or even set up the foundation of schools for "education permanente" at managers and executive programmes (preferably linked to the institutions of higher managerial learning).

Accounting systems

Closely connected to the creation of successful organization forms is the creation of accounting systems that are fully consistent with their given functions. This should enable them make it possible to calculate (contributions to) production costs at the lowest possible level in the organization. As the subsystems (departments) are responsible for their contribution, these accounting systems enable one to pinpoint exactly where productivity and efficiency can be improved if necessary (the internal function).

Such a necessity becomes evident, ror example when the particualr part cf the chain appears to be a bottleneck of some kind. These accounting systems therefore also serve an external function within filières-like structures.

Ownership patterns and functional control

Various forms of industrial ownership exist in Viet Nam: State enterprises and bodies, co-operative or collective firms, and private business. It is not possible to find a generally optimal mix of these three basic forms. Here again, the practicabilities of particular filières-like structures, to be judged upon by experts in the field, should improve the modus operandi of the filière. It would be conceivable to allocate the function to Government bodies, so that they could act as both initiator and consumer (or guarantor) of the end-product(s) of the filières. It could easily be applied more systematically to all infrastructure-linked filières (road and railway transport, telecommunications, medical industries, etc.).

The actual forms of ownership of industry seems to be of less importance than questions concerning the triggering of economic activity.

Financial requirements

An efficiently operating banking system (normally but not necessarily part of the total capital market which also inlcudes stock markets) would be of definite importance for the smooth functioning of the Vietnamese economy. The present system has to operate more efficiently. The State Bank seems to be largely subservient to the finance ministry and other connected state bodies. A change in this respect needs therefore a serious consideration, possibly along the lines of a more decentralized banking system. A clear demarcation of responsibilities seems to be in order here, noting that the basic function of a banking system is to invest layed-in capital in selected industries or companies.

Foreign linkages

The filière-concept has also merits in the area of incoming direct investment. Many foreign direct investment projects have proved to be a non-success because there was no follow-up in either downstream or upstream activities. Individual projects should therefore be formulated as part of a braoder programme of the filière.

Work force, skills requirements

For most industrial undertakings, the level of trianing determines the potential flexibility in the workforce. A general vocational training, satisfying needs of an industrial subsector or branch of industry are usually very important as the basis for on-the-job and factory training. It permits a specialization in job functions, which fosters quality and productivity, while at the same time it gives the workers an overview of other parts and segments of the production process. The internal migration of the personnel between different work stations and job functions could be an important way of stimulating creativity and the transfer of skills.

Looking at an industrial chain of production, it is important for all members of the workforce to understand the links and interdependencies between each production unit. The quality of the product form the first step in the

production may determine the end results. The flow of material and products between work stations in a company and from one company to another should be made visible to all members of a chain of production. It could affect the way work is organized, skills are used and ideas for improvements are applied. A skilled, and a continuously retrained workforce could enforce these lines or chains of production.

Highly skilled manpower

The special functions of the highly skilled personnel should be underlined. Production engineers are crucial for the coupling of different segments in a production process, to fit the most appropriate, available machinery into a flow of goods and services. Together with planners and marketing personnel they could also be instrumental in creating better linkages between the major steps in a production process from the raw materials until the end product. Such a coherent understanding of the filière makes the alternative ways of producing open to serious considerations. A better use of the suppliers of raw materials and energy is only one such aspect. The distribution networks, a common use of specialized machinery and service personnel, an engineering capacity that could be shared by several firms in the filière are other examples of functions that are closely related to the workings of a whole chain of production.

Technical and other intermediate personnel

In many production processes, technicians and intermediate personnel play an important role for the continuous renewal of machinery and the organization of work. Many innovations are diffused through learning-by-doing and much flexibility is attained through very practical problems of connecting parts of a production process. A special training of this type of personnel could be an extremely economical investment. Historically, this category of the workforce has been an important agent for the transfer of technology between subsectors of industry and between different types of firms. Traditionally, the middle-strata of the workforce have also embodied skills that may not always be needed during the day-by-day activities, but may be crucial in times of disruption or serious problems in the process of production. Hence, a differentiated structure of skills in a company or within a filière may stimulate innovation and flexibility, while, at the same time, make connections between the different elements of a chain of production much more effective.

Job rotation and internal integration

In order to foster links between the different chains of production and, at the level of industry, use qualified or highly skilled manpower more effectively, systematic actions should be taken to make it easier for these manpower categories to have several job functions over a period of time. To mention filière should also be able to use some of their special knowledge and skills in related production processes. Supporting personnel such as documentalists, design engineers and construction specialists, researchers and other R and D personnel should be expsoed to a wide range of practical problems in industry and related economic activities. Marketing personnel and

administrative specialists should be encouraged to deal with not only a set of problems within a chain of productive activities, but to use their special skills more widely.

Science and technology, information and intelligence functions

The dynamics of an industrial filière is attained through the linkages between the many actors involved. It is not just at the company level, where good conditions for improvements and change are created, but on all levels from the production units to whole chains of production. The infrastructure supporting these functional linkages must include the scientific and technological institutions, which potentially could serve the actors involved with relevant information and know-how. Specialized expertise, if not working in production, must be available to the filière. Historically, there is often but not always a parallel development of certain production capacities in industry of other economic activities and, on the other hand, the evolution of specialized centres for research and training, consultancy firms and engineering activities, or, in short, information and intelligence functions for the filière.

With the help of technical experts and other highly qualified personnel these centres monitor the technological trends that could influence the future development of a specific production chain. Such a centre would identify the chaning needs and challenges, evaluate competing ways of production, judge upon possible conflict and co-operation patterns, etc. Without an intelligence function, any filière cannot survive in a long-term perspective. That is why it is important to foster an infrastructure for scientific and technological information, as well as for other types of information.

Science and technology often not used as the driving force towards industrial products and processes innovation or renewal. The expertise at the institutions of science and technology and in other specialized laboratories for testing and standardization etc. in Viet Nam could be used more effectively for innovative functions in a production process. Manpower training, transfer of technical knowledge, development of prototypes, upgrading of machinery, advanced calculations and stimulations of technical performance are just a few such functions, where highly skilled, specialized expertise would be necessary.

These kind of linkages should not just be a matter of formality or a general offer. Informal networks should be made easy and be stimulated. The mobility of personnel and the common use of laboratories should be the rule, not the exception.

International linkages are also important. For companies that operate on foreign markets, international expertise may be crucial for the survival on these markets. The innovative capabilities at home are certainly more important, but they have to be complemented by an active sourcing of technical and other information abroad.

In this consist a number of policy issues could be raised such as the concentration of R and D activities to the major cities of Viet Nam. Between 80 and 90 per cent R and D of personnel is concentrated to Hanoi and Ho Chi Minh City. Following the diffusion of industrial development, would it be

beneficial to consider some redistribution of the R&D activities so as to fit industrial priorities in specialized fields of activity? Should other priorities be set in the national R and D system to better match the emerging capabilities for innovation in specific industrial subsectors? Should the methods of allocating R and D resources, especially large investments in equipment and special laboratory instruments be different? Considering the growing number of small and medium sized industrial firms, are any special programmes and techniques needed to connect them with highly skilled expertise?.

6. INDUSTRIAL POLICIES

The formulation of an industrial strategy constitutes an appropriate substantive basis for a reassessment and rationalization of industrial policy measures. Rather than considering policy changes only in a general framework it is essential to evaluate and test policy measures and their consistency against specific development requirements as embodied in the strategy. The "filière" strategy has to specify these requirements and can also provide guidance as to the sequence of certain policy reforms. Thus the introduction of changes in the price system towards greater reflection of scarcities in the domestic (and foreign) economy can be linked with the systematic build-up of production chains in the strategy. Similary, the requirements for a more rational and effective government decision-making and administration - as was discssed in previous chapters - can be substantiated and met more accurately on the basis of the introduction of dynamic production chains, cutting accross the current functional structure of the government authorities.

APPENDIX I:1

Food supplies to large urban population centres

1. INTRODUCTION

The Ho Chi Minh City is the largest city in Viet Nam with a population slightly over 4 million. From an administrative point of view, the city is divided in 12 central and 6 peripherial districts.

Information on food supply and the agro-based industries from this area serves the purpose of illustrating, in general terms, the situation also in other larger population centres in the country. It should be stressed, however, that the order of magnitude in different fields vary considerably with regard to, e.g., standard and capacity of food processing facilities and supply of inputs with particular reference to farm produce as raw material.

2. SUPPLY REQUIREMENTS, PROCESSING CAPACITY

In addition to having large consumer groups in different income brackets, the city is also the centre in the south for industrial production, for its own requirements, for supply to surrounding provinces and for export.

Food production in the six peripherial districts cover about 60 per cent of the demand of vegetables, including tuber crops, and 10 per cent of the requirement of pork.

Other products such as pineapple, sugar and tobacco for processing is mainly grown and supplied from surrounding provinces. In this respect, the processing industry in Ho Chi Minh City is a very much needed outlet for these commodities. The requirement of paddy rice is at least 500,000 tonnes per annum and 50,000 tonnes of wheat flour.

The wheat is imported from abroad and approximately 600,000 tonnes of paddy rice (for 1988 580,000 tonnes) are bought from nine provinces west of Ho Chi Minh City. The paddy rice is supplied on a quota basis determined by the Central Government.

On a farm level, major difficulties are encountered with the summer/autumn paddy crops, which are difficult to dry in the traditional way during the wet season. Hence, substantial losses are frequent at this level.

In the Han Giang Province, a silo system has been built to reduce the storage losses.

The overall rice processing capacity of the city is 200,000 to 300,000 tonnes per year indicating that approximately 50 per cent of the requirement will have to be supplied as processed rice. The mechanical installations are poor, resulting in low extraction rate and high percentage of broken grains.

The demand for meat in Ho Chi Minh City is 50,000 tonnes calculated from the average per capita consumption of 12 kg per year. About 80 per cent of this, or 40,000 tonnes, is pork and the rest, beef and poultry. Assuming an average population growth including urbanization, of 3 per cent and that the target is met of increasing the per capita consumption of meat to 25 kg per year until 1995, the total supply of meat will then have to increase to some 120,000 tonnes in total, 100,000 tonnes of which is pork, with maintained share of 80 per cent for pork products.

No detailed information is available regarding the proportion of beef and poultry. It is reasonable to assume, however, that the consumption of beef accounts for about 15 per cent, leaving 5 per cent for poultry meat. The demand for beef in 1995 would then be of the order of 15,000 tonnes and that of poultry meat 5,000 tonnes per annum.

