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UNITED NATIONS INDUSTRIAL
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SUB-REGIONAL PROGRAMME OF TECHNICAL ASSISTANCE TO THE ASEAN GROUP 1/

Industry Sector

by

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1. INTRODUCTION

The decisions taken by the meeting in Kuala Lumpur of the Asean Economic Ministers involved an immediate allocation among its members of four large industrial projects (Diesel engines, urea, superphosphates and soda ash).

The meeting also decided that an expert group be created with the immediate following tasks:

a) review the industrial cooperation programme;

b) examine the feasibility of establishing those four industries;

c) investigate the feasibility of establishing additional sub-regional manufacturing capacity for newsprint and potash;

d) coordinate the national programmes for the development of steel and petrochemical industries;

e) exchange information on various sub-sectors of the national industrial development programmes with a view to identifying possibilities for complementation among the existing industries; and

f) study and propose coordinated sub-regional programmes of development for the following sub-sectors:

Metalworking, Machine-Tools, Fisheries, Electrolytic Tin-Plating, Heavy-Duty Tires and Electronic Components

A UNDP/ESCAP Mission composed of Messrs. Adriano Garcia and Prok Amranand visited the member countries with the purpose of identifying areas of technical assistance to the Asean Secretariat and preparing an integrated programme of assistanoe. As far as the industrial sector was ooncerned, the mission was jcined by Mr. K Aselmann, SIDFA and Mr. O. Gcnzalez-Hernandez from UNIDO Headquarters, in Bangkck from 1-11 July. During their visit to the member countries, the UNDP/ESCAP mission found that the interest of the member countries in receiving specialized technical assistance for the industrial sector is primarily in the study of the six sub-sectcrs mentioned under f) above. We will therefore draw up in this report proposals fcr technical assistance in thcse sub-sectors. For the sake of olarity we will precede these proposals with scme brief nctes on regional oo-operatien.

Furthermore, at the end of this report, a list of additional ..... proposals of teohnical assistance is attached, dealing with specific fields whioh have linkages with the six projeots mentioned above and/or where interest has been shown by member countries to receive technical assistance.

By express request of Mr. Garoia a speoific project proposal tc initiate and pave the way tc the programme of assistance was prepared and is attached as Annex V.

2. REGIONAL CO-OPERATION

The mechanisms for regional oo-operation in the industrial field are rather complex and still not tco widely proven by practice in developing countries. Basically, these mechanisms are three as follows:

a) Trade liberalization through progressive and selective tariff reductions;

b) Allocation of large industrial projects;

c) Complementation and Specialization agreements.

Trade Liberalization

Through this mechanism, intra-regional tariffs for a number of products agreed upon in advance are reduced progressively. Advantages are its simplicity of administration and the natural enforcing of a competitive policy in each country. It is purely a customs type of agreement like the EEC (Common Market) and mainly applicable for developed type of economies. However, for developing nations, it has more limited appeal, since it cannot avoid duplication of manufacturing efforts and, in the long run, produces or aggravates development gaps between their member countries.

Allocation of large industrial projects

This has been applied mostly in the Andean and Asean Groups whereby large industrial complexes have been allocated among its member countries. On its own, this mechanism should be only applicable to self-sufficient type of industries where economies of scale are particularly important, such as certain chemical or metalworking industries. In these cases, overcosts are minimized. For most types of industries it can only be applied together with complementation and specialization agreements in view of the multiple linkages between assemblers and component manufacturers (e.g. automotive industries) or downstream type of productions where manufacturing of final products follows a number of interlinked sub-processes from the original raw materials (e.g. petrochemicals).

Complementation and Specialization Agreements

This mechanism allows for certain terminal industries based on both indigenous and imported inputs to complement the local content with the purchase from another country of certain components. In return, other components are exported. The countries can thus specialize in the manufacture of a narrow range of components, maximizing the utilization of productive capacity and increasing, in net terms, local content. Many times these agreements are simply a barter type of operation and no money transfers are involved. It has been used, in bilateral agreements between Latin-American countries in the automotive industries field, with a certain success. Disadvantages are that countries have usually the same type of products to barter and agreement on pricing, vis-a-vis the international levels, themselves fluctuating today very rapidly, is difficult to reach.

In practice, these three techniques have to be applied simultaneously and in varying degrees, depending on the type of regional co-operation basic agreement and most important, depending on specific industrial fields under study. An example to illustrate this point, refers to the manufacture of mechanical machinery (Major Group 382 of ISIC). This group involves manufacture of engines, turbines, agricultural machinery and equipment, metal and woodworking machinery, special industrial machinery, office computing and accounting machinery, and others. On surface, an allocation of the different types of machinery by member countries (2nd mechanism) would suffice. However when looking into each of these products one sees a large number of different components which are common to many of the products.

pedestals

gears

shafts

electric motors

electronic commands

hydraulic systems

fabricated structures

etc., etc.

These components can be grouped in similar production technology families such as Castings, Forgings, machining and Electronics.

Some of them, because of their high capital intensity (large foundries) or high level of technology (numerically controlled machining) should be allocated among the countries and/or plants through complementation and specialization agreements (3rd mechanism).

Again, to avoid inefficiencies of production and unacceptable overcosts, sub-regional tariffs should be progressively reduced both for components and final products (1st mechanism).

Ideally, a common external tariff should be agreed upon to permit a limited degree of protection to the whole exercise, at least during its early phase.

