



TOGETHER
for a sustainable future

OCCASION

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



TOGETHER
for a sustainable future

DISCLAIMER

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

FAIR USE POLICY

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

CONTACT

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

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

Restricted

20608

August 1993
English

OLEOCHEMICAL AND SURFACTANTS
US/INS/90/010

INDONESIA

Final report

PART II

Project document: Workshop on Integrated Development of the
Chemical Industry

Prepared for the Government of the Republic of Indonesia
by the United Nations Industrial Development Organization

by

JSRD experts Dr. J.A. Kopytowski (team leader)
Dr. M. Zebrowski and Dr. W Ziembla

Backstopping Officer: E. Puerto Ferre
Chemical Industries Branch

United Nations Industrial Development Organization

Vienna

UNITED NATIONS DEVELOPMENT PROGRAMME

**Project of the Government of
the Republic of Indonesia**

PROJECT DOCUMENT

Title: Workshop on Integrated Development of Chemical Industry

Number: ... /INS/93/---/A/01/37

Duration: Five months

Sector (Govt. Class.):
Industry

(UNDP Class. and code):
Industrial Development Services
0510

Sub-sector (Govt. Class.):
Chemical Industry

(UNDP Class. and code):
Industrial Development
510

Government Implementing Agency: Ministry of Industry
Department of Basic
Industries

UNDP and cost-sharing financing

UNDP

IPF \$

Other

Government

Total

US \$ 144,000

Executing Agency: Industrial Development Organization (UNIDO)

Estimated starting date: January 1994

Government inputs: Rupiahs 520,000 (in kind)
(local currency)

Brief description: The project is intended to transfer modern, computer aided methodology for the integrated development and investment project priority selection and to establish a set of correct local policies for the chemical industry in Indonesia. It is to be achieved through transfer of software, intensive training and cases analyses. This will allow to use the methodology and supplementary technological information in further planning exercises by Basic Chemical Industries Department in preparation of Repelita VII in selecting the priority business opportunities for the local and foreign investors in the petrochemicals down-stream processing operations.

Signed:

Date:

Name:/title

on behalf of the Government

on behalf of the Executing Agency

on behalf of the UNDP

Part A. Context

1. Description of subsector

Indonesia is one of the South-East Asian countries becoming a candidate to the group of NICs (Newly Industrialized Countries). The country fulfills all necessary conditions for industrial development and can be characterized by:

- large scale local market allowing for establishment of economic size installations;
- abundance of hydrocarbon resources;
- abundance of natural resources of agricultural origin;
- stable and advantageous system attracting foreign investments;
- satisfactory infrastructure and well established banking system.

However, this "embarrass de richesse" poses high responsibility on shoulders of decision makers. The options for development are not obvious, and selection of investment projects priorities requires numerous studies and neutral assessment. On the one hand it could be advantageous to follow the established way of development of the petrochemical industry and add more value to the hydrocarbon resources. However, on the other hand agriculture employs over 50% of the population and introduction of agro-products processing industrial structure may have positive impact on the increase farmers income as well as on the industrialization process. The selection of the most advantageous option is also important from the point of view of international competition.

The export promotion strategy initiated in 1983 may bring positive results in the long term only when commodities will be produced accordingly to the modern technology and competitive in terms of used raw material and manpower costs.

One obvious candidate for project selection priority exercise is the branch of surfactants and detergents. All the natural raw materials exist in Indonesia and could be processed to high value added products for local consumption and export. However, the development of the petrochemical industry gives also opportunity to follow this line of development, but using petrochemical transformation technologies.

The Indonesian development strategy as many of South-East Asian (SEA) countries primary was import substitution oriented. In decade of 70-ties Indonesia denoted high rate of the economic growth that was largely fueled by crude oil extraction and exports. Just before 1980 the oil sector contributed about one quarter of GDP, over 60% of Government revenues and about 80% of merchandise export. However, owing to the following oil price decrease and rapid growth of interest rates the cost of debt service increased quickly and negative growth has been recorded. Following the drastic policy measures like devaluation of rupiah, cutting subsidies and postponing the development projects and liberalization of foreign trade, equilibrium of economy has been regained and in 1985 positive GDP growth was restored. Important reforms has been enacted in tax and other financial fields.

However, in 1986 oil prices again dropped and US dollar was depreciated against other major currencies which intensified again Indonesia's debt service problem. Again policy measures has been enacted, like rupiah devaluation, Government budget cuts and positive change to export promotion policy has been denoted. In 1987 export bans and quotas as well as import control of about 400 commodities has been removed and abolishment of export licenses was undertaken. Also positive changes promoting capital inflow in the investment law were enacted. During last years Indonesian economy grew slightly over 6% per year reflecting increasing investment in Indonesia in the field of textile and civil construction. The low cost and abundant supply of labour in Indonesia are attracting lot of investment in labour oriented industries such as textiles.

