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INDICATIVE PROGRAMME FOR THE DEVELOPMENT OF THE PESTICIDES INDUSTRIAL SYSTEMS IN TANZANIA

Vol I. Consultant report.

Programme Development Support Unit
Industrial Policy and Perspectives Division

Backstopping officer: Ms T. Salazar de Buckle

[illegible] Ph.D., Chem.Eng. — [illegible]
M.S., Chem.Eng.

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Preface

The author wishes to express his appreciation for the cooperation received from the following persons and institutions during his visit to Tansania from January 15(20), 1990:

Mr.Rasmussen	[illegible] Res.Rep.	Dar-es-Salaam
Mr.Mushi, Mr.Kaitaba	Min.of Agriculture	"
Mr.Ruben	Plant Protection Dept.	
Mr.M Kassi	Min.of Industry Sector of Chem. Ind.	"
Mr.Akhabunaga	TPRI	Arusha
Mr.Paulsson,Mr.Mpemba	[illegible]	Dar-es-Salaam
Mr.Msaki	TIRDO	"
Mr.Lucia	FAO	"
Mr.Msangi, Mr.Endiri	NPI	"
Mr.Stavropoulos	SAPA Chemical Industries Ltd	Dar-es-Salaam

1. EXPLANATORY NOTES: ABBREVIATIONS AND GLOSSARY

Abbreviations of names of institutions:

NCI	National Chemical Industries
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
NAFCO	National Agricultural and Food Corporation
TFA	Tanzania Farmer's Association
TCMB	Tanzania Cotton Marketing Board
IMF	International Monetary Fund
TShs	Tanzanian Shillings
GDP	Gross Domestic Product
GNP	Gross National Product
FAO	Food and Agriculture Organization
NEMC	National Environment Management Council
TPRI	Tropical Pesticides Research Institute
T.C.G.A.	Tanganyika Coffee Growers Association
E.A.C.	East African Community
PESTIS	Pesticides Industrial Systems
SADCC	Southern African Development Coordination Conference
TPA	Preferential Trade Area

Abbreviations of crop protection terms:

A.C.	Aqueous solution
C.E.	Concentrated emulsion
E.C.	Emulsifiable concentrate
M.E.	Micro-encapsulated product
S.C.	Suspension concentrate
W.D.	Water dispersible granule
W.P.	Wettable product
G.	Granule(ated)
P.	Powder
D.	Dust
F.L.	Flowable (suspension concentrate)
WSG	Water soluble granule
ULV	Ultra low volume

GLOSSARY OF CROP PROTECTION TERMS

Term	Definition
Acaricide	A chemical for killing mites /Acarina/ as distinct from insects
[illegible] or a fish [illegible]	[illegible] the biological activity
[illegible]	A dispersion of liquid particles, the majority of which are between [illegible] and [illegible] in diameter [illegible]
[illegible]	A chemical for killing bacteria
Batch	The material produced in a single series of operations by a non continuous process
Blend	A homogeneous mixture of two or more batches
[illegible] filler or diluent	An inert formulant added to facilitate uniform distribution of a formulation when used
Compatible chemicals	Chemicals which are chemically, physically and biologically compatible
Contact herbicide the plant	A herbicide toxic to the treated parts of
Defoliant	A chemical which causes leaf fall
Dispersible powder Water dispersible powder	A powder intended for dispersion in a liquid
Oil dispersible powder	A fine powder for dispersing in water A fine powder for dispersing in oil
Dust	A fine powder, usually airborne, which can settle
Dust concentrate	A powder intended for further formulation before use as a dustable powder

Emulsifiable concentrate	**A solution which forms an emulsion on mixing with water**
Emulsion	The mixture of water and a liquid in which the liquid is dispersed in the water
Invert Emulsion	An emulsion of water in oil
Inert	An [illegible] material in a formulation other than the biologically active ingredient(s)
Formulation	[illegible] ingredient(s) plus inert(s)
[illegible]	[illegible] killing fungal spores [illegible]
Granules	Agglomerates, or coated impregnated lumps, or particles defined by size
Herbicide	A chemical for killing plants
Insecticide	A chemical for killing insects
Nematocide	A chemical for killing nematodes
Pesticide	A chemical for killing certain detrimental living organisms
Phytotoxicity	Chemical damage to a plant
Powder	Solid particles up to 250 um in diameter
Seed treatment, seed dressing	The process of coating or impregnating seeds with a chemical
Spray	To apply a liquid in the form of droplets suspended in air
Surfactant, or surface active agent	**A material for reducing interfacial tension**
Suspension concentrate	**A stable suspension of active ingredients in a fluid /intended for dilution before use/**

Tank mix	The mixing by the operator of chemicals /and/or formulations/ in the spray tank
Technical material	The unformulated active ingredient
[illegible]	[illegible]

2. CONCLUSIONS AND RECOMMENDATIONS

1. As typical of any development country especially least developed country, availability of foreign exchange is the chief determinant for import of formulated pesticides or active substances but also for the maintenance of existing plants [illegible] of equipments, spare parts etc. [illegible] nothing about planning [illegible].

2. [illegible] financial status of farmers plays a determinant role in the demand supply of pesticides.

3. [illegible] [illegible] of the production capacity of the existing formulation plants is utilized.

PESTICIDE PRODUCTION AND FORMULATION PLANT IN MOSHI

4. Based on the soft loan of the Italian government and on the continuous assistance of UNDP/UNIDO after several delays in the implementation all construction works are planned to be complete by 1st quarter 1991. However it is targeted to commence formulation by second half of 1990.

Assistance is needed in the following areas which are considered critical for the successful completion, commissioning and future operation of the plant:

4.1 Training of local personnel (short term fellowships) in pesticides formulation technology and in project management.

4.2 Secondment of experts in the initial period of production. (During and after the plant has been commissioned and handed over to NCI by TECNIMONT)

4.3 Assistance in financing the procurement of effluent treatment plan (incinerator and waste water treatment facility)

4.4 Establishment of R&D laboratory at the Arusha based TPRI.

TPRI

5.Being the central authority for the registration and control of the use (application, storage,handling,transport) and production of pesticides it is a vital issue for the country to provide TPRI with all means necessary to perform its duty:

5.1 Assistance in financing the procurement of instruments for the quality control of active substances and formulations.

5.2 Training of personnel (short term fellowships) in the use of quality control instruments.

5.3 Training of personnel (short term fellowships) in the legislation of pesticides in developed countries.

5.4 Training of personnel (short term fellowships) in the methodology of the [illegible] (efficacy, persistence, resistance, side effects, etc.).

5.5 [illegible] chemicals necessary [illegible]

6. Assistance in preparing a feasibility study for the local production of active substances selected by the study "Overview Study of Chemica Sector"prepared by TISCO. Probably starting with a pilot plant.

7. Assistance in the financing the procedure of registration of locally produced pesticides.

8. Technical assistance and financial support to enhance the efficacy and broaden the activity of the existing extension services.

9.Technical assistance and financial support in the procurement of packaging equipments for the local production of special packages especially for smallholder farmers to enhance safe handling and avoid environmental pollution.

10. Training of personnel of NCI and TISCO (short term fellowships) in commissioning and hand-over procedures and requirements of new production and formulation plants and in preparing marketing surveys and feasibility studies for new pesticides.

11. For the locally formulated products it is desirable but for the those of active substances it is essential the preparation of a study dealing with the market possibilities (exports and imports of pesticides and active substances) in the neighbouring countries.
Although this issue is very strongly influenced by political considerations, the economy of both the existing but much more the planned product(ion)s especially that of the active substances can not be assured unless a regional market has been created.

2. INTRODUCTION

[illegible]

Obviously the increase of export can be achieved by the enhancement of the output (quality and quantity) of the agriculture, but the necessary inputs (agrochemicals, equipments etc) are again dependent on the availability of foreign exchange.
One important means to overcome or reduce this circulus vitiosus is the local production and/or at least formulation of pesticides.

[illegible] is presently conducting a strategic effort in creating a [illegible] and indicative programming of the pesticide production in the developing countries of Africa in order to elaborate industrial development strategies for the (domestic) production of pesticides.

The first two steps of this process are

(A) PESTIS (Pesticides Industrial System): Programming industrial development options and strategies for groups of African countries.

(B) case studies. Indicative programmes for individual countries

Short summary of the methodology can be found in App. [illegible]

The present study has been prepared as a consequence of PESTIS; tries to present an indicative programme for the development of the pesticides industrial system of Tanzania, representative of the countries belonging to the Group 5 of PESTIS ("Large population, medium and growing consumption of pesticides")

4. PROGRAMME CONTEXT

4.1. Description of the system's main components and linkages

The pesticide industrial system is consisting of the PRODUCTION of active substances, FORMULATION of final products from the active substances. Both processes use RAW MATERIALS either IMPORTED or locally [illegible]. The end-product is fixed by and determined by the INDUSTRIAL [illegible]. The final product must be STORED and DISTRIBUTED for [illegible], CONSUMPTION or EXPORT through adequate MARKETING system. The rational use of pesticides increases the output of the agriculture thus a manifold benefit (self sustaining food production and/or increased foreign currency through exports) can be enhanced by suitable GOVERNMENT POLICIES.

The structure of the system and the interdependence among the above mentioned components are illustrated in Fig.1.