Ho Chi Minh City has one large slaughterhouse, Vissan, which has a designed capacity of 2,400 head or rouguly 180 tonnes of pork per one shift (6 hours killing). With 350 days of operation per year, the annual production is about 50,000 tonnes. If modified operational routine are adopted, including two shifts for killing, the required quantity of pork can be handled also by the mid of the 1990s. In a 10-year perspective, additional slaughtering facilities are necessary and the formulation of the project concept should be initiated fairly soon.

One important issue to determine is whether additional supplies of live pigs to the city is a realistic alternative, or whether a suitable future pig-producing area can be identified elsewhere, where the bulk of the feed can also be produced. Pending the result of such studies, the localization of additional slaughtering capacity should be determined within a period of two or three years from now.

A current problem related to animal production is the irregular supply of animal feed. Although only a comparatively small portion of the live pigs are supplied from the city area, the situation will aggravate in the future with increased demand for pork. Existing animal feed processing plants are reportedly in a poor condition but operations are maintained by high technical know-how of the operational staff.

Manufacturing of animal feed is of fundamental importance for sustained and improved animal production. The investment plans for the feed processing industry should be included as an integral part of detailed studies and recommendations pertaining to the long term strategy for supply of meat to the city.

Other food processing enterprises in the area include biscuit and confectionery manufacturing, noodles, sauces, etc.

In addition, there are Central State enterprises for tobacco, alcohol and beverage processing localized in Ho Chi Minh City. The tobacco industry produces 650 million packs of cigarettes per year, the range of products from the distillery is substantial and the brewery branch produces 170 million liters of beer annually. The raw material input for these industries is mainly supplied from other areas.

In general, the equipment in the different food industries are reportedly 10 to 15 years old, or more, using outdated technology.

Continued industrial development and expansion is vital for Ho Chi Minh City. This is also a major policy of the Peoples Committee. Of present industrial capacity, consumer goods accounts for 80 per cent of manufacturing and the food processing sub-sector, 20 per cent. This supplies the city population, other areas in the country and so far, limited quantities for export. A future development focused also on increased export must be based on up-to-date processing technology in plants and industries equipped with acceptable process controls and monitoring systems, to ensure uniform, hygienic and generally high standard products. Assistance would have to be requested to obtain technical access regarding suitable equipment, suppliers and means of financing.

3. GENERAL GUIDELINES FOR 1990-2005

The Peoples Committee has adopted general guidelines for investments from 1990-2005 focused on satisfying the requirements of the population; (1) food, (2) housing, (3) textiles, (4) education, (5) health services and (6) transports.

The plans for the period 1990-1995 are under study and three programmes have been presented:

- 1st. Ensure increased food production through the manufacture and supply of agricultural machinery and equipment and market investigation to prepare for increased food supply from surrounding areas.

- 2nd. Increased supply of consumer goods. This is a major programme accounting for 70 per cent of the budget. The increased output should also allow for additional exports. Alternative branches are being studied, including food industries, textiles, electrical and mechanical industries. New regulations are being prepared and amendments of the investment law may be necessary. However, the study is far from completed and the major part still remains.

- 3rd. This programme is related to import-export focused on the scope of exporting industrial products and agricultural products, supplied as a counter trade from other provinces, in exchange for industrial products from Ho Chi Minh City. Export is considered essential for buying food in the future and it is stressed that the three programmes are closely linked.

4. CONCLUSIONS

The economy of Ho Chi Minh City is an integral part of the national one. Hence, the strategy for development of the human resources in the city has an impact on commodity trade from other areas. This is not likely to be successful without using modern technology in industry to make it competitive in an international perspective.

Existing production facilities should be evaluated also in the light of the quality of the food products which are turned out on the market. Only superior quality should be accepted for export and the detailed studies of separate food industries must focus also on this issue.

Many agro-based industries use water in the processes and the quantities of effluent are considerable. No sewage treatment system exists either for this effluent or for the city sewerage hence, all water courses are badly polluted. This must have detrimental effects on the sea fauna downstream in the Mekong river causing serious damage to the marine fishery resources, at least in the coastal areas.

APPENDIX 12

The Tien Giang Province

1. GENERAL

The Tien Giang Province is located about 75 km southwest of Ho Chi Minh City. It covers an area of 240,000 hectare and has a total population of 1.4 million. An estimated 75 per cent are living in rural areas and mainly engaged in agriculture, 15 per cent are artisans, industrial workers, etc. and 10 per cent are engaged in administration and service occupations. The population density is 583 per sqkm.

2. LAND USE

Tien Giang is typical for the Mekong delta although with a much higher population density.

The landscape is flat, penetrated by a number of water courses and occupies some very wet areas, suffering from highly acid soils. Major land use is as follows:

Use	Hectares
Rice production	105,000
Household gardens	30,000
Pineapple	2,500
Sugar cane	3,500
Agro-forestry	10,000

Coconut trees cover about 9,000 hectare, 7,000 hectare of which are referred to the coastal line.

A total of 5,000 hectares of water including rivers and small lakes are used for aquaculture.

3. FARM CULTURE

Farm system

Based on the experience from a collective system of farming, there has been a change to a system where the individual is expected to take full responsibility for the performance of the production unit and also reap the benefit if he is doing well.

In principle, a certain area of land - or farm - is allocated to the individual. This arrangement may be organized, as in the case of all rice producing areas, through farm co-operatives.

The farm co-operatives have 50 to 100 hectare of arable land where each peasant farms his share of the land. The income from the sales of the paddy goes to the farmer, not to the co-operative. Since the barter system penetrates all the way down to the producer, he must supply a certain quota to cover costs of inputs such as fertilizer, pesticides and sometimes equipment.

Above quota deliveries are paid for in cash by the provincial authorities responsible for procurement of paddy.

A pineapple farmer would typically have a contract with one of the provincial state pineapple estates for a minimum period of three years. He would then get a number of hectares which, in the case of the Dong Thap Muoi area where the soils are very arid, are reclaimed through canalization. He also gets a house and certain extension services from the Technical department of the pineapple estate which also provides fertilizer, etc. The farmers are organized in 10-member groups and one of them is appointed by the estate management as deputy supervisor for the group. He also receives training for this function.

Production quotas are determined for each farm unit. This varies depending on the productivity of the soil where the unit is located. Any quantity above the quota which covers all input costs, except labour, is paid according to the price on the market.

Paddy

The total area used for cultivation of paddy is 105,000 hectare. Depending on the growing conditions one, two or three crops per year may be grown.

Crops/year	Hectares	Hectares harvested/year
1	25,000	25,000
2	60,000	120,000
3	20,000	60,000

In total, 205,000 hectares of paddy are thus harvested per year, giving an average cropping intensity of 1.95. The normal annual crop yield is 825,000 tonnes, or on an average about 4 tonnes per harvested hectare. Major constraints for higher production are insufficient supply of fertilizer and pesticides. Present irrigation system is also inadequate.

The post harvest losses are considerable, especially for the summer/autumn crop harvested during the rainy season. The average losses are quoted at 20 per cent in total which adds up to about 200,000 tonnes per year, equivalent to the requirements of some 900,000 people.

Storage facilities on co-operatives and provincial level are reportedly adequate but there are no facilities for cleaning, and in particular, for drying of the paddy.

Pineapple

Total area for pineapple production in Tien Giang Province is 2,500 hectares of which the provincial state farms cover 2,100 hectares. Due to the geographical location - part of the Mekong Delta - 1,350 hectares of the state

farm has acid sulphate soil with extremely low pH reportedly 2.4 in the rainy season and up to 4.5 during the sunny season. In an effort to reduce the acidity of the soil, canals have to be made to drain the water out of the fields and elevate the area for planting. The canals reduce the arable land by 50 per cent on an average. Average yield of pineapple per hectare in the province is reportedly 12 tonnes on the state farm and up to 30 tonnes on private farms. No figures are available on total production of pineapple.

Pig production

The total number of pigs in the province is of the order of 200,000 heads but there is no information regarding the number of breeding stock.

Most pigs are kept on a household basis with some on a few provincial state pig farms. Exotic breeds such as Large White, Landrace, Duroc and Hampshire appear to be used here whereas the domestic type of pig is the common breed in the small scale piggeries.

Average live weight at slaughter is 80 kg indicating an average dressed weight of about 60 kg. Local consumption in the province is reportedly 12,000 tonnes per year or 200,000 pigs.

Supplies of slaughtering pigs to the Union of Livestock Enterprises in the province started in February 1988. So far about 9,000 pigs have been delivered. The Tien Giang Province also supplies pigs to Vissan slaughterhouse in Ho Chi Minh City but the numbers are not known.

4. AGRO-INDUSTRIES

Although agricultural dominates the economy of the province, the Tien Giang Provincial authorities operate a number of agro-based industries. This includes a feed mill, a pineapple processing plant, and a slaughterhouse/ freezing plant. In addition, there are two district feed mills and numerous small rice mills capable of milling the local demand, about 300,000 tonnes per year.

Feed milling

The provincial feed mill capacity is 24,000 tonnes per year and the two on districts level are capable of milling and mixing 5,000 t/year each. The installations are reportedly outdated with poor performance.

Rice bran, maize, manioc and fish meal are mixed into a compound pig feed. Ground sea shells are included as the sole mineral supplement. There are no laboratory facilities available for analysis of ingredients or finished products.

The current market price is Dong 400/kg or half that price when subsidized.

Pineapple processing

The pineapple processing industry is specialized in one frozen product, cut up pineapple without syrup.

The plant was established in 1978 and has an output capacity of 5,000 t/year. Pineapple are supplied from within the province but also from other provinces. Hence, the plant can operate the year around, during 6 month running at full capacity, 3 shifts a day and during 6 months with an average capacity utilization of about 50 per cent, which is then related to the capacity of the contact freezing cabinets.

Under these conditions, the plant is capable of producing 5,000 tonnes of finished product out of 25,000 tonnes of input.

Preparation of the fruit is entirely a manual operation involving 900 workers. After cutting the crown and stalk from the fruit, the subsequent operation are as follows: peeling, cutting, submerging in 2 ppm chlorine solution, draining/screening, packing, sealing, freezing.

The only mechanical equipment used is a tilted oscillating draining/screening table and the electrical unit used for sealing the bags.

Some of the premises are ventilated through a direct system above the working area. The plant shows signs of its age and would need some upgrading of physical structure and, e.g., adjustment of some of the freezing cabinet doors.

Previously the lack of spare parts for the refrigeration compressors created problems. This has now been overcome by keeping a reasonable stock of spares.

Power cuts occur from time to time and amounts to about 50 hours per month. This is reportedly a common feature in provincial areas like Tien Giang and is due to weakness in the power transmission network.