Having in mind that any macroeconomic data have value in relation to similar parameters of other countries, below information is given for several SEA countries. Historical trend of the results of the export oriented strategy of development applied in SEA countries is also presented:

Table 1 Economy transformation features in SEA countries

Country	GDP growth (1965-1990) % per year	Contribution of industry to GDP in %		Ratio in world exports %		Trade balance US \$ million	
		1978	1990	1978	1990	1975	1990
Indonesia	6.3	9	14	0.03	0.24	2333	5969
Korea Rep.	9.3	24	30	0.78	1.97	-2193	8885
Malaysia	6.6	17	19	0.18	0.37	277	4559
Philippines	4.1	25	25	0.12	0.21	-1482	-1596
Thailand	6.7	18	21	0.11	0.27	-903	-3499
Taiwan Pr.	9.0	38	43	0.87	1.95	-643	10739

Source: Global report UNIDO 1992/1993
UNCTAD Handbook of International Trade and Development
Statistics, New York 1991

The data indicate healthy economic growth and efficiency of export promotion strategies. Indonesia still has a low contribution of industry to GDP and lower than expected ratio in world export. The data on actual (1990) economic situation are given in table 2.

Table 2 Macroeconomic features of the SEA countries development (1990)

Country	Population mln	GDP per capita US \$	MVA(3) US \$	Ratio of export to GDP %	Ratio of investment to GDP %
Indonesia	180.5	728	70	6.9	36.9
Korea Rep.	43.6	3559	2103	35.9	37.0
Malaysia	17.2	2422	510	22.6	32.3
Philippines	62.5	670	116	10.1	22.5
Thailand	55.6	1221	427	9.0	36.8
Taiwan Pr.	20.3	4277	2730	50.8	22.4

Source: Global report UNIDO 1992/1993
Macroeconomic Structural Issues in the Asia-Pacific Economies

Indonesia among the SEA countries has largest population, nearly equal to the total of other mentioned countries and nearly lowest GDP per capita and manufacturing value added. However, owing to the needs of export promotion, rupiah is undervalued and GDP per capita expressed in terms of purchasing parity power is about 3 times higher than expressed in terms of official rate of exchange. Similar situation has been observed in Korea Rep. and Taiwan Pr. in early seventies.

Large rate of investment in the GDP and economic growth rate shows that Indonesia has taken part in competition to become the next NIC in the region.

It is obvious that strategy of development imposed certain pattern on the selection of the technologies. Countries with high rate of manufacturing export must aim at the advanced technologies. The qualitative assessment of the features in technology status quo in SEA countries is given in the table below.

Table 3 Technology development level in SEA countries

Country	Technology pattern			
	Raw materials oriented	Labour oriented	Capital oriented	Science oriented
Indonesia	++	++	+	-
Korea Rep.	-	+	++	++
Malaysia	+	++	+	+
Philippines	+	+++	+	-
Thailand	+	+++	+	-
Taiwan Pr.	-	+	++	++

Source: Global report UNIDO 1992/1993
Macroeconomic Structural Issues in the Asia-Pacific Economies

Remark: Number of positive signs shows intensity of the technology applied

Following the world economic situation is very difficult to forecast future development of economies in SEA countries. However, taking into account large scale Asian market, local natural resources one can project positive growth of economies in SEA countries and in particular in Indonesia. The macroeconomic projection of the development by the year 2000 is given in table below.

Table 4 Macroeconomic projection of the SEA countries development by the year 2000.

Country	GDP growth % per year	Population growth % per year	GDP per capita US \$ a/	MVA (3) per capita US \$ b/
Indonesia	6	1.5	1128	270
Korea Rep.	7	1.1	6280	4000
Malaysia	7	2.1	3847	1000
Philippines	5	1.9	903	225
Thailand	8	3.8	1820	800
Taiwan Pr.	6	1.3	6702	4600

Source: Global report UNIDO 1992/1993 and own consultants' calculations

Remark: a/ in 1980 prices b/ in 1990 prices

For Indonesia there are the following targets of industrial development for the decade of 90-ties:

- to overpass the level of US \$ 1200 of GDP per capita;
- to increase the export ratio to GDP to 15%-18%;
- to increase the ratio of manufactured products in total export to 55%-65%;

The parallel usage of agricultural and mineral resources should be promoted taking into account importance of the agro-industries for well-being of over 70% of population as well as the price dumping of petrochemical products on SEA countries markets by industrialized world.

The particular figures in tables are given in values obtained through recalculation from national currency using official rate of exchange. However, for some countries, especially in South-East Asia, the GDP expressed in US \$ and derived from Purchasing Power Parity are much higher than obtained through official rate of exchange. This phenomenon is observed in cases when export promotion policies lead to under evaluation of local currency and accordingly with social policies of Government prices of food, energy, etc. are in a realistic way reflecting purchasing power of the society. Below are given the data for SEA countries taking into account PPP as a multiplier.

Table 5 GDP value of SEA countries in terms of PPP
(1992)

Country	GDP in US \$ billion		Difference
	at rate of exchange value	at PPP value	in %
Indonesia	120	510	425
Korea Rep.	300	380	127
Malaysia	54	130	241
Philippines	53	155	292
Thailand	102	320	314

Source: World Economic Outlook, IMF 1993

The projections of local consumption should be rather correlated to the PPP equivalent because prevailing statistical data of industrialized countries are given in PPP values, which in their cases are nearly equal to the values received through rate of exchange.