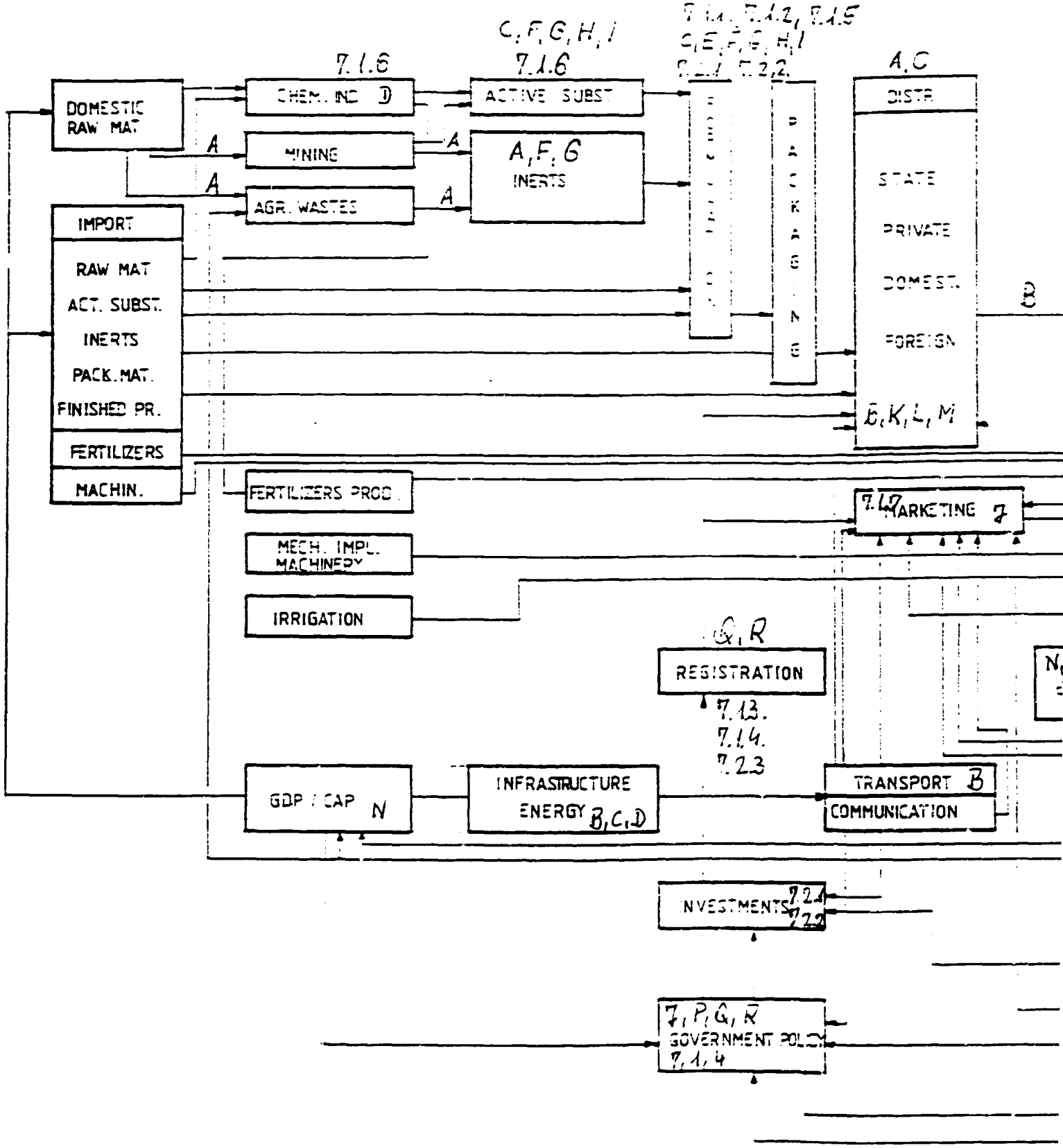
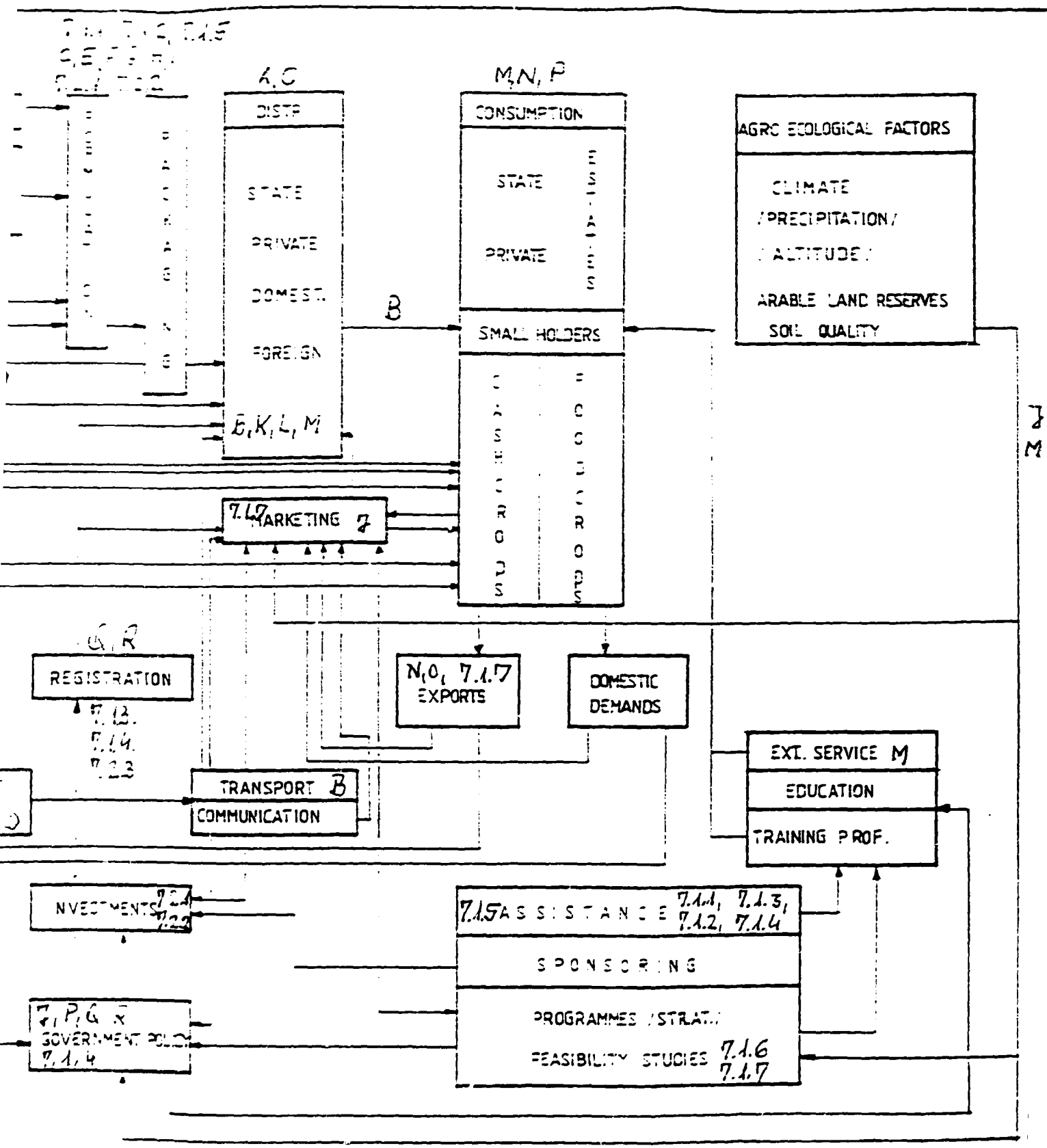


FIG.1. PESTICIDES INDUSTRIAL SYSTEM - BASE DIAGRAM



...RIAL SYSTEM - BASE DIAGRAM

Block letters: constraints /s. Table 6/
Numbers: Project concepts.

1.1.1. Quantitative description of the performance of all important components of the system

RAW MATERIALS

[illegible] small reserves have been [illegible]

[illegible] The [illegible] mining [illegible] materials used by the local industries. [illegible] limestone, clays and kaolin.

The following raw materials have been taken into consideration as carriers for formulation of dry products of the planned pesticide plant in Moshi:

Kaolin	662 tons per year
Silica	799 tons per year
Calcium Carbonate	1373 tons per year

For the development of chemical-based industries the following raw materials are available: pyrite, bauxite, sulphuric acid and alumina.

Sugar molasses to be produced from sugar mills can be used for the production of ethylalcohol.

Wood. Of the total land area, 42 per cent is covered by forests, but the largest part is not exploited commercially. The wood processing industry is dominated by saw milling. So the basic raw material of the paper industry is available, which is a good opportunity to develop various packaging materials.

Coal. Total proven reserves 327 million tons, total estimated reserves 1.3 billion tons.

Iron. 85 million tons proven reserves.
Gypsum. 2.6 million tons proved reserves.
Salt. 60.000 tons per year for 20 years.
Phosphates. 2.5 million tons proven.

INDUSTRIAL INFRASTRUCTURE

Transport.
Major cities and regions are connected by train, however potential partners and customers of pesticide producers can be reached by the [illegible] is in poor condition.

[illegible]
[illegible] existing telephone network in the country. It is extremely [illegible] is especially during working hours.

[illegible]

Water.
Total quantity of water supplied to consumers is about 120 million cubic metres. Data on the distribution among major townships are in App.4. and 5.

PRODUCTION AND FORMULATION

[illegible] substances. There is no existing plant for production.

Formulation.
Five existing plants represent a 11.75 million kg and 14.5 million litres per year formulation capacity with an about 10-30 per cent utilization. The reason of such poor utilization is low consumption due mainly to the low purchasing power of farmers. Detailed data of the existing plants can be found in App. 6. Although the data are seven years old, data on capacity are valid. The only change is since 1987 that Tanzania Pesticides Co. Ltd. in Morogoro resumed its activity. The main activity of these companies:

- repacking bulk products into ready-to-use formulations
- dilution, mixing and repacking of imported concentrates
- preparation of special packs with more than one pesticide
- formulation of imported active substances into emulsifiable concentrates, ULV preparations and powders.

Beside the above five existing plants there is under construction in Moshi a pesticides production and formulation plant. It will be the first plant producing active substance : Copper oxide, 3000 tons, and also the only to prepare wp formulae. Its formulation capacity:

- wettable powders	3000 tons
- granules	2000 tons
- herbicide flowables	1500 tons

Distribution of formulation is summarized in Table 1.

Table 1.
Distribution of formulation

Others	426 (5.1%)	242 (3.9%)	971 (7.2%)	1000 (6.2%)
Liquid (EW/EC):	3327 (40%)	2805 (44%)	5298 (39%)	6349 (40%)
Others (granular, etc)	negligible	negligible	negligible	negligible
I. Total (MT)	[illegible]	[illegible]	[illegible]	[illegible]
Rate of growth (%)		4.5%	55.6%	18.4%

Source: SI/URT/86/075 (Dr.K.Szabó)

Although the Moshi plant is due to start formulation in second half of 1990 there is a lack of trained personnel who could manage pesticide plant, there are gaps in the technical assistance provided under Italian soft loan, proper technology and facility to treat affluents is missing. Effluent treatment was considered essential, but because of shortage of funds, it was omitted from the contract. Instruments and trained personnel for quality control also would be necessary.

STORAGE AND HANDLING

Due to the low demands on pesticides and the general level of infrastructure the storage of pesticides is to be improved considerably. Especially in case of higher utilization of existing formulations capacity and more effective distribution (which-hopefully-will be realized in the not far future) storage conditions must be significantly

improved both at production plants and in various points of the distribution network. The climatic conditions (average air temperature and humidity) require special conditions in certain parts of the country.
Especially the after harvest and grain losses could and should be decreased.
Grain losses are for example [illegible] the magnitude of 20% of the total grain produced in the country. The Larger Grain Borer ("Dumuzi" or "[illegible]") [illegible] in the country, is bound to push [illegible] higher in certain areas.

MARKETING AND DISTRIBUTION

[illegible] functionality can be seen [illegible]

Table 2.

Distribution of market demand as per functionality

Product (MT)	1985/86	1986/87	1987/88	1988/89
Fungicides	4943	5036	8140	9706
" change %		1.8	61.6	19.2
Insecticides	2483	2515	3281	3936
" change %		1.3	30.4	20.0
Herbicides	912	1162	2138	2352
" change %		27.4	83.9	10.0
Total (MT)	8338	8713	13559	15994
" change %		4.5	55.6	18.0

Source: SI/URT/86/875 (Dr.K.Szabó)

In Tanzania the distribution of pesticides is determined by the big marketing corporations specialized for the major cash-crops. All marketing and distribution functions providing of necessary inputs including the procurement of pesticides is belonging to their activity.

Coffee Marketing Board, Cotton Marketing Board, Tanzanian Tea Authority, Tanzanian Sisal Association, Sugar Development Corporation, do the necessary activity for the respective crop.

The National Agricultural Food Production Corporation, a parastatal [illegible], is procuring and distributing pesticides for various crops [illegible] produced by the farms belonging to it. The Agricultural and Industrial Supplies Co. is procuring and [illegible] farm implements, equipments, pesticides etc. for the parastatals. The [illegible] marketing distribution system is rendered [illegible] Fig 2. In a simplified flow diagram of pesticides in Tanzania.

