OCCASION

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

DISCLAIMER

FAIR USE POLICY

CONTACT

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

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

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

RESTRICTED

17397
(1 of 3)

DP/ID/SER.A/1166
9 March 1989
ORIGINAL: ENGLISH

PHILIPPINES PHARMACEUTICAL INDUSTRY DEVELOPMENT STUDY

DP/PHI/87/019

PHILIPPINES

Technical report: Environment and possibility of the Pharmaceutical Industry in the Philippines of upstream integration*

Prepared for the Government of the Philippines
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Dr. K. Ivanov, Chief Technical Adviser
Drs. William Padolina and Modesto Chua - Biotechnology and Human Resources
Atty. Hiram Mendoza - Law, Mr. Nicanor Gabunada and
Dr. Ruperto Alonzo - Economics

Backstopping Officer: Dr. Zoltan Csizer, Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

V.89-52790

ACKNOWLEDGEMENTS

The authors wish to express their gratitude and appreciation to the Honorable Dr. Alfredo Bengzon, Secretary of Health, for his valuable guidance and moral support, which made this study possible.

We are particularly grateful to Mr. Rhais M. Gamboa, Undersecretary of Health, for his deep interest and his continuous support in the management of the project.

Our special thanks go to Dr. Quintin Kintanar, Assistant Secretary of Health, for sharing his experience and for his professional advice and assistance.

Tha authors are very indebted to Dr. A. Tcheknavorian - Asenbauer, Director of UNIDO, for her initiatives and vision in the elaboration of the study and its validation.

We wish to express our gratitude to Mr. T. Mangun, Resident Representative of UNDP in the Philippines, for his understanding, encouragement and cooperation.

Our sincerest thanks and appreciation go to Dr. Romeo Reyes, Assistant Director General, NEDA, to Mrs. Glory Chanco, Director Chemical Industries Department, Board of Investments and Mrs. Fleur de Lys Torres, Director Social Services Staff, NEDA, for their cooperation and active participation in the preparation of the study.

We wish to thank also all members of the staff of the Department of Health and the PCHRD for their efficiency, understanding and friendly collaboration.

The authors wish to express their special thanks to Mrs. Olivia Fery, Country Manager Philippines and Business Development Manager, South East Asia of IMS Pacific Ltd., Mr. Adriano C. Dy, Managing Director of SGV &Co. and the Health Action Information Network (HAIN), for their assistance and cooperation on providing valuable data and information used in our study.

TABLE OF CONTENTS

ADDENDUM 2

INTRODUCTION : THE PHARMACEUTICAL INDUSTRY

In broad terms, there are basically three types of industrial enterprises participating in the pharmaceutical market place:

- bulk pharmaceutical chemicals producers
- dosage form formulators
- fully integrated pharmaceutical manufacturers

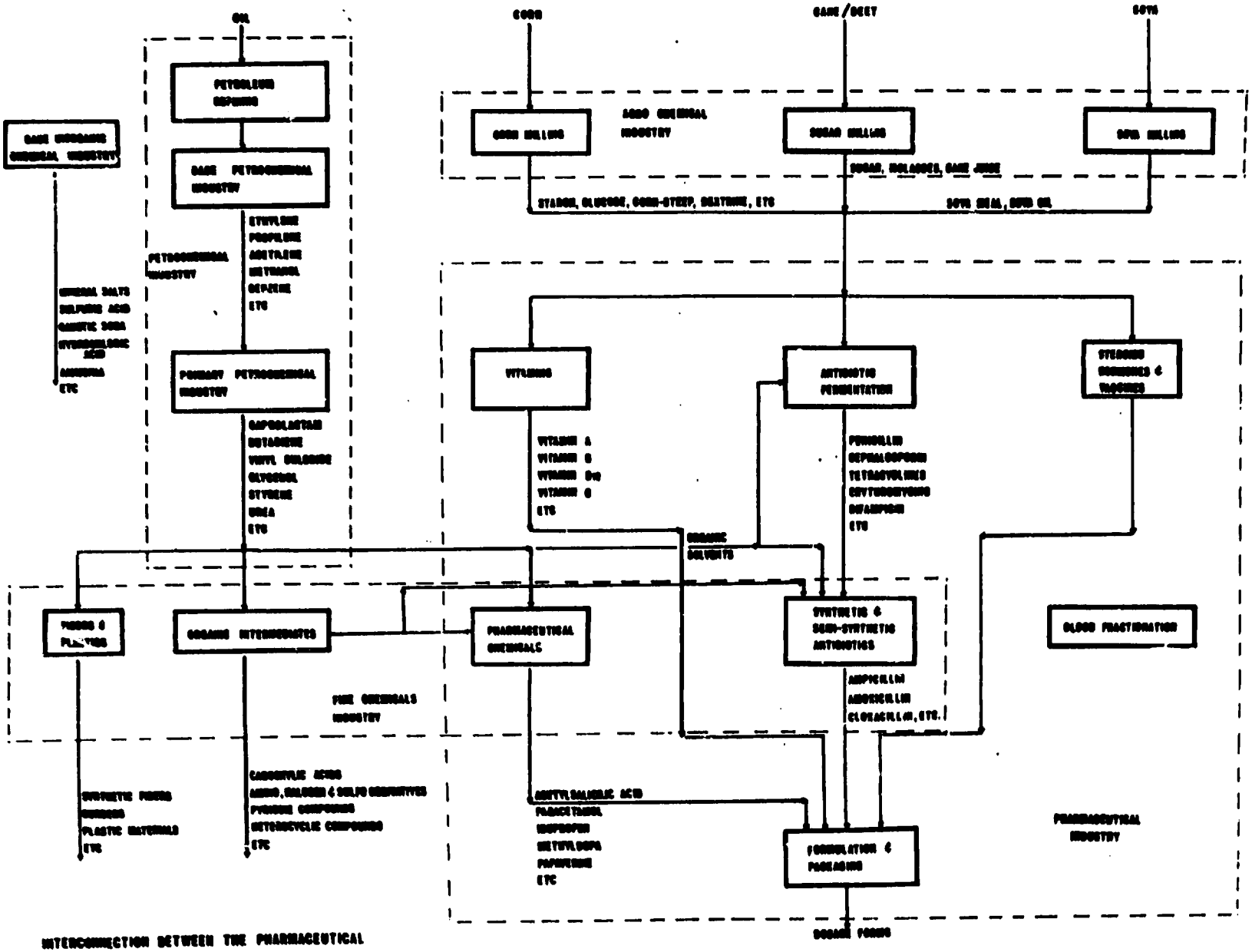
The first ones are those firms producing pharmaceutical chemicals in bulk only such as antibiotics by fermentation and/or semi-synthesis, for example. They do not manufacture any dosage form drugs. Dosage form formulators, on the other hand, do not manufacture any fine chemicals in bulk, but purchase them on the open market, formulate , package and market them. The fully integrated pharmaceutical manufacturers have the capability of producing their own pharmaceutical chemicals, as well as the capacity to formulate and package their own dosage form finished pharmaceuticals. These manufacturers are also selling their excess or non-captive bulk material to dosage form formulators, either directly or through brokers.

In more precise terms, the manufacture of active ingredients,pharmaceutical or fine chemicals, does not belong, strictly speaking, to the pharmaceutical industry per se, but is relevant to the chemical one. As mentioned above, some pharmaceutical conglomerates do own such chemical plants, but they are usually separate operating units and profit centers. In this sense, the reputable pharmaceutical manufacturers in the Philippines, domestic and foreign, are doing exactly what any other reputable pharmaceutical producing plants do in the US, in Europe, or in Japan.

The following figure could illustrate interconnection between the pharmaceutical industry and other chemical industry branches.

The pharmaceutical manufacture, thus consists basically of two phases - the formulation, often misconstrued as a simple mixing of some ingredients and the packaging of the pharmaceutical finished forms.

In fact, the first phase encompasses several more or less sophisticated steps, governed by various technologies, some of them under patent protection. Starting from a scientifically based selection of pharmaceutical chemicals and excipients from different sources and passing, for instance, in the case of dry forms through grinding, sifting, blending, mixing, granulating, drying, etc. with several quality controls on the way, under proper and strict "good manufacturing practices", the produced finished medicines should demonstrate the required physico-chemical properties essential on ensuring the bioavailability of the product and its desired therapeutic effect.



INTERCONNECTION BETWEEN THE PHARMACEUTICAL INDUSTRY AND OTHER CHEMICAL INDUSTRY BRANCHES

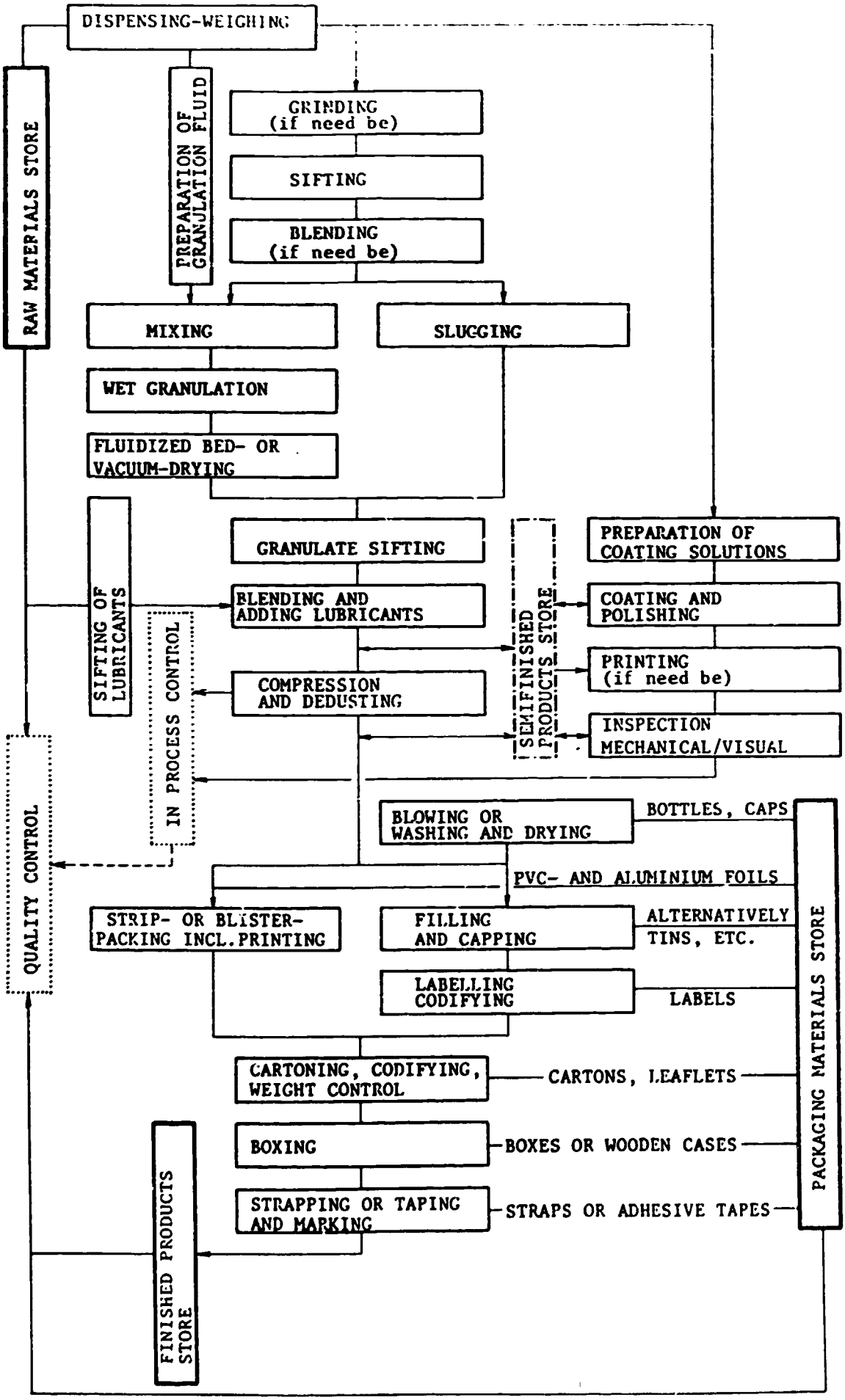
The main finished-dosage forms are presented as tablets, capsules, syrups, drops, injectables (parenterals), powders [1], creams, ointments, suppositories and others such as pastilles, spansules (time-releasing capsules), granules, emulsions, sprays, suspensions and lotions.

The following illustrative flow-diagrams and sheets could demonstrate the various steps taken in the preparation of different galenical forms of the medicines (Figures 2 - 9).

---

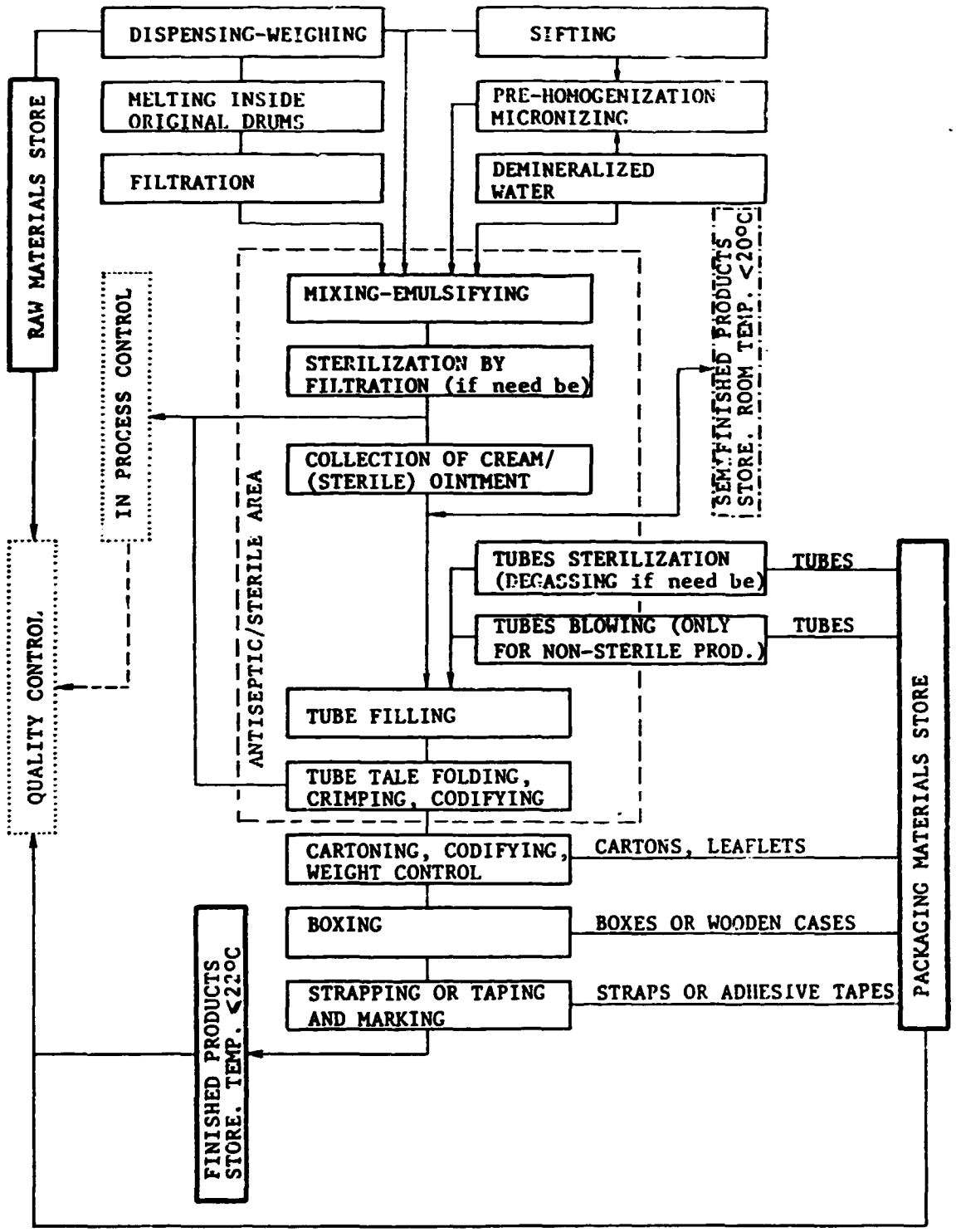
(1) including "liquid powders", consisting usually of alcohol-talcum suspensions.