Chemical industry in SEA countries and in Indonesia in particular is not considered a locomotive of development. All countries denote large deficit in the trade in chemicals and production per capita is lower than expected taking into account GDP per capita level. The chemical industry in SEA countries has been established through:

- investments promoted and sponsored by the Governments;
- joint-venture investments;
- by endogenous investment from trade capital savings.

The basic features of the chemical industry in SEA countries are given in the table below.

Table 6 The pattern of the chemical industry in SEA countries (1990) a/

Country	MVA (351+352) ratio in manufacturing in %	Export per capita in US \$	Import per capita SITC 5 US \$	Trade balance SITC 5 US \$ M
Indonesia	7.6	5.3	1.2	-1789
Korea Rep.	8.8	185.5	26.4	-3291
Malaysia	11.3	57.5	12.2	- 798
Philippines	13.1	15.2	2.8	- 868
Thailand	8.0	4.7	1.9	-1692
Taiwan Pr.	9.7	264.2	67.7	-2301

Source: Global report UNIDO 1992/1993 and own consultants' calculations

Remark: a/ in current prices

Indonesia has clearly underdeveloped chemical industry and

taking into account that all modern products are composed or connected in production process with consumption of chemicals the need for the strong Government promotion of this industry is obvious and urgent.

The weakness of the chemical industry in Indonesia can be illustrated also by the structural composition of this industry. The data on SEA countries are given in the table below.

Table 7 Chemical industry structure in SEA countries

Countries	Chapters of SITC					356
	351	352	353	354	355	
	in % of the total chapter SITC 35					
Indonesia	15.9	15.0	55.9	.	9.1	1.1
Korea Rep.	22.3	25.1	18.9	5.1	16.1	12.5
Malaysia	49.8	12.1	11.0	1.6	18.1	7.4
Philippines	12.7	21.1	58.9	0.1	4.4	2.8
Thailand	14.4	31.1	30.9	1.9	14.2	7.5
Taiwan Pr.	22.9	24.4	40.1	0.6	4.6	2.4

Source: Global report UNIDO 1992/1993 and own consultants' calculations

To adjust structure of the chemical industry to the pattern (351) 19%, (352) 20%, (353) 43%, (355) 11% and (356) 8% which may be considered as adequate to the level of Indonesian economy development, it would be necessary to invest about US \$ 1,750 million.

The performance of the chemical industry and consumption of selected groups of chemicals in the SEA countries and in particular in Indonesia is given in the table below.

Table 6 Performance of the chemical industry in SEA countries

Variables	Unit	SEA		Indonesia		% by the year 2000
		1990	2000	1990	2000	
Production:						
- ethylene	Kt		6200		550	8.9
- propylene	Kt		3000		300	10.0
- benzene	Kt		2000		120	6.0
- p-xylene	Kt		2000		270	13.0
- PE	Kt	2100	4300	-	700	16.3
- PP	Kt	1300	2700	20	345	12.8
- PS	Kt	1200	1700	23	53	3.2
- PVC	Kt	2350	2850	175	215	7.5

Table 9 Consumption of chemicals in SEA countries

Variables	Unit	SEA		Indonesia		% by the year 2000
		1990	2000	1990	2000	
Consumption:						
- detergents						
-- kg/capita			5.6	3.0	4.0	-
-- Kt			2600	540	850	32.7
- cosmetics						
-- US \$/capita				18.2	22.5	-
-- Kt			12500	3700	4600	36.7
- paints & lacks						
-- kg/capita				0.8	3.0	-
-- Kt			2950	144	630	21.4
- engineering plastics						
-- kg/capita				0.1	0.3	-
-- Kt			1220	18	65	5.3
- textile additives						
-- Kt		970	1052	127	270	25.7

These data are showing expected development direction in a quantitative way by the year 2000. To develop packages of industrial policies active for a longer period of time there are necessary qualitative assessment of the options in each branch of industry as well as consideration of constraints of development. The combined matrix may show the priority areas as well as add to the selection of package of policies supporting the development of the oleochemicals industry at later stage of this analysis. The options and constraints are given in following tables.

Table 10 Options of the chemical industry development in SEA countries

Products Countries	HTP	EP	SF	SUR	P&L	PCh	TCh
Indonesia	+++	+	++	+++	+	+	+
Korea Rep.	+++	++	+	++	+++	++	+
Malaysia	+	++	+	+++	+	++	++
Philippines	-	-	+	++	+	-	-
Thailand	++	-	+	+	++	++	+++
Taiwan Pr.	+++	+++	++	+	+++	++	+

Source: Global report UNIDO 1992/1993
 Macroeconomic Structural Issues in the Asia-Pacific Economies

Table 11 Constraints of the chemical industry development in SEA countries

Constraints Countries	PS	IS	LE	LCE	E&TL	FCP	EC	DS
Indonesia	+	++	-	++	+	+	+	+
Korea Rep.	+	+++	+	++	++	+	++	++
Malaysia	++	++	-	-	+	++	+	-
Philippines	-	-	-	-	+	+	-	-
Thailand	+	++	-	-	+	+	-	+
Taiwan Pr.	+++	+++	++	++	+++	+++	++	-

Source: Global report UNIDO 1992/1993
 Macroeconomic Structural Issues in the Asia-Pacific Economies

Therefore, there are development opportunities for Indonesia in the chemical industry, taking into account socio-economic priorities to use available raw materials (crude oil, natural gas, minerals), options on the scale of the national and regional market, as well as availability of graduated engineers.