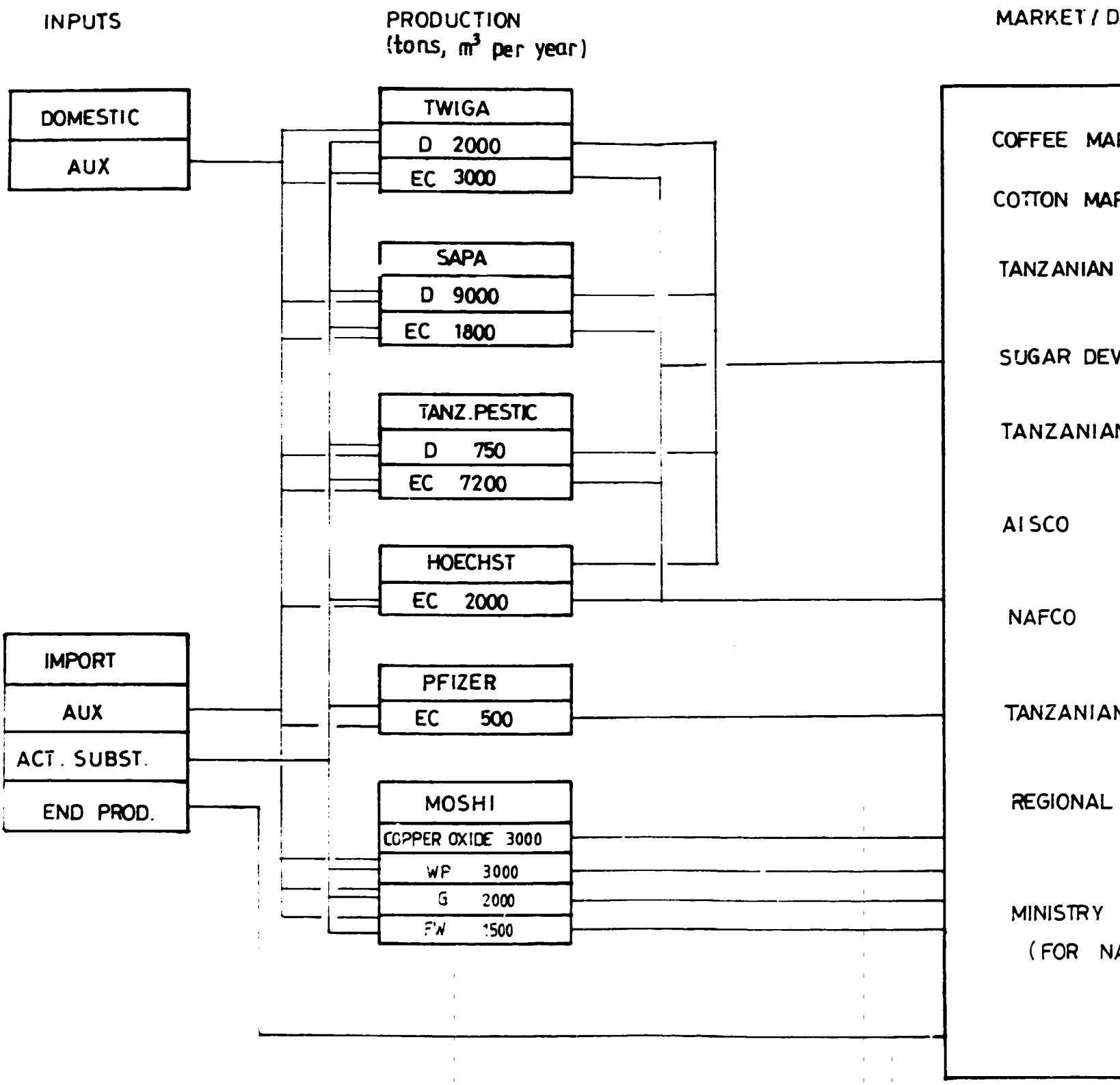


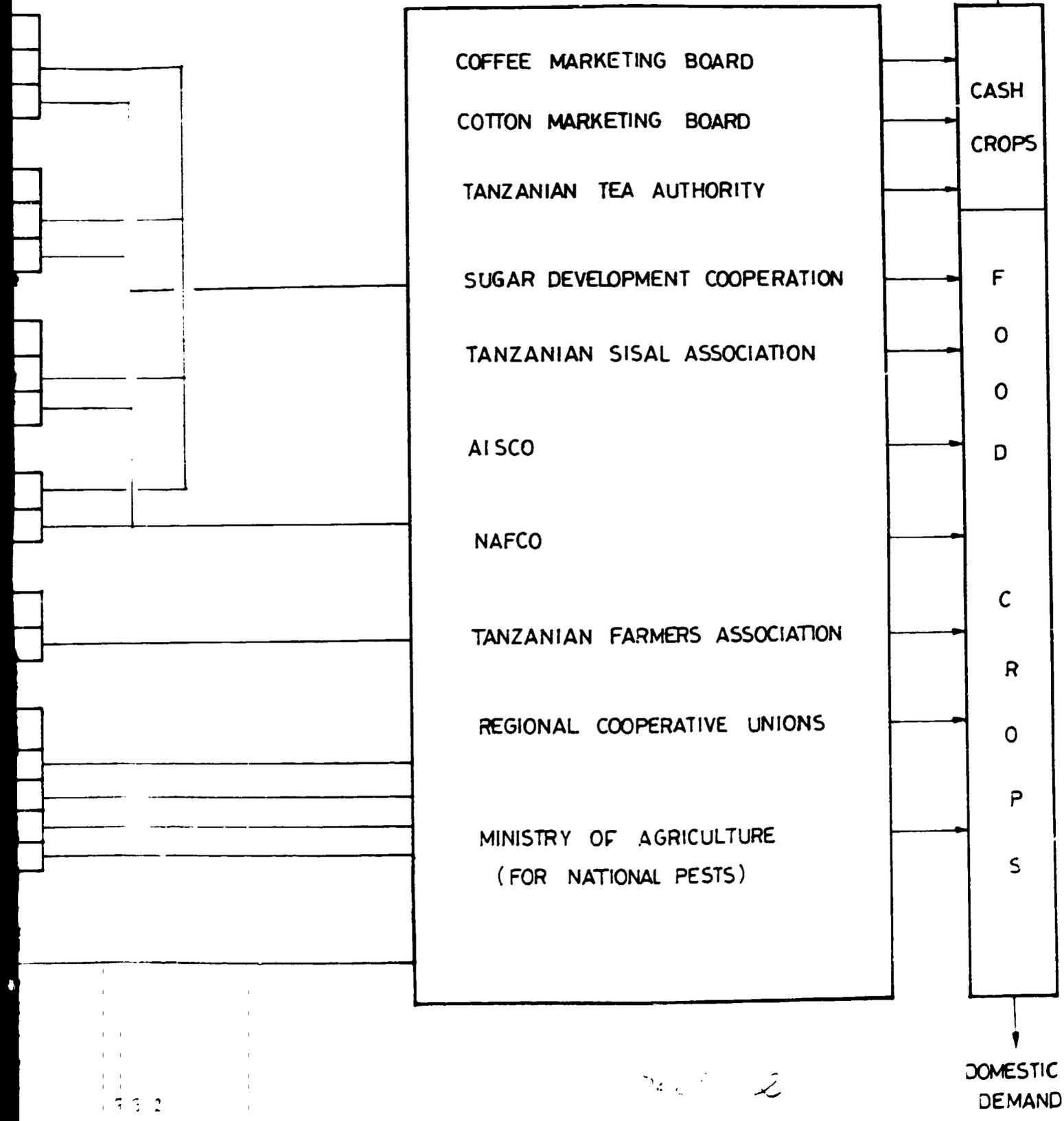
FIG 2

PESTICIDE PRO
IN

TRADE/CONSUMPTION

MARKET / DISTRIBUTION

EXPORT



PESTICIDE PRODUCTION AND PROCUREMENT
IN TANZANIA

CONSUMPTION

Possible orders are summarized in Appendices 7-12, namely:

- [illegible]	App.7
- [illegible]	App.8.1.8.2
- [illegible]	App.8.1.8.2
- [illegible]	App.10
- [illegible]	App.11
- [illegible]	App.12.1-12.4

Contents of these appendices are summarized in Table 3.

Table 3.

Possible orders for 1989/90

(up to Oct 15, 1989)

Crop	Quantity litres	Quantity MT	Value million $	
Coffee	3,119,000	4883	39,2	App.7.
Cotton	1,136,000		6,2	App.8.
Various	122,000	53		App.9.
Various	212,000	703		App.11.
Various	2,087,000	1573		App.12.
National pests: (Locust quelea bird army worm rodents)	170,000	10		App.10.

Data in App 7/12 are not coherent and "gathered from various sources, whose accuracy could not be easily verified... and to be understood as aggregate estimates".

THEORETICAL DEMAND

[illegible] and 1984-85. A total of 1,172 tons were needed in the 1983/84 season and the demand is increasing to 5,822 tons in 1984/85. Justification of the Moshi Plant can hardly denied.

Cropwise breakdown of the agrochemicals demand can be found in App.15. Coffee, followed by sugar cane will absorb the bulk of the insecticides whereas coffee alone will absorb more than 80% of the fungicide dusts.

The aggregate demand forecast for all plant protection inputs including seed dressing chemicals and vermin control ammunition are presented in App.16.

A detailed breakdown was prepared for 1982/83 by AISCO. The list can be regarded as a "critical list" which could help the rehabilitation of the agricultural sector. (Not the brand/trade names, but the properly formulated active substances are of importance). App.17.1.17.2 .

EXPORT/IMPORT

Pesticides.
[illegible] report, all consumed pesticides are imported.

Table 4.

[illegible] year	Rate of growth of pesticide inputs (%)
[illegible] - [illegible]	[illegible]
[illegible] - [illegible]	[illegible]
[illegible] - 1984	[illegible]
[illegible] - [illegible]	[illegible]
[illegible] of [illegible] - [illegible]	[illegible]

Source: [illegible]

[illegible] and value of exported cash crops are summarized in App.21.

The balance of trade of Tanzania needs badly any forms of help including aid, soft loans etc. The shortage in foreign exchange is the main problem of the development of the country.

Table 5. contains the summary of inputs (incl. pesticides) of U.S.$ 100 output of main cash crops.

Table 5.

Cash Crop	Import inputs, US $ per US $ 100 output	Pesticide component
[illegible]	[illegible]	little
[illegible]	[illegible]	little
Tea	11	limited, moderate
[illegible]	20	significant
[illegible]	20	dominant
[illegible]	25	very limited
[illegible]	25	limited, steady

[illegible]

Conclusion from export/import data is obvious:
To enhance the export of COFFEE, COTTON, TEA, CASHEWNUTS and to reduce the import of CEREALS and SUGAR (by increasing the output) are of paramount importance.

Table 13. illustrates the role and significance of sugar and cereals among imports of agricultural commodities:
1 billion Tshs for sugar, 1,7 billion Tshs for cereals could be reduced or even saved by enhancing local production.
Significant reserves are in the gap between Tanzanian domestic yields and world average figures.

For example cereals some data for comparison:

YIELDS
metric tons/hectares

	TANZANIAN	WORLD
Maize	1,2 - 1,7	2,7 - 6,5
Sorghum	0,7 - 1,0	2,0 - 3,0
Millet	0,6 - 1,0	1,7 - 4,0
Paddy	1,2 - 2,0	2,5 - 3,5
Wheat	1,2 - 1,6	2,0 - 2,5

The country has all basic agro-ecological factor to reach full degree of self-sufficiency in food gradually. Grants from foreign countries and organizations may support this process.

GOVERNMENT POLICIES

During the 1980s, Tanzania's economic performance declined considerably due to the oil price shocks, world recession and the subsequent deterioration of the price of the main export crops, the burden of the financial war with Uganda and the repeated droughts.
Severe shortage in foreign exchange required for the importation of raw materials and spare parts, utilization of industrial capacity dropped to less than 30%.
The Government adopted a three year Structural Adjustment Programme (SAP 1982-85).
The programme failed to achieve its objectives mainly due to the lack of sufficient foreign exchange.
The Government initiated another three year programme the Economic Recovery Programme (ERP 1986-89). Its noteworthy feature is the intention to liberalize the economy and to encourage the increased participation of the private sector, to reduce the state intervention, to make the industry more efficient. Strong emphasis is laid on the rehabilitation of the existing industrial enterprises.