Each sub-sector therefore has to be studied carefully to investigate the optimal "dosing" of the three mechanisms.

3. METALWORKING INDUSTRIES

The borders of this sub-sector of industry are often misunderstood. To put the record straight it would be convenient to list its breakdown, as included in the International Standard Industrial Classification of All Economic Activities.

Division 38 - Manufacture of Fabricated Metal Products, Machinery and Equipment

Major Group 381	Manufacture of fabricated metal products, except machinery and equipment.
Group 3811	Manufacture of cutlery, hand tools and general hardware.
Group 3812	Manufacture of furniture and fixtures, primarily of metal.
Group 3813	Manufacture of structural metal products.
Group 3819	Manufacture of fabricated metal products except machinery and equipment not elsewhere classified.
Major Group 382	Manufacture of machinery except electrical
Group 3821	Manufacture of engines and turbines
Group 3822	Manufacture of agricultural machinery and equipment.
Group 3823	Manufacture of metal and woodworking machinery
Group 3824	Manufacture of special industrial machinery and equipment except metal- and wood-working machinery.
Group 3825	Manufacture of office, computing and accounting machinery.
Group 3829	Machinery and equipment except electrical not elsewhere classified.

Major Group 383	Manufacture of electrical machinery, apparatus, appliances and supplies.
Group 3831	Manufacture of electrical industrial machinery and apparatus.
Group 3832	Manufacture of radio, television and communication equipment and apparatus.
Group 3833	Manufacture of electrical appliances and housewares.
Group 3839	Manufacture of electrical apparatus and supplies not elsewhere classified.
Major Group 384	Manufacture of transport equipment.
Group 3841	Shipbuilding and repairing.
Group 3842	Manufacture of railroad equipment.
Group 3843	Manufacture of motor vehicles.
Group 3844	Manufacture of motorcycles and bicycles.
Group 3845	Manufacture of aircraft.
Group 3849	Manufacture of transport equipment not elsewhere classified.
Major Group 385	Manufacture of professional and scientific, and controlling equipment, not elsewhere classified, and of photographic and optical goods.
Group 3851	Manufacture of professional and scientific, and measuring and controlling equipment, not elsewhere classified.
Group 3852	Manufacture of photographic and optical goods.
Group 3853	Manufacture of watches and clocks.

From these, the following are attached as separate project proposals, in view of their relative higher importance and specific interest for immediate study by the Asean Secretariat.

Group 3823 (machine-tools)

Group 3832 (radio and TV)

Group 3833 (electric appliances)

Groups 3841 and 3813 (Shipbuilding & repair. Heavy Plate Work)

Group 3843 (motor vehicles)

Group 3844 (" ")

Furthermore, the categories listed below, because of their scarce interest for the region or low economies of scale, permitting therefore manufacture practically in each member country, do not deserve special study at the moment.

Group 3811 (hardware)

Group 3812 (metal furniture)

Group 3819 (fabricated metal products)

Group 3829 (general machinery)

Group 3839 (general electrical machinery)

Group 3845 (aircraft)

Group 3849 (other transport equipment)

Group 3821 has already been allocated in its most important element (diesel engines) to Singapore. Therefore we are left with the following activities for study.

- Manufacture of agriculture machinery and equipment.
- Manufacture of special industrial machinery and equipment.
- Manufacture of office, computing and accounting machinery.
- Manufacture of electrical industrial machinery and apparatus.
- Manufacture of railroad equipment.

- Manufacture of professional and scientific, and measuring and controlling equipment not elswhere classified, and of photographic and optical goods.

The methodology for studying these activities would comprise the following phases:

a) Analysis of present of and projected (up to 1985) markets

b) Survey of present manufacturing facilities and plans for their development or new establishment.

c) Preparation of packages of similar technological manufacturing processes (products and components) for allocation and/or complementation.

Description of technical assistance inputs.

For this project it is estimated that a general coordinator (metalworking industry adviser) would be needed for a period of 18 months.

In addition to coordinate the individual studies described below, he could operate as a general adviser for the assistance to be provided to the Asean Group in the industry sector.

Furthermore, a minimum of six months of consultancy services per sub-branch would be needed. The total amount of assistance needed would be:

		US $
General Coordinator	16 m.m.	64,000
Consultants	36 m.m.	144,000

4. MACHINE TOOLS

Having in mind the linkages between the machine-tool industry and the rest of the metalworking industries as described in the previous project proposal and the relatively low level of development of both in the sub-region, it seems to us of prime importance the preparation of a development programme at short and medium range for the machine-tool industry in the sub-region.

The machine-tool industry, being basically a capital-intensive and long term operation, if international quality and price levels are aimed at, should preferably be developed on a sub-regional rather than a national basis.

Although terminal manufacturing operations can be undertaken in several factories practically in all countries, the manufacture of specialised components needing large investment or very high technological level, such as large castings and numerically-controlled machining, should be distributed among an optimal number of plants, as low as feasible.

The present and particularly future (10 years) markets for machine tools in the sub-region is considerable and therefore manual and automatic standard machine tools could be manufactured at internationally competitive prices, provided duplication and unnecessary sub-regional competition is avoided.

Furthermore, considering the good prospects for the region in the electronics sector, numerically controlled machine-tools could be envisaged as well as a long-term manufacturing possibility for the sub-region.