A standby generator is used during periods of power failure.

Present input cost was quoted at Dong 150,000/ :n of pineapple, delivered at the factory and the product price Dong 1.7 million/ton.

APPENDIX 1:3

The Ho Chi Minh Food Company

The Ho Chi Minh Food Company is a provincial state enterprise engaged in a wide range of activities. It was established in 1980 and assumed the responsibility to collect, process and supply rice to the city population.

The organization of the enterprise follows the city administrative system, that is, each of the 18 districts has a Food Company Branch. To facilitate the distribution of food, there are 800 shops in 140 markets throughout the districts. In addition, 7,500 selling points are appointed where the small entrepreneur gets a percentage revenue of the sales.

The Food Company is authorized by the city authorities to operate as a commercial enterprise with no subsidies on any product.

The General Manager, Mrs. Nguyen Thi Thi, has, from the onset, applied a system of incentives and responsibility in the expansion and development of all activities.

1,700 people are on the payroll, 125 of whom employed at the head office. The total number of workers, however, in the Food Company "system" is 45,000.

Five rice mills, one plant for instant noodles, one animal feed plant and one pilot scale oil refinery are at present run by the Food Company. In addition, there are 1,700 partnership companies, private enterprises in the food processing sub-sector. Their products are paid for according to agreed prices plus part of the sales margin, usually 10 to 12 per cent.

Some 46,000 tonnes of rice is used per month out of this 12,000 tonnes are used in manufacturing together with 20,000 tonnes of wheat flour which is processed into a variety of products, mostly by a number of the 1,700 partnership enterprises. The enterprises are responsible for the quality of their products although product quality control is made on more than 100 different products such as dried fish products, rice paper, ravioli, beef extract, direct mushroom, arrow root sharch etc.

Out of the total demand of paddy 51 per cent is processed in the Food Company rice mills. The second grade rice from these mills have some 30 broken kessels as compared with the processed rice supplied from the premisses where as much as 40-45 per cent may be broken. Besides, losses in the milling process are above what is acceptable but was not qantified.

The better quality of the rice processed by the Food Company is their routine procedure of drying the rice upon arrival from the provinces and prior to storage. Hence, the rice is processed at a lower moisture content.

Losses during transport are low. There is a margin given by the government of 2 per cent for paddy and 1 per cent for rice. the Food Company has less than 1 per cent for paddy which is achieved by an incentive system. For instance, for a truck load of 10 tonnes the acceptable losses are

determined at 70 kg. Should there be no losses the transporter gets market price tor 70 kg as a bonus, but if the losses exceed 70 kg he has to pay every kg at the current market price.

The feed manufacturing is seen as a natural part of the business activities with its close linkage to the flour and rice milling. The feed mill equipment perform poorly and marketing problems adds to the burden. There is no corelation between price of food and market price of slaughter pigs and the sales of feed have dropped.

However, a new feed plant is being considered. The capacity is intended to be 80,000 tonnes of feed per year and a further development is in its planning stage. This includes in a longer perspective establishment of smaller satellite installations using premixes or concentrates from the new feed plant and local supplies the bulk of the formula feed.

To integrate the activities further the Food Company is seriously thinking of starting a pig breeding scheme; ultimately for supply of weaner pigs to farmers/co-operatives who would then be regular purchasers of feeds.

Up till now, investment in food industry has relied on government funds. The ambition of the city authorities is to develop the food industry at a faster rate. This is difficult to achieve in the present situation of low investment capacity.

But the horizon for the Feed Company is much wider. The difficulties to obtain foreign excnange is a serious constraint to the company development. After the reorientation implying authorization for the Food Company to import and export directly as from June 1988, an improvement has already been registered. Foreign exchange will be in the future for import of e.g. inputs also to partnership companies.

The development embarked upon in practice transforms the company into a trading house. A small oil refinery enterprise is established with French co-operation. The capacity is 40,000 t/year, petrol, disel, fuel and kerosin. Urged by the increasing need for fertilizer the Food Company has expressed an interest in establishing a petrochemical industry when the capacity of the oil refinery is increased to 200,000 t/year. Offers have already been obtained. The product range would thus include also lubricants and urea. All these products can be used in their form commodity trade.

For the time being a contract has been signed with a Spanish company for the supply of 300,000 tonnes of urea, about 60 per cent of current demand in the Mekong Delta. In the past fertilizer has been provided entirely by the Central Government but the Food Company requested, and was authorized, to enter the fertilizer trade.

One of the last initatives is the discussions with Spain regarding a possible future airline.

The expanded business activities are channelled through European trading companies. So far permanent representation is established with a number of countries including Spain, France, Singapore, Japan and regular contracts with Taiwan Province of China, Republic of Korea, Federal Republic of Germany and Canada.

A Swiss company has offered a line of credits for export of products.

The Food Company's accelerated international contracts are expected to show results fairly soon. Still, the system of barter trade for domestic business appears to be difficult and certainly out of place.

APPENDIX 1:4

The Linh Xuan Canning Factory

The Linh Xuan Canning Factory is located 25 km north of Ho Chi Minh City. In 1988 2000 tons of canned products were processed by its 500 workers. Permission has been obtained to import/export through the Pineaple Export Company (Pinexco) under the jurisdiction of Ho Chi Minh City People's Committee.

The factory uses on an avarage 4 tons of fruit to produce 1 tonne of finished product. Pineapple accounts for the greater part but other fruits such as bananas, rambutan, papaya, and also mushrooms are including in the product range.

The new status as an exporting company widens the market and required product volumes. Hence, an incentive payment scheme, was introduced in September 1988 with the effect that the productivity was doubled. As aconsequence the company now has difficulties in obtaining sufficient inputs such as fruit, sugar and tins. In an effort to solve the problems, the management is considering to import fertilizer and pesticides to use as barter for fruits, both from their present sources, but also to increase the deliveries from producers further away from the factory mainly from the Mekong Delta area in South West, where fruits of a better quality is grown. The quality and size of the fruit from this area is superior and only 3 tonnes of pineapple is required to produce 1 tonne of finished product. The production system is very labour intensive with only the manufacturing of tin cans and the closing of the cans being done by machines.

The future plans include canning of roasted peanuts and investment in a mechanized juice line with UHT packing system for juice concentrates. The capacity is intended to be sufficient for processing 2,500 t/year of mangos, papaya, banana and pineapple juice concentrate.

APPENDIX 1:5

The Van Diem Sugar Factory

The Van Diem Sugar Factory is located in Phu Xuyen in Ha Son Binh Province, about 30 km south of Hanoi, not far from the No.1 road going to the Southern parts of the country. Construction started in 1959 with technical assistance from Poland. It was completed two years later and started production in November 1961.

The designed capacity is 1000 tonnes of sugar cane per 22 hours and an expected production of 150,000 tonnes of semi-refined sugar per year.

Mechanical equipment for extraction of the sugar juice from the cane is of Chinese manufacture, whereas machinery and equipment for the remaining process are supplied from Poland.

A boiler plant with two units, fueled by dust coal, are capable of prodcuing 16 tonnes of steam per hour at a pressure of 26 kg/m2. The stream is used mainly in the evaporation/crystalization process but to a large extent also for turbine generation of electricity. The network is connected to the national grid.

Three pumping stations serves the factory

(i) supply of water from the river, 350 m3/h
(ii) filtering, recirculation 1000 m3/h
(iii) waste water disposal, 350 m3/h.

A limestone plant using lump coal (cap. 50t/day) supplies sufficient quantities of carbon hydroxide for the factory. Auxillary facilities include rail bound cars for transport of sugar cane from the supply to the feeding conveyor, loading facilities, work shop and storage shed with conveyor for powder coal.

The sugar cane is supplied by 38 cooperatives in the provinces of Ha Nam Ninh, Ha Son Binh and Hai Hung. The total hectarages under sugar cane is 2,800 hectares and the distance of transport varies from about 2 km to 80 km. 75 per cent of the transports are done by a fleet of 45 trucks which, on average, are able to load about 4 tonnes of sugar cane and haul 400-500 t/day. Some quantities are transported on the river and a maximum of 150 t/day on ox drawn carts. The harvesting period of sugar cane, hence also the period of time the sugar factory is operating, starts in November and terminates in March.

During the rest of the year 500-600 workers of the total work force of 1000 people, are kept in the factory for maintenance work and cleaning. The rest are engaged in sideline activities such as processing of different alcoholic products.

The sugar content in the cane is generally low, 11-13 per cent, and the availability of raw material limited to about 100,000 tonnes per year. This is the result of lack of interest on the part of the grower to produce additional

quantities of sugar cane to suffice also for deliveries another month at the end of the season. They are more interested in other crops which are more rewarding.

In 1987 94,000 tonnes of sugar cane were processed giving 5,700 tonnes of semi-refined sugar, 4,900 tonnes of molasses and an estimated 25,000 tonnes of bagass. About one third of this is absorbed by a paper factory, about half kilometer from the sugar factory, but the two thirds have to be disposed of since the boiler is not designed to handle bagass. The capacity of the paper factory is the limiting factor for extended use of bagass for paper manufacturing.

In 1987 381 million Dong were paid in tax leaving 64 million Dong profit after tax. Half of this was taken by the state and the rest, 32 million Dong, used by the factory to replenish the three funds, the product development fund, the bonus fund and the social wellfare fund.

A plan budget is prepared every year based on the plan target set by the Government. These cost estimates are made for the production year including items such as input costs, energy, labour, maintenace and depreciation. The plan budget is adjusted every third month in an effot to keep the figures up to date. Over the years this has proved to be impossible. These figures are on the paper but they far from coincide with the actual results, or costs at the end of the year. From this point of view the plan is never followed. However, it is essential that the production is in conformity with the norms of performance, in this case a cane-sugar ratio of 15:1. This has repeatedly always been the case. As from 1987 the new regulations stipulate that the amounts for depreciation are returned to the factory to be used for e.g. renovation of installations. In 1987 the depreciation was 19,4 million Dongs which were used to pay outstanding debts for repairs made earlier. In addition, the Government has allocated 250 million Dongs which will be used for repairs. Funds may be made available by the government for e.g. rehabilitation of machinery in which case credits must be obtained from foreign countries.

The above description about procedures for costing and economic management reflects the general situation for enterprises, although the seriousness at which they are performed, is likely to differ widely.

Cost of sugar cane is determined by the government, at present 200 kg of paddy for 1 tonne of sugar cane. Out of this 50 per cent must be paid in paddy in this area, and the remaining 50 per cent in cash or supplies of fertilizer, equivalent to the value of 100 kg of paddy rice.