UNIDO -in line with the above and in the context of the Industrial Development Decade for Africa - undertook a diagnostic survey of the rehabilitation needs in 1988.

The Government adopted again a new Five Year Development Plan in 1987 to complement the ERP. Its aim is to increase capacity utilization and to ease bottlenecks on essential imports.

LEGISLATION

In the past, pesticides were under the jurisdiction of the Ministry of Health. The TPRI Act of 1979 firmly placed the role of registration and control of pesticides under the TPRI.
This role is made difficult by the fact that unlike other agricultural inputs, agrochemicals are numerous, diverse and their effect during manufacture, handling, storage, application to people involved directly or indirectly and -last, but not least at all- to the environment needs careful approach.

There are 307 pesticides registered in Tanzania.
Complete list of them can be found in App.13.0-13.19.
Table 6. contains a summary broken down according to applications.

Procedure of the registration is well organized. Pesticides can be registered for:

-general use for five years (full registration)
-general use for two years (provisional registration)
-restricted use
-experimental use only

[illegible] is requested in the application form. [illegible]

[illegible] of the country belong to the just recently [illegible] Environment Management Council, which is a governmental [illegible] supervising body of a board of directors consisting of [illegible] representatives of industry and administrations.

Table 6.

Number of pesticides registered in Tanzania.

(SUMMARY)

	Insecticides	Fungicides	Herbicides	Acaricides	Nematicides	Avicides	Rhodenticides
Full registration (5 years)	3	1	1				
Provisional registration (2 years)	110	37	69	5	7	1	
Restricted registration	20	1	3				
Registration for experimental purposes	128	59	73	8	3		8
Subtotal	261	98	146	13	10	1	8

4.2. Importance of the system in the country's economy.

The importance of agriculture in the national economy of Tanzania can be illustrated by two data:

[illegible]

[illegible] pesticides could hardly undervalued.

Unfortunately the importance and advantages of the proper use of pesticides is not generally recognized.
While the use of fertilizers is wide-spread, the necessity of the other agrochemical method i.e. application of pesticides is not yet generally accepted.

The recognition of the importance of pesticides even by the most relevant authority can be illustrated by the fact that in the book "Basic Data. Agricultural and Livestock Sector 1983/84-1987/88" pesticides are not mentioned at all, while in Chapter IX "Input Distribution" five tables deal with the fertilizer, seed and implements consumption broken down to region-, and/or cropwise distribution.

Shortly summarized: The importance of the use (and the local production of pesticides) can not be denied but is not yet generally recognized in Tanzania.

4.3. Government development objectives related to the system.

Active substance production.
The manufacture of copper oxychloride will start in 1991 in the
[illegible] Production and Formulation Plant in Moshi.
[illegible] of the production of other products is under
[illegible] in the Ministry of Industry based on the [illegible]
[illegible] of the "Chemical Sector" prepared by PSC.

[illegible] products. As a first step of the implementation of the Moshi Plant the formulation department will start production in second half of 1991. By doing so a significant step will be made towards local pesticide production upon completion the plant will be expected to supply granules, herbicide flowables and wettable powders which are wholly imported at present.

"National Pests". Protection is controlled by the Ministry of Agriculture.
There are some pests which cause national concern:
Army worms and the Quelea quelea birds have an unparallel potential for devasting crops.
Grain storage losses are of the magnitude of 30% of the total grain produced in the country. The Large Grain Borer a recently introduced pest in the country is bound to push this loss figure much higher in areas where it is already established.
The protection is organized and carried out by the [illegible] Plant protection crews of the Ministry of Agriculture.

Marketing/distribution.

There is an agrocultural credit policy to enable the peasant to procure the necessary inputs including, but not sufficiently using pesticides. The government development objectives related to PESTIS are included in the National Food Strategy, according to which the following targets were set for the year 2000:

- estimated population growth from 14.1 to 21,5 million inhabitants
- [illegible] per capita [illegible]
- [illegible]
- average growth rate of production of major crops 3-4 %

Those trends will also need the increased use of fertilizers, pesticides, irrigation and improved seed as well.

4.4. Ongoing development activities related to the system.

On-going technical assistance and financially supported activities for the development of the agriculture of Tanzania by various international organizations are listed in App.2.6.

FAO represents an outstanding role especially in the implementation of the projects supported by UNDP.
The seed programme is to be mentioned first of all because of its influence on the whole national agriculture.

As regards for the Plastic, the UNDP/UNIDO activity for establishing a pesticides production plant started already in 1980 with project Ref.No.DP/URT/78/011 and continued with SIS/URT/84/801 and SI/URT/86/875. Based on the soft loan of the Italian Government the plant is under construction in Moshi.
As a first step the formulation plant will be handed over in June 1990 and the production can be started in the second half of the year. The active substance production facility will be ready next year, and the start of the production is planned for the second half of 1991.

<u>Other ongoing activities.</u>

Agricultural adjustment pricing and institutional reform in agriculture. /IDA/ US$ 158,6 million.

Extension service rehabilitation /IDA/ US$ 18,4 million. Co-financing of US$ 8,8 million is anticipated from Africa Development Fund. Total cost US$ 30,4 million.

Rehabilitation of agricultural R and D /IDA/ US$ 8,3 million.

Roads rehabilitation programme. /IDA/ US$ 146 million.

Restructuring and rehabilitation of the industrial sector, reforms in the trade regime /IDA/ US$ 135 million.

4.5. Institutional framework for the development of the system.

[illegible] international situation has prevented an improvement and even rehabilitation of industrial [illegible] and utilize the country's high agricultural potential.

[illegible] national food strategy also [illegible].

[illegible] the implementation of the investment [illegible] several reforms and programmes partly supported by various institutions in addition to those summarized in App.23.

The most significants are:
Structural adjustment programme under which a growth in the institutional infrastructure of the industry has been envisaged.

The "Economic Recovery Programme" /ERP/ has been supported by the World Bank /US$ 96 million/.

Further World Bank sectoral loans have been disbursed. Tanzania was one of the first beneficiaries of the World Bank Special Africa Facility.

Although all development programmes are in close linkage with, or based on the of agrochemical methods, the author could not find the signs of priority or even importance of the use of pesticides.

5. PROGRAMME JUSTIFICATION

5.1. Problems to be addressed: bottlenecks and constraints hindering the development of the system towards Government objectives.

RAW MATERIALS.

As discussed in section 4.1.1. there is a proper selection of mineral raw materials for carriers of dry formulae. However the quality especially morphology, impurities, particle size (distribution), etc. need to be confirmed by and during the production in the Moshi plant. (C)

INDUSTRIAL INFRASTRUCTURE.

One of the most important constraint hindering the development of the Tanzanian economy is the generally low level of the industrial infrastructure aggravated by the worn-out facilities without proper maintenance for decades. "Everything is either not working or is in a state of shambles...Recovery Management should be seen as a direct product of the failure...to exercise maintenance and preventive management." (App.24) (C)
Chemical industry is represented by fertilizer, cement, glass, paper, lime plants. "Pesticides, insecticides" project is among future plans. (D)

PRODUCTION AND FORMULATION.

Lack of existing organic chemical industry and the comparatively small domestic market, production of active substances seem to be of not the first priority of the development of the country.
The capacity of the four working formulation plants is used to 10-30 %. One plant is idle. A sixth is going to start its production witht in months. (E)
So the main constraint is but far not the availability of formulation capacity but inadequately low purchase power of the farmers and the insufficient foreign exchange available for the import of active substances. (P) (N)

x Bottlenecks and constraints are marked by block-letters.

Although the Moshi plant is due to start formulation in second half of 1990 there is a lack of trained personnel who could manage pesticide plant (H), there are gaps in the technical assistance provided under Italian soaft loan (F), proper technology and facility to treat affluents is missing. Effluent treatment was considered essential, but because of shortage of funds, it was [illegible] (I). Instruments and trained personnel for quality control also would be necessary (I).

MARKETING AND DISTRIBUTION.

[illegible] partly attributed to the fact that planning and development of agricultural inputs has attached insufficient emphasis on the importance of pesticides compared to other inputs such as seeds, fertilizers and farm implements. (J)

Agrochemical companies and also credit suppliers ought to be aware that protective attire for safe handling of pesticides must be delivered together with pesticides to the farmers. Information on the environmental effects of the (not proper) use of pesticides is also to be disseminated among farmers, first of all among small-holders. (M)

Regional storage and repacking facilities are to be created. Special packaging forms fitting to the equipments of the users must be developed in order to avoid remaining surplus in the opened sacks or containers. (K) (L)

Distribution of pesticides has to face the conditions of the transport routes of the country. The problem is by far not restricted to pesticides; significant part of the (national and private) budget could be saved by the wear and tear of vehicles and spare parts. (B)

Farmers especially small holders are not aware of the specific advantages of pesticides. While the effect of irrigation is obvious even for the most unskilled, use of fertilizers is going to be accepted, the (more) sophisticated agrotechnical methods (e.g. crop-rotations, crop mixtures) and above all the proper use and economy of pesticides need much broader and more intensive information. (J)

Although agrochemical companies are active in this respect, the enhanced extension services of the parastatal corporations and those of the Ministry of Agriculture are badly needed. (M)

CONSUMPTION/DEMAND/TRADE

The actual consumption of pesticides is well below the demands. As mentioned earlier, shortage in foreign exchange for the import of pesticides (both as active substances and formulated products) and also in the purchasing power of the farmers represent the main constraints in increasing the pesticide consumption to the proper level.

[illegible] agroecological factors of the country, arable area of land, yield, however, promising possibilities for the increase of the pesticide consumption which again opens the way to enhance the output of the agriculture consequently improving both the foreign exchange situation and the financial strength of the peasants.

Improving the export marketing of agricultural products is also very important possibility of increasing the foreign exchange situation of the country. A bigger share of the world market can be seized only with better quality and/or higher quantity which again will result in increasing demand on pesticides. (N) (O)

GOVERNMENT POLICIES

In order to promote the development of the country the Government concentrates all its efforts to increase the exports and decrease food imports. Both goals can be achieved by improving the output of the agriculture.
In frame of these efforts the proper use of pesticides has an unreasonable low priority among other inputs (e.g. fertilizers, irrigation and implements). (J)

The purchase power of farmers esp. that of the small-holders is low. The domestic price system together with the low efficacy of the export marketing represent important constraints of the development. (P)

The best summary of the bottlenecks in the marketing system of the agriculture of Tanzania can be found in the lecture of the Prime Minister. (App.25)

General trends to liberalize the access to foreign exchange together with the enhancement of private ownership in various fields of the economy seem to be a major enhancement in this respect.

LEGISLATION

The procedure of registration of pesticides is adequate in general.

TPRI was originally planned to meet the demands of three countries. The size, layout, concept of the Institute correspond to that purpose.

Unfortunately the shortage or even lack of some vital instruments and equipments especially in the analytical laboratories raise serious doubts about the efficacity and performance of the Institute. The daily working of the laboratories is dangered by the shortage in reagents and similar materials.
Analysing equipments are often idle because of lack of spare parts.

[illegible] environment [illegible] the newly founded NEPA [illegible] a key in creating the conditions for the practice of controlling the diverse activities in the national economy in the whole country.