2. Host country strategy

Strategic priorities in the manufacturing sector of Indonesia are related to the high rates of the economic growth and strong export promotion. The state promotes the recovery and expansion of the economic infrastructure, encouraging the technological revalorization. Large part of the GDP will be invested in the future years therefore the big efforts are made to coordinate investments ensuring maximum efficiency. For Indonesia there are the following targets of industrial development for the decade of 90-ties:

- to overpass the level of US \$ 1200 of GDP per capita;
- to increase the export ratio to GDP to 15%-18%;
- to increase the ratio of manufactured products in total export to 55%-65%;

The parallel usage of agricultural and mineral resources should be promoted taking into account importance of the agro-industries for well-being of over 70% of population as well as the price dumping of petrochemical products on SEA countries markets by industrialized world. Chemical industry is one of subsectoral priorities with special emphasis on the development of the down-processing operations of the available raw materials and commodities (e.g. fine chemicals). Indonesia started the programme of self-reliance in the basic chemicals and technological development, local know-how improvement as well as full investment scheme independent implementation.

Indonesian Government has established industrialization targets for the Repelita V national plan and in particular for basic chemical industries:

- growth rate 13% per year;
- export of manufactured products 1.2 US \$ billion;
- employment of 35,000 people;
- total investment of US \$ 5.6 billion.

Priority sectors in organic chemical industry are the following:

- up-stream petrochemical industries (olefines and aromatics);
- pulp and paper industries
- rubber goods and tire industries;
- agro-based chemical industries:
 - oleo chemicals based industries;
 - cassava and molasses based industries.

The growth of production and diversification of range of products is an evidence of healthy economic environment in Indonesia for the natural resources processing. Through the reasonable custom duties regulations, Government keeps the local industry competitive and export oriented.

Implementing the plans of the chemical industry development, investment projects were selected by making comparisons of the preselected feasibility studies and also advisory services of the international consulting companies as well as using the UN system organizations.

Following the strategic priorities of the complex industrialization, further development of the chemical industry is envisaged as providing important inputs for other subsectors and sectors of the national economy like agriculture, energy production and efficient consumption, as well as engineering subsector development.

To ensure more comprehensive integration of the local raw materials with the consumers market at efficient economic terms, planning national organizations are looking for the modern methodology of the development programming. It means, that now it is more important to investigate and compare all potential options of future demand-supply balance and adapt to their requirements future production programmes, taking into consideration the linkages to the existing efficient production structure, raw materials basis, and investment and human resources availability, than to implement an "attractive", dispersed programme in a given industrial branch or an individual feasible project.

Constraints on energy supply, the qualified staff availability, import substitution component of the programme, establishment of the strategic structure etc. are a few of the variables where the impact should be investigated when the final structure of the chemical industry is to be decided upon.

3. Prior and ongoing assistance

Prior and ongoing technical assistance is related to the level and sophistication of the country industry. Technical assistance projects are mainly developing high quality

products/technologies and/or establishing a self-reliant Research Centres and engineering institutions. Several projects are related to the techno-economic evaluations of the specific investment projects (opportunity and feasibility studies). During the last years projects supporting the strategy development and policies establishment to specify priorities in the chemical industry development process were not implemented except the study on "OLEOCHEMICALS AND SURFACTANTS".

4. Institutional framework for subsector

The basic mandate for the preparation of the development plans, strategies and respective Government policies is given to the Ministry of Industry. The MOI is also using self-financing organizations like engineering companies, research national institutions to evaluate prospective projects of chemical industry development, before their submission for the approval and promotion

However, the main strategy is to attract the private financial funds from inside and outside the country and for this purpose special policy measures need to be established for the promotion of the most efficient and well integrated projects within the national economy. The Department of Basic Chemical Industries has been selected as the counterpart organization to prepare the optional programme of the basic chemical industry development. The representatives of the Manufacturing Associations would be also involved, as well as the specialized faculties of the Universities and public R&D organizations (e.g. Center for Research and Development of Industrial Design and Engineering-CRDIDE at Pekayon).

Part B. Project justification

1. Problem to be addressed; the present situation

Development planning of the chemical industry in Indonesia, has an established procedure, by classical instruments. The overall country macroeconomic studies indicate the structural deficiencies and give guidance towards the rational decisions on the priorities in the project-by-project procedures.

Methodology of the feasibility studies preparation, using a modern computerized evaluation system was implemented several years ago and is permanently improving the system of the decision making in the new investments.