The difficult position is that whereas the cost of paddy is affected by the inflation, at latter simmingly of the order of some per cents per day, the price of sugar has been kept stable with no increase. In essence, there is no mechanism to correlate price escallation of different commodities and inputs.

The strange situation also exist that in other areas 60 kg of paddy rice is the fixed quantity, while the value of 140 kg of paddy is paid with fertilizer or in cash.

A major constraint is the supply of sugar cane, as a result of to short harvesting period on the one hand, and the widely spread procurement area on the other. This adds to the cost of raw material through the transports which

are the responsibility of the factory. The factory management has suggested that the sugar cane production is concentrated to the vicinity of the Van Diem Sugar Factory.

The equipment are old and outdated, the workshop small and the engineering capacity weak. This has been the case for the past 12 years when no technical assistance has been provided.

The fact that only one third of the bagasse is used for paper manufacturing, leaving about 16,000 tonnes to be disposed of, creates problems. In the 1960s there was an animal feed plant absorbing the bagass. However, in June 1972 the factory was bombed. Severe damage was done, including on the feed plant, which has not been reconstructed since.

The equipment in the factory is of pre World War II design and especially the sugar juice processing section, including corporation and crystalization, is in a bad state of repair. This applies also to the boiler/turbine department piping and major parts of the civil works. The factory and its immediate surroundings are disorganized, exhibiting an extremely dirty apparence. The heaps of scrap iron scattered over the site, and which presumably never will be used in the factory, constitute a major source of raw material for a small foundry.

The inferior and damaged insultation of pipings and processing equipment etc., and the absence of any form of heat exchangers in the system, makes the factory very uneconomical with high energy consumption per ton of sugar.

APPENDIX 1:6

The Hanoi Fruit and Compot Canning Factory

The Hanoi Fruit and Compot Canning Factory operating under the jurisdiction of Vietnam National Vegetable and Fruit Cooperation, VEGETEXCO, was built in the early 1960s and started production in 1962. The factory has an annual capacity of 3,200 tonnes of finished products and is equipped with machinery from Hungary, GDR and the Soviet Union. In 1987 actual production was around 3,000 tonnes of canned fruit, juices, vegetables, peanuts and meat. Orange, pineapple, green beans, cucumbers, lychee and pork meat are processed in three main production lines. The pork is canned basically for the domestic market during seasons of low supply of fresh fruits. Export accounts for 2/3 of total production. There are 1,000 employees engaged in handling, preparation and canning of the products and manufacturing of the cans.

There are no problems with the fresh fruit and vegetable supply at present. Instead, the increased supply was creating problems with the 500 tonnes refrigirated stores which was considered too small for intermediate storage to even out variations in the supply.

The production unit for cans suffers from outdated machinery which are not syncronized into proper production lines, basically because there is no industrial means of handling the material, the semi-finished cans and the ultimate stock of cans. Dammages occur to the cans which may be a major cause fo leaking cans which reportedly is a problem.

The canning process is entirely a mannual operation which appeared to have comparatively low efficiency. The pineapple supply to the factory, at the time of the visit to the plant, was of uneven quality and a large proportion were very small. This has a detrimental influence on the output per unit of time on the line for preparation of the pineapple for the subsequent canning operation.

The holding capacity of the refrigerated store room for raw material could easily be increased two or three times if a modified system is adopted. If a solution with sectioned slatted floor is used an air duct must cannel the air flow under the slatted floor. Bulk manual handling can be retained and the capacity will be about twice the present.

The other alternative is to adopt a container handling system where the fruit is placed in wooden crates made with about 4 cm opening between the boards in the botton and on all sides. For cucumber the opening would have to be narrower to prevent the cucumber from falling out. The crates should be standarnized about 1 m^3. With a hand operated palletizer the containers are on the floor but if a fork-lift truck is used two or three layers would be a maximum. The products will then be ventilated properly. Care must be taken so as to avoid excessive weight losses, especially of the cucumber. Proper planning is essential.

The equipment for manufacturing tin cans uses a technology from the 1930s. The cans are not of the standard needed for marketing to western countries. In general the hygiene conditions at the factory is well below what is expected for a canning factory selling for export.

The safety measures for the workers could be greatly improved. In general it is felt that the working spirit on all levels could be up-graded.

The accounting and costing is done in accordance with the Government rules and regulations. In the last three years there has been no losses or profits for the company. The costing are adjusted every three months taking the new prices level into consideration. The buildings are depreciated by 5 per cent per year, and the equipment in general by 10 percent per year. In accordance with the new policy, the management will be allowed to keep more of the profit for new investments.

It remains to be seen if this incentive is sufficient to improve the overall performance of the enterprise to generate a profile.

APPENDIX 1:7

The Huong Cana Animal Feed Plant

The Huong Cana Animal Feed Plant is located about 30 km north-west of Hanoi in th South-east corner of the Vinh Phu Province.

The plant was built with assistance from Yugoslavia and completed by the end of 1980. Test run as part of the commissioning was done by Government representatives and engineers from the Yugoslavian supplier. Production started early 1981.

The designed capacity is 20,000 t/year on two shifts. The complete plant include warehouses; an 8 t/hour grain drier; 6 steel silo units with a total storage capacity of 3,000 tonnes; a feed processing line, comprising cleaners, hammer mills, proportioning bins with outlets to a central scale with pre-setting arrangements for automate weight proportioning of the batches (Buhler-Miag), batch mixer, bins for finished feeds and over delleting (Buhler) with installations for fat and/or molasses injections before the pressing operation. There is also a premix line with mannual weighing of the ingredients. The processing lines are complete with the necessary buffer bins, shutes, spouts, elevators and conveyors.

The grain dried and the storage silos with conveying and distribution systems are not protected by many building structures.

The plant is equiped with central control panels, one for each drier, silo and feed processing line. Some positions are remote controlled others mannually operated. However, there is a position indicated system. The bins are provided with level indicators and limit switches, and the storage silos with level indicators/limit switches and a temperature control installation. An emergency power cut-off system is connected to each floor in the feed mill.

There is a small workshop but no laboratory and no fire extinginsher or hydrants in the feed plant.

The plant suffers from heavy infestation by insects, weevils in particular, and rodents. A contributing factor to this condition is the very large quantities of grain, ingredients, feeds or rubbish in practically every place of the plant. Moreover the electrical system including light fixtures need to be mended since very few floors have any light at present. This semi-darkness is not conducive to plant cleanliness and hygiene.

More considerations should have been taken to plant hygiene requirements during design and finishing of the civil works, in particular the concrete works.

The drier has not been used during the last three years and need to be rehabilitated.

The pre-setting arrangement on the proportioning scale has not been working for quite some time.

Level indicating systems, temperature controle system and fire emergency power cut-off system are all out of order. The entire electrical system needs to be overhauled including replacement of covers to connecting boxes repair of light fixtures etc.

The premix line has apparently never been used properly and did not seem to be operable.

There is a total of 100 employees including 1 mechanical engineer, 1 electrical engineer, 1 feed formulation technician, 9 other college graduates, 18 skilled workers and 70 unskilled.

The maximum production achieved in one year is 8,000 tonnes but the normal annual output is about 6,000 tonnes or 30 per cent of designed capacity.

Since there is no laboratory at the plant samples are taken and sent to Hanoi for analysis. Thus, ingredients are sampled about once a week and finished products once a month. The results from the analyses may be available after about one week. However, each bag of feed is provided with a bag starting type of feed and nutrient content which is quaranteed by the manufacturer.

The main reasons for poor capacity uilization is irregular and insufficient supply of ingredients, mechanical break-downs and power failures. More recently market constraints have turned out to be the major reason for low production. The usual customers have no funds to buy feed and there seem to be no shor-term credits available. The result at present is large supplies of ingredients, fish meal, oil cakes and rice bran, in particular, which are kept in the warehouses. Here the stacks of bags have collapsed, bags have busted, some are damaged by moisture, others from urination by rats. Large quantities are deteriorating. Feed conversion rate is unacceptable low, raportedly of the order of 5:1 for pigs. This may be due to inferior management and environment for the annimals, but unqualified feed is a more likely reason where poor feed hygiene may be a contributing factor.

A feed plant of this type should fit in well in a future system of feed processing units where a "nucleous" plant provides the qualified part of a compound feed, the pre-mix, to simpler satellite plants. The present performance is not acceptable and efforts should be made to put things right.

The management of the plant has suggested to the government that some equipemnt be replced by men ones, for instance motors to the hammer mills. Recently a request has been made for Yugoslavia to provide assistance to overcome the problems. In addition to technical assistance which may be provided on a periodic basis after an initial 8 to 10 months, it is essential that the technical capacity at the plant is strengthened. This is necessary in order to ensure that the appropriate maintenance and repair routines are adopted and implemented.

General plant management routines should be reviewed and changed to meet the requirements for keeping all premesis clean and tidy in a broad approach to get rid of the pests, improve plant hygiene and also feed quality.

A laboratory should be arranged on the site, preferably in an existing building, with the necessary equipment for analysis of the main feed

properties, protein, crud fat, crud fat and ash content. The energy value will have to be calculted and the required literature should be included.

Quality of ingredients will remain a problem. These can only be solved by directives from the government related to supplies and costs. It is suggested that a pricing system of agricultural commodities is adopted where the price is related to quality, gradually introducing minimum requirements for acceptance.

APPENDIX 1:8

The Tan Binh Vegetable Oil Factory

The Tan Binh Vegetable Oil Factory in Ho Chi Minh City is a provincial state enterprise built in 1973 with equipment supplied mainly from GDR.

The factory has a screw expeller extraction plant, a solvent extraction unit, a refinerg and equipment for soap making and manufacturing of bread shortening and margarine.

The designed capacity is 80 tonnes/24 hours, or on an annual basis 24,000 tonnes, of raw material, sesame seed, ground nuts, castor beans or coconuts.

Tan Binh Vegetable Oil Factory also receives crud vegetable oil from other plants on a provincial level, 3,000 - 5,000 tonnes/year.

The solvent extraction plant has been inoperable since 1981. The refinery is designed for a capacity of 50 tonnes/day, or on an annual basis, 15,000 tonnes, assuming 300 working days. This quantity is used for cooking oil, shortenings and margarine manufacturing.

The consumers in Viet Nam prefer animal fat in their diet, hence 80 per cent of the crude oil is exported.

The soap manufacturing line and the section for processing of shortening and margurin are sparsely equiped and the latter apparently not used recently.

The condition of the facilities were such that an inspection more in detail was not useful.

Inadquiet supply of oil seeds is considered one of the major problems. This is blamed on the pricing structure of oil seed, shortage of transports and high cost of transport using hired vehicles. To facilitate additional export the state farms are reportedly instructed to increase their production of oil crops, in particular coconut. In fact, planting of coconut palms has been done for the past three years.