Figure 2



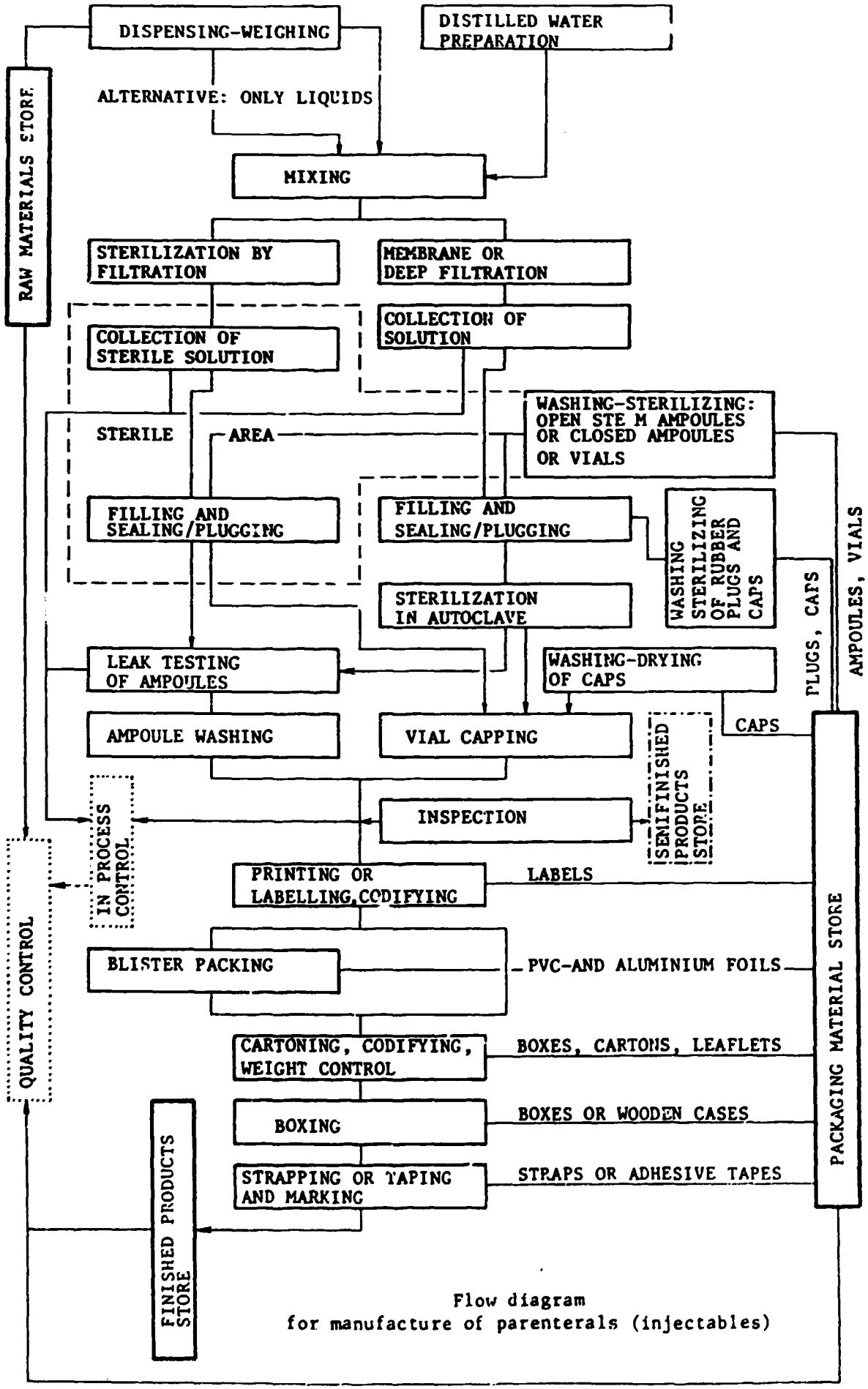
Flow diagram
for formulation of (coated) tablets

Figure 3



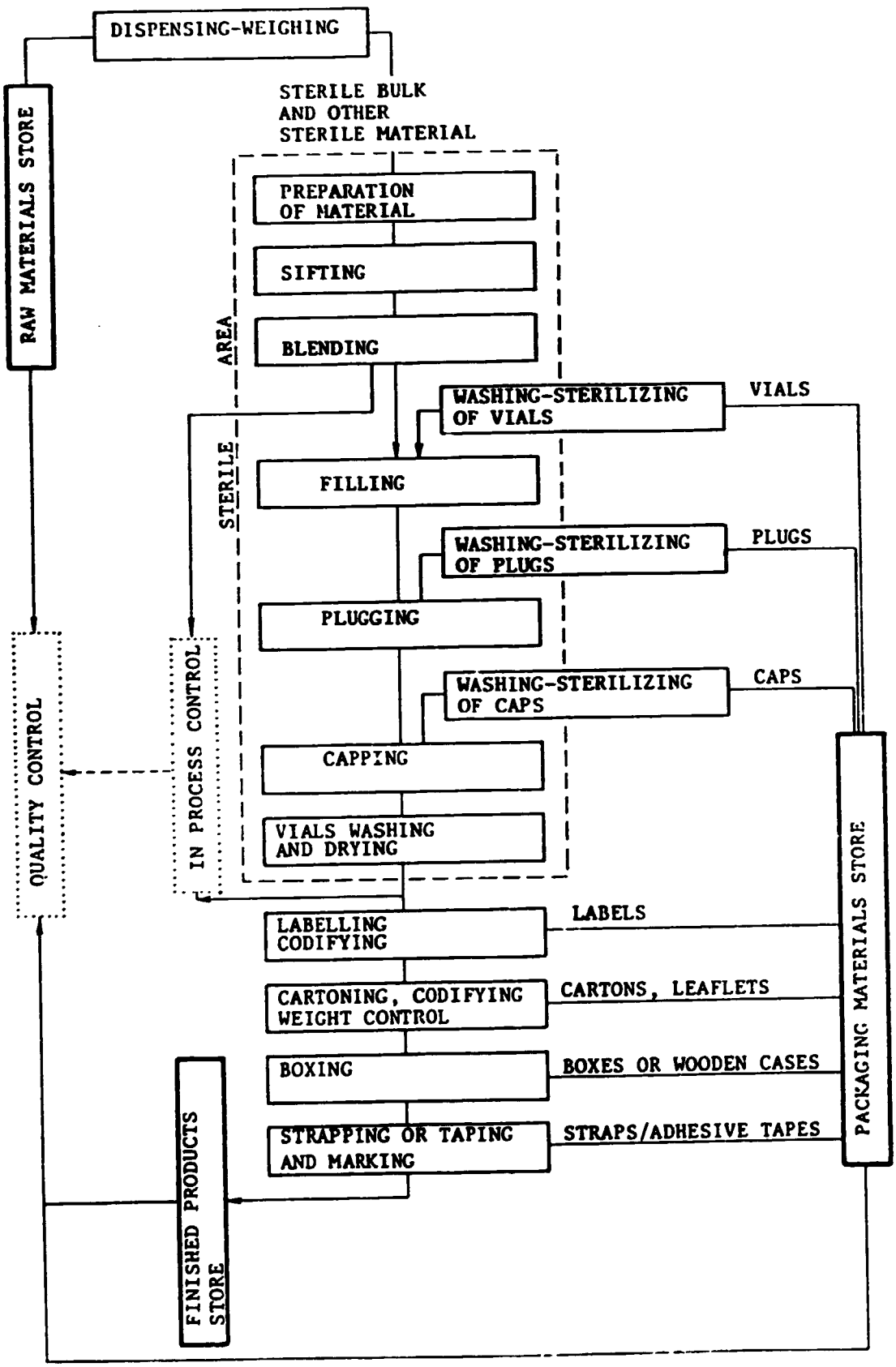
Flow diagram
for manufacture of creams, sterile and non sterile ointments

Figure 4



Flow diagram
for manufacture of parenterals (injectables)

Figure 5



Flow diagram
for blending and filling of antibiotics

Figure 6

FLOW SHEET FOR FORMULATION OF TABLETS

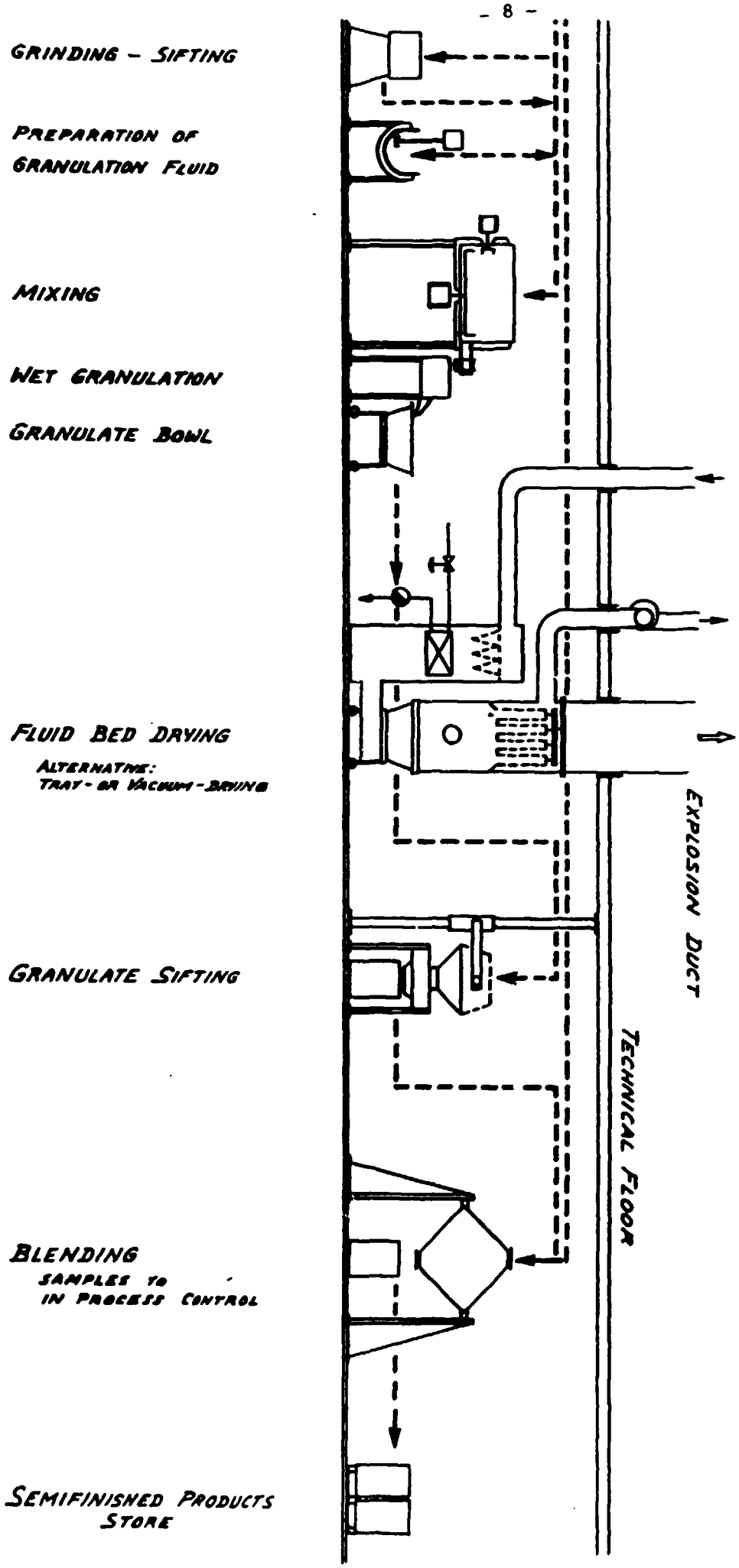
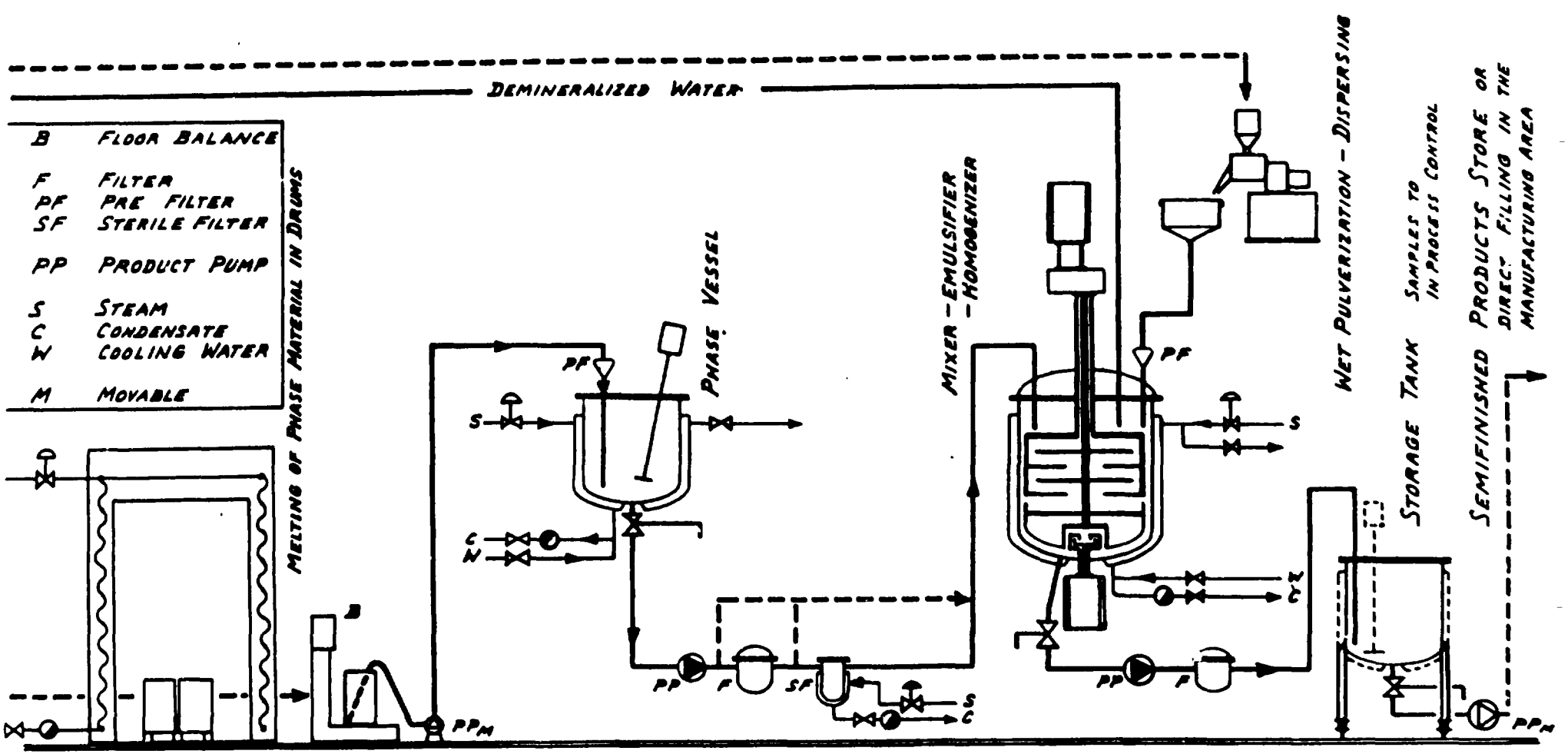