However, as stated above the need for quick development of the petrochemical industries, requires constant selection of the projects and evaluation of their competitiveness. Practice of "project-by-project evaluation" through the opportunity studies and consequent feasibility assessment is very costly, as each fully fledged feasibility study may cost from US \$150,000 to US \$500,000. This procedure only proves that at the existing market conditions the proposed project with a certain flexibility meets the economic and financial requirement of the investors. However, it is impossible to answer the question, if other more profitable products could be made using the same resources of raw materials, energy and manpower, not necessarily repeating the other petrochemical centre production profile. To investigate all options of the down-stream petrochemical products processing for the size of the Indonesian market (at least 400 products should be considered) would cost for each petrochemical centre from US \$600 million to US \$ 2000 million.

It is obvious that expenditures of this size cannot be considered and only very standard projects are proposed (e.g PVC, phenol) and approved not necessarily at the best location or structure composition.

Therefore application of the modern computerized system for the integrated evaluation of the development of the industrial complexes and project priority selection may save not only unnecessary expenditures on unfazed, or less profitable projects, to the value of millions of US dollars, but also adapt better the petrochemical processing options to the local industry pattern (e.g leather and shoes industry, wood and furniture industry chemicals demand) considering other constraints on energy or raw materials availability. Otherwise, the commodities produced in Indonesia will be exported to other states and abroad, but complementary chemical products for the local needs of other manufacturing industries will be imported at not necessarily advantageous market conditions and not the best adapted quality.

There are no local capabilities which may allow to develop such a kind of computerized system. However, as the requirements of development programming in the integrated manner were taken into consideration by the applied scientific organizations, as well as by the multinational companies, several years ago, there exists a possibility of the valuable know-how transfer at a moderate cost. Developed computerized models, supported by the technological data base using mono- and multi-criteria optimization, allow preliminary selection of the most suitable projects and simulation of the results of decisions at the different market and policy conditions.

2. Expected end of project situation

The aim of the workshop is to transfer knowledge and theoretical as well as practical skills and abilities to executive officers and experts working in the field of planning and development of various industrial and governmental bodies, especially those dealing with all branches of the chemical industry.

The representatives from the Department of the Basic Chemical Industries, Manufacturing Associations and Polytechnical universities are considered for the participation in the workshop.

It is expected that after the workshop and using the transferred software all parties involved will improve multi-alternative evaluation of the project priority selection, taking into consideration the linkages to the existing efficient production structure, energy constraints, raw materials basis, and investment and human resources availability. This will allow to formulate more comprehensive policies supporting development of the chemical industry in Indonesia.

As stated in the project outputs the software needed for the integrated planning will be transferred, and a selected group of planners will be trained in scenarios formulation, policy criteria establishment, simulation procedures application and results of comprehensive plan interpretation, leading to selection of priority projects in a format allowing decision makers to assess ways and means of development. In the week following the workshop, current case studies will be developed and assistance in preparing set of promotional proposals for further local industry development will be given. One of the important project impacts will be the integration of the decisions of planners from Government, private industry and development bank, who will have the same concept, and advanced tools to evaluate and implement the best possible development policies.

3. Target beneficiaries

The target beneficiaries will be Manufacturing Associations representatives, Government officials involved in the investment decision making process as well as private and public enterprises which will receive comprehensive packages of

policies enhancing the industrialization process, but taking into consideration options and constraints on the environment, energy, at different goal functions (profit, ROI, social benefits etc). Immediate recipients of the technical assistance will be economists, technologists and industrial planners participating in the workshop.

4. Project strategy and institutional arrangements

Project activities will be divided into three stages:

- Preparation of the data base using available UNIDO technological profiles of the petrochemical processes.

This will be prepared by experts during their two weeks mission in Vienna.

- Workshop, which will be carried out in Jakarta for 15-16 participants.
- Study of the optional development opportunities which will be developed just after the workshop with the assistance of international experts. This will be also testing the local capabilities in application of the data bank and operate computerized system.

The scope of the workshop is based on two interacting, parallel streams of activities:

1. A number of lectures; an active participation and exchange of experience is an essential factor.
2. A number of case studies dealing with the methodology supported by the computer simulation of the selected models. Participants during the theoretical seminars and case studies will follow a complete course of actions such as:
 - Problem identification and description
 - Programme buildup
 - Programme verification and constraints selection
 - Selection of optimum results
 - Preparation of the final reports.

The lectures play a supporting role and are aimed at supplying theoretical and methodological knowledge step by step, following the progress participants make in the course of completion of each case study.

The strong assumption behind the programme of the course is that it covers all types of chemical industry, i.e. branches are selected in such a way so as to assure training and access to experience stemming from a variety of options in industrial development, which is so essential in the case of the chemical

industry. The approach assumes a variety of industrial problems to be tackled through the different experiences and attitudes and abilities of the participants supported by the well established methodology and experience of the team of lecturers.

The methodological core of the workshop is based on methodology developed and applied in real life projects.

The methodology may be called MIDA which stands for Multi-objective Interactive Decision Aid.

The MIDA methodology uses as its tool a so-called Decision Support System which is a computer package developed for decision support and analysis for integrated development programming at the changing conditions of the internal and external economic situation.