The main problem is that there is no existing law till now to oblige industrial or agricultural (or other) organizations to obey to environmental prescriptions. (R) (I)

5.2. Analysis of alternative development strategies.

Possible strategies of the development of the PESTIS in Tanzania can be summarized as follows:

a. Local production of all pesticides incl. active substances
   -enhancement of the domestic market
   -building a regional marketing and distribution network

b. Local formulation of all pesticides based on imported active substances and auxiliary materials
   -enhancement of the domestic market

c. Local production of active substances to be formulated locally local formulation
   -for the existing domestic market

d. "laisser faire" strategy: leave the present conditions as they are today and let the market influence the development.

e. total import of all pesticides (except the already locally formulated ones) based on long term agreements with suppliers

Any of the above strategies need:

- improving the control of pesticides: environmental legislation
- improving the extension services
- properly equipped laboratory for TPRI
- better exploitation of the existing formulation plants
- handing-over, commissioning and starting regular production of the pesticides production plant in Moshi

5.2.1. Quantitative analysis of various options for overcoming bottlenecks and constraints

[illegible] can be ruled out without any further analysis [illegible] because of lack of domestic chemical industry and also because of [illegible] huge investment costs.
The marketing elements of this variation, however, need a closer consideration and are useful for other concepts as well.

To compare and evaluate the other variations let us consider the [illegible] consumption [illegible] data [illegible] in App.7-App.17. [illegible] summary:

		consumption	capacity [illegible]
liquid formulae (EC,ULV,FW)	(million lits)	4,6	11,7
Dry products (D,WP,G,active subst.)	(thousand tons)	9,3	11,[illegible]

[illegible] including the Moshi Plant

A superficial glance on the above data may be misleading.
By evaluation of the figures the following must be taken into consideration:

- -2000 tons granules to be produced in the Moshi Plant need special implement for the application at the farmers
- -figures of dry products include in some cases active substances which are to be formulated
- -data in App.7-App.17 are by far not coherent and "gathered from various sources, whose accuracy could not be easily verified...and to be understood as aggregate estimates"
- -capacity of the existing plants is exploited only to 10-30%

In order to be able to formulate all pesticides locally, a conscious policy for purchasing of active substances is needed: supply of formulation technology and licence for the use of trade mark together with the necessary data for registration must be the first priority among tender conditions for active substance suppliers.
The necessity of a coordination (may be cooperation) among purchasers and formulator companies in order to assure the best utilization of production capacities and to minimize unnecessary competition seems to be obvious.

Conclusion: Capacity of the existing formulation plants can cover present demands; implementation of another new plant can not be taken into consideration until after a five year period with steadily increasing consumption, consequently:

VARIATION b./ IS REAL OPTION

[illegible] differs from b./ in the possible production of some of the most important basic substances, other, than Copper Oxychloride which will be produced in the Moshi Plant in 1991.

[illegible] of the M[illegible] plant [illegible] can be summarized in round figures as follows:

Plant machinery (know-how, engineering (to be paid in foreign currency)	million US$	22
All other costs (site prep., civil works, building etc.) (payable in local currency)	in million US$	13
Total investment costs	in million US$	35

Investment costs can roughly broken down to the three production units (based on their equipments) according to the following ratio:

Copper oxychloride/insecticide/herbicide plants = 3/2/1

Consequently the costs of the Copper oxychloride plant can be estimated for about 17.5 million US$. The plant machinery alone represents about 10 million US$ from the sum.

The estimated investment costs of one active substance thus can be put for about 10 millions US$ if located into an existing chemical plant, or around (or above, if located alone) 17.5 million US$ on "green field".

Conclusion: Because of the significant investment costs, implementation of new production plants for active substance are to be based on proper marketing forecasts and feasibility study.

VARIATION c./ IS REAL OPTION

Variation d./ needs no activity or efforts, so it represents the cheapest option of the five. But this is its sole advantage. Considering the level of economy especially the general shortage in

foreign exchange, there is no possibility for an optimistic scenario for the development of PESTIS.
The influence of market can be an enhancement especially if both export marketing of agricultural products and those of the food industry combined with a domestic price policy towards farmers could be realized.
Another stimulant can be the liberalization of the economy, a process just going on having promising results both on the private ownership but also on the access to foreign exchange for entrepreneurs.
But this system of enhancement can only implemented as a deliberate national policy of the government, as not a "laissez faire" at all.

Conclusion: VARIATION d./ IS NOT A REAL OPTION, BUT ELEMENTS OF CAN BE USEFUL

Variation e. seems to be attractive, but no independent country can rely on the "mercy" of certain suppliers not to mention the burden of the never decreasing need of foreign exchange.
The lack of incentives to develop the domestic PESTIS has a paralysing effect for the linking industries as well.
But the principle can be usefully applied: conditions of long term agreements with pesticide suppliers could include process technology, know-how and/or licence for the gradual implementation of local production of certain products.

Conclusion: VARIATION e./ IS NOT REAL OPTION, BUT ELEMENTS OF IT CAN BE USEFUL

5.2.2. Evaluation and selection of the preferred strategy

Starting from the fact that existing formulation plants are used up to [illegible]% of their capacity the BASIC CONSTRAINT IS THE LOW CONSUMPTION.

SO THE STRATEGY TO DEVELOP PESTIS OF TANZANIA MUST BE BASED ON PROJECTS AIMING THE INCREASE OF DEMANDS AND PROPER USE OF PESTICIDES AND HAVE TO COMBINE B.- AND C.- OF THE ABOVE VARIATIONS.

[illegible] the implementation [illegible]

1990-1995 Projects for the increase of demands and proper use of pesticides.
Implementation of Option b./
Preparation of Option c./

1990-2000 Implementation of Option c./

Table 7. helps the selection among the variations or their elements and provides a quick overview on the effect of these variations and the projects to be proposed in chapter 6 and 7 to the constraints of PESTIS.

TABLE 7.

EFFECT OF DEVELOPMENT VARIATIONS AND PROJECTS
ON PESTIS CONSTRAINTS

COMPONENTS	CONSTRAINTS	DEVELOPMENT STRATEGY VARIATIONS					PROJ
		a	b	c	d	e	ASSISTANCE
RAW MATERIALS	A	-	o	o		+	
INFRASTRUCTURE							
ROAD SYSTEM	B	o	o	o		o	
MAINTENANCE	C	-	o	o		+	
CHEMICAL IND.	D	-	+	+		+	
PRODUCTION/FORMULATION							
CAPACITY UTILIZATION	E	-	+	+			
SKILLED MANPOWER	F	-	+	+		+	7.1.1.
QUALITY CONTROL	G	-	+	+		+	7.1.3.
MANAGEMENT EXPERTISE	H	-	+	+		+	7.1.2.
EFFLUENT TREATMENT	I	-	+	+		+	
MARKETING/DISTRIBUTION			+	+			7.1.6.
IMPORTANCE OF PESTICIDES	J						7.1.7.
STORAGE CAPACITY	K	o	o	o		o	
STORAGE LOSSES	L	+	+	+			
EXTENSION SERVICES	M	o	o	o		o	
ROAD SYSTEM	B	o	o	o			
CONSUMPTION/DEMAND/TRADE			+	+			
UTILIZATION OF							7.1.5.
AVAILABLE FOREIGN EXCHANGE	N	-	+	+		-	7.1.6.
EXPORT MARKETING	O						7.1.7.
GOVERNMENT POLICIES							
MORE CREDIT TO FARMERS	P	o	o	o		o	
IMPORTANCE OF PESTICIDES	J	o	o	o		o	
LEGISTLATION		-	+	+		+	7.1.4.
REGISTRATION	Q		+	+		+	7.1.4.
ENVIRONMENTAL PROTECTION	R	-	+	+		+	7.1.4.

\+ solves or does not depend on the constraint
o needs or promotes to solve the constraint
\- creates new problems

TABLE 7.

DEVELOPMENT VARIATIONS AND PROJECTS ON PESTIS CONSTRAINTS

TRAINTS	DEVELOPMENT STRATEGY VARIATIONS					PROJECTS	
	a	b	c	d	e	ASSISTANCE	INVESTMENT
A	-	o	o		+		
B	o	o	o		o		
C	-	o	o		+		
D	-	+	+		+		
E	-	+	+				
F	-	+	+		+	7.1.1.	
G	-	+	+		+	7.1.3.	7.2.3.
H	-	+	+		+	7.1.2.	
I	-	+	+		+		7.2.1.
J		+	+			7.1.6. 7.1.7.	
K	o	o	o		o		
L	+	+	+				
M	o	o	o		o		
N	o	o	o				
		+	+				
						7.1.5.	
N	-	+	+		-	7.1.6.	
O						7.1.7.	
P	o	o	o		o		
J	o	o	o		o		
	-	+	+		+	7.1.4.	
Q		+	+		+	7.1.4.	7.2.2. 7.2.3.
R	-	+	+		+	7.1.4.	7.2.1.

the constraint
he constraint

5.2.3 Expected end-of programme situation

1991. Production of two new formulae will be realized:
[illegible] of wettable powder
[illegible] of granules

[illegible]. [illegible] of copper oxychlor [illegible] will be produced.

[illegible]. [illegible] consumption will [illegible] by [illegible] related to [illegible].
[illegible] total consumption [illegible] of [illegible].

[illegible]. Pesticide consumption will be increased by [illegible]% related to 1990.
One or two active substances are produced and marketed
domestically and regionally (among neighbouring countries)

6. INTEGRATED DEVELOPMENT PROGRAMME

6.1. Programme objectives

[illegible]

- [illegible]

- [illegible]

- [illegible]

[illegible], but not less important objectives are:

- improve the safe handling of pesticides

- decrease the dangers for the environment

- improve the standard of registration and control by better equipped facilities of the authorities

- improve the skill and expertise of farmers

- improve the expertise of people involved in the management and control of the production of pesticides.

6.2. Policy measures

GENERAL POLICY MEASURES

(Not directly related to, but having influence on PESTIS)

[illegible] urged by the IMF has a significant result: [illegible] businessmen and investors have begun to take an active part [illegible] of the dilapidated economy.

[illegible] per cent to over five per cent yearly from [illegible] from a declining rate of 10 per cent to an annual [illegible] per cent. This was [illegible] because better [illegible] must be continued.

Products of the agriculture (incl. hunting, forestry and fishing) represent 61 per cent of the GDP and 83 per cent of the total export of the country.
Consequently the support of the development of the agriculture is obvious but the low priority of the use of pesticides must be corrected.

SPECIFIC MEASURES

(Having direct impact on PESTIS)

The shortage of pesticides faced by the country can be attributed -beside the lack of the sufficient foreign exchange- also to the fact the planning and procurement of agricultural inputs has accorded insufficient emphasis on the importance of agrochemicals relative to other inputs such as seeds, fertilizers and farm implements.
The proper priority of pesticides is to be recognized by the government.

Enhancement of the financial strenght i.e. the purchase power of the farmers, first of all that of the small-holders must be improved; existing loan and credit conditions (esp. those for the purchasing of various inputs when necessary, but pay back until after harvest) are to be improved.
Reasonable price policy should leave a larger share of profit at the farmers.

An integrated programme is necessary to use better of the foreign exchange available for importing pesticides:

- -cooperation between existing formulation plants in order to the better use of their capacity
- -in frame of supply agreements with suppliers of active substances licence and know-how of production formulation together with all data for registration should be a part of the deal
- -regulations offering such benefits (duties and introduction [illegible] exemptions from handling the bulk formulation [illegible] with the list of [illegible] should be a measure of the
- -tenders should contain the above conditions

Extension services should be better supported, including the professional education of farmers.