Figure 7



FLOW SHEET FOR MANUFACTURE OF CREAMS, TOPICAL AND OPHTHALMIC OINTMENTS

Figure 8

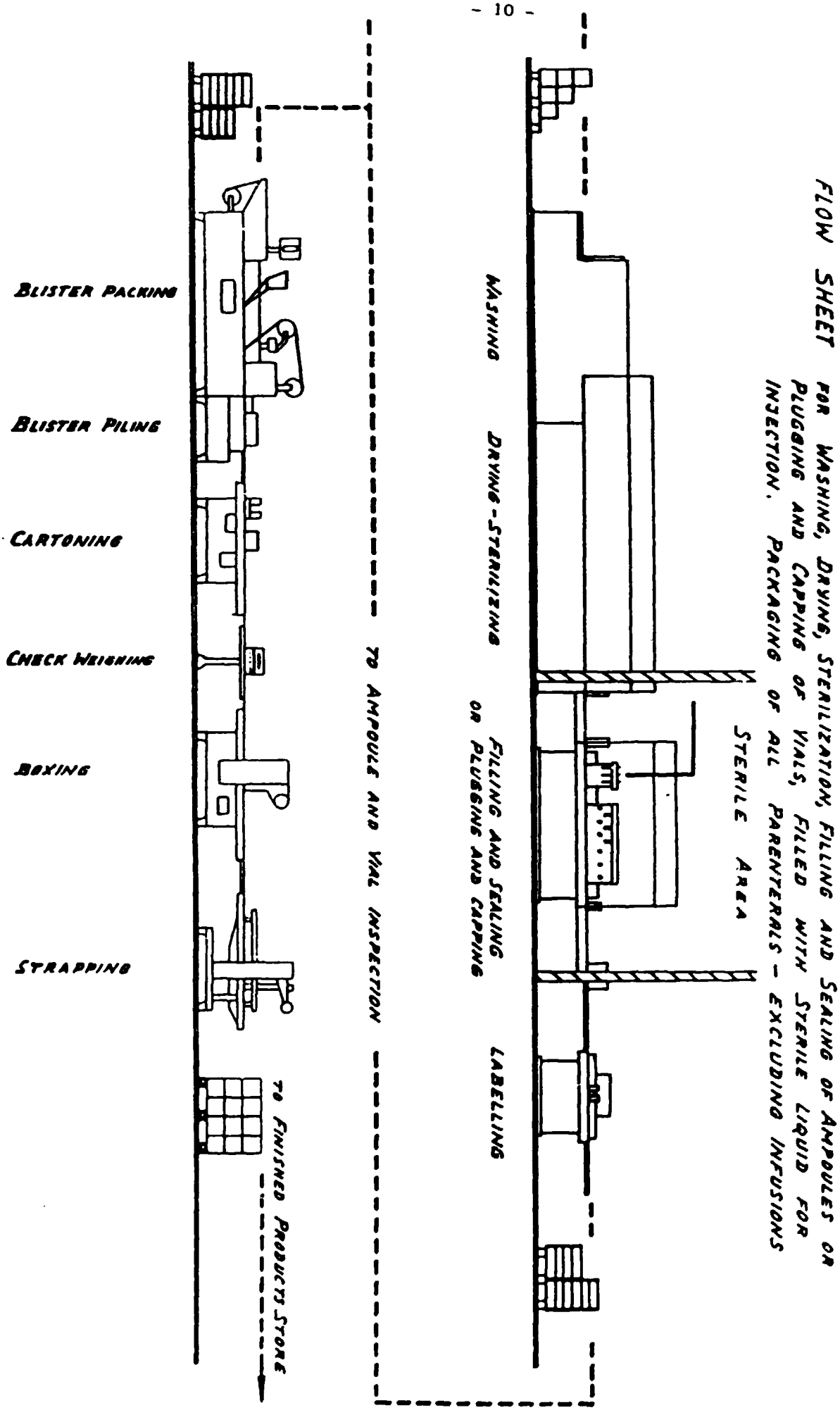
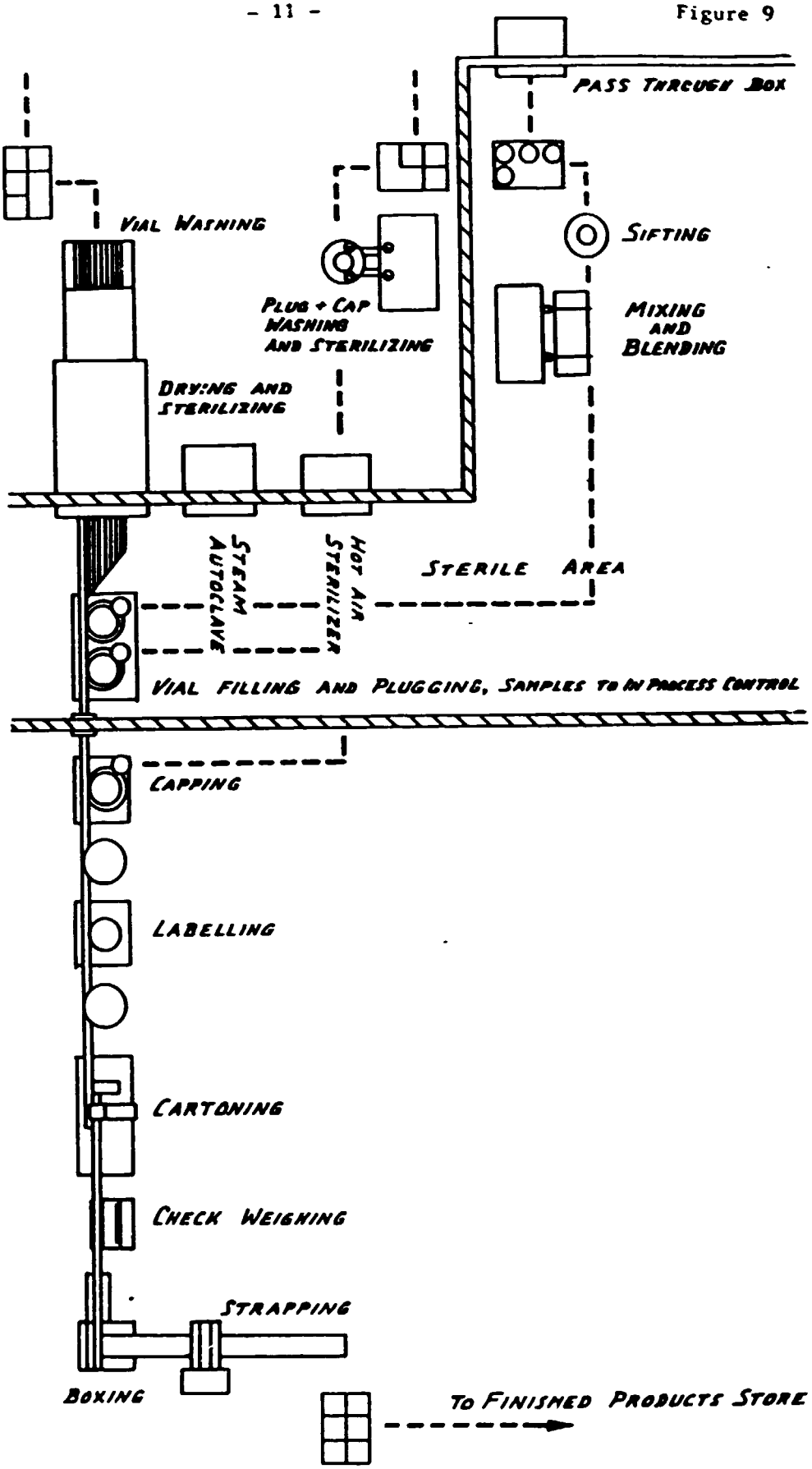

FLOW SHEET FOR WASHING, DRYING, STERILIZATION, FILLING AND SEALING OF AMPOULES OR PLUGGING AND CAPPING OF VIALS, FILLED WITH STERILE LIQUID FOR INJECTION. PACKAGING OF ALL PARENTERALS - EXCLUDING INFUSIONS
STERILE AREA
WASHING
DRYING-STERILIZING
FILLING AND SEALING OR PLUGGING AND CAPPING
LABELLING
TO AMPOULE AND VIAL INSPECTION
BLISTER PACKING
BLISTER PILING
CARTONING
CHECK WEIGHING
BOXING
STRAPPING
TO FINISHED PRODUCTS STORE

Figure 9

FLOW SHEET FOR BLENDING, FILLING AND PACKING OF ANTIBIOTICS



I. THE WORLD DRUG SITUATION

1.1. General Considerations

The World Health Organization has estimated that between 1.3 and 2.5 billion people in the world, out of a total population of over 5 billion, have little or no access to drugs.(1)

The consumption patterns for pharmaceuticals are characterized by marked inequities. While, in 1976 the consumption share of the developing countries where 73% of the total world population was found, represented only 24%, in 1985 these figures were 75% and 21%, respectively. In other words, the consumption of pharmaceuticals in the developing countries has dropped, forced by economics recession and debts.

World Pharmaceutical Consumption and Population

	1976		1985	
	Consumption	Population	Consumption	Population
Industrialized Countries	76%	27%	79%	25%
Developing Countries	24%	73%	21%	75%

1.2 The Consumption of Pharmaceutical Preparations(2)

The drug consumption of the top twenty countries in the world and the top twenty developing countries is shown on tables 1 and 2. The Philippines, with a consumption of 446 million US$ in 1986, is on the 9th place.

The per capita consumption of pharmaceuticals in 1986, illustrated on tables 3 and 4, is more indicative for comparative purposes. With a total expenditure for drugs in 1987 of about US$ 500 million (+₱10 billion), the per capita drug consumption of the Philippines was of US$ 8 (+₱165).

---

(1) World Drug Supply, (WHO, 1988)

(2) UNIDO, Database (1988)

Table :

Consumption of pharmaceutical preparations

(in million US dollars)

Top twenty countries

Rank 1986	Country	Consumption 1986	Percentage 1986	Rank 1985	Rank 1980	Rank 1975
1	USA	29,238	25.90	1	1	1
2	Japan	19,805	17.54	2	2	3
3	Germany, F. Rep.	8,289	7.34	... 4	3	4
4	USSR	6,880	6.09	3	4	2
5	France	6,268	5.55	5	5	5
6	Italy	5,302	4.70	6	7	7
7	United Kingdom	2,934	2.60	8	8	9
8	China	2,665	2.36	7	6	6
9	German Dem. Rep.	2,144	1.90	11	12	13
10	Canada	1,915	1.70	9	13	12
11	Spain	1,828	1.62	10	10	8
12	Brazil	1,564	1.39	13	11	10
13	Argentina	1,379	1.22	12	9	18
14	India	1,374	1.22	14	15	15
15	Iran	1,117	0.99	17	21	25
16	Korea Republic	1,083	0.96	16	17	21
17	Mexico	887	0.79	15	14	11
18	Yugoslavia	867	0.77	22	22	19
19	Belgium	831	0.74	18	16	17
20	Switzerland	791	0.70	19	20	23
	Others	15,731	13,94			
	World	112,891	100.00			

Table 2

Consumption of pharmaceutical preparations

(in million US dollars)

Top twenty developing countries

Rank 1986	Country	Consumption 1986	Percentage 1986	Rank 1985	Rank 1980	Rank 1975
1	China	2,665	2.36	1	1	1
2	Brazil	1,564	1.39	3	3	2
3	Argentina	1,379	1.22	2	2	5
4	India	1,374	1.22	4	5	4
5	Iran	1,117	0.99	7	7	7
6	Korea Republic	1,083	0.96	6	6	6
7	Mexico	887	0.79	5	4	3
8	Nigeria	697	0.62	8	8	9
9	Philippines	446	0.40	12	12	14
10	Saudi Arabia	444	0.39	9	17	31
11	Thailand	400	0.35	17	16	15
12	Venezuela	395	0.35	14	9	8
13	Egypt	392	0.35	10	13	11
14	Algeria	382	0.34	16	19	20
15	Pakistan	368	0.33	18	20	24
16	Taiwan Province	368	0.33	15	18	18
17	Indonesia	358	0.32	11	10	12
18	Colombia	352	0.31	13	14	13
19	Turkey	293	0.26	19	11	10
20	Peru	211	0.19	24	21	16
	Others	97,720	86.56			
	World	112,891	100.00			

Table 3

Per capita consumption of pharmaceutical preparations

(in US dollars)

Top twenty countries

Rank 1986	Country	Per capita consumption 1986	Rank 1985	Rank 1980	Rank 1975
1	Japan	162	4	8	19
2	Qatar	153	2	1	2
3	Greenland	149	7	11	24
4	Germany, F. Rep.	136	8	3	3
5	German Dem. Rep.	129	10	10	10
6	Untd. Arab Emir.	126	5	2	1
7	Bermuda	123	6	12	12
8	Switzerland	123	9	5	6
9	American Samoa	122	1	15	16
10	USA	121	3	14	9
11	France	114	11	4	5
12	St. Pier. Mique.	97	12	9	7
13	Italy	93	16	18	13
14	Belgium	84	17	6	4
15	Virgin Islands	77	14	7	8
16	Canada	74	15	24	18
17	Austria	70	24	17	21
18	Sweden	70	20	16	15
19	Brunei	69	13	27	67
20	Finland	67	21	23	17
	Others	8			
	World	23			

Per capita consumption of pharmaceutical preparations

(in US dollars)

Top twenty developing countries

Rank 1986	Country	Per capita consumption 1986	Rank 1985	Rank 1980	Rank 1975
1	Qatar	153	2	1	2
2	Untd. Arab Emir.	126	3	2	1
3	American Samoa	122	1	4	3
4	Brunei	69	4	6	30
5	Bahrain	60	5	14	21
6	Cook Islands	52	7	5	129
7	Oman	50	8	8	9
8	Kuwait	49	6	7	10
9	Argentina	44	9	3	6
10	Saudi Arabia	36	10	12	51
11	Reunion	36	11	11	8
12	Gabon	34	14	10	7
13	Cyprus	29	18	17	68
14	Korea Republic	26	12	16	25
15	Seychelles	25	15	21	53
16	Iran	24	16	22	28
17	Montserrat	23	13	134	130
18	Venezuela	22	17	9	5
19	Bahamas	21	21	45	17
20	Fr. Polynesia	21	24	19	16
	Others	23			
	World	23			

At the same time, in accordance to Scrip[1], the figures were US$ 166 for Japan, US$ 136 for West Germany, US$ 109 for the U.S., US$ 50 for the U.K., US$ 31 for Argentina, US$ 12 for Brazil and US$ 10 for Mexico

Expressed in constant 1980 US Dollars, the per capita consumption of pharmaceuticals in the top twenty developing countries is shown on tables 5 and 6.

1.3 Imports of Pharmaceutical Preparations[2]

In accordance to UNIDO's Database from 1988, the 1985 imports of pharmaceutical preparations by the top twenty countries in the world and by the top twenty developing countries, are summarized on table 7 and 8.

1.4. Production of Pharmaceutical Preparations[2]

The apparent 1985 production of pharmaceutical preparations in the top twenty countries and in top twenty developing ones, is expressed on tables 9 and 10.

The Philippines with an apparent 1985 production level of US$ 336 million of pharmaceuticals, represented mainly by the formulation and packaging of finished dosage forms[3], is ranked 12th out of the top twenty developing countries.

---

(1) Scrip, December 1987, p.21
(2) UNIDO Database (1988)
(3) Except for the production of 57.35 tons of semi-synthetic Penicillins by Chemfields (Ampicillin Trihydrate 39.95, Anhydrous Ampicillin 1.15 T and Amoxycillin 16.3 T.)