MIDA is based on the theoretical background of the integrated planning and is conveyed to participants via the following topics:

- How programming of the development is placed between macro- and micro-economy, and enters on the level of intermediate (cluster) economy as an instrument for project priority selection;
- Decision problems formulation;
- Overview and the modelling of the chemical industry, saying what is specific in specific branches;
- Constraints and goals formulation;
- Multi-objective problem solving;
- Simulation of the alternatives and chemical industry optimal structure identification;
- How to formulate the development programme;
- How to link the results to the feasibility investigation of the individual projects and corporate planning.

With the above theoretical and methodological background, three case studies are foreseen:

- One product, different feedstocks production chain case;
- One raw material, multiple products network case;
- Complex processing technological network case.

For each case study a specific issue of MIDA methodology is devised and relevant methodology will be exercised by participants starting from the goal formulation, development thesis formulation, quest for concordance between available resources and technologies, optimization-simulation exercises, ending with the reporting of results. Several tradeoffs between different production resources, environmental protection and transportation of materials will be also investigated.

Duration of each lecture will be 2x 45'. For the discussion another 90' will be provided. Symposium will be held

at the MOI for ten days in the two sessions: morning 9:00-12:00 and afternoon 13:00-16:00. The Aide Memoire will be distributed at least one month before the Workshop leaving necessary time for registration of the participants. Language of the seminar will be English. Having in mind efficient communication, if necessary, simultaneous translation should be ensured. Workshop programme is attached as Annex II.

5. Reasons for assistance from UNDP/UNIDO

In several technical assistance projects to the developing countries UNIDO has shown the utility and usefulness of the integrated development programme preparation e.g for Iran, Algeria, China - Shanxi province, Brazil - State Rio Grande do Sul) .

The classical means and forms of the planning cannot meet today's requirements and cannot consider the influence of quickly changing economical parameters of the development programme. Taking into consideration the future size and the complex structure of the Indonesian Chemical Industry, the methodological assistance is considered satisfactory for the needs of the local planners.

6. Special considerations

None

7. Coordination arrangements

The coordination of the project will be carried out by MOI, Department of Basic Chemical Industries with the assistance of CRDIDE, which will take the responsibility of the national counterpart organization. The preselection of the participants, workshop organization will be supervised by the Department of Basic Chemical Industries, which will give the necessary authority to CRDIDE.

8. Counterpart support capacity

CRDIDE is the public enterprise responsible for the development of the methodologies of design and engineering as well as is involved in practical execution of investment projects.

They have the necessary staff to organize the workshop, and also facilities to carry it out. Also CRDIDE has already developed computerized systems of individual project evaluation, therefore the group of specialists in informatics can absorb new software and take care of further training and dissemination.

Part C. Development objective

The development objective to which the project is related is to promote the chemical industry development in the Republic of Indonesia.

Part D. Immediate objective(s), outputs and activities

1. Immediate objective 1

To provide the methodological assistance in the formulation of the policy measures related to the development of the chemical industry

1.1. Output 1

Methodological papers on the integrated chemical industry development (lecturers handouts, guide and manual).

Activities for output 1 To be completed by:

- | | | | |
|--------|--|-------|---|
| 1.1.1. | Recruitment of the experts | month | 2 |
| 1.1.2 | Preparation of the papers | month | 3 |
| 1.1.3 | Implementation of the methodology | month | 4 |
| 1.1.4 | Preparation of the final methodological guidelines | month | 4 |
| 1.1.5 | Preparation of the final workshop report | month | 5 |

1.2 Output 2

Computer software for the future project priority selection.

Activities for output 2 To be completed by:

- | | | | |
|-------|--------------------------|-------|---|
| 1.2.1 | Preselection of software | month | 2 |
| 1.2.2 | Purchase of software | month | 3 |
| 1.2.3 | Operation of software | month | 4 |

2. Immediate objective 2

To train 15 engineers and economists from Government institutions and manufacturing associations

3.1 Output 1
Trained 15 engineers and economists prepared to develop policy measures and elaborate on programmes of the development of different branches of chemical industry.

Activities for output 1 To be completed by:

3.1.1	Preparation of the Aide-Memoire	month	1
3.1.2	Nomination of the participants	month	2
3.1.3	Workshop	month	4
3.1.4	Preparation and distribution of the final workshop report	month	5

Part E. Inputs

(a) Government Inputs

National staff

- a) National Project Coordinator
- b) Secretarial and administrative support (3)
- c) 15 engineers and economists to be trained
- d) Two computer systems (Annex III)

Other national inputs

a) In kind:

- 1) Cost of the conference facilities and presentation equipment (overhead projectors, slide projectors etc).
- 2) Cost of reproduction of all materials distributed to the participants during the workshop
- 3) Cost of the salaries and daily subsistence allowances for the participants during the workshop

(b) UNDP/UNIDO Inputs

International staff

<u>Post</u>	<u>Title</u>	<u>total m/m</u>
11-50	International consultants:	3 3/4
11-51	Industrial Technologist	1
11-52	System analyst	1
11-53	Informatics engineer	1
41-00	Expendables (software)- list attached - Annex II	
42-00	Non-expendable equipment - Annex II	
51-00	Miscellaneous	

Skeleton budget

Budget line	Unit	Amount	Cost US \$
BULI 11-50 International experts	m/m	6	72,000
BULI 16-00 UNIDO staff travel		-	12,000
BULI 41-00 Expendables(software)		-	42,000
BULI 42-00 Non-expandable equipment (Multi-User computer systems)	1		15,000
BULI 51-00 Miscellaneous			3,000
BULI 99-99 Project Total			144,000

In the case of a single-user system (DOS) the total price may be decreased by 10.000 USD (see Annex II).