Being the central authority for the registration and control of use (production, storage, handling, transport, application) of pesticides it is a vital issue for the country to provide TPRI with the necessary means to perform its duty.

Legislation of environmental protection is to be developed further: NEMCO should be provided not only with the title and authority but also the legal implements to exercise its power to control all industrial and agricultural activities in order to prevent environmental damages.

6.3. Technical assistance projects

6.3.1. Training of personnel of the Moshi plant in pesticide formulation, quality control and management.

6.3.2. Technical assistance during the initial period of the production of the Moshi plant. A plant manager and some other experts (2-3 people of different expertise for 1-2 months each during the initial two years of the operation).

6.3.3. Training of personnel of the TPRI (short term fellowships) in the use of quality control instruments

6.3.4. Training of personnel of NCI, TISCO, Ministry of Agriculture, NEMC (short term fellowships) in the development of national network for the control and advise on the proper agrochemical techniques.

6.3.5. Assistance in preparing a study on the optimal utilization of the capacity of the existing formulation plants.

6.3.6. Assistance in preparing a feasibility study for the local production of active substances selected from the "overview study of the Chemical Sector" prepared by TISCO.

6.3.7. Marketing study for the consumption and demand of pesticides in the region around Tanzania. Such a marketing study is also be helpful for 6.3.5.

6.4. Investment projects

6.4.1. [illegible] treatment at the [illegible] plant.
The original [illegible] on the [illegible] of the Italian Government [illegible] the waste water treatment facility and [illegible] by products.

6.4.2. [illegible] and [illegible] of the [illegible] plant.
Originally this element was planned to be installed in Orient using the infrastructural background of the TPRI.
The implementation had to be postponed until new financial support had been found.

6.4.3. Procurement of instruments for the analytical laboratory of TPRI.
Basic instruments first of all a high pressure liquid chromatograph with accessories are badly needed.

The above projects or elements of them can be combined or consolidated:

For example 6.4.3. and 6.3.3. can merge, this resulting in the selection, purchase of the instrument simultaneously with the training of the personnel.
Or 6.4.2. and 6.4.3. also can be united, depending on the availability of necessary funds
6.2.6. and 6.3.7. again would be combined.
Last, not least 6.3.1. and 6.3.2. can also be amalgamated.
The author tried to formulate all important project concepts as individual elements in order to enable the combination of them up to priorities and financial possibilities.

7. PROJECT CONCEPTS

7.1. Technical Assistance Project Concepts

7.1.1. Technical Assistance Project Concept

United Republic of Tanzania / Moshi
TRAINING OF PERSONNEL OF THE PESTICIDES PRODUCTION AND FORMULATION PLANT IN MOSHI

Estimated duration: three months

UNIDO contribution: $ 94.800.-

PROBLEMS TO BE ADDRESSED

Implementation of the Moshi Pesticides Project by NCI on behalf of Tanzanian Government has finally taken off.
UNDP/UNIDO assistance Ref. DP/URT/78/011 covered the initial stage, i.e. the preparation of the feasibility study.
UNDP/UNIDO assistance Ref. SIS/URT/81/801 and SI/URT/86/875 helped to clear uncertainities of the offered technology and the implementation.
All assistance projects has been ended. The implementation of the plant is going on based on the soft-loan offered by the Italian Government.
Assignment of the Italian partner (M/S TECNIMONT) will be ended by the commissioning and handing over to NCI.

There is no staff having practice in the managing of a pesticide production plant.

As the scheduled start of the first step of implementation (formulation) is second half of 1990, solving the problem is urgent.

CONCERNED PARTIES-TARGET BENEFICIARIES

The problem has been identified by NCI in their "Terminal Report on SIS/URT/84/901 & SI/URT/86/875"

[illegible] beneficiary is NCI, but local production of Copper Oxychloride, formulation of [illegible] imported WP, D, and FW products are benefits for the national agriculture as well.

PRE-PROJECT AND EXPECTED END OF PROJECT SITUATION

Pre-project: No staff experienced in the production of pesticides.

End-of-project: Staff of six having the basic information and experience in the production (technology, process control, working safety, quality control, handling of wastes and by-products) and management of pesticides.

SPECIAL CONSIDERATIONS

Integration of women must be carried out with utmost care: no problem about packaging, storage and handling packaged materials, but where the direct contact (consequently the incorporation) can not be excluded, the nature of the substances and relevant prescriptions are to be carefully studied and followed.

In order to avoid environmental pollution the proper technology and the well trained and disciplined staff are of equal importance.

OTHER PROJECTS EXECUTED BY UNIDO, OR BY OTHER DONORS IN THE SAME SUBSECTOR AND COUNTRY

None.

MAJOR ELEMENTS

Project objectives

[illegible] training.
[illegible] is to provide the plant with the minimal number of skilled manpower having the basic information and experience to work [illegible] under a properly trained plant and experienced [illegible] manager.

Project outputs

Output 1.
Two technical management staff trained in
-resp. technology, process control, handling of wastes and by-products, working safety of formulation.

Output 2.
Two technical management staff trained as in Output 1, but also for the active substance production. Can be the same persons as for Output 1.

Output 3.
Two chemical engineers trained in the quality control and registration pesticides in general, and in the specific analytical methods and instruments needed for the analysis of the resp. products.

Project activities

Training 1.
On the job training at a company having formulation plants for WP,G and FW formulations, preferably at the resp. plants of TECHNIMONT (donor of the technologies).
Schedule of training:

-two weeks:	general information on technologies and working safety
-four weeks:	working in regular shifts in the production
-three weeks:	working as foreman in regular shifts under supervision
-one week:	working in the quality control dept.
-two weeks:	working as assistant plant manager

Trainig 2.
On the job training at a company having an Copper Oxychloride plant, preferably at TECNIMONT.
Schedule of training is the same as for Training 1, but in a Copper Oxychloride plant.

Trainig 3.
On the job training in a quality control department of a pesticide formulating enterprise having properly equipped laboratories.
Schedule of the training:

- [illegible]: general information on technologies and materials (raw materials, intermediates, active substances, auxiliary materials, formulated products, impurities)
- [illegible]: testing in lab methods of sample preparation and qualitative analysis of the active materials.
- [illegible]: general information on the registration of pesticides.

HOST COUNTRY COMMITMENT

The need of a training of personnel in frame of UNDP/UNIDO assistance was expressed by NCI on behalf of the Tanzania Government.
There is no possibility for such a training in the country.

RISKS

The biggest risk is the delay of starting the training, which may result in the postponement of the start of regular production, which again may cause a lot of problems to say nothing about the missed profit. Another risk may be whether the trained personnel would stay at the company. Considering the situation about work places for the time being this risk may not be regarded as serious .

INPUTS

Travel costs:	6 travels @ $3,000	= 18,000
Fellowship	16 months @ $3,300	= 52,800
Training fee	8 months @ $3,000	= 24,000
	Total	**$ 94,800**

7.1.2 Technical Assistance Project Concept

United Republic of Tanzania - Moshi

ASSISTANCE DURING AND AFTER THE ESTABLISHMENT OF PESTICIDE COMPLEX AT MOSHI

[illegible] has been formulated [illegible] a component [illegible] Terminal Report [illegible] Technical Assistance [illegible] Establishment [illegible] Tanzania. Based on the [illegible] project [illegible] Assistance for the Establishment [illegible] Pesticides Pilot Plant Under a Soft Loan Advance from the Italian Government].

A copy of the original project formulation framework can be found on the next pages.

PROJECT FORMULATION FRAMEWORK 22 JUNE 1988

Country: Tanzania

Project No:

Proposed Title: Assistance during and after the Establishment of Pesticide Formulation Plant.

Estimated Duration: Three years (36 months).

Estimated Cost: U.S.$ [illegible]

[illegible] Project [illegible] [illegible] of Government U.S.$ [illegible] million in local and foreign currency.

A. Development problems to be addressed by the proposed project:

	Causes	Evidence
1. At macro level.		
1.1. Agricultural Sector. Declining agricultural output particularly that of major cash crops, resulting in shortage of foreign exchange.	Lack of inputs such as fertilizers, pesticides, land reclamation, incentives for farmers and trained personnel.	Food production not able to meet demands and export of cash crops not increasing.
2. At micro level.		
2.1. Chemical (Pesticides) Industry sub-sector. Absence of facilities for production and formulation of pesticides.	Establishment of facilities need long term planning, feasibility studies and availability of know-how.	All pesticides used in the country are imported at a high cost of around U.S.$ 30 million per annum.

	Causes	Evidence
2.2. Lack of infrastructure and trained personnel, who could establish [illegible] pesticide [illegible].	Creation of infrastructure needs outside help. Personnel in the chemical industry do not have the opportunity to get training in pesticide [illegible].	The country has to depend on imported pesticides as finished products.
[illegible] establishment of pesticide production facilities including processing of raw materials, obtaining the right know-how, testing of raw materials for suitability and in taking adequate steps in safety and manual control measures.	[illegible] modern requirements for the establishment of pesticide production facilities.	[illegible] agreement between National Chemical Industries (NCI) and the Italian subcontractors needed modifications under UNIDO's advice. It also needed getting proven know-how and testing of raw materials. NCI still need assistance during and after the construction of the plant.
2.1. There are gaps in the technical assistance provided under Italian soft loan for the establishment of pesticide complex at Moshi. These need to be filled for smooth implementation of the project.	The gaps come about due to a number of responsibilities undertaken by National Chemical Industries.	These gaps were identified during UNIDO's assistance in the negotiations between NCI and their subcontractors.

B. Concerned Parties/Target Beneficiaries.

1. Party identifying project.

The Ministry of Industry submitted a request to UNIDO in 1986 [illegible] advisory assistance to enable them in their negotiations with their sub-contractors for the establishment of a pesticide [illegible] formulation complex at Moshi. Based on UNIDO's advisory assistance under SI/URT/85/875, problems were identified which [illegible] material assistance outside the Italian Soft Loan arrangement. This assistance is very essential for successful accomplishment [illegible] undertaken by the National Chemical [illegible].

2. [illegible]

The National Chemical Industry (NCI) of the Ministry of Industry will be the direct beneficiary of the UNDP/UNIDO assistance - agricultural sector.

3. Pre-project and end of project status.

[illegible] situation	End of project [illegible]
The NCI has completed their final negotiations with their sub-contractors and have started civil works. Soon the project will be ready to receive equipment.	A smooth co-ordination between NCI and sub-contractors. and NCI completing their responsibility in carrying out biological testing of experimental formulations, raw materials in place, establishment of effluent control for formulation unit after commissioning and handing over by the contractors.

D. Special Considerations

NONE

E. Other donors, programmes active in the same sub-sector.

1. The pesticide complex itself is built by the Tanzanians with the assistance from the Italian Government under a soft loan agreement.

2. [illegible]

2. Its relation to the country programme: - The above objective is in keeping with the industry sector and other sectors to promote agricultural production by import substitution, enshrined in the country programme.

1. Major Elements

Immediate Objective	Success Criteria
To enable the National Chemical Industry (NCI) to carry out its major responsibility in the establishment of a pesticide complex to be constructed under an Italian Soft Loan Agreement.	A pesticide complex well established within the time schedule and operating smoothly after hand over by the Italian sub-contractors.

Outputs	Activities	Party responsible for Activity
1. Pesticide formulations made from locally available raw materials tested biologically	Export assistance in testing formulated materials in collaboration with the Ministry of Agriculture and in consultation with FAO.	NCI/UNIDO/Ministry of Agriculture.