Assistance in this field would require a first phase consisting of the preparation of a production programme based on:

a) Market analysis (both sub-regional and export possibilities)

b) Evaluation of existing and forecasted manufacturing programmes.

c) Preparation of industrial profiles for the establishment and/or development of manufacturing units, mostly requiring high capital/technology inputs.

Once an agreement in these manufacturing units and their allocation/complementation would be agreed upon, a second phase of assistance could be envisaged for the detailed preparation, promotion, negotiation and implementation of specific industrial projects.

While the first phase of this project should be preferably undertaken by multilateral assistance, the second phase could be carried out by sub-regional personnel with only occasional specific inputs of assistance from multi or bilateral sources of technical assistance.

Description of technical assistance inputs		US$
1st phase	Expert in machine-tools 12 m.m.	48.000
2nd phase	Short term consultative services 12 m.m	48.000

5. FISHERIES

This matter refers to fishery development. If technical assistance is referred in this field, FAO should be consulted.

6. ELECTROLYTIC TIN PLATING

The study of this process should, in our view, to a key important consideration.

Tin plating should be preferably made right after the rolling of the steel coils to avoid corrosion and the necessary subsequent treatment, if the coils are transported from one country where they are produced to another where they are tin plated. Therefore this sub-sector should not be dissociated from the broader field of steel production, where a separate project of assistance is suggested.

Description of Technical Assistance Inputs

	US $
One expert on electrolytic tin plating 3 m.m.	12,000

This assistance however, should only be provided after the question of iron and steel is decided upon.

7. HEAVY-DUTY TIRES

In all countries of the sub-region, passenger, medium- and heavy-commercial vehicle tires are manufactured, for almost exclusively national consumption.

However, a considerable number of heavy-duty tires, in view of its large variety of sizes and models and very low individual consumption in each country, is being imported from outside the sub-region. This constitutes a heavy drain on foreign exchange, and diminishes the effective utilization of installed production capacity.

It is felt that the majority of odd-sized models and sizes of heavy-duty tires presently imported can be sub-regionally manufactured, provided their production is concentrated on a very reduced number of plants (maximum two or three) of the sub-region.

In order to determine the allocations to be made in this field and ways and means of their implementation, assistance would be required for the following tasks

a) Preparation of a list of presently imported heavy-duty tires and related demand (present and projected)

b) Evaluation of existing tire manufacturing facilities

c) Preparation of a suitable product-mix for sub-regional manufacture divided into a low number of manufacturing package units to be allocated

d) Recommendations on the changes needed in the present plants in terms of machinery, installations and personnel to accommodate the package units mentioned above.

Description of technical assistance inputs		US$
One expert on tire manufacture	3 m.m.	12.000

8. ELECTRONIC INDUSTRIES

1. Background.

Electronic technology is perhaps the most versatile when one takes into account the assistance this technology has provided, to most if not all of other technologies, for instance, considering the electronic instrumentation now being used in:

Agriculture	: for analytic investigations and examinations;
Manufacturing Industries	: for automation; for quality-control; to establish reliability;
Commerce	: for data-processing; in office tasks;
Communications	: to achieve faster and more reliable contact; to achieve greater dispersion of information;
Transport	: to achieve greater operational reliability of transport-vehicles; to reduce atmospheric pollution;

However, electronic components have made electronic technology what it is today, it is these components which form the basic building-blocks of the instrumentation which provide the desired assistance, and it is the demand for this assistance which has caused a regular, world-wide, shortage for well-designed and reliable components.

This " electronification" of goods and services has set the stage for the establishment of electronic industries in many of the developing countries where advantage could be taken of lower wage-rates, however, it is of interest to note that virtually all of these developments were started on the assumption that the required components would always be available in any desired quantity.

Nothing could be further from the truth. It is not uncommon that a number of developing electronic industries are experiencing hardships due to lack of components, which in turn, has hindered their plans for expansion.

The proposals put forward here, are aimed at correcting this situation.

Proposals

The complete list of electronic components covers many items, however, only a few of these have a very high rate of demand, and it is therefore these items which should be considered for manufacture in the first place.

(a). PRINTED CIRCUIT BOARDS and STRIPS:

types: - Single sided boards,
- Double sided boards,
- Flexible strips.

The manufacturing processes for these items are strongly labour-intensive. Training can be achieved within a modest period of time.
World-wide demand for these components is high and constant.

(b). RESISTORS:

types: - Carbon Film
- Precision
  Wire wound
- Metal Film
- Power
  Wire wound

The manufacturing processes for these items are moderately labour-intensive, as certain phases must be automated to obtain the close tolerances expected and demanded by end-users.
World-wide demand for these components is very high at any time and can be expected to increase.

(c). CAPACITORS - FIXED - :

types: - Plastic Film : polyester; polystyrene; polycarbonate;
- Ceramic
- Mica
- Tantalum Foil electrolytic
- Sintered Tantalum electrolytic
- Aluminium electrolytic

The manufacturing processes for these items differ from type to type, however each process has a moderate-to-strong labour-intensive component.
World-wide demand for these components is very high at any time and can be expected to increase.

Note:

At this point in time manufacture of variable capacitors is not considered interesting enough for developing countries, as world-wide demand is relatively low and can be met from existing sources.

Also, the manufacturing processes are rather costly to establish and are complicated, while substitutes are available which will cut the demand.