Part F. Risks

Description of risk	Estimated likelihood
1. Factors which can over time cause major delays or prevent achievement of the project's outputs and objectives	
1.1 Delay in the international consultants recruitment	low (necessary high quality consultants were recruited by similar UNIDO projects)
1.2 Delay in the participants nomination	medium (Government may have difficulties to liberate from duties for two weeks the required high caliber national staff).
1.3 Delay in the software purchase	low (UNIDO purchased necessary software for similar projects)
2. Factors which may at the outset cause major delays or prevent achievement of the project's outputs and objectives	
2.1 Delay in the participants nomination	low (finally Government will be interested to train their best personnel planners)

Part G. Prior obligations and prerequisites

(a) Prior obligations

The Project Document will be signed by UNDP, and UNDP assistance to the project will be provided only if the prior obligations stipulated above have been met to UNDP's satisfaction.

1. National Project Coordinator will be nominated
2. Cost-sharing facilities will be confirmed.

(b) Prerequisites

The Project Document will be signed by UNDP, and UNDP assistance to the project will be provided, subject to UNDP receiving satisfaction that the prerequisites listed above have been fulfilled, or are likely to be fulfilled. When anticipated fulfillment of one or more prerequisites fails to materialize, UNDP may, at its discretion, either suspend or terminate its assistance.

1. Liberation of the necessary personnel to participate in the workshop during its duration will be decided.

Part H. Project reviews, reporting and evaluation

- (a) The project will be subject to standard review.
- (b) A project final report will be prepared for consideration of all parties concerned.

Part I. Legal context

This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of the Republic of Indonesia the United Nations Development Programme, signed by the Parties.

Part J. Budgets

See point B (e).

Annex I

PROVISIONAL PROGRAMME OF THE WORKSHOP

Daily programme of the workshop will be divided into two sessions:

- first, from 8:00-12:00 a.m.
- second, from 13:00-16:00 p.m.

It is suggested that lunch should be organized at the location of the workshop for all the participants and lecturers from 12:00-13:00 p.m.

FIRST DAY

- Opening ceremony of the workshop
- Introductory lecture
- Chemical industry, definitions and features
- Technological network
- Chains of the development options

SECOND DAY

- Data bank; data collection and updating
- Prices of the chemicals
- Evaluation of the demand of the chemicals

- Macroeconomical correlations between the demand production, foreign trade and GDP

- Correlations between subsectoral demand and macroeconomic parameters and patterns of consumption
- Forecasting of the demand in the technological network

- Estimation of the production programme of the technological network

THIRD DAY

- MIDA methodology

FOURTH DAY

- MIDA block computer programme
- MIDA operation guidelines

FIFTH DAY

- Demonstration programme

Weekend

SIXTH DAY

- Case study "Limited multi-resources, one product case"
- Network description
- Data analysis
- Problem formulation/policies, parameters
- Simulation exercises

Decision making and final report presentation

SEVENTH DAY

Case study "One resource, multi-product case
Network description
Data analysis
Problem formulation/policies, parameters
Simulation exercises
Decision making and final report presentation

EIGHTH DAY

Case study "Multi-resource, multi-product case"
Network description
Data analysis
Problem formulation, policies, parameters
Simulation exercises
Decision making and final report presentation

NINTH DAY

Summary of the methodology
Presentation of the users manual

TENTH DAY

Summary of the workshop
Discussing of the evaluation sheet
Closing ceremony

Annex II

List of the basic hardware and software.

Hardware

To ensure effective training by the "learning by doing" method multi-user microcomputer systems capable to handle large scale optimization problems have to be purchased:

- Type IBM PC fully compatible Intel 80386DX (or Intel 80486DX)
- RAM 6 MB
- Hard disc min. 200 MB capacity
- Coprocessor Intel 80387 (if not Intel 80486DX based main board will be chosen)
- Monitor and graphics adapter (at least Hercules)
- 2 x RS-232C serial ports and 1 printer port
- One (two recommended) serial line terminal DEC vt200 (or compatible)
- Printer (min. 9-Pin dot matrix; EPSON recommended)

Software

To ensure compatibility to the existing models and programmes the following software has to be purchased for multiuser application mode:

- MIDA
- SunSoft INTERACTIVE UNIX Base Solutions SVR3.2, Ver. 4.0
- Informix SQL and ESQL/C RunTime Ver. 4.x INTERACTIVE UNIX Version
- LINAT LPI Fortran ported for SunSoft INTERACTIVE UNIX

It is also possible to implement MIDA computer system on a single user DOS computers. However for the purpose of the workshop several such installations (minimum 2) are necessary. The overall cost in such a case would be lower (total project cost 134.000 USD).