Outputs	Activities	Party responsible for Activity
2. Well trained staff [illegible] for [illegible] maintenance of the plant [illegible]	Expert assistance in normal running and maintenance of the plant [illegible] for one year after handover of the plant.	UNIDO
[illegible]	Suitable [illegible] installed and put [illegible] operation in collaboration with the sub-contractor of the major pesticide complex.	[illegible]
4. Three well trained staff in quality control, effluent treatment and safety aspect.	Three fellows trained in laboratories outside Italy on quality control, effluent treatment and safety aspects.	

H. Project Strategy

1. Direct Recipients

The project counterparts of the National Chemical Industry (NCI) of the Ministry of Industry are the direct beneficiaries of the project.

2. Relationship between direct recipients and target beneficiaries

The assistance provided to NCI will make sure that they can supply pesticide formulation according to specifications to the end users (farmers) and in the process creating new jobs, saving foreign exchange and also improving prospects for export.

3. Implementation Arrangements

The National Chemical Industry (NCI) will be the Project Counterpart Agency They will select a National Project Director who will co-operate with UNIDO's non-residential Chief Technical Adviser and will co-ordinate the project activities through UNDP, Dar-Es-Salaam.

4. Alternative strategies/implementation arrangements considered

No alternative project strategies considered.

5. Host Country Commitment

The Government has already committed financial and human resources to this project and protocol with the Italian Government has been signed and the contract for the construction of the complex and know-how has been given to an Italian company Technimont. The site has been allotted and civil work already started. There have also provided a team of political personnel for implementation of the project.

6. Risks

Description of Risks	Estimated likelihood of occurrence
1. Factors which may at the outset cause major delays or prevent achievement of the project's outputs and objectives: Experience by UNIDO in their negotiations indicate that unless assistance is provided, there is a risk of lack of co-ordination and adherence to work-plan and some results not available in time for full implementation.	High without UNDP/UNIDO assistance. Low with UNDP/UNIDO assistance.
2. Factors which could over time cause major delays or prevent achievement of the project's outputs and objectives:	
2.1. The extent of compatibility of local raw materials for pesticide formulation.	Low

Description of Risks	Estimated likelihood of occurrence
2.2. Effluent control and waste [illegible]	[illegible]
2.3. Long term availability of [illegible]	[illegible]
[illegible]	[illegible]
2.5. Foreign producers dumping formulated materials at a low price.	Low

K. Inputs

1. Budget Outlines

Enternal Output

Personnel

11-1 Formulation Manager - Pesticide Formulation, non-registered [illegible]	12 M/M	$ 36,000
11-2 Plant layout specialist, split mission	6 M/M	$ 18,000
11-3 Quality control expert, split mission	2 M/M	$ 10,000
11-4 Safety [illegible] effluent control, safety specialist	1 M/M	$ 1,000
11-5 Short mission		$ 10,000
21-11 Training		
Quality control	2 M/M	
Effluent control	1 M/M	
Safety aspects	1 M/M	$ 20,000
41-00 Expendable Equipment		$ 5,000
42-00 Non-expendable equipment (effluent control equipment for the formulation unit)		$ 150,000
50-00 Miscellaneous		$ 6,000
TOTAL		$ 261,000

Government Contribution

In cash and kind:
The Government has already committed for the main project almost U.S.$ 37 million in local and foreign currency.

2. Comments on possible project input policy issues:

NONE

7.1.3 Technical Assistance Project Concept

United Republic of Tanzania - Moshi

TRAINING OF PERSONNEL OF THE TPRI IN THE USE OF UP TO DATE QUALITY CONTROL INSTRUMENTS

[illegible]

[illegible]

PROBLEMS TO BE ADDRESSED

Laboratories of TPRI have a very limited number of instruments. In order to better utilize the existing and to be procured (e.g. described in project concept 7.2.3) instruments, an on the job training is necessary.

CONCERNED PARTIES-TARGET BENEFICIARIES

Quality Control Laboratory of the TPRI.

PRE PROJECT AND EXPECTED END PROJECT SITUATION

Staff of existing the quality control laboratory will be able to utilise better of their instruments by using more sophisticated methods, and identify contaminants, state the exact purity of compounds.

SPECIAL CONSIDERATIONS

NONE.

MAJOR ELEMENTS

Project Objectives

The project concerns direct training.
The immediate objective is to provide the staff of [illegible] with the skill and expertise necessary for the use of high tech. up to date instruments, in order to be able to detect and identify extra small amount of materials. This an extremely important issue in the process of the control and exploitation of geothermal fields. Identification of contaminants

Project outputs

[illegible] to fulfil project objectives.

Project activities

Two month on the job training in a laboratory equipped with up to date liquid.- and gas cromatographs.

HOST COUNTRY COMMITMENT

To assure the conditions for the training in suitably equipped laboratory.

RISKS

None.

INPUTS

Travel costs:	1 travel @ $3,000	=	3,000
Fellowship	2 months @ $3,300	=	6,600
	Total:	$	9,600

7.1.4 Technical Assistance Project Concept

United Republic of Tanzania

TRAINING OF PERSONNEL IN THE CONTROL AND LEGISLATION OF PESTICIDES

Estimated duration: Two months

Major contribution: 5 [illegible]

PROBLEMS TO BE ADDRESSED

The procedure of registration of new pesticides duely organized. However both the necessary practice and law on the proper production, storage, handling and application are missing.

CONCERNED PARTIES-TARGET BENEFICIARIES

Ministry of Agriculture, NCI, TISCO. NEMCO

PRE-PROJECT AND EXPECTED END OF PROJECT SITUATION

Pre-project:

Pesticide production.
Active substance production is due to start in 1991.
Formulation of FW, G and WP products is going to start in 1990.
Pesticide storage, transport and handling.
The development of pesticides has reached Tanzania: newer, more effective and in some cases more dangerous products are going to be introduced.
Pesticide legislation.
Except the registration of new pesticides no existing law is governing the production, transport, storage and application of pesticides.

End-of-project:

Proposals and draft of guidelines will have been prepared for the proper handling (production of active substance, formulation, handling of wastes, cleaning of equipments, transport, storage, application in fields, safety of personnel, environmental protection) of pesticides.

SPECIAL CONSIDERATIONS

While during the production properly trained personnel and necessary equipment is a precondition, the same must not be supposed concerning the handling of pesticides outside the factory. During the transport, storage and application to the layers of the population can contact them.

[illegible] must be taken also with some esp. where the [illegible] can not be excluded.

OTHER PROJECTS EXECUTED BY UNIDO OR BY OTHER DONORS IN THE SAME SUBSECTOR AND COUNTRY

MAJOR ELEMENTS

Project objectives

The project concerns short term fellowships.
The immediate objective is to provide the country and the resp. institutions (authorities and companies) with special knowledge and experience of the developed countries.

Project outputs

Staff members of the relevant authorities (Ministry of Agriculture and NEMCO), producers of chemicals (NCI) and developers of industry (TISCO) will have the special expertise on the handling of hazardous materials.
Proposals and drafts for guidelines will be elaborated.
Basis of the legislation of handling of pesticides will be created.

PROJECT ACTIVITIES

Two months fellowship for four people - one from each of the above mentioned institutions - to three different developed countries for two weeks and a two week period at the end for the preparation of the final report.

- [illegible] weeks in the first visited country
  - 1.week: in a pesticide producer company
  - 2.week: at an environmental protection authority
- [illegible] weeks in the second visited country
  - 1.week: in farms and at distributors
  - 1.week: pesticide registration authority
- [illegible] weeks in the third visited country
  - 1.week: in farms and at distributors
  - 1.week: pesticide registration and or environmental protection authority
- two weeks preparation of desk study in UNIDO/Vienna

HOST COUNTRY COMMITMENT

Support in transports and organizing of visits.

RISKS

None.

INPUTS

Travel costs:	4 travels @ $3,000	= 12,000
Fellowship	8 months @ $3,300	= 26,400
Expert fee 2x0,5 months	1,5 months@ $8,000	= 12,000

	Total:	$ 50,400

7.1.5 Technical Assistance Project Concept

United Republic of Tanzania

ASSISTANCE IN PREPARING A STUDY ON THE OPTIMAL UTILIZATION OF CAPACITY OF EXISTING FORMULATION PLANTS

[illegible] duration: [illegible] months.

[illegible] estimate: $ 21,100.-

PROBLEMS TO BE ADDRESSED

[illegible] foreign exchange limits the quantity of pesticides well below the demands of the country.
Significant amount is imported as formulated end product, while the capacity of the existing formulation plants is utilized to about 10-30 per cent.

CONCERNED PARTIES-TARGET BENEFICIARIES

Tviga Chemicals Industries - DSM
Sapa Chemicals Industry - DSM
Hoechst Tanzania - DSM
Pfizer - DSM
Tanzania Pesticides Co. Ltd. Morogoro

PRE-PROJECT AND EXPECTED END-OF-PROJECT SITUATION

Pre- project: see: Problems to be addressed.

End-of project: Import of formulated products is decreased to about the half of the present value (or even less), to the benefit of active substances which will be formulated within the country utilizing the existing but partly idle capacity up to minimum 50 per cent.
The available foreign currency is much better utilized (by saving the added value of formulation) resulting in
-saving foreign exchange and/or
-providing more pesticides for the consumers.

SPECIAL CONSIDERATIONS

None.

MAJOR ELEMENTS

Project objectives

The project envisages the preparation of a study based on quantitative analysis of present consumption and possible future demands of pesticides and assist in formulating capabilities.

Project outputs

Option A.
15-30 per cent saving in foreign exchange (for the same amount and sortiment of pesticides), or

Option B.
10-30 per cent higher amount of pesticides for the agriculture (using the present amount of foreign exchange).

Selection between the two options is up to the Tanzanian Government, however Option B enables higher yields of cash,- or food crops which again results in increased foreign exchange income which is vital for the country.

PROJECT ACTIVITIES

Preparation of study is scheduled:

two weeks:	desk study (analysis of pesticides consumption and capacity data of existing plants)
three weeks:	fact finding visit to formulation plants (assessment of condition of facilities and formulations)
	analysis of possible future demands of pesticides, based on major cash crop and food crop data in order to develop suggestions for locally formulated pesticides.
three weeks:	preparation of final study/report

HOST COUNTRY COMMITMENT

None.

RISKS

[illegible]

INPUTS

Travel costs*	1 travel	@ $3,000	= 3,000
DSA+accomodation	3 weeks	@ $1,000	= 3,000
Expert cost	2 months	@ $9,050	= 18,100

	Total		$ 24,100

* Remark: To Tanzania through Vienna.

7.1.6 Technical Assistance Project Concept

United Republic of Tanzania

ASSISTANCE IN PREPARING A FEASIBILITY STUDY FOR THE LOCAL PRODUCTION OF ACTIVE SUBSTANCES OF PESTICIDES

Estimated Duration: 3.5 months

UNIDO Contribution: $ 27,875.-

PROBLEMS TO BE ADDRESSED

There is no production of active substances in Tanzania.
Total amount of active substances of pesticides used in the agriculture is imported against and consequently limited by the available foreign currency.
Parallel with the development of the chemical industry, local production of certain types of active substances is worth of consideration.

CONCERNED PARTIES-TARGET BENEFICIARIES

Ministry of Industry.
National Chemical Industries.
Tanzania Industrial Studies and Consulting Organization.

PRE/PROJECT AND EXPECTED END OF PROJECT SITUATION

Pre-project: The production of the first active substance (copper oxychloride) is due to start in 1991 in Moshi.
Concepts for the development of the chemical industry are elaborated in the "Overview Study of the Chemical Sector" by TISCO. A number of organic chemical compounds have been specified as potential active substances or intermediates for the pesticide production.