Constant per capita consumption of pharmaceutical preparations

(in constant 1980 US dollars)

Top twenty countries

Rank 1986	Country	Per capita consumption 1986	Rank 1985	Rank 1980	Rank 1975
1	German Dem. Rep.	145	2	9	13
2	Germany, F. Rep.	136	1	3	4
3	Greenland	121	3	10	16
4	Qatar	116	8	1	2
5	France	116	4	4	7
6	Untd. Arab Emir.	108	9	2	1
7	Japan	105	5	8	15
8	Switzerland	95	6	5	6
9	Belgium	94	10	6	5
10	USA	91	11	13	12
11	Argentina	86	7	12	37
12	Brunei	82	12	26	44
13	Italy	79	13	17	9
14	Sweden	73	14	15	11
15	Bermuda	70	15	11	3
16	Canada	63	18	23	20
17	Austria	63	17	16	17
18	Finland	58	19	22	14
19	Virgin Islands	58	25	7	10
20	United Kingdom	57	22	20	18
	Others	8			
	World	21			

Table 6

Constant per capita consumption of pharmaceutical preparations

(in constant 1986 US dollars)

Top twenty developing countries

Rank 1986	Country	Per capita consumption 1986	Rank 1985	Rank 1980	Rank 1975
1	Qatar	116	2	1	2
2	Unid. Arab Emir.	108	3	2	1
3	Argentina	86	1	3	9
4	Brunei	82	4	6	13
5	Bahrain	54	6	14	14
6	Kuwait	54	5	7	11
7	Oman	46	8	8	3
8	Saudi Arabia	42	7	12	45
9	Reunion	33	9	11	12
10	Gabon	27	10	10	8
11	Korea Republic	26	11	16	17
12	Cyprus	25	15	17	51
13	Venezuela	24	13	9	4
14	Montserrat	23	12	134	128
15	Paraguay	21	14	26	38
16	Hong Kong	20	20	39	32
17	Uruguay	19	16	15	20
18	Seychelles	19	17	21	31
19	Fr. Polynesia	19	19	19	19
20	Kiribati	18	18	135	130
	Others	20			
	World	21			

Imports of pharmaceutical preparations

(in thousand US dollars)

Top twenty countries

Rank 1985	Country	Imports 1985	Percentage 1985	Rank 1980	Rank 1975
1	Germany, F. Rep.	887,925	7.53	1	1
2	USA	867,821	7.36	7	30
3	Japan	788,178	6.68	2	3
4	United Kingdom	549,150	4.66	6	9
5	USSR	490,000	4.16	3	21
6	Italy	465,442	3.95	9	7
7	Netherlands	448,701	3.81	5	5
8	Belgium	409,117	3.47	4	2
9	Canada	350,000	2.97	17	14
10	Saudi Arabia	340,000	2.88	15	16
11	Switzerland	287,094	2.44	14	11
12	Sweden	283,683	2.41	10	6
13	France	275,396	2.33	18	31
14	Iran	220,000	1.87	12	4
15	Austria	213,821	1.81	13	12
16	Poland	209,083	1.77	16	45
17	Algeria	205,454	1.74	8	10
18	Hong Kong	180,409	1.53	19	18
19	Iraq	176,800	1.50	22	40
20	Australia	166,495	1.41	24	13
	Others	3,977,915	33.73		
	World	11,792,492	100.00		

Imports of pharmaceutical preparations

(in thousand US dollars)

Top twenty developing countries

Rank 1985	Country	Imports 1985	Percentage 1985	Rank 1980	Rank 1975
1	Saudi Arabia	340,000	2.88	4	4
2	Iran	220,000	1.87	3	1
3	Algeria	205,454	1.74	1	3
4	Hong Kong	180,409	1.53	5	5
5	Iraq	176,808	1.50	6	16
6	Syrian Arab Rep.	120,000	1.02	7	6
7	Nigeria	110,316	0.94	2	2
8	Malaysia	110,000	0.93	8	9
9	Egypt	98,555	0.84	33	29
10	Pakistan	94,062	0.80	17	31
11	Taiwan Province	84,053	0.71	18	25
12	Singapore	83,872	0.71	9	7
13	Thailand	80,000	0.68	11	8
14	Panama	77,000	0.65	55	58
15	Brazil	61,535	0.52	61	46
16	Libya	59,200	0.50	13	15
17	Djibouti	57,824	0.49	15	21
18	Tunisia	57,610	0.49	12	14
19	Lebanon	52,000	0.44	14	11
20	Mexico	48,433	0.41	21	68
	Others	9,475,361	80.35		
	World	11,792,492	100.00		

Apparent production of pharmaceutical preparations

(in thousand US dollars)

Top twenty countries

Rank 1985	Country	Production 1985	Percentage 1985	Rank 1980	Rank 1975
1	USA	23,115,000	24.17	2	1
2	Japan	16,776,251	17.54	1	2
3	USSR	7,767,948	8.12	3	3
4	Germany, F. Rep.	5,526,834	5.78	4	4
5	France	5,117,638	5.35	5	5
6	China	4,528,893	4.74	6	6
7	Italy	3,698,020	3.87	7	7
8	United Kingdom	3,271,305	3.42	8	8
9	Korea Republic	1,903,519	1.99	17	21
10	India	1,572,480	1.64	11	16
11	Spain	1,570,202	1.64	10	10
12	Canada	1,446,816	1.51	15	13
13	Switzerland	1,398,326	1.46	13	12
14	German Dem. Rep.	1,347,155	1.41	14	14
15	Argentina	1,323,028	1.38	9	17
16	Brazil	1,263,025	1.32	12	9
17	Mexico	1,063,567	1.11	16	11
18	Belgium	774,584	0.81	18	18
19	Iran	722,458	0.76	29	46
20	Yugoslavia	640,661	0.67	19	19
	Others	10,810,487	11.30		
	World	95,638,196	100.00		

Apparent production of pharmaceutical preparations

(in thousand US dollars)

Top twenty developing countries

Rank 1985	Country	Production 1985	Percentage 1985	Rank 1980	Rank 1975
1	China	4,528,893	4.74	1	1
2	Korea Republic	1,903,519	1.99	6	6
3	India	1,572,480	1.64	3	4
4	Argentina	1,323,028	1.38	2	5
5	Brazil	1,263,025	1.32	4	2
6	Mexico	1,063,567	1.11	5	3
7	Iran	722,458	0.76	9	20
8	Nigeria	398,424	0.42	18	19
9	Indonesia	389,570	0.41	8	10
10	Taiwan Province	377,668	0.40	14	16
11	Colombia	353,278	0.37	12	11
12	Philippines	336,180	0.35	10	12
13	Turkey	329,706	0.34	11	8
14	Venezuela	309,019	0.32	7	7
15	Thailand	267,430	0.28	16	15
16	Pakistan	240,928	0.25	19	21
17	Egypt	190,020	0.20	13	9
18	Korea, D.P.Rep.	150,180	0.16	24	18
19	Ecuador	139,621	0.15	27	26
20	Peru	123,970	0.13	15	13
	Others	79,655,232	83.29		
	World	95,638,196	100.00		

1.5 Exports of Pharmaceutical Preparations[1]

The 1985 exports of pharmaceutical preparations are illustrated on table 11 for the top twenty countries and on table 12 for the top twenty developing ones.

1.6. The Pharmaceutical Chemicals World Trade in 1985[1]

6.1 Imports of pharmaceutical chemicals

The 1985 imports of pharmaceutical chemicals are shown on table 13 and 14.

6.2 Exports of pharmaceutical chemicals

The 1985 exports of pharmaceutical chemicals are illustrated on tables 15 and 16, for the top twenty countries and top developing ones, respectively.

It becomes very clear, when examining tables 13 to 16, that there is no self-sufficiency in the production of pharmaceuticals even in the most advanced free market economics in the world. For example, in 1985, the United States, Japan, France, Italy, West Germany and the United Kingdom, have imported US$ 3,090,170,000 worth of pharmaceutical chemicals. Thus, it would be more-appropriate to talk about a relative self-reliance of the countries in this field.

---

(1) UNIDO Database (1988)

Exports of pharmaceutical preparations

(in thousand US dollars)

Top twenty countries

Rank 1985	Country	Exports 1985	Percentage 1985	Rank 1980	Rank 1975
1	USA	1,691,715	14.73	4	5
2	Germany, F. Rep.	1,622,304	14.13	1	1
3	United Kingdom	1,474,075	12.84	2	2
4	France	1,191,073	10.37	3	4
5	Switzerland	1,080,240	9.41	5	3
6	Belgium	576,741	5.02	6	6
7	Italy	442,262	3.85	8	8
8	Netherlands	379,916	3.31	7	7
9	Denmark	351,919	3.06	11	9
10	Sweden	296,046	2.58	10	10
11	Poland	228,278	1.99	9	38
12	Hungary	204,712	1.78	12	25
13	Austria	155,538	1.35	14	16
14	Yugoslavia	152,570	1.33	13	11
15	Ireland	122,965	1.07	21	19
16	Spain	120,050	1.05	17	18
17	Japan	118,648	1.03	18	12
18	Canada	106,596	0.93	19	17
19	Singapore	106,051	0.92	20	13
20	China	95,000	0.83		
	Others	965,376	8.41		
	World	11,482,075	100.00		

Exports of pharmaceutical preparations

(in thousand US dollars)

Top twenty developing countries

Rank 1985	Country	Exports 1985	Percentage 1985	Rank 1980	Rank 1975
1	Singapore	106,051	0.92	3	1
2	China	95,000	0.83	2	2
3	Bahamas	77,670	0.68	6	48
4	Guatemala	61,000	0.53	4	4
5	Jordan	37,689	0.33	17	18
6	India	35,000	0.30	1	3
7	Malaysia	30,000	0.26	16	13
8	Korea Republic	25,650	0.22	14	12
9	Taiwan Province	23,000	0.20	8	10
10	Mexico	22,000	0.19	5	5
11	Costa Rica	19,000	0.17	7	8
12	Colombia	17,000	0.15	15	11
13	Brazil	16,500	0.14	12	17
14	Hong Kong	16,170	0.14	10	9
15	Panama	15,500	0.14	9	6
16	Thailand	11,000	0.10	18	24
17	Argentina	11,000	0.10	11	15
18	El Salvador	11,000	0.10	13	14
19	Egypt	10,421	0.09	22	16
20	Indonesia	8,000	0.07	24	36
	Others	10,833,424	94.35		
	World	11,482,075	100.00		

Imports of pharmaceutical chemicals

(in thousand US dollars)

Top twenty countries

Rank 1985	Country	Imports 1985	Percentage 1985	Rank 1980	Rank 1975
1	USA	849,957	14.33	3	5
2	Japan	550,000	9.27	2	3
3	France	503,440	8.49	1	1
4	Italy	501,610	8.46	5	4
5	Germany, F. Rep.	473,506	7.98	4	2
6	United Kingdom	211,657	3.57	8	8
7	Switzerland	206,195	3.48	9	12
8	Spain	174,805	2.95	6	6
9	Belgium	133,766	2.25	7	10
10	Netherlands	131,391	2.21	12	14
11	Canada	127,845	2.15	11	7
12	Austria	124,772	2.10	15	21
13	Korea Republic	87,432	1.47	23	29
14	Argentina	80,000	1.35	14	13
15	Mexico	77,170	1.30	13	11
16	Australia	75,223	1.27	25	23
17	Denmark	75,000	1.26	18	18
18	Indonesia	75,000	1.26	17	31
19	Hong Kong	72,584	1.22	19	32
20	Brazil	70,288	1.19	10	9
	Others	1,329,978	22.42		
	World	5,931,619	100.00		

Imports of pharmaceutical chemicals

(in thousand US dollars)

Top twenty developing countries

Rank 1985	Country	Imports 1985	Percentage 1985	Rank 1980	Rank 1975
1	Korea Republic	87,432	1.47	7	10
2	Argentina	80,000	1.35	3	3
3	Mexico	77,170	1.30	2	2
4	Indonesia	75,000	1.26	4	12
5	Hong Kong	72,584	1.22	5	13
6	Brazil	70,288	1.19	1	1
7	Turkey	65,000	1.10	6	5
8	Egypt	62,719	1.06	23	15
9	India	59,009	0.99	17	17
10	Colombia	55,000	0.93	9	9
11	Iran	52,087	0.88	10	18
12	Venezuela	46,092	0.78	8	4
13	Thailand	41,000	0.69	13	14
14	Pakistan	40,293	0.68	14	19
15	Taiwan Province	35,443	0.60	15	16
16	China	27,339	0.46	41	34
17	Singapore	24,420	0.41	16	11
18	Saudi Arabia	23,383	0.39	26	33
19	Peru	18,267	0.31	12	8
20	Philippines	16,384	0.28	11	6
	Others	4,902,709	82.65		
	World	5,931,619	100.00		

Exports of pharmaceutical chemicals

(in thousand US dollars)

Top twenty countries

Rank 1985	Country	Exports 1985	Percentage 1985	Rank 1980	Rank 1975
1	USA	1,096,214	20.14	1	1
2	Germany, F. Rep.	745,332	13.70	2	3
3	Switzerland	523,441	9.62	3	2
4	Italy	417,334	7.67	4	4
5	United Kingdom	371,749	6.83	5	5
6	France	345,003	6.34	6	6
7	Japan	272,413	5.01	8	9
8	Netherlands	229,315	4.21	7	7
9	Hungary	144,686	2.66	10	18
10	China	131,877	2.42	12	25
11	Spain	113,057	2.08	11	21
12	Sweden	109,497	2.01	20	27
13	Denmark	100,071	1.84	16	13
14	Austria	97,040	1.78	14	17
15	Czechoslovakia	86,000	1.58	18	11
16	Belgium	84,204	1.55	9	8
17	Ireland	75,237	1.38	13	10
18	Canada	57,752	1.06	19	15
19	Mexico	38,000	0.70	23	14
20	Bahamas	35,000	0.64	17	16
	Others	368,728	6.78		
	World	5,441,950	100.00		

Exports of pharmaceutical chemicals

(in thousand US dollars)

Top twenty developing countries

Rank 1985	Country	Exports 1985	Percentage 1985	Rank 1980	Rank 1975
1	China	131,877	2.42	1	6
2	Mexico	38,000	0.70	5	2
3	Bahamas	35,000	0.64	3	3
4	Brazil	29,786	0.55	4	8
5	Singapore	25,038	0.46	2	1
6	Korea Republic	17,336	0.32	9	13
7	Panama	16,500	0.30	7	5
8	Argentina	16,000	0.29	6	4
9	India	10,665	0.20	12	9
10	Zaire	10,000	0.18	13	12
11	Taiwan Province	9,400	0.17	8	10
12	Indonesia	7,255	0.13	11	7
13	Turkey	5,299	0.10	17	18
14	Guatemala	5,000	0.09	15	22
15	Malaysia	3,000	0.06	36	37
16	Cyprus	2,931	0.05	25	54
17	Hong Kong	2,257	0.04	14	16
18	Neth. Antilles	2,000	0.04	115	36
19	Jamaica	1,400	0.03	26	42
20	Colombia	1,200	0.02	20	25
	Others	5,072,000	93.20		
	World	5,441,950	100.00		

1.7. Leading Pharmaceutical Companies

The leading pharmaceutical Companies in global 1986 sales are:(1)

		Pharmaceutical sales (US$ millions)	Pharmaceutical sales as % of total sales
1.	Merck, Sharp & Dohme	3,441.0	83.3
2.	Hoechst (W. German)	3,042.6	17.4
3.	Ciba Geigy (Swiss)	2,851.2	32,1
4.	Bayer (W. German)	2,787.5	14.9
5.	American Home Products (US)	2,650.4	52.0
6.	Glaxo (British)	2,536.7	100.0
7.	Pfizer (US)	2,203.0	49.2
8.	Sandoz (Swiss)	2,155.1	46.4
9.	Eli Lilly (US)	2,119.8	57.0
10.	Abbott (US)	2,057.0	54.0
11.	Warner-Lambert (US)	2,041.0	65.8
12.	Takeda (Japanese)	1,997.4	58.9
13.	Bristol-Myers (US)	1,961.7	40.6
14.	Smithkline (US)	1,896.0	50.6
15.	Upjohn (US)	1,863.0	81.7
16.	Roche (Swiss)	1,768.5	40.7
17.	Johnson & Johnson (US)	1,731.7	24.7
18.	Boehringer Ingelheim (W. German)	1,616.91	85.8
19.	Schering-Plough (US)	1,557.6	64.9
20.	Imperial Chemical Industries (British)	1,535.2	10.3

---

(1) Scrip, Pharmaceutical Company League Tables 1986-87

1.8. Top Pharmaceutical Products Worldwide

Ranked by estimated 1987 revenues in US$ million, the top pharmaceutical products out of the Fleming's top 50 branded ones, worldwide, are[1]:

Rank	Brand	Company	Therapeutic Class	Revenues
1	Zantac	Glaxo/Sankyo	H_2-antagonist	1,479.0
2	Tagamet	SmithKline	H_2-antagonist	1,132.0
3	Tenormin	ICI	beta-blocker	867.0
4	Capoten	Squibb	ACE-inhibitor	779.0
5	Vasotec	Merck & Co	ACE-inhibitor	635.0
6	Adalat	Bayer/Takeda	Ca-antagonist	587.0
7	Naprosyn	Syntex	NSAI	555.7
8	Voltaren	Ciba-Geigy	NSAI	544.1
9	Feldene	Pfizer	NSAI	524.0
10	Ceclor	Eli Lilly	oral cephalosporin	515.0
11	Cardizem	Marion	Ca-antagonist	425.0
12	Zaditen	Sandoz/Sankyo	Anti-asthma	390.0
13	Ventolin	Glaxo	bronchodilator	387.7
14	Inderal	ICI/AHP	beta-blocker	376.2
15	Amoxil	Beecham	antibiotic	368.5

The US was the country of origin for 20 of the top 50 branded products, followed by the U.K. with 10.