The necessary hardware and software will be purchased by UNIDO and has to be checked by the experts before dispatching to the project site to ensure full operation during the workshop.

Preliminary Work Plan

Activities	Timing (in weeks) after project approval											
	2	4	6	8	10	12	14	16	18	20	22	
1. Preparation of the Aide-Memoire	XX											
2. Selection of the participants			XXXXXXXX									
3. Preparation of the case studies and data bank			XXXXXXXX									
4. Preparation of the TOR			XXXX									
5. Delivery of software and hardware					XXXXXXXX							
6. Bidding procedures for subcontract					XXXXXXXXXXXXXXXXXXXX							
7. Installation of the MIDA system								XXXX				
8. Workshop performance									XXXX			
9. Local case studies development									XXXXXXXX			
10. Preparation of the final methodological guidelines											XXX	
11. Preparation of the final project report												XX

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

JOB DESCRIPTION

Post title Chemical engineer (technologist)

Duration Two months

Date required Three months after approval

Duty station Vienna and Jakarta

Purpose of project To implement computer aided integrated development programming methodology

Duties The consultant will work with the industrial managers and planners in Indonesia to analyze and evaluate strategies of the chemical industry development and ensure selection of the proper policy measures in application to the projects priority selection of given technological networks in the petrochemical industry.
The consultant will be a team leader of the group of experts participating in the workshop.
He will specifically be expected to:

In Vienna:

1. adapt from UNIDO files necessary technological profiles for the selected case studies;
2. Prepare the integrated technological networks to be discussed and implemented as case studies during the workshop.

In Jakarta:

1. Prepare lecture and teach on the technological network development and application of the technological profiles;
2. Supervise simulation experiments on the project priority selection with a group of participants.
3. Evaluate participants' case studies;
4. Participate in the real life case study on the local petrochemical industry development;
5. Contribute to the preparation of the guide and manual;
6. Prepare his contribution to the final project report.

.....

The Workshop programme is attached.

Qualifications

Chemical engineering graduate
(technologist) with good theoretical and
practical experience in chemical processes
analysis and evaluation, as well as
experience in macroplanning of chemical
industry development and necessary
knowledge of computer aided (MIDA)
optimization systems.

Language

English

Background Info

See Project Document

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

JOB DESCRIPTION

Post title	System analyst
Duration	Two months
Date required	Two months after project approval
Duty station	Vienna and Jakarta
Purpose of project	To implement computer aided integrated development programming methodology
Duties	<p>The consultant will work with the industrial managers and planners in Indonesia to analyze and evaluate strategies of the chemical industry development and ensure selection of the proper policy measures in application to the projects priority selection of given technological networks in the petrochemical industry.</p> <p>He is expected to provide the following services:</p> <p>In Vienna :</p> <ol style="list-style-type: none">1. Test adaptation and filing of UNIDO technological profiles for the selected case studies;2. Advise on selection of integrated technological networks to be discussed and implemented as case studies during the workshop; <p>In Jakarta:</p> <ol style="list-style-type: none">1. Prepare lectures and teach on mono- and multi-criterial optimization;2. Prepare lectures and teach on the applications of the optimization methodology in the planning of the development of the chemical/ petrochemical industry;3. Prepare lectures and teach on impact of policies on the options of the development of the industrial structures;4. Supervise simulation experiments on the project priority selection with a group of participants;5. Evaluate participants' case studies;6. Participate in the real life case study

- on the local petrochemical industry development;
7. Prepare the guide and manual;
 8. Prepare his contribution to the final project report.

..... The Workshop programme is attached.

Qualifications

Informatics engineering graduate with good theoretical and practical experience in modern optimization theory and its applications in the planning of the development of the chemical/petrochemical industry, and necessary knowledge of the computerized systems operation.

Language

English

Background Info

See Project Document

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

JOB DESCRIPTION

Post title Informatics engineer (specialist in systems operation)

Duration Two months

Date required Two months after project approval

Duty station Vienna and Jakarta

Purpose of project To implement computer aided integrated development programming methodology

Duties The consultant will work with the industrial managers and planners in Indonesia to analyze and evaluate strategies of the chemical industry development and ensure selection of the proper policy measures in application to the projects priority selection of given technological networks in the petrochemical industry.
He is expected to provide the following services:

In Vienna :

1. Participate in the software adaptation for the establishment of the data base;
2. Check suitability and operation of the purchased software and run testing exercises of the case studies

In Jakarta:

1. Prepare lectures and teach on the systems functions and structure (description of modules and their interrelations);
2. Prepare lectures on the scenario identification constraints and options selection, policies impact assessment and results of simulation experiments interpretation;
3. Carry out case studies with the selected group of participants;
4. Evaluate participants case studies;
5. Participate in the real life case study on the local petrochemical industry development;
6. Contribute to the preparation of the

- guide and manual;
7. Prepare his contribution to the final project report.

..... The Workshop programme is attached.

Qualifications

Informatics engineering graduate with good theoretical and practical experience in modern computerized systems and their applications in the planning of the development of the chemical/petrochemical industry, and necessary knowledge of the scenario identification and results interpretation;

Language

English

Background Info

See Project Document