(d). INDUCTORS:

types: - Miniature RF : can be combined with resistor manufacture.
- Chokes : for low-frequency applications,
- Ballasts : for use with fluorescent tubes,
- Transformers : for use in power supplies , etc,
- RF Coils and RF Transformers.

The manufacturing processes for these items are strongly labour-intensive. Training can be achieved within a modest period of time. World-wide demand for these components, at present, is moderately high and constant.

(e). SEMICONDUCTORS:

These components are in great demand and this demand is constantly increasing. Unlike the above-mentioned "passive" components, semiconductors are "active" components and their manufacturing processes are very complicated and require great operator's skill and therefore involve long training periods.

In addition these manufacturing processes rely heavily on a fully developed support industry (i.e. special metals; special gases; ultra-clean water; ultra-clean surroundings; etc), which suggests even more strongly that this manufacture should not be attempted in developing countries until this infra-structure is available.

However, should this infra-structure be available, then manufacture could be considered for:

types: - low power diodes,
- low power, general purpose, transistors,
- low power, RF transistors,
- high power rectifiers,
- SCR's,
- power transistors.

With regard to IC's , LSI's and other special semiconductor devices it is recommended that the manufacture of these items be held back until the production of the standard units mentioned above shows that economical yields can be achieved constantly.

(f). MAGNETIC AUDIO TAPE and CASSETTES:

This item, in the true sense of the word, cannot be regarded as an electronic component, however it is associated with electronic technology and since there appears to be a great world-wide demand for these items and that demand is on the increase, it is mentioned in this list as a likely candidate for manufacture in developing countries.

The manufacturing processes involved are fairly simple and production costs are low, and these items therefore make for good export-potential, apart from satisfying local home-demand.

2. The technical assistance in this field, would be composed of the following two phases:

I-Phase- General Programming

Institutional support to the Asean Secretariat as preparatory xxxxxxxxx work for the general programming and specific project preparation,

promotion and implementation in respect of the electronic sectorial programme in the Asean Group

a) Techno-economic analysis and revision of existing studies related to the electronics industry of the sub-region (present state of art).

b) Determination of the availability of existing technologies at world level and future trends, with a view to selecting the most appropriate technologies for the Asean Group (particularly with respect to components to be allocated).

c) Determination of personnel requirements at production, engineering and management levels for the sub-region and recommendations for the preparation of training programmes.

d) Study on the availability of raw materials obtainable in the sub-region for the manufacture of electronic components.

e) Preparation, on the basis of existing market surveys of an updated market study containing demand projections for finished products and its components within the next ten years.

f) Preparation of specific industrial projects of similar technology products and components for allocation and complementation between member countries.

g) Programme of study tours for Asean Secretariat staff-members to Institutions and industrial enterprises in the electronics sector.

II Phase - Preparation, Promotion, implementation and supervision of industrial projects in the countries of the Asean Group

This phase would be initiated immediately after the approval of the corresponding sectorial programme by the Asean Group, and

would comprise:

a) Identification of the projects and planning the rationalization of the existing production in the member countries.

b) Identification and preparation of Techno-economic feasibility studies, including the financial analysis, as necessary for the implementation of the projects.

c) Preparation of specifications for international bids and analysis of offers.

d) Liaison with resources procurement activities for recommending financial and investment plans for the projects to be implemented.

e) Advise on the development of technologies, improvement of existing designs, standardization of projects, products and components and promotion of capabilities for indigenous design, research and development.

f) Assistance in the re-organization and rehabilitation of existing manufacturing industries, provision of trouble-shooting advice and improvement of production and maintenance and repair systems at enterprise and country levels.

g) Selection and utilization of machinery and tools and introduction of improved production techniques. Advice on the establishment and operation of testing and quality control facilities.

h) Fellowship programmes for nationals of member countries, in support of the implementation of individual industrial projects.

Description of Technical Assistance Inputs

I Phase

		US $
Sectorial Economist	8 m.m.	32,000
Electronics Engineer	8 m.m.	32,000
Short-term experts	10 m.m.	40,000
Consulting firm	7 m.m.	28,000
Study tour		5,000
		137,000

II Phase

Sectorial Economist	18 m.m.	72,000
Eletronics Engineer	18 m.m.	72,000
Production Engineer	18 m.m.	72,000
Short-term consultants	26 m.m.	104,000
Fellowships		36,000
Study tour		5,000
		361,000

ANNEX I

Sub-Regional Pilot-Plant for Mineral Beneficiation

1. For many long years, selective mining of high grade ores has been a common practice in Asean countries, with the result that reserves of high grade deposits have undergone rapid depletion. In view of the urgent necessity to fully exploit the mineral wealth, selective mining of indigenous ores needs replacement by mining methods which would prevent dumping of commercial low grade ores which could be economically upgraded.

2. It is only during the last decade or so, that the mineral industry in developing countries has become conscious of the necessity of beneficiating low grade ores. Some ore-dressing plants are effectively upgrading limestone, manganese ore, iron ore, coal etc. There are other plants that have been treating the ores of gold, copper, lead, zinc, etc. including the mineral rich black monazite sands. However, the scope for mineral beneficiation of indigenous ores as yet practically remains by and large untapped.