The countries from which the leading pharmaceutical products of 1986 and 1987 originated, are:[2]

Country	No. of products 1986	1987
US	23	20
UK	8	10
Switzerland	6	6
Japan	5	7
West Germany	4	5
Sweden	2	1
Italy	1	1

---

(1) "Pharmaceutical Products Worldwide", 1988

(2) Scrip No. 1343, September 1988, p. 26 and "Pharmaceutical Products Worldwide", 1988.

II. THE PROJECT

2.1 General Considerations

The project originally entitled "Establishment of a Master Plan for the Development of an Integrated Pharmaceutical Industry", and subsequently renamed "Philippine Pharmaceutical Industry Development Study" was initiated by the Government of the Philippines, with the respective project document signed on November 19th, 1987 by the Secretaries of Health, Dr. A. Bengzon and of the Economic Planning, Ms. S. Monsod, as well as by the Director General of UNIDO, Mr. Domingo L. Siazon Jr. and the UNDP Resident Representative in the Philippines, Mr. T. Mangun.

The Government Agency entrusted with the implementation was the Department of Health (in association with the Departments of Trade and Industry and of Science and Technology). The Executing Agency was the United Nations Industrial Development Organization (UNIDO).

2.2 Development Objective

The development objective was defined as " the establishment and development of an integrated pharmaceutical industry in the Philippines to achieve self-reliance in selected strategic pharmaceutical items and meet domestic demand for affordable pharmaceutical products in support of national health objectives".

2.3 Scope of the Study

The scope of the study was originally defined in the Project Document as follows:

2.3.1 Situational Analysis

2.3.1.1 Current national development policies, health policies, pharmaceutical policies, industrial development policies

2.3.1.2 Current and projected national health situation

2.3.1.3 Government agencies affecting the pharmaceutical industry

a) Roles/interaction/effectiveness
b) Current policies/regulations affecting the industry (importation, production, marketing, distribution, registration, patents, investment incentives)

2.3.1.4 Demand for Pharmaceuticals

a) Potential and effective demand
b) Government and private demand
c) Factors affecting demand

2.3.1.5 Supply of Pharmaceutical Products

a) Quantity/sources
b) Production capabilities/constraints of existing local manufacturers (level of technology used, research and development levels, human resources)
c) Quality control
d) Drug prices and comparison with those of other countries
e) Marketing, promotion and distribution practices

2.3.1.6 Pharmaceutical Industry Subsectors

a) Formulation and packaging of finished pharmaceutical dosage forms
b) Basic pharmaceutical chemicals
c) Intermediates
d) Bioactive substances of animal origin
e) Biotechnology (Fermentation processes for products such as enzymes, antibiotics, etc.)
f) Vaccines and sera
g) Pharmaceuticals from medicinal plants
h) Packaging materials for pharmaceuticals
i) Medical supplies

2.3.2 Recommendations

2.3.2.1 Proposed pharmaceutical industry development policies and strategies over the short term, the medium term and the long term

a) Priority drugs/projects (production technology to be utilized for each raw materials sourcing, marketing, distribution and promotion)
b) Incentive mechanisms (e.g. legal, fiscal)
c) Requirements: (i) financial
(ii) infrastructure
(iii) manpower
d) Role of various government agencies
e) Implementation

2.3.2.2 Proposed development strategy for the ancillary industries

a) Priority projects
b) Incentives
c) Requirements
d) Role of various government agencies
e) Implementation timetable

2.3.3 Conclusions

Summary of effects of proposed development strategy, including:

2.3.3.1 benefits

2.3.3.2 constraints

2.3.3.3 concerns

2.4 Project Revision

At the beginning of the study, in February 1989, it was recognized that a shift of emphasis was necessary to reflect the priorities of the upstream integration. It was decided to:

- Cancel the activities in the field of formulation and packaging of finished pharmaceutical dosage forms and converting them into excipients production; subsequently this post was also eliminated due to the difficulties to recruit experts in such a broad field .

- Cancel the activities in the fields of quality assurance, medical supplies, glass and plastic packaging materials and design engineering. It was agreed that the Board of Investments would provide appropriate studies and recommendations covering the glass and plastic packaging, to be included in the study.

- Convert chemical synthesis and fermentation into chemical synthesis, fermentation and semi-synthesis of antibiotics.

- Convert biotechnology into genetic engineering and industrial biotechnology.

Thus, a conceptionally newer approach was adopted, calling for a higher level of technical expertise, for a more intensive interaction of experts with overlapping areas of interest and for a more cohesive programme of activities, leading to a more focused study than the one originally planned.

2.5 Project Document Revision

Reflecting the abovementioned changes of activities and shift of emphasis, the project document was revised.

The project document changes could be summarized as follows:

2.5.1 The name of the project from "Establishment of a Master Plan for the Development of an Integrated Pharmaceutical Industry" was modified to "Philippine Pharmaceutical Industry Development Study". This includes also changes of the name, wherever "Master Plan" is mentioned, such as on paragraph 3 page 2, paragraph 4 page 3, paragraph 2 page 4, paragraph 2 page 5, paragraph 5 page 6, paragraph 6, 7 and 8 page 7, etc. By the same token, the term "Integrated" was omitted, as for instance paragraph 3 page 2, paragraph 4 page 3, paragraph 2 page 5 etc.

2.5.2 The text of some outputs was modified and others omitted altogether.

2.5.2.1 Output 1.1 the "Government's Pharmaceutical Policy and Legal Framework" was revised to read "The Government's Pharmaceutical Industry Policy and the Legal Framework for its Development". This amendment was necessary, since the Government of the Philippines has already formulated its National Drug Policy, the UNIDO study covering only the fourth pillar (1) pertaining to the relative national self-reliance in the production of medicines.

2.5.2.2 Output 1.3 "Plans for the rationalization of existing facilities and the new infrastructure requirements" was omitted, the UNIDO activities on the field of formulation and packaging being cancelled. Some general observations will be included only.

2.5.2.3 Output 1.8 concerning the "auxillary industries, their level of development and their upstream and downstream integration with the pharmaceutical industry", will be based only on data provided by the BOI, the UNIDO activities in this field having been cancelled in February 1988.

2.5.2.4 Output 1.11 was omitted. There might be one or more smaller or larger project proposals in each subsector, some of them covered by separate feasibility studies to be identified; thus, the "economic and financial evaluation of the entire project, including sensitivity studies and identification of financial resources", was somewhat out of place.

---

(1) Subsequently third pillar

2.5.2.5 Output 1.12 "The integration of the Pharmaceutical Industry's development with the general health policy and its incorporation into the national economic development plans" was revised to read: "The Pharmaceutical Industry Development Study recommendations to be consistent with the general health policy and with the national economic development plans".

2.5.2.6 Recommendation 2.1 a) "Priority Drugs Projects" was revised to read "Priority Pharmaceutical Industry Projects".

2.5.2.7 Recommendation 2.1 d) "Role of various Government Agencies" was revised into "Participation of various Government Agencies".

2.5.2.8 Recommendation 2.2 "Proposed development strategy for the ancillary industries - priority projects, incentives, requirements role of various Government Agencies, implementation timetable " was omitted (see 2.3).

2.6 Budget Revisions

In line with the project revision and further to the dynamics of the study process and the changing conditions, the budget was revised three times to reflect these changes

2.7 Activities

The indicative activity plan of the project included:

a) Assessment of major raw materials and intermediates

The analysis will be primarily based on research data and studies available with the Department of Health and other government departments/agencies and will be carried out by national professionals and international staff. It is anticipated that a series of discussions and meetings with respective officials, etc. will be required for the team to develop an effective assessment.

b) Appraisal of economic, physical, social and administrative

Same as a) above.

c) Analyses of selected pharmaceutical industry sub-sectors

An overview of all the pharmaceutical industry sub-sectors will be undertaken following which the relevant ones will be jointly selected by the Chief Technical Adviser and the Department of Health.

The International staff will carry out international market, finance, economic and demand assessments of the respective sub-sectors on the basis of the terms of reference established by the Chief Technical Adviser and the Department of Health.

National and International staff assigned to the project will carry out analyses of the respective sub-sectors indicating internal and external demand of products, identification of and solutions for any bottlenecks and constraints or other critical areas inhibiting the development, establishment and/or growth of the industry in the particular sub-sector.

A detailed list of activities to be undertaken has established as follows:

2.7.1 Appointment of National Project Director, Project Manager and National Experts

2.7.2 Identification of Office Areas at the DOH and/or BOI, arrangements for Secretarial Service, Transportation, etc.

2.7.3 Review of the Project Document:

- Development Objectives
- Immediate Objectives
- Outputs
- Scope of Study (including Recommendations)
- Indicative Activity Plan

2.7.4 Review of required foreign expertise fields, the terms of reference and the duration of studies:

- (Weakness in R & D, Human Resources Development, Agriculture and Agro Industries).
- (Inadequate durations of some studies).

2.7.5 Selection of Foreign Experts from UNIDO's list and starting of recruitment procedures

2.7.6 Selection and appointment of National Professionals, clarifying their role and cooperation with the "Government Study Groups", and their interrelations

2.7.7 Preparation of a detailed list of data to be collected and analyzed by the Government Study Teams

2.7.8 Identification and constitution of "Government Study Teams" and their composition in accordance to the defined scope of activities to be undertaken, appointment of team leaders

2.7.9 Collection and classification of available data at DOH (the Pharmaceutical Task Force's Documentation) and other Departments, the BOI, NEDA, Department of Science and Technology, Department of Trade and Industry, Department of Agriculture, PCHRD, PCCI (Philippine Chamber of Commerce and Industry), IMS and other private sources, the DAP, PAMURI (Philippine Association of Multinational Companies Regional Headquarters, Inc.) etc.

2.7.10 Assessment of availability of pertinent reference books and literature at the B.F.A.D. library, the college of Pharmacy (USP, BP, Vidal, National Formulary, etc.)

2.7.11 Review Data on:

2.7.11.1 National Drug Policy and its implementation (including E.O. 174 & 175)

2.7.11.2 Position Paper on the Pharmaceutical Industry (DAP, January 1988)

2.7.11.3 Minutes of Public Hearings (16 February 1988, etc.)

2.7.11.4 National Health Policy and implementation; Health Care Financing, etc.

2.7.11.5 Results of Public and Congressional Hearings

2.7.11.6 Requirements for registration of "New Drug Products"

2.7.11.7 Amended General Regulations for the Licensing of Drug Establishments

2.7.11.8 Medium-Term Government Development Plan and the 1987 Investment Priorities Plan (IPP) from the BOI

2.7.11.9 The Omnibus Investment Code of 1987 (E.O. No. 226)

2.7.11.10 Pending House Bills such as 2144, 2804, 2550, 2187

2.7.11.11 The Philippine Pharmaceutical Industry Fact Book (Products and product classification, manufacturing capacity, importation of pharmaceuticals, size and composition of the market, distribution of sales, pricing and cost structure, profits, etc.)

2.7.11.12 Current health status and health indicators of the country including population, births, deaths, prevailing pathology, morbidity, etc.

2.7.12 Preparation of a Work Plan and implementation schedule

2.7.13 Arranging meetings and discussions with appropriate Government Departments, Divisions and Sections, Professional Associations, the Private Sector, etc.

2.7.14 Visiting selected Filipino and Foreign Manufacturing facilities.

2.8. Data to be Provided to the National and International Experts.

The following list of information necessary for the Expert's activities to reach the study objectives, has been established.

A. 1. Constitutional provisions and amendments, as well as principles and issues pertaining to health and pharmaceuticals

2. Presidential speeches and addresses, or portions of them, concerning health and pharmaceuticals, such as: "a drug policy for the country is necessary not only to health, but also for the nation's economic structure"

or

the national drug policy was "designed to eventually bring about the availability and affordability of safe, effective and good quality drugs for all sectors of the country, but specially for the poor who need the most, but who can least afford"(1)

3. Bills originating from the House of Representatives and the Senate concerning health and pharmaceuticals,(2) such as:

3.1 HB No. 2144, seeking to establish a Drug Industry Commission

3.2 HB No. 2804, seeking to nationalize(3) the Drug Industry

3.3 HB No. 2550, proposing retail price control on drugs

---

(1) President Corazon C. Aquino, April 30, 1987

(2) See "Position Paper on HB 2144, 2187, 2550, and 2804" by DAP

(3) Seems to pertain to "Filipinization" only

3.4 HB No. 2187, calling for the monitoring of the import prices of bulk pharmaceuticals and prescribing regulatory measures

4. Patent laws concerning brand names, manufacturing processes, formulation, etc., of pharmaceuticals.

5. The pharmaceutical legislation concerning importation, storage, manufacture, quality control, distribution and utilization of drugs

6. The Health legislation

Expected output:

Comprehensive report with analysis and evaluation

Skills

Attorney-at-Law outside of Government Departments: Industrial Pharmacist acquainted with drug policies and legislation

B. 1. National Revenue Code (with particular emphasis on the pharmaceutical business and industry):

1.1 Corporate and personal income taxes

1.2 Municipal Taxes

1.3 Remittance taxes

1.4 Sales taxes

1.5 Value added taxes

1.6 Other taxes

2. Foreign exchange control regulations

2.1 Report of capital and capital goods

2.1 Repatriation of capital

2.3 Remittance of profits

2.4 Others

3. The "Omnibus Investments Code of 1987" (Executive Order No. 226)

3.1 Books 1, 2, 3, 4, 5 and 6

3.2 Executive Order No. 136

Expected output:

Comprehensive report with analysis and evaluation

Skills

Economist from BOI and NEDA, preferably with knowledge on the pharmaceutical industry

C. 1. Short and long-term National Drug Policies, their timing and degree of implementation in the areas of importation, storage, manufacture, quality control, distribution and utilization of drugs.(1)

1.1 General Objectives

1.2 Pillars

1.2.1 effective regulation of drug importation, production, marketing and utilization

1.2.2 efficient and cost effective Government procurement of drugs and medicines

1.2.3 rational use of drugs by health professionals and consumers

1.2.4 national self-sufficience(2) in pharmaceuticals

1.3 Characteristics

1.4 Implementing mechanisms

(Particular attention should be paid to price controls, regulations on advertising of pharmaceuticals rules and regulations on labeling, the usage of generic names, the reduced drug lists with different levels of reimbursement, national formulary, import restrictions, registration of new products, regulations for licensing of drug establishments, quality control requirements, measures in drug use and abuse.)

---

(1) See "Implementation of the National Drug Policy and Executive Order No. 174 and No. 175" and "The National Drug Policy of the Philippines"

(2) We have suggested the use of "Degree of self-reliance in selected areas" or subsectors.

2. The medium-term Government Development Plan, the 1988 Investment Priorities Plan (IPP), and the incorporation of the pharmaceuticals and the pharmaceutical chemicals.

3. Reactions and recommendations of the House and Committees,(1) the "Drug Association of the Philippines" (DAP), the "Chamber of the Philippine Drug Manufactures and Distributors"(2) (CPDMD), the "Philippine Chamber of Commerce and Industry" (PCCI), the American Chamber of Commerce (AMCHAM), other Chambers of Commerce, the medical profession, the academic circles, the results of public hearings, etc.

Expected output:

Comprehensive report with analysis and evaluation

Skills

Industrial Pharmacist, Chemist or Physician from the Department of Health (DOH) with extensive knowledge of drug policies and management.

D. 1. The Government Health Policy and the National Healthcare and Medicare System:

1.1 The DOH annual budget and its allocation for pharmaceuticals

1.2 Health care financing

1.3 Criteria for accrediting suppliers

1.4 List of accredited suppliers(3)

1.5 Government procurement mechanism(4)

1.6 Distribution of drugs

1.7 Reimbursement of drugs and services

---

(1) "Committee of Trade and Industry" and "Committee on Health" in the House; "Committee of Health" in the Senate

(2) See "A Position paper on the Pharmaceutical Industry" (January 1988, DAP)

(3) See "Association of Drug Industries of the Philippines" (ADIP) and the commercial activities of its members.

(4) Drug procurement fo the Armed Forces and budget allocation.