End-of-project: Based on techno-economical considerations a selection will have been performed among possible compounds. Proposal for the feasible candidates enables the Government to realize the production of certain active substances in frame of the harmonical development of the chemical industry.

SPECIAL CONSIDERATIONS

OTHER PROJECTS EXECUTED BY UNIDO, OR BY OTHER DONORS IN THE SAME SUBSECTOR AND COUNTRY

None.

MAJOR ELEMENTS

Project objectives, outputs

The project concerns preparation of a feasibility study.
The immediate objective is to select 1-3 active substances and/or intermediates which can be produced economically in Tanzania and have a promising domestic and regional market.

Project activities

1. Desk study. Four weeks.
   Comparative study on the process technologies.
   Preliminary selection of 3-5 active substances and/or intermediates from the specified candidates of the "Overview Study of the Chemical Sector" (TI3CO) based on their technological feasibility.

2. Fact finding mission in Tanzania and to possible markets.
   Six weeks.

3. Preparation of final report. Four weeks.

HOST COUNTRY COMMITMENT

None.

RISKS

None.

INPUTS.

Expert cost	3.5 months	@	$ 9,050	= 31,675
Travel costs (To Tanzania)	travel	@	$ 3,000	= 3,000
(In the region)	5 travels	@	$ 600	= 3,000
	Total			$ 37,675

7.1.7 Technical Assistance Project Concept

United Republic of Tanzania

MARKETING STUDY FOR THE CONSUMPTION AND DEMAND OF PESTICIDES IN THE REGION AROUND TANZANIA

Estimated duration: Four months.

UNIDO contribution: $ 47,200.-

PROBLEMS TO BE ADDRESSED

Developing countries in the region of South and East Africa are individually too small, but regional market and distribution network(s) can result in a suitable market size especially for local production of pesticides.

CONCERNED PARTIES-TARGET BENEFICIARIES

Certain countries of SADCC, PTA and Sacu.

PRE PROJECT AND EXPECTED END OF PROJECT SITUATION

Pre project: Individual domestic markets of pesticides without cooperation or regional distribution network for neighbouring countries.

End-of-project: Marketing study of pesticides for SADCC, PTA and Sacu countries containing consumption and (future) demands and proposals for regional cooperation and distribution network(s) based on country-by-country analysis. Suggestions for local production and/or formulation of pesticides.

SPECIAL CONSIDERATIONS

Special political tensions and relations between individual countries must be taken into consideration.

OTHER PROJECTS EXECUTED BY UNIDO, OR BY OTHER DONORS IN THE SAME SUBSECTOR AND COUNTRY

Projects of donors for the individual countries, first of all those of [illegible] to be investigated - [illegible] with the development plans of the [illegible] countries and [illegible] e.g. [illegible], FTA and [illegible].

MAJOR ELEMENTS

Project objectives/outputs

[illegible] feasibility study.
The immediate objective is proposal [illegible] for regional marketing cooperation[illegible] distribution networks[illegible] for pesticides.

Project activities

1.Desk study. Four weeks.
Analysis and summarizing of statistical data on the agriculture, pesticides consumption and production of the individual countries. Investigation of project documents for the development of agriculture and chemical industries of the countries of the region.

2.Data collection and fact finding mission to the selected countries. Eight weeks.

3.Preparation of final report. Four weeks.

HOST COUNTRY COMMITMENT

Supply of data, organizing of meetings, domestic transports.

RISKS.

None.

INPUTS

Consultant fee	4 months	@	$ 9,050	= 36,200
[illegible]			$ 6,000	= [illegible]
[illegible]	2 months	@	$ 2,7[illegible]	= [illegible]
	[illegible]			[illegible]

* Remark : To finalize and prepare the report.

7.2 Investment Project Concepts

7.2.1 ESTABLISHMENT OF EFFLUENT TREATMENT FACILITY IN THE PESTICIDES PRODUCTION PLANT IN MOSHI

PROBLEMS TO BE ADDRESSED

Implementation of the Moshi Pesticides Project by NCI on behalf of the Tanzanian Government has finally taken off.
NCI in collaboration with TISCO made the necessary contacts for procurement of machinery and know how from Italy and managed to negotiate a supply contract worth $ 12.36 million.
The Italian Government pledged to finance the foreign component through a soft loan to the Tanzanian Government.
Local costs in Tanzanian Shillings have been estimated earlier amounting to the equivalent of about $ 6 million.
Although the effluent treatment was considered essential for the future operation of the plant, due to lack of sufficient foreign funds they were omitted from the machinery supply contract.
Considering the dangerous effects the plant can have on the surrounding environment and eco system if the effluent discharges are not properly treated, and the inability of NCI to raise foreign funds for procurement of the treatment equipments, UNDP's assistance seems to be necessary.

CONCERNED PARTIES-TARGET BENEFICIARIES

Concerned party: NCI the implementing agency.
Beneficiary: Population of Moshi.

PRE-PROJECT AND EXPECTED END-OF-PROJECT SITUATION

Pre-project: Formulation in the Moshi plant will start in the second half of 1990. The plant has no waste water treatment facility.

End-of-project: An incinerator for burning solid wastes, and water treatment equipment for treating liquid discharges will ensure that the environment will be protected against hazardous and/or toxic materials.

SPECIAL CONSIDERATIONS

[illegible] THE NEIGHBOURHOOD OF KILIMANJARO, THE VICINITY OF THE NGORONGORO CRATER, THE SERENGETI PARK AND OTHER WORLD FAMOUS RESERVATIONS justify special judgement.
The author can not help but express his personal conviction that hardly can project be so worth for support as the present one.

OTHER PROJECTS EXECUTED BY UNIDO, OR BY OTHER DONORS IN THE SAME SUBSECTOR AND COUNTRY

None.

MAJOR ELEMENTS

Project objectives

The immediate objective is to assist in the financing of the procurement of
- one incinerator for the burning of solid wastes, and
- technology and equipments for the treatment of liquid wastes

Project outputs

The pesticides production plant in Moshi will be equipped with the necessary facilities for the treatment of both liquid and solid wastes. (Effluent air is cleaned by filters, which are parts of the technical equipments supplied by the contractor)

Project activities

Project proposal is to be prepared by NCI to UNIDO/UNDP.
The proposal will contain the concised plans of the effluent treatment [illegible] and the specifications of the machinery and equipments.
After the formal [illegible] preparation of the project by UNDP/UNIDO [illegible] of the equipment is realized through open and public tenders. Implementation will be agreed upon and the starting will be controlled [illegible] contractor.

HOST COUNTRY COMMITMENT

[illegible] will be carried out by the Tanzanian counterpart.
Estimated costs: Shs 6-12 million (equivalent of $ 30-60,000)

RISKS

None.

INPUTS

Foreign exchange	$	5,000-20,000 (1)
Local currency	Shs	6-12 million (2)

Remarks: (1) Preliminary estimation. More exact figure can not be given until after the selection of the equipments.

(2) Preliminary estimation. More exact figure can not be indicated until after the elaboration of the technology of the treatment processes.

7.2.2 Investment project concept

United Republic of Tanzania - Arusha

ESTABLISHMENT OF AN R & D LABORATORY FOR PESTICIDE FORMULATIONS AT THE TROPICAL PESTICIDE RESEARCH INSTITUTE, (TPRI), ARUSHA

[illegible] and a half years

[illegible] $ 72[illegible]

[illegible] Shs 1.1 million in kind [illegible]
Shs 2.2 million in cash [illegible]

[illegible]

PROBLEMS TO BE ADDRESSED

Pesticide manufacture/formulation needs continuous research first of all because pesticides unlike to other products are highly sensitive to changing environmental and ecological conditions such that with time their effectiveness diminishes and pests develop resistance.

R&D work is necessary to ensure that the products to be manufactured are continuously improved to match with changing ecological and environmental conditions

Research work creates the possibility for developing the use of local materials as inputs in formulation to cut down expenditure on imports.

The recommendations as put forward in the terminal report of the feasibility study No.DP/URT/78/011 of November,1982 and reactivated in technical report No.SI/URT/86/875/11-01/32.1.6 of January 1987 had the full backing of UNIDO/UNDP since the experts brought up the idea. however, no concrete commitment to finance the project has to date made.

It had been proposed that in order to cut down costs of implementation the infrastructure already established at TPRI in Arusha be used for setting up the laboratory. TPRI were prepared to make available one spacious laboratory building for the purpose and some of their existing professional staff could be used to start up the laboratory.

UNIDO's contribution would mainly go into purchasing additional laboratory instruments and pilot scale formulation equipments.

Total UNDP input was estimated $ 729,000 while Government input would be Shs 3.3 million in local currency.

7.2.3 Investment Project Concept

United Republic of Tanzania - Arusha

PROCUREMENT INSTRUMENTS FOR THE ANALYTICAL LABORATORY OF TPRI

[illegible]

[illegible]

PROBLEMS TO BE ADDRESSED

The Tropical Pesticides Research Institute (TPRI) was originally planned to meet the demands of three countries.
Size, layout and concept of the Institute correspond to that purpose.

Unfortunately the shortage or even lack of vital instruments and equipments especially in the analytical laboratories raise serious problems. The separation and identification of impurities and metabolites is a conditio sine qua non for up to date analytical work necessary during the process of registration.

Without proper analytical control methods authorities are exposed to and have to rely on the statements of applicants. Such situation is unacceptable in a country where the agriculture is the backbone of the national economy.

CONCERNED PARTIES-TARGET BENEFICIARIES

Concerned party: TPRI
Beneficiary: Tanzanian agriculture and environment.

PRE-PROJECT AND EXPECTED END-OF-PROJECT SITUATION

Pre-project: Identification and separation of extremely small quantity of materials beside active substances occurs daily during registration procedures.
Without properly equipped analytical laboratory validity and reliability of the registration pr[illegible]s most difficult to maintain and doubts can be raised especially in case of supposed accidents.

End-of-project: Properly equipped analytical laboratory is at the disposal of TPRI.
Quality control of products, active substances and auxiliary materials can be carried out quickly with reliability and accuracy.

SPECIAL CONSIDERATIONS

In the selection of instruments and laboratory equipments [illegible] and after-sales [illegible] considerations are to be taken into account [illegible] high performance.

OTHER PROJECTS EXECUTED BY UNIDO, OR BY OTHER DONORS IN THE SAME SUBSECTOR OR COUNTRY

The project could be combined with 7.1.3 (Training of personnel of the TPRI in the use of up to date quality control instruments).

MAJOR ELEMENTS

Project objectives

The project concerns selection and procurement of high performance up to date analytical instruments combined with the training of personnel.

Project outputs

Analytical laboratory at TPRI equipped with cromatograph(s).
A high performance liquid cromatograph as basic instrument seems to be of vital importance completed by accessories and possibly by a second cromatograph depending on the equipments of the other laboratories of the Institute.

Project activities

The project will be implemented during three periods:

- one month : on the job training for one chemist or chemical engineer of IPBI in a well equipped analytical laboratory of a pesticide producer or institute of good reputation.
  Selection of the suitable instruments and prescriptions is performed.
- [illegible] procurement of the selected instruments according to prescriptions of [illegible]
- [illegible] verification and start-up of new equipments with [illegible]

HOST COUNTRY COMMITMENT

None.

RISKS

None.

INPUTS

Travel costs	2 travels	@ $	3,000	= 6,000
Fellowship	1 month	@ $	3,300	= 3,300
Expert cost	1 month	@ $	9,050	= 9,050
Instruments (to be selected in frame of the project)				= 40,000

Total				$ 58,350

8.1 List of references and appendices

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List of Appendices

21. Exports of cash-crops 1983-1988

22. 1-6. Application form for pesticides registration