3. Mineral beneficiation is a process of separating valuable minerals from worthless gangue in low grade ores by physical or physico-chemical methods based on differences in specific gravity, hardness, lustre, magnetic susceptibility, electrical properties such as conductivity and surface properties, without destroying the identity of different minerals in any way. Grade of the concentrate to be obtained will depend upon various factors including the requirements and specifications laid down by the consumer metallurgical industry. Main objectives of an integrated pilot plant would be to obtain technical operational and economic data on mineral beneficiation cycles with a view to their implementation on industrial scale. The success (or failure) of such pilot plant trials determines whether

a particular ore treatment and beneficiation flow-sheet will find eventual industrial scale utilization.

4. For designing an industrial plant for ore treatment and beneficiation, data relating to technical feasibility and economic acceptability of the flow-sheet have to be evaluated after continuous pilot plant trials. Main objectives of this pilot plant would not be so much to lay stress on producing good grades of concentrate under optimum conditions, but to investigate the effects of variations of one or several of the variables such as, feed composition, feed rate, distribution, moisture content, external temperature, yield and recovery figures, tailing's loss etc. In other words, the overall economics and technical feasibility of the operational cycles would be examined not only under ideal laboratory conditions, but also under simulated prototype industrial scale trials. The personnel, who would actually operate the projected industrial scale beneficiation plant can also get excellent opportunities for advance training in co-ordinated functioning of constituent operations. In the absence of suitable pilot plant facilities for continuous trials of beneficiation processes, it is common practice to send heavy tonnages of ore samples for pilot plant investigations to overseas laboratories; this situation shall now be largely rectified by sub-regional availability of specialised facilities.

5. As there is no "off-the-shelf" general upgrading treatment scheme universally applicable to upgrade any type of ferrous and non-ferrous ore, systematic investigations on each type of ore have to

be undertaken individually. Whilst laboratory scale researches will specify the applicability of different beneficiation techniques vis-a-vis individual ore under study, commercial scale utilization of the beneficiation flow-sheet can only be determined on the basis of pilot plant scale trials.

6. The proposed pilot plant shall be equipped to carry out a large number of simple and complex research investigations to develop specific beneficiation techniques and of flow-sheets for up-grading different types of low grade ores. Exhaustive studies shall be directed towards beneficiation of low grade ores, particularly of manganese, iron and chrome limestone, graphite, pyrite etc. derived from different parts of the sub-region. It has been observed during the course of such investigations in other countries that many low grade ores are fully amenable to suit beneficiation techniques. Wherever research results have established the economic and technical feasibility of up-grading cycles, industrial scale flow-sheets have been worked out on the basis of which some important beneficiation plants have been installed in various countries, some illustrations of which are:

1. Iron ore treatment plants
2. Graphite ore-dressing plants
3. Fluorspar beneficiation plants
4. Iron ore sinter plants for steel plants
5. Beneficiation units for metallurgical flux quality limestone for steel-making
6. Copper-lead-zinc flotation plants
7. Copper flotation plants

7. In the case, however, of some low grade ores, classical ore-dressing techniques may not provide the full answer. In such cases applications of specialized techniques based on thermal beneficiation, hydro-metallurgical treatment etc. will need specialized research investigations.

Equipments and Facilities

8. The proposed pilot plant should be in a position to continuously treat any type of ore by classical ore-dressing methods including reduction roast treatments and agglomeration of concentrate fines. Different units of this pilot plant should have a minimum rated capacity of half a ton of stock feed or more per hour. The plant is to be divided into different sections such as (a) crushing; (b) washing and grinding; (c) reduction roast and low intensity wet magnetic separation; (d) heavy media separation (e) flotation; (f) gravity concentration; (g) thickening, filtration and drying; (h) electrostatic and high intensity magnetic separation and (j) sintering, briquetting and pelletising. In addition, other requirements would include a supply of electric power of the order of 750 kva as well as ample water-softening treatment facilities for flotation purposes.

9. Adequate facilities are to be provided at the pilot plant for preparing samples for sieve analysis, chemical analysis and petrological studies. The petrological section should have various types of petrological and ore microscopes, X-ray fluorescence analysis equipment; differential thermal analysis equipment, etc. In addition, continuous pH meter and recorder, automatic pulp density recorder and controller, oxygen analyser, CO/CO_2 analyser, multi-point temperature recorder, gas flow meters, flow rate indicators for water, etc. will be needed for plant operational

control. A dry grinding unit complete with cyclone separators and also a pneumatic shaking table should be installed for ores requiring dry treatment.

10. For example, for an ore like magnetite which can be upgraded by magnetic separation, the crushed ore is ground in a rod mill/ball mill to requisite fineness; the magnetic fraction would be separated from the non-magnetic fraction by passing the material through a drum belt type magnetic separator. If the ore required simple washing, as in the case of many iron ores, to eliminate adherent slimy fines containing a high presence of insolubles, it could be done by passing the crushed ore directly to a blade washer installed for scrubbing and wet screening. In addition, if the ore contains minerals possessing different specific gravities, gravity treatments based on jigs, Wilfley tables, Humphrey's spirals and heavy-media separation are brought.

11. If the ore requires straight flotation treatment, the crushed ore is ground in a ball mill operating on a closed-circuit system with the classifier to attain requisite fineness prior to flotation. For treatment of low grade ferruginous manganese ores, the iron minerals can be reduced to magnetite by passing the washed ore through a magnetising reduction roast kiln; the reduced ore is subsequently crushed and treated in magnetic separators. The pilot plant should also be equipped with two gas producers, a 15,000 cft. gas holder and facilities to agglomerate the finished products either in the form of pellets, sinter or briquettes.