1.8 Number of registered drugs (for DOH use, on the market and for "brand-name" purposes)

1.9 List of essential drugs and other reduced lists of pharmaceuticals

1.10 Private healthcare institutions and regulation for licensing and operation

2. Health infrastructure (hospitals, clinics, health centers consultation rooms, family-planning centers, etc.) with the respective number of beds, hospital consultations and admissions, days of hospitalization, etc.

3. Human resources (physicians, surgeons, dentists, pharmacists, nurses, health agents, etc.)

4. The standard therapeutic schemes

5. Government programmes and projects for health, nutrition and family planning

5.1 Health

5.1.1 primary health care

5.1.2 health infrastructure

5.1.3 manpower development

5.1.4 disease control[1] and eradication

- malaria
- schistosomiasis
- T.B.
- diarrhoea

5.1.5 education[2]

5.1.6 medicare

5.1.7 employee compensation

5.1.8 R & D

---

(1) Communicable and non-communicable diseases

(2) Changing consumption models (prescription patterns and auto-medication habits)

5.2 Nutrition

5.2.1 nutrition intervention (growth monitoring, nutrition information and education, nutrition-related health services, food assistance, food production)

5.2.2 FNP organization development

5.2.3 Philippine nutrition surveillance system

5.3 Responsible Parenthood

5.3.1 adolescent fertility

5.3.2 population education

5.3.3 family planning

5.3.4 manpower development

5.3.5 population information management and dissemination

6. Health state and Epidemiology

6.1 general situation, morbidity and mortality

6.2 infectious diseases

6.3 diseases of the cardio-vascular, gastro-intestinal, genito-urinary and nervous system

6.4 malignant tumors

6.5 nutritional diseases

6.6 accidents, including road and work accidents, and professional diseases

Expected outcome:

Comprehensive report with analysis and evaluation

Skills

Medical Doctor with extensive experience in health care (DOH, PCHRD)

E. 1. The consumption of pharmaceutical products

1.1 Size and composition of the domestic market (ethicals, proprietary drugs, total at retail and/or wholesale price levels

1.1.1 sales through drugstores

1.1.2 sales through hospital pharmacies(1)

1.2 Breakdown of sales (in value and volume)

1.2.1 by region (geographic distribution)

1.2.2 by major therapeutic class

1.2.3 by second level therapeutic class

1.2.4 by dosage form (tablets, capsules, drops, syrups, injectables, creams and ointment, powders, suppositories and other.(2)

1.3 Number of brands in major therapeutic classes subdivided in essential and non-essential drugs

1.4 Number of brands in the top 10 or 20 Corporations

1.5 Decoding of all dosage form volume sales in active ingredients, excipients, and packaging materials, presented in kgs, tons, litres, etc.

2. Importation of finished and semi-finished drugs (f.o.b. constant prices)

2.1 Historical data

2.2 Composition of reports

2.2.1 by therapeutic class

2.2.2 by dosage form

2.2.3 by country of origin

2.2.4 by essential or non-essential drug

2.2.5 by finished or semi-finished category

(1) Also sales to the Armed Forces

(2) Pastilles, troches, emulsions, sprays, lotions, etc.

3. Importation of raw materials (active ingredients, excipients and packaging materials)

4. Report of pharmaceuticals

5. Drug Imports and Exports vs total Imports and Exports

Expected outcome:

Comprehensive report with analysis and evaluation

Skills

Knowledge and extensive experience in marketing and sales promotion of pharmaceuticals. (This applies also for points 7, 8, 9 and 10).

6. National Pharmaceutical Industry(1)

6.1 Estimated manufacturing capacity utilization ratios and incremental capacity of the industry by dosage form

6.1.1 ampoules and vials

6.1.2 suspensions

6.1.3 tablets and capsules

6.1.4 creams and ointments

6.1.5 large volume of parenterals

6.1.6 suppositories

6.2 Drug manufacturing laboratories(2)

6.2.1 Companies operating manufacturing units (including those producing generics for the DOH)

---

(1) General overview and its historical background, the actual stage of development and growth potential, degree of horizontal and vertical integration.

(2) It is realized that, due to the confidential nature of the data and to the fact that all pharmaceutical manufacturing units belong to the private sector, detailed information not be available for point 6.2

6.2.1.2

The formal and informal organization, the organization levels and span of management, line and staff authority relationship (functional and admin. authority), delegation of authority,(1) etc.

6.2.1.3

The management and its managerial competence and skills in the technical, commercial and financial fields, the managerial functions (planning, organizing, staffing, leading and controlling), the management tools with particular emphasis to the production and operation management, including all activities necessary to produce and deliver the product to the buyer, such as purchasing, warehousing, manufacturing and transportation. As far as the manufacturing function is concerned, particular care should be taken when analysing the type of products and the manufacturing mix, the available technology (license agreements, technical assistance agreements, manufacturing contracts, etc.) the existing and incremental capacities and their utilization ratios, the manufacturing efficiency (flow charts, time and motion studies), the industrial costs, the allocation of expenses and the manufacturing margin, the production programme and budgets, the machinery and equipment and the capital investment plans for replacement, improvement or extension and their origin, etc.

6.2.1.4

The personnel and the personnel policies (number, recruitment, manpower development with career path planning, contract labour, wage scale systems, incentive programmes, pension funds, medical care and health insurance, canteen service, living accomodations, social and sporting activities, etc.).

---

(1) Detailed audit encompassing all aspects of the organization, the management and the operation, as well as their performance.

6.2.1.5

Other functions such as internal control, financing, management, financial and cost accounting with complete performance analyses of balance sheets, income statements and pertinent ratios (internal rate of return, return on equity, return on sales, etc.), marketing and sales, repair and maintenance-mechanical, electrical, electronic engineers, etc. and their respective degrees of efficiency and expense levels.

6.2.1.5

The quality control and quality assurance functions with their human, material and financial resources.

6.2.1.7

The site with eventual extension possibilities, the disposition and state of the buildings, the general services with the supply of water, steam, electricity, gas, compressed and cooled air, the solvent yard and the recuperation of solvents the purification system and installations, the safety and loss prevention measures, etc.

6.2.1.8

The existing R & D level, its facilities and resources.

6.2.1.9

The available technologies and their transfer, as well as the transfer of modern management concept and techniques.

6.2.1.10

The presence and development state of some auxilliary industries such as paper, cardboard, glass, plastics, rubber, metal, solvent, sugar, food colorants, etc., as well as related industries manufacturing condoms, intrauterine devices, laboratory and dispensary equipment, diagnostics, syringes and needles, infusion sets and system, nursing supplies, etc. (gloves, masks, drapes, dressings bandages, plasters, etc.), formulation and packaging of veterinary drugs and animal feeds.

6.2.1.11

The existance of supporting functions such as repair, preventive maintenance, manufacture of spare parts, etc

6.2.2 Manufacturers without plant

6.3 Potential for upstream integration(1)

6.3.1 The availability of raw materials from agricultural origin(2) (including agro-waste)

6.3.2 The medicinal flora and its geographical distribution in a spontaneous and cultivated state

6.3.3 The livestock, the slaughterhouses capacity, storage and freezing facilities and the availability and utilization of animal organs for the manufacture of bio-active substances(3)

6.3.4 The national transportation and communication system and their respective infrastructure

6.3.5 The patent and the patent, protection constraints

6.3.6 The situation with consultancy organizations and their expertise in the design, the engineering and the project management

6.3.7 The construction expertise and the existing enterprises, the availability of construction materials, the construction costs, etc.

6.3.8 The available foreign and domestic industrial financing options and the respective government rules and regulations

---

(1) See also 6.2.1.8, 6.2.1.9, 6.2.1.10, 6.2.1.11 and 11.8

(2) Such as corn used for the manufacture of corn-steep liquor, starch, syrup and oil, basic materials used in fermentation of antibiotics

(3) Such as the pancreas gland for the production of "Insulin"

6.3.9 The multilateral and bilateral financial and technical assistance programmes and their socio-economic impact

Expected outcome:

Comprehensive report with analysis and evaluation

Skills

- Industrial Pharmacist or Chemist with extensive experience in management of pharmaceutical manufacturing units
- Botanist, or Phytochemist with extensive experience in medicinal plants
- MD with experience in traditional medicine
- Specialist in the construction of pharmaceutical units with knowledge of available construction materials and their cost
- Veterinary Doctor or Agronomist specialized on livestock

F. Pricing of pharmaceutical

7.1 Average annual growth rate (taking into account prices of imported raw materials, the foreign exchange rates and domestic inflation, tax rates, etc.)

7.2 Comparisons of consumer prices and drug prices.

7.3 Comparisons of the price movements of the pharmaceutical industry with other industries

G. The pharmaceuticals industry cost structure

8.1 Cost of goods manufactured and sold

8.2 Operating expenses (administrative and marketing)

8.3 Detailed marketing and sales promotion expenses (samples, medical visits, advertising, exhibitions, promotional material, personnel costs, operating margin per marketing employee)

H. Profitability of the pharmaceutical industry

9.1 return on sales

9.2 return on equity

9.3 return on assets

9.4 comparative profitability of the pharmaceutical industry to total manufacturing

9.5 comparative profitability of the pharmaceutical industry to other industries

10. Supply and distribution

10.1 distribution channels

10.2 distribution outlets

10.3 distribution chart

10.4 estimated distribution costs

11. Estimation of the potential consumption of pharmaceuticals, or the evolution of the demand

11.1 The drug consumption at a given time and its historical development trends

11.2 Demography

11.2.1 total population

11.2.2 population by age group and age pyramid

11.2.3 structure of the population

11.2.4 birth rate and fertility

11.2.5 mortality by age and sex

11.2.6 life expectancy at birth

11.2.7 population growth projections

11.2.8 aging of the population

11.3 Health state and epidemiology(1)

11.4 Health infrastructure(2)

---

(1) See also para 6

(2) See also para 5.1.2

11.5 The GNP per capita and the distribution of wealth

11.6 Percentage distribution of total family expenditure by major expenditure group

11.7 Factors conditioning the level of expenses

11.7.1 size of the family

11.7.2 income of the family

11.7.3 global household expenses

11.7.4 socio-professional category of the family head

11.7.5 housing and living conditions

11.7.6 place of settlement (rural or urban)

11.7.7 proximity to health facilities and distribution outlets

11.8 The academic institutions abilities, capacities and budgets to educate and train medical paramedical and pharmaceutical personnel, as well as highly specialized individuals on the technical, commercial and managerial fields, such as

- industrial pharmacists
- microbiologists
- chemists
- engineers (civil, structural, mechanical, electrical, etc.)
- business managers

11.9 The medical promotion activities of domestic and foreign pharmaceutical enterprises

11.10 The development of new drugs, new delivery systems and new therapeutic schemes

Expected Outcome

Comprehensive report with analysis and evaluation

Skills

Economist

2.9 The Team of Experts

The study was undertaken by a team of international experts who was complemented by a team of national experts. Both teams were guided and coordinated by Dr. Kamen Ivanov, Chief Technical Adviser.

2.9.1 The international experts and their respective fields of expertise are as follows:

2.9.1.1	Dr. William N. Walker	- Chemical Synthesis
2.9.1.2	Dr. Henry Bungay	- Biotechnology
2.9.1.3	Dr. Zoltan Csizer	- Vaccines and Sera
2.9.1.4	Dr. Jack Cameron	- Vaccines and Sera
2.9.1.5	Dr. Ferenc Peterfy	- Bioactive Substances of Animal Origin, Blood derivatives and Industrial Biotechnology
2.9.1.6	Dr. Norman Bisset	- Medicinal Plants
2.9.1.7	Dr. Valerio Gallo	- Fermentation
2.9.1.8	Dr. Roberto Sciaky	- Semi-synthesis of antibiotics
2.9.1.9	Dr. Amu Therwath	- Genetic Engineering
2.9.1.10	Dr. Gunnar Tornqvist	- Industrial Economics

2.9.2 The team of national experts was composed of the following:

2.9.2.1	Dr. William Padolina	- Biotechnology and
2.9.2.2	Dr. Modesto Chua	- Human Resources Development
2.9.2.3	Atty. Hiram Mendoza	- Law
2.9.2.4	Mrs. Maricar Bautista	- Economics
2.9.2.5	Mr. Nicanor Gabunada	- Economics
2.9.2.6	Dr. Ruperto Alonzo	- Economics

2.10 List of Persons Met

1 . Dr. Alfredo Bengzon	-Secretary of Health
2 . Jaime Cardinal Sin	-Archbishop of Manila, -Primate of the Philippines
3 . Mr. Manuel T. Yan	-Undersecretary of Foreign Affairs
4 . Dr. Mita Pardo de Tavera	-Secretary of Social Welfare and Development
5 . Dr. Antonio V. Arizabal	-Secretary of Science and Technology
6 . Mr. Rhais Gamboa	-Undersecretary of Health
7 . Mr. Mario Taguiwalo	-Undersecretary of Health
8 . Dr. Manuel Roxas	-Undersecretary of Health
9 . Dr. Leyland Villadolid	-Undersecretary of Science and Technology
10 . Dr. Quintin Kintanar	-Director PCHRD, Assistant Secretary of Health
11 . Dr. Alberto Romualdez	-Assistant Secretary of Health Adviser to the Regional WHO Representative
12 . Mr. Romero Reyes	-Assistant Director General,NEDA
13 . Ms. Glory Chanco	-Director, Chemical Industry, BOI
14 . Ms. Fleur de Lys Torres	-Director Social Services Staff, NEDA
15 . Dr. Ramon Valmayor	-Executive Director, PCARRD
16 . Dr. Pacita Zara	-Deputy Director, PCHRD
17 . Mr. E. Del Rosario	-Chief, Industry Division, NEDA
18 . Ms. Rose Nepomuceno	-Industries and Utilities Staff, NEDA
19 . Ms. Evelyn Ladra	-Industries and Utilities Staff, NEDA
20 . Ms. E. Segovia	-Executive Director, BOI
21 . Ms. Catalina C. Sanches	-Director, BFAD
22 . Dr. Leticia B. Gutierrez	-Professor, U.P. College of Pharmacy
23 . Dr. Natividad de Castro	-University of the Philippines, College of Pharmacy
24 . Dr. Cecile B. Gonzales	-Medical Advisor to the Department of Health
25 . Eng. Chat Estacio	-BOI (Consumer Chemicals)
26 . Eng. Glo Santos	-BOI (Intermediates and Chemicals)
27 . Ms. Milagros S. Castro	-General Manager, Pro-Center, Inc. Head Drug Industry Liason Group, Department of Health
28 . Mr. R. Salazar	-President, Drug Association of the Philippines (DAP)
29 . Mr. Benny de Guzman	-President of the Chamber of the Philippines Drug Manufacturers and Distributors (CPDMD)
30 . Ms. Lydia Tansinsin	-Regional Director, Dept of Science and Technology
31 . Ms. Lydia M. Joson	-Chief, Microbiology & Genetics Division, Industrial Tech. Dev. Institute (ITDI)
32 . Mr. Marsh Thompson	-Vice-President, American Chamber of Commerce
33 . Dr. William Padolina	-Professor of Chemistry, U.P. Los Banos, Director of Biotech
34 . Dr. E. Quintana	-Prof. and Coordinator, Medicinal Plants Project, U.P. Los Banos
35 . Ms. Pratima Kale	-UNICEF Representative for the Philippines
36 . Dr. Bernardo Mora	-Chief, Biological Production Services,DOH