The oil bearing seeds are paid in cash. However, the growers frequently also request payment in advance in order to obtain inputs like fertilizer to the future crop. This can normally not be arranged. If short term credit facilities were available to the oil seed producers, the supply fo oil bearing seed to the factory is likely to improve.

Technical problems associated with mechanical break-downs and poor extraction of oil are common. These are further aggravated since spare parts are not available from the suppliers; manufacturing of this type of equipment stopped about 20 years ago. Most parts could be made locally, according to the management, if the raw material, the iron or alloy for bearings etc., had been available.

The crude oil is exported through VEGOILIMEX, mainly to socialist countries, and reportedly with no profit to the factory.

The technical design of the installations indicate that it is at least 30-40 years old. This opinion is to an extent verified by the information regarding the spare parts situation. It also indicates that the technical solution used was outdated before the plant was installed in 1983.

The overall impression of the plant is such that rehabilitation, including upgrading of e.g. the department for shortings and margarines, most likely would imply replacement of the main part of the equipemnt and installations.

APPENDIX 1:9

The Vissan Slaughterhouse, Ho Chi Minh City

The Vissan Slaughterhouse is located in Ho Chi Minh City and was completed in 1974.

The total capacity of the three pig slaughtering lines is 2,400 head per 6 hours shift or about 700,000 pigs per year per shift. Two shift operation is considered feasible from a practical point of view. Maximum capacity for the cattle line is quoted at 300 head in a 6 hours shift. The present capacity utilization is estimated at about 90 per cent for pig slaughter and 17 per cent for cattle.

The slaughtering lines are straight forward. The animals are stunned, debleeded, hoisted to a rail and conveyed mannually past the stations where the different tasks are completed to produce a clean carcass.

Apart from a scalding vat with associated dehairing unit for the pigs, there are no other mechanical facilities, Pig carcasses are not singid, but carefully scraped by hand. There are approriate arrangements for veterinary inspection on the lines.

After weighing of the carcasses these are conveyed to the chilling department. The slaughtering premesis are spatial with a modern appearance. The installations are mostly galvanized. The age of the plant is starting to show up from corrosion, wear and erosion of floor surfac , damage by the moist environment in patches on the walls and ceiling, cable ladders etc.

Approximately 50 per cent of the daily slaughter is butchered in the meat cutting department, including special cuts according to specifications for export to the Soviet Union. The meat is marketed through the wholsale/retail shops in the major districts of the city. They are all provided with refrigeration facilities.

Seventy five carcasses, on avearage about 5-6 tonnes are frozen per day to maintain a constant revolving stock of 900 tonnes of frozen meat.

The blood is collected, boiled and sold for direct consumption. There is a small batch rendering unit for condemned carcasses but no treatment plant for serwerage. This is disposed of directly into the recipient.

A total of 7,000 pigs can be accommodated in the lairage designed for the pigs and an additional 3,000 if the premises for cattle are also used. Each pen is provided with troughs or watering and feeding.

The hygien programme at the slaughterhouse includes medical check-ups of all personnel twice a year including dental services.

The slaughtering area is cleaned using high pressure units after each shift and clorine is used fo the last rinsing At the time of the visit a number of gutters and pip ections were not properly clean and drains were blocked. Shortage of clean encies makes it practically impossible to maintain the slaughterhouse in erfectly clean condition.

The slaughterhouse is subject to periodic inspections by City Council veterinarians, and a committee representing health authorities, workers organization, fire-fighting authorities and the employees.

In addition, representatives of importing countries such as USSR, Hong Kong and Singapore also visit the plant for approval of the products for export.

Supply of animals

Pigs account for at least 80 per cent of total slaughtered quantities. In 1987 a total of 50,000 tonnes of live weight pigs were slaughtered or approximately 625,000 head, calculated on the basis of a registered average of 80 kg. Out of this total 100,000 slaughtering pigs were supplied from the outer districts of Ho Chi Minh City. In the past the majority of the pigs were of the local breed, the Bong Ba Xuyen breed. However, exotic breeds and crosses have increased from about 30 per cent of the total number a few years back to an estimated 40 per cent at present. Breeding programmes run by the Ministry of Agriculture and Food Industries can reportedly not satisfy the demand of improved breeding animals and some pig breeding programmes are being developed on a provincial level.

Slaughtering pigs are collected at buying points and subject to veterinary inspection prior to acceptance. This precaution results in few animals being rejected at the second inspection, upon arrival at the slaughterhouses and before killing. An estimated 0.5 per cent was quoted as an average figure for rejected number of animals. Out of the total of number of pigs received, 20 per cent are supplied from large scale production units, and 80 per cent from housesholds. The household pigs frequently suffer from deseases and parasites.

Slaughtering pigs normally weigh 60-100 kg live weight with 80 kg as an average. Local breed pigs are smaller with generally fatuer carcasses.

Cattle for slaughtering are supplied from the central parts of Viet Nam and also from the Mekong River Delta. Only about 15,000 head are slaughtered per year or 1,500 tonnes. By comparision the average carcass weight is very low. The small animals from the central parts weight normally about 60 kg, cold dressed weight, while the Mekong Delta animals are more than twice that size, reportedly some 150 kg carcass weight.

The supply of slaughtering pigs is irregular with significant increase in number of pigs during January-February and also in March-April when the farmers are forced to sell their pigs to get money for planting a new crop. During this period it may be expected that a large number of pigs are not yet ready for slaughtering.

There appears to be a trend of reduced interest in rearing pigs for slaughtering. This is the result from poor feed, very unfavourable feed conversion rates, reportedly 5-7:1, and no correlation between cost of feed and price of slaughtering pigs.

The present cost of feed is Dong 400/kg, hence the feed cost per kg live weight is Dong 2,000-2,800. In addition, the feed to the bredding stock will have to be paid for through the slaughtering pigs. This amount may under prevailing conditions be estimated at some Dong 500/kg. The feed cost alone is Dong 2,500-3,300 per kg live weight while the current producers price is Dong 2,200/kg live weight.

In order to prevent possible future shortcoming in supply of slaughtering pigs there has been suggestions of initiating a Vissan pig breeding programme which would be based on modern concepts of pig production. This would imply the involvement of three breeds in the breeding scheme, contract supply of weaner pigs to pig producing farms, pigs which would subsequently be delivered to Vissan, based on contractual agreements. Stable and qualified supply of feed would have to be provided at a reasonable cost.

A package could be developed including veterinary services at predetermined costs, extension and credit facilities for the necessary investments in small efficient pigs units.

Demand for meat in the Ho Chi Minh City area is expected to increase during the 1990s and the Vissan Slaughterhouse may soon have to start operating on two shifts, at least periodically.

The strain on the slaughterhouse and associated facilities will increase. The physical state of the slaughterhouse is not alarming as yet, but actions should be taken very soon to repair and remedy what has been worn and degraded over the years.

APPENDIX 1:10

The Swine Rearing Corporation, Ho Chi Minh City

Slaughtering pigs to the Ho Chi Minh market are supplied to some extent from pig farming in the outer districts of the city.

The Swine Rearing Corporation under the Peoples Committee of the city is engaged in integrated pig production and feed processing.

1. Pig production

The Corporation operates 8 state (provincial) farms where commercial breeding stock is bred from crossing Yorkshire and Landrace and subsequently introducing a third breed, Duroc, to obtain commercial feeder pigs which are supplied to farmers for fattening on a contractual basis.

The average number of pigs born per sow per year is 15.6 out of which 13 are weaned at an average age of about 90 days when they weigh 20-25 kg. Feed conversation ratio is on an average of 5:1 for the fattening stock.

Average live weight at slaughter is 90 kg which most pigs reach when they are about 235 days old.

The future development, as envisaged by the management, is to concentrate the resources of the state farms to maintain a larger number of the three pure breeds, Yorkshire, Landrace and Duroc. A larger number of F_1 sows, first generation, would then be distributed to cooperatives and farms specialized in the production of F_2, second generation, commercial feeder pigs. One alternative would be that the farmers sell all offsprings to pig fattening on the farms or that they have less number of sows and keep all progeny for fattening farm, integrated pig farming. Whatever system, the number of slaughtering pigs produced, under such a Swine Rearing Corporation coordinated pig production scheme, would be quite considerable.

Sale of slaughtering pigs to existing slaughterhouses is not considered profitable. It is thus the intention that the Swine Rearing Corporation invests in a slaughterhouse of its own.

Table 1:10 gives the total number of breeding sows on the different farms, type of stock produced and sales, which is either for slaughter or as feeder pigs. For the purpose of this calculation, it is assumed that the replacement rate is about 40 per cent and that there is no mortality after weaning.

The feed requirement for the fattening pigs amounts to 14,110 tonnes at present feed conversion rate. However, with a well balanced ration, the feed conversion rate should be about 3.5:1 or 4,233 tonnes less, sufficient to feed another 13,400 feeder pigs for slaughter.

Table 1:10 Estimated production per year

No. of Farms	Breeding Sows	Boars	TYPE	Estimated production per year		
				Weaners	Breeding	Sale
1	300	100	PURE	3,900	400	3,500
2	600	25	F_1	7,800	1,000	6,800
5	2,400		F_2	31,200	-	31,200
	3,300					41,500

Source: The Swine Rearing Corporation.

The breeding programme which is used complies with what is common practice in successful operations elsewhere in the world. However, the number of weaned pigs per year is low by comparison. This is likely to be the result from using feed of inferior quality. In fact, the quality of the feed is not really known but it is confirmed by the management that feed supply is a major constraint.

Assuming that the number of pigs per sow is increased by 3 per year, there would be an additional 10,000 pigs per year for slaughtering. This is quite realistic if quality feed is supplied, given that the overall management is up to standard.

Feed processing

The Swine Rearing Corporation operates three feed mills with a total capacity of 100,000 tonnes per year, based on three shifts per day. At present, only 50,000 tonnes per year are processed as a result of insufficient supply of feed ingredients.

The equipment in the plants are of simple design, in a poor state of repair and the performance is not sufficient for the production of quality formula feeds of even composition.

There are no laboratory facilities which can be used to analyze ingredients as a basis for formulation of the feed and to control the final products also for the purpose of monitoring the process.

Rice bran and dried trash fish are used as the major ingredients in the feed. Ground sea shells are added to provide calcium. Apart from this, the mineral supplementation is erratic or non-existent.

There were comparatively large stocks of dried fish in bags. The appearance of the product and the odor could not be associated with acceptable quality of raw material for feed processing.

The feed supplied from the Corporation's feed mills is obviously one major reason for the low standard of performance at the pig enterprise farms and at co-operative and peasant farm levels during the fattening period.