ANNEX II

Shipbuilding and Repair

The Asean Secretariat requests the specialized technical assistance from UNDP for the purpose of receiving consultancy services and expertise for carrying out studies on a number of industrial branches, as directed by the recent meeting of Kuala Lumpur of the Asean Economic Ministers.

Within this context, the Secretariat will receive the services of a consulting firm to prepare a comprehensive study of the actual situation, future prospects and recommended course of development of the Shipbuilding and Repair Industry in the Asean Group. This study is intended to provide the Secretariat staff with the adequate information needed to programme this branch e.g. to allocate specific industrial activities in each member country within the particular frame of economic integration formed by trade liberalization schemes, product specialization (components and final products) and coordination of regulations and policies related to this particular sector.

A number of national studies for some member countries has been prepared which will be used as background material to the firm. The consulting firm is expected to fulfil the following tasks:

1. to agree with the Secretariat on a definite group of activities to be studied.

2. to collect and review all the existing information on policies and present status agreed upon the secretariat, directly or indirectly related to this field.

3. to prepare a detailed analysis of the existing shipbuilding and repair facilities in the area, which should include

   a) a survey in the main yards, their present activities and future plans (installed and

utilised capacities, equipment, personnel, technical capabilities, level of activity, marketing channels, etc.)

b) a general but comprehensive appraisal of the ancillary industries

c) a survey of existing heavy plate work facilities in the shipyards.

4. To prepare a rough estimation on the demand of new ships and repair services by main types and sizes of vessels for the next 10 years, taking into account the existing maritime traffic projections, which will have to be checked and completed by the consulting firms.

Special attention should be given to the oil, ore transportation and fishing activities, and the related fleets.

5. To prepare and recommend a coordinated development programme which should include specifically:

a) types of vessels to be built locally

b) levels of local and/or Asean contributions to the supply of raw materials, instruments, deck and propulsion equipment.

c) specialization recommended for existing facilities

d) general scheme for the regional activity in this field which should include alternative recommendations; if deemed possible and convenient, to specialize each country in specific types of construction and/or services or any other type of division of work and cooperation between countries and shipyards.

6. Effect on the proposed alternatives on the ancillary industries supplying the necessary raw materials, parts and services.

7. Estimated number of necessary new facilities up to 1987 for the alternative schemes proposed, new investments and personnel required, suggested locations, external and internal tariff levels.

8. Manpower, training and technologies needed.

9. General suggestions for the development of heavy plate work facilities for the manufacture of related products, such as

- Chemical and petrochemical equipment
- Railway equipment
- Boilers
- Structural Steel work

ANNEX III

Petrochemicals

Four member countries of the ASEAN Group, namely Singapore, Malaysia, the Philippines and Indonesia, have expressed interest in setting up petrochemicals production for the region. However, it was agreed by the ASEAN countries that careful planning is necessary in order to avoid duplication of efforts and unnecessary competition among the countries concerned. The following proposals involving possible UNDP/UNIDO assistance are made with the above in mind.

1. Establishment of Petrochemical Complexes in the Region

A feasibility study on "South-East Asia Petrochemical Complex" was carried out in 1970 and 1971 under the sponsorship of of ECAFE and the French Government with participation of UNIDO. The reports in four volumes were completed in May 1971 by BEICIP of the French Petroleum Institute. The study was mainly concerned with the possible raw material production in Singapore, the Philippines and Indonesia, but Malaysia was considered as a petrochemical consuming country only. However, with the recent discovery of petroleum and natural gas in Malaysia, the country has also a claim for raw materials production. These feasibility study documents are available at ESCAP under reference 30285, Vol. 1-4. It has also to be mentioned that the feasibility study was reviewed by the former UNIDO Regional Petrochemical Adviser, Mr. J.T. Shen (also available at ESCAP).

Suggestion for UNIDO assistance

We would suggest that UNDP/UNIDO assistance could be given to update the above feasibility study with the inclusion of Malaysia.

UNIDO's view at that time, namely in 1971, was that Singapore was the preferred location for the Regional Complex.

Reference should also be made to the project study of petrochemical industries for Thailand, DP/THA/72/140 (reference material available at UNDP office in Bangkok). However, owing to the rise of oil prices, it seems that the Government has delayed its decision in petrochemical development.

2. Exchange of experience with other Regional Groups in Petrochemical Development

UNIDO could arrange for representatives from the ASEAN Group to visit the Andean Group and the Industrial Development Centre for the Arab States (IDCAS). The recently signed Complementarity Agreement in petrochemicals by the six ANDEAN countries would be a very useful reference document for the ASEAN countries. A copy of the Agreement in Spanish can be made available to the appropriate petrochemical authorities in the ASEAN Group.

3. Establishment of Petrochemical Development Centres for the ASEAN Countries

These Centres would support the petrochemical and fertilizer industries in research, development, production engineering and pilot production, on a regional basis.

Interest has already been shown by Indonesia and the Philippines to host them. The assistance from UNDP/UNIDO would aim at preparing a precise proposal for the establishment of these Centres. Their implementation would be assured by the countries themselves, preferably with bilateral assistance.