List of Persons Met

37 . Dr. Jaime Tan	-Programme Officer, UNICEF
38 . Ms. O.A. Ferry	-Country Manager, Philippines IMS Pacific Ltd.
39 . Mr. L. Trinidad	-Production Manager, IMS Pacific Ltd.
40 . Mr. Michael Richter	-Managing Director, Boehringer Ingelheim (Phil.) Inc.
41 . Mr. Hinrich Schumacher	-President, Hoechst Far East Mrkg. Corp. President, European Chamber of Commerce
42 . Mr. Thomas Leber	-Vice-President and General Manager, Wyeth-Suaco Laboratories Inc.
43 . Dr. Felicidad E. Anzaldo	-Head, Technology Transfer Section, ITDI, DOST, Rural Technological and Information Division
44 . Mr. Jose O. Juliano	-President and General Manager, Interphil Laboratories
45 . Mr. Rafael Hizon, Jr.	-President and General Manager, Hizon Laboratories
46 . Mr. Federico Gonzales	-Senior Vice-President, Pfizer, Pharmaceutical Division
47 . Mr. Peter Wallace	-President, AYC Consultants Inc.
48 . Mr. Katipunan de los Reyes	-Executive Assistant to the President, USA Generics Pharmaceutical Inc.
49 . Dr. Lino Nazareno	-President, Livestock Dev. Council
50 . Dr. Efren P. San Juan	-Chief, Meat Inspection Officer
51 . Dr. Patria Navarro	-President, Phil. Obstetrical & Gynecological Society
52 . Dr. Bernardo B. Resoso	-Executive Director, National Meat Inspection Commission, Department of Agriculture
53 . Dr. Romero Alcasid	-Director, Bureau of Animal Industry, Department of Agriculture
54 . Dr. Vicente X. Genato	-Vice-President, Polymedic General Hospital
55 . Dr. Juanito P. Cruz	-University Clinic, Ateneo de Manila University
56 . Dr. Augusto L. Lingao	-President, Philippine Society of Allergology & Immunology
57 . Dr. Augusto Litonjua	-President, Philippine Diabetes Association
58 . Dr. Amelia A. Garcia	-Department Head, Makati Medical Center
59 . Mr. Eduardo Cabrera	-Manufacturing Manager, Interphil Laboratories
60 . Dr. Alberto K. Alcantara	-President, Philippine Society of Microbiology
61 . Capt. Larry Laughlin	-US Naval Medical Research Units
62 . Dr. Thomas Maramba	-Undersecretary, DOH
63 . Dr. Manuel V. Cruz	-Professor, Department Obstetrics & Gynecology, UST
64 . Dr. Fortunato Sevilla	-Director, Research Center for Natural Science, UST
65 . Dr. Beatrice Guevarra	-Research Center for Natural Science, UST
66 . Dr. Manuel Navarro	-Professor, Research Center for Natural Science, UST
67 . Ms. Criselda G. Abesamis	-Pathologist, Blood Coordinating Council
68 . Ms. Carmen T. Narciso	-Hematologist,Chief Blood Bank,Heart Center

List of Persons Met

69 . Mr. Celso O. Samson -Director, Philippine Red Cross
70 . Dr. Ditas B. Javier -Department Head, Rizal Medical Center
71 . Dr. Norma Ona -Hematologist, Polymedic General Hospital
72 . Ms. Amelia Garcia -Hematologist, Polymedic General Hospital
73 . Ms. Floricita C. Fernadez -R & D Superintendent, Magnolia Division, Philippine Dairy Products
74 . Mr. Mario G. Cesorio -Manufacturing Superintendent, Magnolia Division, Philippine Dairy
75 . Ms. Elma C. Llaguno -Department of Chemistry, UP
76 . Ms. Luisa S. Saniel -Culture Collection, Institute of Biology NSRI
77 . Ms. Evangeline C. Santiago -Analytical Services Laboratory NSRI
78 . Mr. Jorge A.K. Ochoa -Culture Collection, Microbiology Unit, NSRI
79 . Ms. Maria Auxillia Tan -Culture Collection, Microbiology Unit, NSRI
80 . Ms. Virginia S. Carino -Institute of Biology, UP Diliman, QC
81 . Ms. Adoracion T. Aranez -Institute of Biology, UP Diliman, QC
82 . Ms. Saturnina C. Halos -NSRI, UP Diliman, QC
83 . Dr. Edito G. Garcia -Prof. Inst. of Medical Parasitology UP Manila
84 . Dr. Amante G. Cruz -Ass. Prof. Inst. of Med. Parasitology UP Manila
85 . Dr. Nadia Manuson -Professor, Department of Microbiology UP Manila
86 . Dr. Antonio V. Jacalde -Professor, Department of Microbiology UP Manila
87 . Ms. Luz Z. Lucas -Antibiotics, National Institute of Biotechnology
88 . Dr. Mediodora Saniel -Director, Institute of Tropical Medicine
89 . Dr. Remigio Olveda -Head, Institute of Tropical Medicine
90 . Dr. Rufino C. Lirag -Director, Industrial Technology Development Institute
91 . Mr. Antonio L. Gonzales -Head, Department Organic Chemistry, ITDI
92 . Ms. Dolores Isaac -Head, Department Inorganic Chemistry, ITDI
93 . Ms. Josefina B. Manalo -Head, Department Pharmaceutical Chemistry, ITDI
94 . Ms. Qunlillano Montevilegen -Head, Chemical Process Development, ITDI
95 . Dr. Violeta Ana -Chief, Chemicals & Minerals Division (ITDI) DOST
96 . Dr. Esther Albano-Garcia -Deputy Executive Director, PCASTRD
97 . Ms. Mercedes Soriano -Deputy Director, ITDI, DOST
98 . Dr. Ing. Adolfo Gopez -Deputy Director, ITDI, DOST
99 . Mr. Antonio Aguilar -Chief, Valuation & Classification Division, Bureau of Customs
100 . Dr. Eulalia Venzon -Head, Biology & Toxicology Dept. NIST, DOST
101 . Mr. Aubrey C. Bout -General Manager, Abbott Laboratories
102 . Mr. Juan V. Cadano, Jr. -Director of Manufacturing Abbott Laboratories President of PMMA
103 . Dr. Chang -WHO Representative a.i. Philippines
104 . Dr. Zenaida Ludovice -Chief, Health Intelligence Service (Philippine Health Statistics Office)
105 . Dr. Ponciano Alberin. Jr -Head, Maternal & Child Health Service Department of Health

List of Persons Met

106 . Ms. Nacita Sison	-Officer CICCO, Central Bank
107 . Ms. Carmelita Araneta	-Assistant Director, CICCO, Central Bank
108 . Ms. Purita Neri	-Economics Research Dept. (Domestic), Central Bank
109 . Ms. Betty Marquez	-Economics Research Dept. (International), Central Bank
110 . Mr. Adu Abueg	-Chief, Food & Drug Administration Unit, Bureau of Customs
111 . Ms. Delia Morala	-Valuation & Classification Officer, Bureau of Customs (Finished Goods)
112 . Ms. Merci Medina	-Valuation & Classification Officer, Bureau of Customs (Raw Materials)
113 . Ms. Noemi Ribaya	-Assistant Chief, Valuation & Classification Officer, Bureau of Customs
114 . Dr. Veronica Chan	-Professor, UP College of Medicine
115 . Dr. Ruben Aspiras	-Professor, Microbial Physiology, UPLB
116 . Dr. Asuncion Raymundo	-Professor, Bacteriology UP, Los Banos
117 . Dr. Marita Reyes	-Professor, UP. College of Medicine
118 . Dr. Hellen Molina	-UP, Los Banos
119 . Mr. Edwin P. Santiago	-Secretary General, Federation of Filipino Pharmaceutical Industries Inc.
120 . Dr. Tito Torralba	-Dean, Faculty of Medicine and Surgery, University of Santo Tomas
121 . Dr. Ernesto del Rosario	-Professor of Chemistry UP. Los Banos
122 . Dr. Nelia Cortes-Maramba	-Professor of Pharmacology UP. College Of Medicine
123 . Dr. Man Nancho	-Biologist, Research Institute of Logical Medicine
124 . Dr. M. T. Chua	-Director, Philippine Institute of Pure and Applied Chemistry (PIPAC)
125 . Dr. Fabian Dayrit	-Associate Professor, Department of Chemistry, Ateneo de Manila University Research Coordinator, PIPAC
126 . Dr. Rufino Lirag	-Director, ITDI, (DOST)
127 . Dr. L. Banez-Gutierrez	-Professor, UP College of Pharmacy
128 . Dr. F.E. Jacinto	-General Manager, Chemfields Inc.
129 . Dr. P.M. Cana	-Plant Manager, Chemfields Inc.
130 . Dr. Pepito M. Delgado	-Tech. Services Manager, Chemfields
131 . Mr. E.R. Ortez- Luiz	-Purchasing Manager, Philippine Refining Company
132 . Mr. Charles L. Sarris	-President & General Manager, Pfizer Inc.
133 . Mr. Jeff Ashpitz	-Managing Director, Cyanamid Philippine, Inc.
134 . Mr. Paul G. Hughes	-President & General Manager, Warner Lambert
135 . Mr. Jesus Ma. V. Veguillar	-Manufacturing Director, Pfizer Inc.
136 . Mr. Jose D. Pascual Jr.	-Operating Vice President, United Laboratories Inc.
137 . Ms. Estelita N. Garcia	-Assistant Vice-President, United Laboratories Inc.
138 . Dr. Rogelio P. de Leon	-Director, Analytical Chemistry Group. United Laboratories, Inc.

List of Persons Met

139 . Dr. Benigno D. Peczon	-Analytical Research and Development, United Laboratories, Inc.
140 . Mr. Geoffrey J. Kavanagh	-President & General Manager, Schering Corporation (Phil.) Inc.
141 . Ms. Rosalinda Tirona	-Philippine Ambassador to the United Nations in Geneva
142 . Mr. Simeon L. Luna	-Manager, Business Statistics Monitor
143 . Dr. George L. Burwell	-Director, CMS Markating Division, United Laboratories Inc.
144 . Mr. Luis Jimenez	-Asst. President, United Laboratories Inc.
145 . Mr. Mark Lewis	-Manager, APV Philippine Inc.
146 . Mr. C.C. Gutierez	-Sales Manager, APV Philippines Inc.
147 . Dr. Maximo Santos	-Chief, Malaria Control Services, DOH
148 . Dr. Napoleon T. Lara	-Senior Epidemiologist, Malaria Control Services, DOH
149 . Dr. Abraham Pascual	-Executive Vice-President, Pascual Laboratories Inc.
150 . Mr. Teofilo Zapanta, Jr.	-Sales Marketing Manager, Pascual Laboratories Inc.
151 . Dr. Conrado Dayrit	-Vice-President, Corp. Med. Director, United Laboratories Inc. Medical Director, Polymedic Gen. Hospital
152 . Dr. A. D. Nazarea	-Programme Director, Molecular Biology and Biotechnology Program U.P. Diliman
153 . Dr. Samuel Bernal	-Assistant Professor, Division of Medicine Harvard Medical School
154 . Dr. Calixto A. Zaldivar Jr.	-Director, Lung Center of the Philippines
155 . Dr. Claro Santiago	-National Institute of Science and Technology
156 . Ms. Alicia G. Salazar	-Head, Antibiotic Section, Bureau of Food and Drugs
157 . Dr. Marlito L. Cardenas	-Head, R&D, San Miguel Corporation
158 . Dr. Carlito R. Barril	-Professor, Institute of Chemistry, UPLB President, Philippine Association of Chemistry
159 . Dr. J. Farbos	-Meat Inspection Officer, National Meat Inspection Commission
160 . Dr. Elizabeth Callanta	-Monitoring Officer, National Meat Inspection Commission
161 . Dr. Lydia C. Crisostomo	-Chief, Laboratory Services Division Bureau of Plant Industry
162 . Dr. Augusto G. Santos-Ocampo	-Chairman, Board of Chemistry Professional Regulatory Commission
163 . Dr. Masatsugu Nakoso	-JICA Expert, Bureau of Food and Drugs
164 . Dr. Reynaldo de la Paz	-Marine Science Institue U.P. Diliman
165 . Mr. Ben Yap	-Economist, United Laboratories
166 . Mr. Luis P. Jimenez	-Economist, United Laboratories
167 . Dr. Bartolome C. Patague	-Meat Control Officer, NMIC
168 . Mr. Jose Labudahon	-Owner, Project 8 Abattoir
169 . Ms. Emmma Mojica	-Meat Inspector, Pasay City Abattoir
170 . Mr. Agapito Villanueva	-Meat Inspector, San Juan Abattoir

List of Persons Met

171 . Ms. Carmina J. Parce	-Head, Research Section, Bureau of Food and Drugs
172 . Ms. Rosario E. Martin	-Head, Toxicology Section, Bureau of Food and Drugs
173 . Ms. Elisea Elvena	-Head, Drug Section, Bureau of Food and Drugs
174 . Ms. Alicia T. Lorenzo	-Head, Cosmetic Section, Bureau of Food and Drugs
175 . Ms. Josefa P. Lucero	-Head, Food Section, Bureau of Food and Drugs
176 . Ms. Isabel N. Dy	-Head, Food Microbiology Section, Bureau of Food and Drugs
177 . Mr. Oscar G. Gutierrez Jr.	-Head Veterinarian, Animal House Bureau of Food and Drugs
178 . Mr. Marciano C. Aganan	-Group Manager, Purefoods Corporation
179 . Mr. Eduardo Martinez	-Assistant Vice-President, Purefoods Corp.
180 . Ms. Rosario Maria G. Sonica	-Marketing Assistant, United Laboratories
181 . Dr. Rosario Jose	-Dean, College of Science, DeLa Salle College
182 . Mr. Venancio R. delos Reyes	-Assistant for Programme Development, Offices of the AVP for Sectoral Relations
183 . Mr. Armando A. Andaya	-Department of Biology, De La Salle College
184 . Bro. Eduardo Salgado	-Chairman, Biology Dept. De La Salle College
185 . Mr. Wyona C. Patalingling	-Chemistry, Department, De La Salle College
186 . Mr. Sevillano Olano, Jr.	-Associate Dean, College of Engineering
187 . Ms. Christine C. Ngo	-Organic Chemistry Department
188 . Mr. Enrique Manzano	-Department of Physics
189 . Ms. Consolacion Rosales	-Chemistry Department
190 . Ms. Florencia G. Claveria	-Department of Biology
191 . Mr. Horst O. Gunther	-General Manager, Hoechst Philippines Inc.
192 . Dr. Teresita Melo Espina	-Researcher, National Inst. of Biotechnology and Applied Microbiology
193 . Ms. Elsa M. Luis	-Project Leader, Mycorrhizal Fungi
194 . Dr. Klaus Lampe	-Director General, International Rice Research Institute, Los Banos
195 . Dr. Honorata G. Baylon	-Section Head, Blood Bank and Transfusion Service & Serology, National Kidney Inst.
196 . Mr. Hernando T. Veloso	-Deputy Director, Administrative Services National Kidney Institute
197 . Mr. Filoteo A. Alano	-Director, National Kidney Institute
198 . Mr. Ruben A. Garcia	-Professor & Dean, College of Engineering University of the Philippines
199 . Mr. Katipunan delos Reyes	-USA Generics, Makati,MM
200 . Mr. Pham Binh Chay, Ph. D.	-Researcher, Project Leader Fermentation Engineering Laboratory National Institutes of Biotechnology and Applied Microbiology (BIOTECH)
201 . Mr. Casiano S. Abrigo Jr.	-Director, Sugar Technology Program University of the Philippines

List of Persons Met

202 . Mr. Luis E. Garcia	-President, General Manager, Metro Drug Inc.
203 . Dr. Jovita Movillon	-Acting College Secretary
204 . Engr. Rex B. Dimafelis	-Instructor
205 . Engr. Sixto A. Valencia	-Instructor
206 . Mr. Benedicto P. delos Santos	-Instructor
207 . Engr. Rosalia S. Gonzales	-Instructor
208 . Mr. Benjamin Gloria	-Instructor
209 . Mr. Mariano B. Olea	-Instructor
210 . Atty. Nicolas Tayao	-Chief, Procurement and Logistic Service, DOH
211 . Mr. Helmut von Hagen	-President and General Manager, Bayer Philippines, Inc.
212 . Mr. Clemens G. Keiser	-Manager, Pharmaceutical Division, Bayer Philippines, Inc.
213 . Mr. Kai Tarnow	-Manager, Veterinary Division Bayer Philippines
214 . Mr. Rodolfo Y. Eusebio	-Senior Vice-President, Chemphils Manufacturing Corporation
215 . Mr. Luis E. Garcia	-President and General Manager, Metro Drug, Inc.
216 . Dr. Manuel M. Dayrit	-Chief, Public Information for National Drug Policy, D O H
217 . Dr. Virgilio Gonzales	-San Lazaro Hospital, D O H
218 . Ms. Vilma V. Paner	-Health Manpower Development Training Service,
219 . Mr. Lino G. Abueg	-Manager of Meat Production, Purefoods Corporation
220 . Mr. Jacinto Concepcion	-Vice-President, Mercury Drug Corporation
221 . Mr. George W. Drysdale	-Chairman and President, Marsman Group
222 . Mr. William D. Hough	-General Manager, Farmitalia Carlo Erba
223 . Mr. Paul Kleiner	-Regional Director, Zuellig Group of Companies
224 . Mr. Aniceto M. Sobrepena	-Cabinet Undersecretary, Office of the President
225 . Mr. Eliezer V. del Mundo	-President and General Manager, Drugmaker's Laboratories Inc.
226 . Dr. Artemio Luat	-President, Superior Pharmacraft Inc.
227 . Mr. Antonio C. Bautista	-President and General Manager, Elin Pharmaceutical Inc.
228 . Ms. Iluminada T. Tuble	-Vice-President, Johntann (Phils.) International
229 . Mr. Rodolfo Y. Eusebio	-Senior Vice-President, Chemfields Inc.
230 . Mr. Jose Rafael S. Hernandez	-Field Director, Acadamy for Educational Development

2.11 Pharmaceutical Manufacturers Visited

Pfizer, Inc.
Abbot Laboratories
Warner Lambert Philippines, Inc.
Interphil Laboratories, Inc.
Hizon Laboratories, Inc.
Pascual Laboratories, Inc.
Elin Pharmaceutical, Inc.
Superior Pharmacraft, Inc.
Drugmakers Laboratories, Inc.
Johntann (Phils.) International
United Laboratories, Inc.
Astra Pharmaceuticals
Chemfields, Inc.
Hoechst
Bayer

Pharmaceutical Distributors Visited

(Without Manufacturing Facilities)

Marsman
Mercury Drug Corporation
Metro Drug, Inc.