Rehabilitation of the feed processing industry should be given priority. The upgrading of existing facilities is not a realistic approach and the rehabilitation of the industry should include investments in new installations of medium current technology as far as automation is concerned.

The rehabilitation efforts should also focus very strongly on the supply of ingredients with respect both to availability and quality.

APPENDIX III

The Southern Pesticide Company, Ho Chi Minh City

The Southern Pesticide Company is the largest of the eight formulation/mixing plants in Viet Nam. Its designed capacity is 30,000 t/year, which constitutes 75 per cent of the total national capacity which is 40,000 t/year. The Company is responsible for technical assistance to the other mixing companies. In 1988, the actual production was estimated at 8,000 tonnes or 27 per cent of designed capacity. The production is divided between three factories, all located in Ho Chi Minh City area.

Factory	Products	Actual production/year
1	Granular	6,000 tonnes
2	Solution & emulsifiable concentrates	1,500 tonnes
3	Dust and wettable powder	500 tonnes

At factory one, the Binh Trieu Plant, the total number of employees is 200 workers and 20 professionals. The granules are produced using the sticking or coating methods.

Simple technology and equipment are used. The quality control is far from satisfactory. There seems to be no rules and regulations for the safety of the workers for the handling and disposal of waste.

The Southern Pesticide Company employs 1,000 people, 40 of which has an engineering degree. Some of them are working at the Research and Production Centre which has a total staff of 30 people. The centre gives technical management assistance to the plants concuring production technology, quality control and safety problem. The centre is also engaged in research on local raw material with the view of finding substitute for imported ingredients. At the moment, the centre is producing small quantities of a dual purpose agent for treatment of paddy seed or, spraying of the plants about ten days after planting.

In general, the equipment at the centre are outdated and basic documentation manuals and handbooks for the production formulation dates back to the 1950s to early 1970s. The centre receives no technical information or research document or scientific information from anywhere. They operate in complete isolation from the outside world.

The centre has three research farms for testing of pesticides for coffee, rice and pepper, respectively.

Overall control of the company is done by the Ho Chi Minh City branch of General Department for Standardization, Metrology and Quality Control under the State Committee for Science and Technology.

The future plans include the increase of actual production to 30,000 t/year by 1995, increase and develop the Research Centre to cope with problems already mentioned above, and to increase the research aiming at producing active ingredients for the mixing of pesticides using local raw materials.

APPENDIX III.2

Union of Co-operatives of Small Industries and Handicraft, Ho Chi Minh City

The small industry and handicraft sector in Ho Chi Minh City, organized by the Union of Cooperatives of Small Industries and Handicrafts, represent 17 different professions. There are 700 co-operatives and 3,100 production groups. In addition, individuals are also members directly when engaged in family handicraft or cottage industry. The largest branches represented among the 17 different professions are Union of Co-operatives of:

i) bamboo, rattan and palm leaf small industries
ii) lacquer ware and art articles
iii) carpets, embroidery, garments and leather products
iv) reed and coconut fibre products.

They all use materials mainly from agriculture, forestry and fishery and a large portion of the final products are exported. For the bamboo, rattan and palm leaf small industries, for instance, this is arranged by the Viet Nam National Bamboo and Rattan Export-Import Corporation (BAROTEX) which is a State Organization specializing in these types of products.

The small industry and handicrafts engage about 200,000 people in production with more than 50,000 in the bamboo, rattan and palm leaf branch.

In 1987, the total value from all branches was 17 billion Dong and the export amounted to about US$ 35 million. Out of this, US$ 8 million came from the bamboo, rattan, palm leaf branch, US$ 3 million from each of lacquer ware, art articles and carpets, embroidery, garments, leather products branches and finally, US$ 1 million from the reed and coconut fibre products.

For 1988, the total export of bamboo, rattan and palm leaf products is expected to increase to the order of US$ 8 million with about 50 per cent from bamboo products.

The Union of co-operatives of Small Industries and Handicrafts coordinates and assists in marketing. It also collects and administers three funds viz, (i) fund for development of products, (ii) welfare fund, and (iii) bonus fund.

Artistic designs, which are in demand on the market, may be bought by the Union for duplication in other small industries. In such a case, the designer receives also a bonus of 0.25-0.3 per cent of the value of the product, or item, sold during one year.

In general, the profession and skill is transferred from generation to generation within a family. Apprentices are also engaged in the co-operatives or production units for on-the-job training and the Union arranges courses from time to time.

Future production of handicraft items will focus on mass production to avoid increase in prices. New designs and techniques will be introduced. At the moment, the small scale industry is using true handicraft methods and simple machines.

The introduction of better equipment and systems will have a positive effect on output hence, improve the income to the co-operative and ultimately to the individual. These changes should be made without affecting the workmanship adversely but rather contribute to better working conditions in addition to productivity. Nevertheless, efforts should be exercised to further promote fine art and workmanship, as demonstrated in, e.g., lacquer works, to ensure future unique, very high standard products which are likely to be attractive in a longer perspective.

APPENDIX 1:13

Agricultural machinery and equipment manufacturing

Agricultural machinery, equipment and tools are manufactured by state enterprises under the Ministry of Engineering and Metallurgy but also by Provincial State enterprises in at the most, 20 out of 40 provinces in Viet Nam. The manufacturing is not monitored on a national level and detailed information on manufacturing capacity of agricultural machinery is not available.

Research and development is focused on the following:

(i) a 50 hp four wheel tractor model,
(ii) small diesel engines,
(iii) mini hydro-electric power units,
(iv) equipment for extraction of vegetable oil from oil bearing seeds,
(v) pumps for industrial uses and irrigation, and
(vi) manual tools.

The progress appears to be slow due to financial constraints and lack of documentation.

Machinery and equipment manufactured by state enterprises are as follows:

(a) 2-wheel 12 hp tractors and the necessary implements and trailers; a total of 2,500 tractors were manufactured in 1987

(b) Pumps, 800 m^3/h; 10 units are manufactured per year.

(c) Dredging equipment with pumps.

(d) Knapsack sprayers, capacity about 150,000 units/year.

(e) Small capacity threshing machines.

(f) Carts for draft animals.

(g) Cleaning machines for paddy rice; they are designed with oscillating screens and air and made in two models. A large one with an input capacity of 2 tonnes per hour, motor-powered and intended for co-operatives and small hand-operated cleaner for use on the farms. Both types are made in different factories in Viet Nam at a rate of a few dozen large ones per year. Some 10,000 small cleaners are believed to be manufactured per year, mostly in the south.

(h) Rice driers with capacities from 0.5 to 5.0 tonnes per hour. The air is heated by rice husks, coal or fuel oil. The total manufactured drying capacity per year is of the order of 30-40 tonnes per hour and these units are reportedly only used for drying of paddy rice for export to ensure a high quality product.

(i) Rice mills are made by enterprises under the Ministry of Engineering and Metallurgy at a rate of 5-10 units per year with a capacity of 15 tonnes per 8 hours. Mills with 5 tonnes capacity are also produced. At present, about ten 15-ton units and twelve 5-ton units are in operation. The national capacity for manufacturing rice mills is reportedly 1,000 to 2,000 units per year. This information probably indicates the order of magnitude rather than absolute figures. It is reasonable to assume, however, that a certain number of these mills have a lower capacity, probably less than 1 ton per day.

(j) Oil crushers for oil-bearing seeds. These are hand operated and capable for extracting vegetable oil from 50-60 kg of seed per hour. So far about 10 units have been manufactured.

(k) Sugar cane processing plants for extraction of the sugar and evaporation of the syrup. The plants are designed for 50 or 100 tonnes of sugar cane per 24 hours. A few hundred of the smaller units are reportedly in operation but only five 100-ton plants. For a larger plant, imported components amount to about US$ 100,000, or 10 per cent of total investment.

(l) Coffee processing machinery for shelling, drying and roasting are manufactured domestically but classifiers are imported from the Federal Republic of Germany. The Ministry of Engineering and Metallurgy is responsible for collection of the required equipment from different manufacturing enterprises, whereas the assembly of the plants is supervised by the Union of Enterprises for Coffee under the Ministry of Agriculture and Food Industries. Up till now, the manufacturing capacity of processing equipment has been sufficient and the engineering aspects managed through a joint venture agreement with the German Democratic Republic. In the future, when coffee production is increased, the manufacturing capability for this type of machinery will have to be strengthened.

(m) Only some components in the tea processing plants are made in Viet Nam while major equipment are imported from the USSR and more recently some from India. Spare parts, however, are manufactured locally in sufficient quantities.

In addition to the joint venture agreement with the Democratic Republic of Germany for coffee processing equipment, Viet Nam has cooperation with Eastern European countries also with respect to tea and sugar cane processing facilities. In order to benefit from the experience gained in countries engaged in coffee, tea and sugar cane processing, technical assistance may be requested from UNIDO.

APPENDIX 1:14

The Phu Lam Export Furniture Manufacturer

The Phu Lam Export Furniture Manufacturer is under the jurisdiction of the Union of Wood Processing Industries Area No.1 covering Ho Chi Minh City. The production is divided between three factories, all located in Ho Chi Minh City. A total of 1,200 workers are employed in the 20 workshops. In 1987 the total export of furniture to six countries amounted to US$ 4 million accounting for half the manufactured volume. There three factories require 2,800 m3 of logs per year for its production. However, wood is not available in sufficient quantities, reportedly due to transport problems from the forest areas and appearantly also difficulties at the saw mills. If these problems were solved the possibilities for export is quite bright.

The company is rated as one of the better ones in Vietnam, and still the machinery and the production concept is in need of rehabilitation. The safety for the workers using the machines is also far from satisfactory. The accuracy of the equipment is not up to normal standard, which is evident from the finished product. Existing machines are not used optimal. The reason for this may be that large quantities of semi-finished component are stacked almost every where making any transfer of elements from one place to another rather difficult. It would also disturb the general flow of material. Nevertheless, modifications should be considered in a future rehabilitation process.

The quality control on all levels of production should be improved in a programme to promote overall finish of the products. The workers appear to be well trained and highly motivated, and can easily ajust themselves to new technology and a higher standard of quality control. If these minimum changes in combination with qualified product development and design is done, the preconditions for increased export of furniture will be improved.

APPENDIX 1:15

Central Council of Co-operatives and Non-Governmental Orgnizations (CCNGO), Hanoi

The Central Union of Co-operatives of Small Industry and Handicrafts was formed in 1961 and has developed to an organization with more than 2 million members. The Union is the apex organization for 5,944 co-operatives with an estimated 600,000 members, 40,000 production groups with 300,000 members, 600,000 private workers and the rest 500,000 in agricultural cooperatives. Two thirds work in collectives. The name of the Union recently changed to " Central Council of Cooperatives and Non-Governmental Organizations" (CCNGO) to better reflect the mandate of the organization and its importance in the development efforts of Viet Nam.