4. Regional Centre for Plastics Technology

A UNIDO project DP/INS/75/020, Establishment of a Plastics Technology Centre at the Indonesian Petrochemical Research Institute, (LEMIGAS) is scheduled for implementation in 1977. Project details and project document are available at the UNDP office in Jakarta. This National Centre in Indonesia could have several sections for sub-regional co-operation with particular reference to the processing and use of plastics in low-cost building and in agriculture.

5. Regional Demonstration Plant for the manufacture of Synthetic Fibres

The UNIDO project at the Silk and Art Silk Mill's Research Association (SASMIRA) in Bombay, India, DP/IND/71/610, can be used as a model for a Regional Synthetic Fibre Demonstration Plant, possibly to be located at Singapore. A copy of the technical report by UNIDO consultants can be made available which contains full technical details, together with the objectives of the demonstration plant. It is suggested that a form of co-operation such as twinning or sister-institute arrangement could be made by UNIDO linking the SASMIRA project to the Synthetic Fibre Demonstration Plant to be established in the ASEAN Group. As a first step, UNIDO could arrange visits and consultations between the parties concerned. As the demonstration plant at SASMIRA is expected to be fully functional towards the latter part of 1977, study tours could be arranged for the ASEAN representatives at that time. This is in line with the recommendation of the Economic Ministers at their recent meeting in Kuala Lumpur.

6. Development of Rubber Products Industry

UNIDO is currently discussing with the International Rubber Research and Development Board concerning assistance in development of powdered liquid and thermoplastic natural rubber. It is also envisaged that the rubber research laboratories in Malaysia and its associate laboratory in England would also look into the question of expanded use of natural rubber for a variety of industrial and household goods. It is suggested therefore, that the ASEAN interest in natural rubber development seemed to be well covered in this proposed interregional project, especially for the fact that with the exception of the Philippines, all the other ASEAN countries are members of the International Rubber Research and Development Board, as well as its sponsor, the Association of Natural Rubber Producing Countries (ANRPC).

ANNEX IV

Standardization

The decisions taken by the meeting of Kuala Lumpur of the Asean Economic Ministers, involved an immediate allocation of four large industrial projects among its members.

The meeting also decided that an expert group be created in order to

a) review the industrial co-operation programme

b) examine the feasibility of establishing those four industries

c) study and propose allocations on a number of other industrial sectors.

These allocations will mean that a variety of final products will be traded among the Asean Member Countries. The standards up to which these products will be manufactured, should not vary from country to country so as to completely avoid disputes and ensure uniform and constant quality of the same products.

Furthermore it is envisaged that this mechanism of allocation will be accompanied by measures of complementation and specialization whereby basic raw materials, semi-finished products and components will be liberally traded among the member countries. This trade will not be possible if the quality and specifications are not the same.

The long range aim of the ASEAN Group in this line should be therefore to have common sets of standardization, quality control certification and metrology procedures.

This aim should be reached before the integration process is completed, so as to ensure that the traded products, semi-products, components and raw materials are manufactured to the same agreed standards.

Assistance in this field should comprise a preliminary survey of existing standardization, quality and measuring control procedures and bodies administering them. On the basis of the industries to be studied by the expert group and respective recommendations, and the survey above, a specific programme would be prepared to coordinate the following activities:

- A set of common general and specific standards
- Quality Control certification and testing systems
- Metrology (legal and industrial)

To the maximum extent, the existing institutions in the member countries, in this line would be used and their activities coordinated between each other.

ANNEX V

Selection of Technological Families for Manufacturing Operations in the Context of ASEAN Regional Co-operation

Principles

Most industrial sub-sectors are not self-sufficient. For the manufacture of most products, there are usually much more operations required than the terminal process might reveal. A number of basic materials and intermediate products as well as special components and standard engineering parts are, in their own turn, manufactured according to different technologies and in specialized manufacturing establishments. More important, these materials and components are, very often, common to a wider variety of final products; therefore a large network of linkages between numerous preparatory and terminal operations is thus essential.

The main lesson from these considerations is that economies of scale are particularly important when planning the manufacture of these intermediate materials and components; as a rule much more so than in the terminal operations where volume is less important. Therefore the cost/benefit analyses are much more essential for components and intermediate-materials manufacture, than for assembly or final operations, because scale economies obtainable from components manufacture effect a much more rapid cost reduction than from assembly operations in the same range.

One of the principle advantages of regional co-operation is constituted in the fact that manufacturing operations can be concentrated on a smaller number of larger units, thus improving the benefits over cost. Furthermore, the establishment of certain capital- or skill-intensive manufacturing processes can only be envisaged on an efficient basis if a larger regional rather than a limited national market is aimed at.

The studies for allocation and/or complementation for different sectors can be done by pursuing different political or economical mechanism, and the mechanism of allocation in technological families is hereby explained as a model applied for a group of machinery.

Example

The major group 382 of ISIC involves the manufacture of engines, turbines, agriculture machinery and equipment, metal and woodworking machinery, special industrial machinery, and others.

On first analysis, an allocation of the different types of machinery among member countries, might be sufficient. This way, one country would get agricultural machinery, the other certain types of machine-tools, still another turbines or office machinery, etc. etc.

However, when looking in depth into each of these products, one can differentiate a large number of basic and intermediate materials, components and standard parts which are common to most of these products, in varying degree. The list is too long to enumerate here but illustrative cases are the following:

machine bases

gear transmissions

electric motors and switches

electronic modules

hydraulic systems

fabricated structures

These components can be grouped in packages of similar technological manufacturing processes or technological families, such as castings, forgings, precision machining, electronics, among others.