The Central Council is located in Hanoi. Its main functions is to maintain contacts with the Government, arrange training of members both in Viet Nam and abroad and provide assistance in general to provincial unions. In each province there is a provincial union responsible for matters of technical and practical nature such as assistance to purchase raw material, marketing and export in addition to technical assistance.

The new policy gives the individual co-operative the possibility to deal directly with central import-export organizations to reduce the bureacratic procedures.

At present the total output is about 60 billion Dong accounting for 43 per cent of the total industrial output and 60 per cent of all consumer goods produced in Viet Nam. Thus, the members of the former Union countributes a significant share of products and items both for local consumption and for export. Total export value for 1988 is expected to be 140 million rubles/US$ which accounts for around 18 per cent of total export from Viet Nam. Handicraft export include primarely bamboo and rattan products, lacquer wares, carpets, garments, leather wares and coconut fibre articles.

The new directives for CCNGO, lately formulated by the Government, includes the task of creating 400,000 new jobs every year up to year 2000. In the past five years the Union has managed to create around 200,000 new jobs per year.

With the new policy CCNGO predicts to increase its total production to 74 billion Dong by 1990, 140 billion Dong by 1995, 240 billion Dong by year 2000, and 320 billion Dong by 2005, all in fixed prices. In the long term plan it is envisaged that the export will be as follows: 160 million rubles/US$ by 1990, 320 million rubles/US$ by 1995 and 800 million rubles/US$ by year 2000.

For national economic and employment points of view the cooperatives are of great importance as the figures aboue clearly indicate. Of equal importance are the new opportunities to exploit so far dormant entrepreneurship, often out in rural and remote areas, where there are few other job alternatives. Most of the co-operatives are running economically well, despite small problems with supply of raw material etc. By comparision the co-operative

members have an income generally well above what other workers in the same area are getting. In most co-operatives there is a good spirit and the members are hard working.

There is no doubt that the co-operatives and the rest of the non-governmental section will be a very important partner for the Government in its efforts to develop the country. This is especially important in the rural areas where the co-operatives are doing most for the production of consumer goods, processing of food, creating job opportunities, and at the same time generating about 20 per cent of Viet Nam's total export.

APPENDIX 2

Total production of main crops

(except paddy)
(1000 tonnes)

Type of crop	Actual production 1985	Projection 1995	Projection 2005
Maize	587	1,450	2,400
Potatoes	189	960	1,400
Sweet potatoes	1,778	2,800	5,000
Manioc	2,940	3,500	4,000
Vegetables	2,605	6,000	8,000
Bean of various types	82	215	340
Soya beans	79	225	350
Peanuts	202	430	640
Sugar cane	5,560	13,800	23,000
Tobaco	38	44	80
Jute	47	113	200
Tea	127	280	600
Coffee	12	10	12
Rubber	48	144	410
Coconut	612	600	600
Bananas	1,250	2,000	2,000
Pineapple	363	720	1,080
Orange and lemon	111	176	300
Livestock			
Cattle (1000 heads)	5,188	7,750	10,250
Pigs (1000 heads)	11,807	16,100	20,300
Poultry (million)	92	175	245
Meat production (unslaughtered 1000 tonnes)	748.6	1,308	1,845
eggs (million)	1,472	4,200	7,000

Source: Ministry of Agriculture and Food Industries

APPENDIX 3

Meteorological information

		Average	Maximum	Minimum
CROPPING SEASONS				
Summar/autumn	rice crop	June - September		
Autumn	rice crop	July - November		
Winter	rice crop	December - May		
Winter/spring	rice crop	January - May		
1. RAINFALL, (mm)				
North	Annual	1,500	2,400	1,400
	Summer/autumn crop season	1,300	2,00	1,100
South	Annual	1,800	2,500	1,400
	Summer/autumn crop season	1,500	2,300	1,200
2. NUMBER OF RAINY DAYS				
North	Annual	130	180	100
	Summer/autumn crop season	90	140	70
South	Annual	120	170	90
	Summer/autumn crop season (in Delta area)	100	140	70
3. SUNSHINE HOURS				
North	Annual	1,700	1,800	1,600
	Summer/autumn crop season	1,100	1,200	900
South	Annual	2,500	2,800	2,400
	Summer/autumn crop season	1,100	1,200	1,000
4. TEMPERATURES (C)				
North	Annual	27	29	25
	Summer/autumn crop season	27	28	25
South	Annual	28	30	30
	Summer/autumn crop season	28	30	26
5. FLOOD PERIODS				
North		August - September		
Central		September - October - November		
South		September - October - November		

Note: Moisture content of paddy rice at harvest is 20 per cent.

APPENDIX 4

Food processing industries

Enterprises		Capacities, tonnes/year			Actual utilization %	
Type	Numbers	Installed	Utilized	Max. practical	of installed capacity	of max. practical
Milling	963	2,378				
Meat processing	10	50,000	20,000	40,000	40	50
Central	1	2,000	1,000	2,000	50	50
Local	9	48,000	19,000	38,000	39.5	50
Feather processing		2,000	1,500	2,000	75	75
Central		150	130	150	86	86
Local		1,850	1,370	1,850	74	74
Fruit & vegetable processing	13	45,000	32,000	41,000	71	78
Central	10	39,000	26,000	36,000	64	66
Local	3	6,000	6,000	5,000	100	120
Freezing/cooling establishments	6	20,000	17,000	20,000	85	85
Central	2	6,000	4,500	6,000	75	75
Local	4	14,000	12,500	14,000	89	89
Drying	50	6,000	4,000	5,000	67	80
Sugar factories (tonnes sugar)						
Central	6	9,000	4,500	7,200	50	63
Local (cane/day)	4	2,000	1,000	1,600	50	63
Glucose processing	1	2,000	1,400	2,000	70	70
Beverage manufacturing						
Alcohol	3	22.5	18.0	22.0	80	81
Beer	2	140.0	85.0	105.0	61	81
Others	1	50.0	16.0	30.0	32	53
Confectionary manufacturing						
Central	1	6,000	2,500	4,500	42	55
Local		15,000	10,000	13,000	67	77

.../...

Enterprises		Capacities, tonnes/year			Actual utilization %	
Type	Numbers	installed	Utilized	Max. practical	of installed capacity	of max. practical
Vegetable oil						
Coconut		50,000	22,000	40,000	44	55
Peanut		5,000	4,000	5,000	80	80
Coffee processing		300	70	300	23	23
Milk processing (million cans)	2	175	45	70	26	64
Mono glutamat		3,000	2,200	2,500	73	88
Animal feed processing						
Central		80,000	40,000	70,000	50	57
Local		400,000	200,000	350,000	50	57
Fibre processing						
Silkworm		180	100	135	56	74
Jute		160	90	120	56	75
Cotton (tonnes of cotton seed)		5,000	1,000	3,000	20	33

Source : Ministry of Agriculture and Food Industries.

APPENDIX 5

Persons met and institutions and enterprises visited by the UNIDO industrial strategy mission to Viet Nam 8-22 June 1988

HANOI

Ministry of Foreign Affairs

Mr. Vu Khoan, Assistant Minister

Mr. Nguyen Trung, Director of Department of Economy, Culture, Science and Technology

Mr. Dang Duc Lan, Deputy Director, Department of Economy, Culture, Science and Technology

Mr. Le Huu Hung, Export/Interpreter, Department of Economy, Culture, Science and Technology

State Planning Committee

Mr. Tran Phuong, Director, Long-term Planning Institute

Mr. Nguyen Phi Hung, Director, Industry Department

State Committee on Science and Technology

Mr. Hoang Dinh Phu, Vice Chairman

Mr. Nhuyen Van Thu, Vice-Director, Centre for Science and Technology Strategic Studies

Ha Dong Agricultural Tools Factory

Mr. Hang, Managing Director

Sao Vang Yellow Star Rubber Factory

Managing Director

8th March Textile Factory

Mrs. Cu Thi Han, Managing Director

Song Da Hydroelectric Power Plant Project

Mr. Thai Phung Ne, Director General (of the Power Plant Project)

Mr. Nhuyen Si Phong, Director, Department of Intenational Co-operation, Ministry of Energy

UNDP

Mr. David Smith, Resident Representative
Mr. Nigel Ringrose, Deputy Resident Representative
Mr. Lars Adermalm, Junior Professional Officer, UNIDO
Mr. Phan Duc Thang, National Programme Officer

Swedish Embassy

Mr. Carl Erhard Lindahl, Ambassador
Ms. Maj Britt Amer, Head, SIDA Development Co-operation Office
Ms. Sonja Björkén, SIDA Programme Officer - Industry

AGENCIES PARTICIPATING IN THE UNIDO TEAM'S PRESENTATIONS OF INTERNATIONAL TRENDS IN HANOI

(The agency representatives were generally of the level of Chief of Department and main actors in the process of policy-making.)

State Planning Committee
State Committee of Science and Technology
Ministry of Foreign Affairs
Ministry for Foreign Economic Relations
Ministry of Finance
Ministry of Engineering and Metallurgy
Ministry of Energy
Ministry of Light Industry
Ministry of Basic Construction
Ministry of Transport and Communication
Ministry of Agriculture and Food
General Department of Chemical Industries
Centre on Postal Communications
General Department of Petroleum
General Department of Minerals and Geology
Institute for Science and Technology
Institute for Economic Management
Central Institute for Economic Management Research
National Union of Small Industry and Handicraft Co-operatives

HO CHI MINH CITY

People's Committee of Ho Chi Minh City

Mr. Nguyen Van Huan, Vice Chairman
Mr. Nguyen Van Anh, Director, Department of Industrial Services
Dr. Pham Hu g Phi, Deputy Director, Committee for Science and Technology

Indira Gandhi Jute Mill

Mr. Dang Van Nho, Director

Sai Gon Garment Factory No.1

Mrs. Tran Bach Hue, Director

Dong Tam Mechanical Co-operative

Mr. Nguyen Chau, Director
Mr. Tien Ahn, Deputy Director

VIETTRONICS

Mr. Pham Khac Khiet, Deputy Director
Mr. Vo Ngoc Diep, Deputy Director
Mr. Sy, Director of Research Centre
Mr. Dao, Deputy Director of Research Centre
Mr. Bang, Head of Planning Section

Ho Chi Minh City industrialists participating in the UNIDO team's presentation and discussion

Mr. Nguyen Van Anh, Director, Department of Industrial Services

Mr. Con, Deputy Director, Department of Industrial Services

Mr. An, Deputy Director, Department of Industrial Services

Mr. Huynh Ngoc Danh, Deputy Head of Industrial Section under the Municipal Party Committee of Ho Chi Minh City

Mr. Pham Duc Thong, Senior Expert, Industrial Section under the Municipal Party Committee of Ho Chi Minh City

Mr. Hoang, Director-General, Union of Garment Enterprises of Ho Chi Minh City

Mr. Viem, Director, Garment Enterprise No.3

Mr. Phong, Director, United Agricultural Mechanical Enterprise

Mr. Nguyen Van Than, Director, Textile Enterprise No.3

Mr. Dang Quan Duc, Director, Jute Processing Equipment R&D Programme

Mr. Ngo Thanh Can, Deputy Director, Manufactured Products Export Corporation

Mr. Nguyen Chau, Director, Dong Tam Mechanical Co-operative

Mr. Huynh Hoa Nha, Deputy Director, Union of Handicraft and Small Industry Enterprises of Ho Chi Minh City

Mr. Nguyen Cong Thuan, Director, Leather and Leather Footware Enterprise (SAGODA)

Mr. Nguyen Thanh Lap, Expert, SAGODA.