Some of them pose no problem in their manufacture, do not need significantly high skills or volumes of production for effectiveness and can be considered on a purely national basis.

However, others, because of their high level of technology (e.g. - numerically controlled machining) or high capital intensity, (e.g. - modern foundries) should be envisaged for larger markets and therefore on a sub-regional basis.

Therefore, the first issue to be tackled would forming several families, as described above, for allocation to stipulated member countries. A suitable programme of complementation/specialization has to be studied from various angles in order to ensure that the correct mix of components is produced and that all participating countries get benefits commensurate with their shares both in investments and markets.

Naturally, each industrial sub-sector has to be carefully studied on its own, to investigate and quantify the optimal "dosing" of the three mechanism, i.e. allocations, complementation/specialization and/or tariff schemes.

Description of technical assistance proposed

The methodology described above can be applicable to a number of the sectors to be studied by the Asean Secretariat (Automotive Industries, Machine-Tools, Electronics).

The purpose of this project is to introduce this methodology in the member countries through direct consultations at the working and the policy level. The methodology drawn up above would be carefully explained both in its principles and practical application, drawing experience from other integration exercises where it has been successfully applied.

The mission would conclude with a workshop to take place in the Asean Secretariat, with participants from governments and industries of the member countries, for detailed discussions on the findings of the mission with the aim to draw up an action programme for selected sectors and/or projects.

One Senior Adviser	6 m.m.	US $ 24,000

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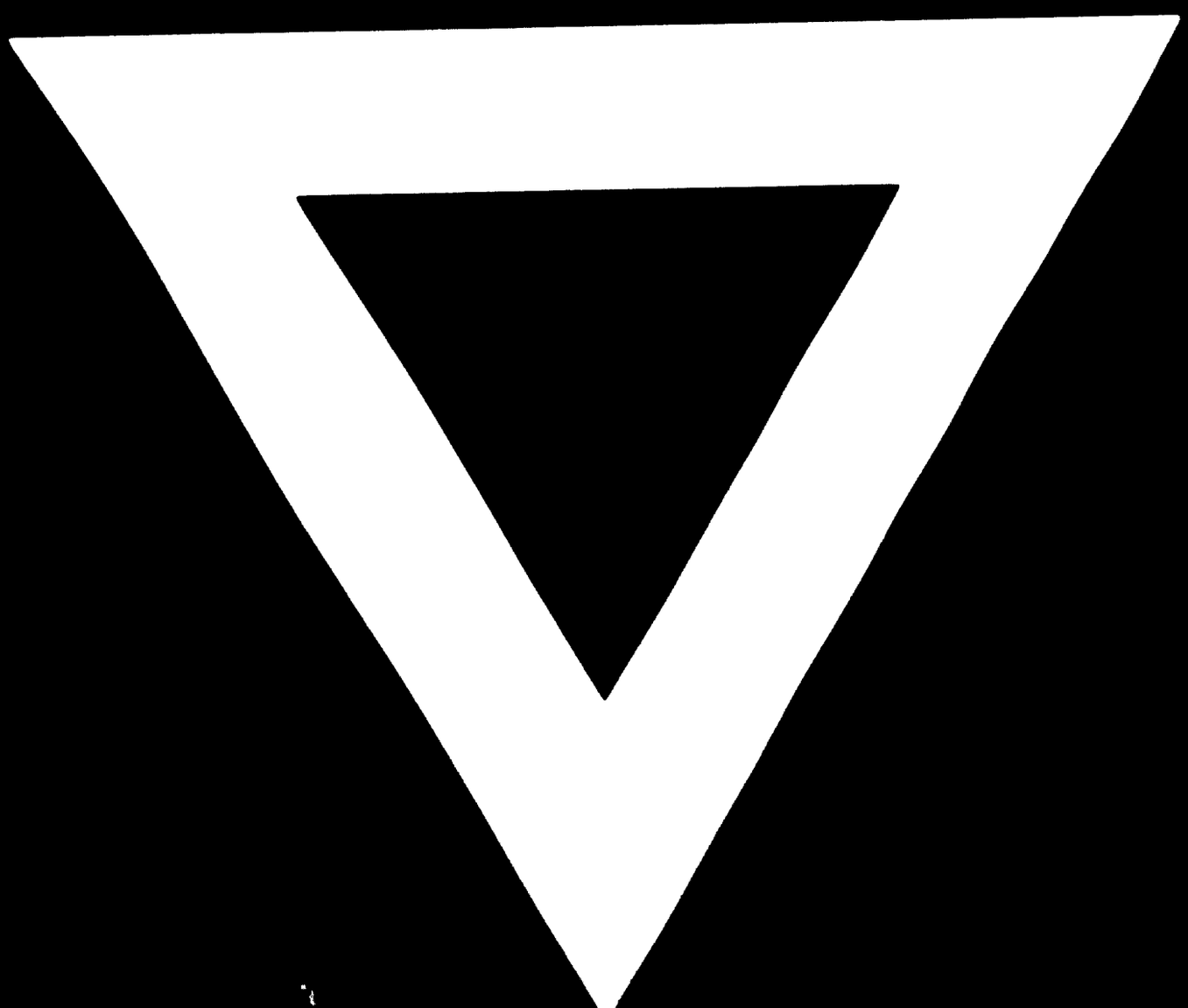

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