LIST OF INSTITUTIONS AND PERSONS INTERVIEWED SEPARATELY BY JAN ANNERSTEDT, UNIDO SCIENCE AND TECHNOLOGY POLICY SPECIALIST:

HANOI

State Commission for Science and Technology (SCST):

Mr. Hoang Dinh Phu, Vice Chairman of SCST and Director of the Centre for Science and Technology Strategic Studies

Mr. Nguyen Thuong, Industry Department

Centre for Science and Technology Strategic Studies (of SCST):

Mr. Nguyen Van Thu, Vice Director

Institute of Science and Technology Management (of SCST):

Mr. Vu Cao Dam, Director
Mr. Nguyen Si Loc
Mr. Tran Tan Minh

Central institute of Science and Technology Information (of SCST):

Mr. Dang Mong Lan

National Center for Scientific Research of Viet Nam:

Prof. Nguyen Van Hieu, President
Prof. Ho Si Thoang, Vice President and President Ho Chi Minh City Branch

HO CHI MINH CITY

Committee for Science and Technology of Ho Chi Minh City:

Mr. Hoang Anh Tuan, Chairman
Mr. Pham Hung Phi, Vice Chairman

Program of Development Studies, affiliated to the "Industrial Service" of Ho Chi Minh City:

Mr. Dang Quan Duc, Director and Editor of "Science and Development Review"
Mr. Le Manh Hung
Mr. Nguyen Cuong
Mr. Nguyen Van Mai
Mr. Tran The Nam

APPENDIX 9

Persons met and institutions and enterprises visited by the UNIDO agro-industrial team to Viet Nam 24 October to 14 November 1988

(Persons present at several meetings listed first time only)

HANOI

State Planning Committee

Mr. Tran Phuong, Director, Long-term Planning Institute
Mr. Nguyen Phi Hung, Director, Industry Development
Mr. Tran Thanh Hien, Official
Mr. Le Hun Trinh Hiem, Department for External Co-operation
Ms. Dinh Thi Hoa, UNIDO Section, Department for International Organizations, Ministry of Foreign Affairs

State Committee on Science and Technology

Mr. Tran Tri, Vice Chairman
Mr. Nguyen Hung
Mr. Dang Duc Lam, Deputy Director of Centre for Research Strategic Science and Technology
Mr. Tieu, Forecast Center
Mr. Dan, Department of Application of Technique and Technology.
Mr. Dac, Depart. Research of Technologies in Industry
Mrs. Nhu, General Planning
Mr. Lan, Scientific Information Institute
Mr. Duc, Scientific Management Institute
Mr. Dao, General Office
Mr. Thuan, Depart. Local Planning, Sciences and Technology (in provinces)
Mr. Thuan Thai, Foreign Relations (in technical fields)

Central Council of Co-operatives and Non-Governmental Organizations

Mr. Vuong Dinh Thoai, Director

General Department of Chemistry

Ms. Truong Phuong, Expert, Central State Economics Management
Mr. Tran Hien, Director, Institute for Economics
Mr. Nguyen Dang Duong, Deputy Director, Department for External Co-operation
Mr. Nguyen Ngoc Chau, Director of Chemical Science
Mr. Dinh Phu Tu, Expert

Ministry of Engineering and Metallurgy

Mr. Hoang Gia Truong, Director Department of Planning
Mr. Nguyen Van Hoi, Director, Institute for Agricultural Machinery Research
Mr. Ho Ngoc Xien, Deputy Director, Department for External Co-operation
Mr. Dinh Huy Tam, Expert

Ministry of Forestry

Mr. Van Nam, Deputy Director, Department for International Co-operation
Mr. Bui Linh Anh, Deputy Director, Department of Forest Production
Mr. Nguyen Due Xuyen, Department of Forest Production

Ministry of Fishery

Mr. Ta Quang Ngoc, Deputy Director, Department of Science Technology
Mr. Nguyen Quoc Viet, Expert, Department of International Co-operation

Ministry of Agriculture

Mr. Nguyen Ich Chuong, Deputy Director, Department for International Co-operation.
Mr. Nguyen Van Phuoc, Director, Department for International Co-operation
Mr. Nguyen Van Thai, Director, Department of Long Term Planning
Mr. Nguyen Mien, Department of Planning
Mr. Truong Phong, State Planning Committee
Ms. Ho Minh Chau, Department of International Coop.

Ministry of Light Industry

Mr. Nguyen Lam Con, Deputy Director, Department of Economic Planning
Mr. Le Hoan, Expert, Department Economic Planning
Mr. Phan Trong Tiem, Expert, Department of International Co-operation
Mr. Vuong Dinh Thoai, Director, Department for International Co-operation, Central Union of small Industry and Handicraft Co-operatives of Viet°Nam

Van Dien Sugar Factory

Mr. Nguyen Huu Trong, Director
Mr. Nguyen Dich, Deputy Director

Viet Nam National Vegetable and Fruit Corporation

Mrs. Le Tu Mac, Deputy Director General
Mr. Le Pham Trung, Manager International Co-operation Dept.
Mr. Chu Ngoc Vu, Deputy Director, Hanoi Fruit and Compot Canning Factory

SIDA Development Co-operation Office

Mr. Tran Phuong, Vice Chairman
Mrs. Majbritt Amer, Head of SIDA Development Co-operation Office, Hanoi
Mrs. Annlis Aberg, Programme Officer, Development Co-opeation Office, Hanoi

UNDP

Mr. David Smith, Resident Representative
Mr. Jean Marc Bonnamy, Senior Industrial Development Field Adviser
Mr. Lars Adermalm, Junior Professional Officer

HO CHI MINH CITY

Peoples' Committee of Ho Chi Minh City

Mr. Nguyen Cong Ai, Vice Chairman of the Peoples' Committee of Ho Chi Minh City, President of the City Planning Commission
Mr. Le Si Han, Ho Chi Minh City Planning Commission

Union of Co-operatives of Small Scale Industry and Handicraft

Mr. Nguyen Thai Bao, Director
Mr. Ha Huy Thanh, Vice President

The Southern Pesticides Company

Mr. Nguyen Luat, General Director
Mr. Do Linh Cuong, Deputy Director General
Mr. Nguyen Manh Tuyen, Deputy General Director, Director of Pesticides Research and Production Center.
Mr. Nguyen Duy Kinh, Deputy Director of Pesticides Research and Producticon Center
Mr. Tran Lam Ban, Technical Deputy Director, SPC

National Union of Viet Nam Vegetable Oil Manufacturers

Mr. Tan Dang Hieu, Director, Tan Binh Vegetable Oil Factory
Mr. Tran Binh Luan, International Co-operation Department Tan Binh Vegetable Oil Factory
Mr. Nguyen Tuan, Technical Department
Mr. Mai Dinh Phon, Director General, The Swine Rearing Corporation.

Union of Wood Producers No.3 Ho Chi Minh City

Mr. Duong Minh Ngoc, Director General
Mr. Nguyen Cong Kieu, Director, Phu Lam Export Furniture Factory
Mr. Le Minh Tien, Deputy Director, Phu Lam Export Furniture Factory
Mr. Le Van Huu, Head of Technical Depart., Phu Lam Export Furniture Factory

Vissan Slaughterhouse

Mr. Le Quang Nhuong, Director
Mr. Do Thanh Long, Deputy Director
Mr. Vu Van Hieu, Veterinary Doctor
Mr. Huynh Xuan Hoang, Production and Export Department

Ho Chi Minh City Food Company

Mrs. Nguyen Thi Thi, General Director, Chief Executive, Food Processing Programme in Ho Chi Minh City; Chairman, Bank for Industry and Commerce, Chairman, Saigon Petro
Mr. Phan Bao Thien, Department of Import and Export
Mr. Phan Hoang Sanh, Director, Cuu Long No.1 Rice Mill
Mr. Le Kiet, Deputy Director, Cuu Long No.1 Rice Mill

Linh Xuan Canning Factory

Mrs. Le Thien Thu, Director
Mr.Nguyen Dinh Nghia, 1st Deputy Director
Ms. Thu Ha, Technical Director
Ms. Thu Ha, Department of Import and Export

SEAPRODEX

Mr. Nguyen Hong Can, Vice Minister, Ministry of Fishery
Mr. Kien Chau Hoan, Deputy Director "Commercial"
Mr. Nguyen Dinh Hung, Vice Director, Dried Sea Products Factory
Mr. Le Nam, Marketing Manager, International Div.
Mr. Doan Ngoc Luu, Vietnam, National Scientific Center
Mr. Nguyen Huy Thach, Service Center
Mr. Hoang Vinh, Marketing, Binh Vegetable Oil Factory
Mr. Hoang Lam Tinh, Engineering - Economic Management

HUONG CANH

Huong Canh Animal Feed Plant

Mr. Dao Huyen, Director General
Mr. Pham Trong Quang, Director
Mr. Phan Hai Nham, Deputy Director
Mr. Phan Thanh Hoa, Engineer

HA BAC PROVINCE

Co-operatives Tien Son District

Mr. Pham Trong Lien, President, Union of Handicraft
Mrs. Nguyen Thi Sam, Director, Tan Tien Co-operative
Mr. Dinh Bang, Lacker Commodities Co-operative
Mr. Ha Van Chi, President, Lien Minh Cooperative
Mr. Dinh Huu Tam Vice President, Lien Minh Cooperative
Mr. Pham Tien Bo, Tien Son District.