2.12 Constraints

2.12 As in several development countries, the single most salient constraint was the difficulty in obtaining complete and reliable data, a fact inhibiting the extent and the quality of the studies, as well as prolonging their duration. Not only data from various sources were different, but often information obtained from the same source, at different times, showed wide variations.

Considerable delays were provoked for instance, when the experts were informed that the **"sales breakdown can be given in value only, as it is physically impossible to measure quantities due to the number of products, the number of presentations and the various packages used on the industry, which are not at all uniform".**

In other cases, products were erroneously classified warping the entire consumption picture, such as, for instance. " with the group of other antibiotics" containing antihistamines, antihelminthics, etc.

In some occasions, the measures of volumes were inconsistent, after confusing tons, kilograms, or grams and creating data as, for example, 52 Tons of imported vaccines, or US $ 71,000 average price of a kilogram of antibiotics.

The experts were compelled to use as many sources as possible, in order to cross-check the figures, their reliability and validity, sometimes arbitrarily deciding the most logical numbers to be taken into account. Data were collected from the DOH, DOST, DTI, BLI, CB, NEDA, NSO, the customs the academie ,various institutes, IMS, the "Business Statistics Monitor", publications such as "The Philippine Pharmaceutical Industry Fast Book" by N. Gabunada, "Doing Business in the Philippines" published by SGV, discussions with the private sector and government officials, etc.

In this respect, one should also add, the understandable reluctance of the authorities in agreeing to use data provided by the private sector, for fear that they might be biased and self-serving. At the same time, several data provided by some Departments were from the private sector, including those concerned with the public one. While, a certain caution should be exercised for obvious reasons, many data from the private sector are comprehensive, more detailed and precise, and better presented. After all, they have more human and financial resources, possess more flexibility and have the habit of collecting, monitoring and processing information in the pharmaceutical field, which except for Chemfields, is entirely in their hands.

2.12.2 The basic misunderstanding of UNIDO's role and the wrong perception about its activities, was another inhibitive factor, especially in the prevailing athmosphere of suspicion and antagonism between some members of the private and public sectors. In addition to the main issue, confusing UNIDO with WHO and their respective activities in the field of generic drugs, restricted lists of essential drugs, etc. areas in which UNIDO in this particular study has nothing to say, the role of the latter was construed as a funding agency of the United Nations engaged in helping the government to establish pharmaceutical facilities in competition with the private sector. UNIDO was even accused of secretly participating in assisting the Government in its efforts to impose a "creeping expropriation of the private sector."

2.12.3 The various Government Departments and Agencies were not officially informed about this particular study, initiated by the Philippine Authorities and were not asked to cooperate and provide assistance and information. This has increased the work-load of the international experts and forced them to engage in excessive administrative activities and often, to undertake short-cuts and adopt a more direct approach than usually desired.

Under normal circumstances, international experts are continuously solicited to provide data, procure litterature, organize study groups, offer advice, perform audits, present lectures, etc. In other words, the host country is utilizing the presence of experts to a maximum, beyond their call of duty, taking advantage of expertise, experience and talent. This did not occur, unfortunately, in the Philippines.

2.12.4 As in many developing countries, due to administrative procedures, the understaffing of various functions, the heavy work-load of the personnel, the insufficient budget allocations, the difficulties of fund disbursement and experience with such undertakings, the logistic support has left a lot to be desired, especially in the initial stages of the project.

2.12.5 The prevailing belief of an almost immediate cost reduction of the pharmaceutical products after the establishment of a domestic basic pharmaceutical (pharmaceutical chemicals) manufacture, was another factor of concern. In reality, more often than not, particularly in the first years of operation , costs of locally produced drugs are higher, due to the purchase of technology, the training of experienced technical and managerial staff, as well as of skilled workers, the installing of good working habits and discipline, the reaching of the production "cruising rhythm", the attaining of manufacturing efficiency, etc.

2.12.6 In general terms, the reconcilliation of liberalization, privatization and deregulation on one hand, with protection, Filipinization and restriction on the other, was another problem of debate and preoccupation when trying to identify subsectors for a possible upstream integration and assesing the factors for the establishment of a domestic basic pharmaceutical manufacture.

2.12.7 On a more specific tone, it seemed complicated to reconcile attracting local and foreign investment from the private sector with the production of very cheap drugs, affordable by the poorest segments of the population. In this instance, one should mention the original idea of the "task force" involved in devising ways and means for the drug procurement and self-sufficiency,i.e. "to establish a non-profit drug manufacturing facility (state-owned or private) to supply pharmaceutical products to both public and private sectors, based on a national formulary."

2.12.8 The conviction that the pharmaceutical industry should necessarily encompass all the manufacture of pharmaceutical chemicals, was another point for clarification. In fact, as discussed in the introduction, the pharmaceutical industry normally consists of formulation, often misconstrued as simple mixing of ingredients, and packaging of the finished dosage forms. Strictly speaking, the manufacture of active substances, or pharmaceutical chemicals, belongs to the chemical industry. In this sense, reputable domestic and foreign Filipino pharmaceutical manufacturers, are doing exactly what many of their colleagues in the industrialized countries would do.

2.13. Recommendations

2.13.1 To prepare a special project defining an information system and mechanism to collect, monitor and process data pertaining to pharmaceuticals, such as their importation, manufacture, sales and distribution in the country. An attempt was made to initiate a specific study with IMS an experienced company in this field, with coverage of all therapeutic groups in the PPI (Philippine Pharmaceutical Index) and the PHPA (Philippine Hospital Pharmaceutical Audit), or selected therapeutic categories, such as :

- antibiotics
- non-narcotic analgesics
- cough and cold preparations
- vitamins

The data to be supplied would be namely of two types

Unit sales to drugstores and/or hospital pharmacies in terms of a common unit of measure or counting units (tablets, capsule , syrups, etc.)

Volume of chemical substances contained in the products in terms of kilogram weights.

The total price for the years 1986 and 1987 covering all therapeutic classes in drugstores and hospitals would be of US $ 41,000. (See special study proposal on the following pages)

2.13.2 To inform the Government Departments, Agencies and Institutions, as well as the private sector of the objectives and scope of similar studies with International Organizations, requesting their cooperation and assistance

2.13.3 To allow longer periods of time for the elaboration of studies of such a magnitude and apparent importance, involving discussions with various persons of different levels. This is particularly true in Manila, where experts were on the road for 3-4 hours daily and more so during the monsoon season.

2.13.4 To provide adequate human, material and financial logistic support with timely planning and execution. In case of understandable difficulties, as mentioned in point 12.4, arrangements could include UNDP/UNIDO participation in providing these services, under budget line 13-00, for instance, or in any other convenient manner.

2.13.5 To maximize the utilization and rationally exploit the experts' knowledge and experience in the interest of the host country, by attaching one or two persons to each expert for a real day to day transfer of technology, managerial experience, decision making, etc. during their stay in the Philippines.

SPECIAL STUDY PROPOSAL

INTRODUCTION

Using IMS database as source of secondary data, a report to be known simply as the UNIDO SPECIAL STUDY is being proposed to the United Nations Industrial Development Organization in response to their statement of data needs. Briefly, the elements of the study are as follows:

a) Data will be sourced from either or both the Philippine Pharmaceutical Index (PPI) and the Philippine Hospital Pharmaceutical Audit (PHPA).

b) Time period coverage of the report will be either 1987 only or 1987 and 1986.

c) Product groups to be included will be either all TCs (therapeutic categories) covered in the PPI and the PHPA or selected TCs only namely:

   i) antibiotics (J1A, J1B, J1C, J1D, J1E, J1F, J1G, J1H, J1K, J1L, J1M, J1N)

   ii) non-narcotic analgesic (N2B)

   iii) cough and cold preparations (R1B, R5A, R5B, R5C, R5D, R5F)

   iv) vitamins (A11A, A11B, A11C, A11D, A11E, A11F, A11G, A11H, A11J)

d) Data to be supplied are mainly of 2 types:

   i) units sales to drugstores and/or hospital pharmacies in terms of a common unit of measure or counting units (eg. tablets, caps, ml, g)

   ii) volume of chemical substances contained in the drugs in terms of kilogram weight

DATA SOURCE

The PPI is a monthly report which provides estimated national sales of all pharmaceutical products sold through retail pharmacies, based on purchase records. Sales are reported in currency values and units and are shown for each pharmaceutical product, application form, dosage, strength and package size. These estimates are accumulated by manufacturer, therapeutic sales and sub-class, and analyzed further to show market shares, variation over previous year's data, prices, dates of introduction, etc. and presented in a series of tabular formats. Data is also shown by region. The PPI works with a representative panel of 260 retail drugstores located nationwide. The report measures approximately 78% of the drug business.

The PHPA is a semestral report which measures the volume and value of drugs which pass through hospital pharmacies. Data layout is similar to the PPI: however reports are shown separately for private hospitals and government hospitals as well as the combined hospital sectors. Approximately 14% of the total drug business pass through hospitals. One hundred (100) hospitals spread throughout the nation make up the panel.

METHODOLOGY

Given that 2 types of data are required, the report will be prepared in 2 phases:

Phase I will involve a computerized re-processing of PPI and PHPA unit volume estimates into counting units or the lowest common unit of measure. This will involve either all TCs and products in the PPI and/or PHPA or selected TCs only. Selected TCs covered are antibiotics, non-narcotic drugs and cough and cold preparations and vitamins. These TCs have a combined market share of 40% of the drugs moving thru drugstores and 26% of drugs sold through hospital harmacies. This phase of the report will be accessed thru our on-line data retrieval system and will be run by the IMS MIDAS office in London.

Phase II will be conducted manually at the Philippine IMS office after completion of Phase I. It will involve the conversion of unit data gathered in Phase I to their equivalent measure of chemical substances. Phase II will cover only 1987 data on selected TCs as defined above.

TABLE FORMATS

The attached table format 1 for Phase I (see Addendum I) will be proposed to IMS MIDAS office: however the final design of the table will be determined by MIDAS depending on the available software. Nevertheless, it is expected that data specified in this table will be the minimum data to be supplied, without losing sight of the need for a simple, easy to read report.

The proposed table format for Phase II appears as Addendum II.

TIMETABLE

Phase I will be completed and delivered to clients, 15 working days from the receipt of signed contract, give or take a few days to allow for courier service.

Phase II will be completed within a span of 16 to 26 weeks as follows:

1987 Selected TCs, drugstore only - 16 weeks

1987 Selected TCs, drugstore and hospital - 26 weeks

PRICE

The subscription price depends on the amount of data to be supplied and the extent of the service purchased. A price matrix showing subscription prices in US Dollars appear hereunder:

	All TCs		Selected TCs	
	1987	1987 + 1986	1987	1987 + 1986
Phase I				
Drugstore Only	14,500	16,000	12,740	14,500
Drugstore & Hospital	22,750	25,000	18,200	20,500
Phase II				
Drugstore Only	-	-	6,000	-
Drugstore & Hospital	-	-	10,500	-

TERMS AND CONDITIONS OF THE CONTRACT

a) Price

1) The full amount of Phase I is due and demandable one week after delivery of the Report.

2) The contract price for Phase II is payable in installment as follows:

50% upon signing of contract
50% upon report delivery

3) The subscription price is payable in the peso equivalent of the dollar price quoted.

b) Use of the Report

1) Client agrees not to sell or divulge or permit anyone else to give, sell or divulge any of the material furnished them in this report or any material furnished them based on the data obtained from this report or any extract or deduction therefrom, to any other than the reponsible personnel of client.

2) Client agrees to use the report and any supplementary data supplied under this agreement solely as a management tool and that no portion of the report or supplementary data, or any extract or deduction therefrom, shall be published by client or by any other party with client's knowledge or consent, or made use of in any legal proceedings without the prior written consent of IMS.

A D D E N D U M I

Phase I

3RD LEVEL TC	TC DESCRIPTION / PRODUCT (COMPANY)	VOLUME in tab/ml/gm (+00 UNITS) 1987 DS	1987 HOSP.	1987 TOTAL	1986 DS	1986 HOSP.	1986 TOTAL
J1A	TETRACYCLINES AND COMBS						
	VIBRAMYCIN (PFIZER LAB)						
	CAP	1,096,0	154,0	1,250,0	1,370,0	98,0	1,468,0
	SYR	490,5	1,0	491,5	499,0	-	499,0
	TERRAMYCIN (PFIZER LAB)						
	CAP	3,540,1	10,0	3,550,1	2,892,0	30,0	2,922,0
	SYR	1,707,0	-	1,707,0	1,611,0	-	1,611,0
	V.IM	150,0	1,0	151,0	173,0	2,0	175,0
	OTHER BRANDS						
	CAP	28,463,8	958,4	29,422,2	42,256,9	989,9	43,246,8
	SYR	5,634,0	16,0	5,650,0	5,478,0	63,0	5,541,0
	SUS	672,0	-	672,0	102,0	-	102,0
	GRN	48,0	6,0	54,0	90,0	12,0	102,0
	TOTAL J1A (ALL BRANDS)						
	CAP	33,099,9	1,122,4	34,222,3	46,518,9	1,117,9	47,636,8
	SYR	7,831,5	17,0	7,848,5	7,588,5	63,0	7,651,5
	SUS	672,0	-	672,0	102,0	-	102,0
	GRN	48,0	6.0	54,0	90,0	12,0	102,0
	V.IM	150,0	1,0	151,0	173,0	2,0	175,0

To Include :

A. Selection
   1) All 3rd level TC
   2) All brands comprising top 70% of the 4th level market arranged in descending order by peso value
   3) Breakdown by tab/ml/gm/others for each brand listed
   4) All remaining brands to be consolidated under "Other Brands" with the same form breakdown
   5) Total 3rd level by tab/ml/gm/others

B. Market Segment
   1) Drugstore (PPI) market
   2) Hospital (PHPA) market
   3) Total drugstore (PPI) and hospital (PHPA market

C. Period
   1) 1987
   2) 1986

A D D E N D U M II

Phase II

3RD LEVEL TC	TC DESCRIPTION	1 9 8 7	
		KILOGRAM	%
J1A	TETRACYCLINES		
	CHLORTETRACYCLINE		
	DEMECLOCYCLINE		
	DOXYCYCLINE		
	METHACYCLINE		
	MINOCYCLINE		
	OXYTETRACYCLINE		
	TETRACYCLINE		
	T O T A L		100.0

III THE ENVIRONMENT OF THE PHARMACEUTICAL INDUSTRY IN THE PHILIPPINES

3.1 Introduction to the Country

3.1.1 Geographic Situation

The Philippines, an archipelago consisting of some 7,107 islands and islets, is situated to the southeast of the Asian mainland and stretches 1,850 kilometers from north to south and 1,120 kilometers from west to east. It is bounded on the west and north by the China Sea, on the south by the Celebes Seas and the coastal waters of Borneo, and on the east by the Pacific Ocean. It has an approximate land area of 229,404 square kilometers (115,707 square miles).

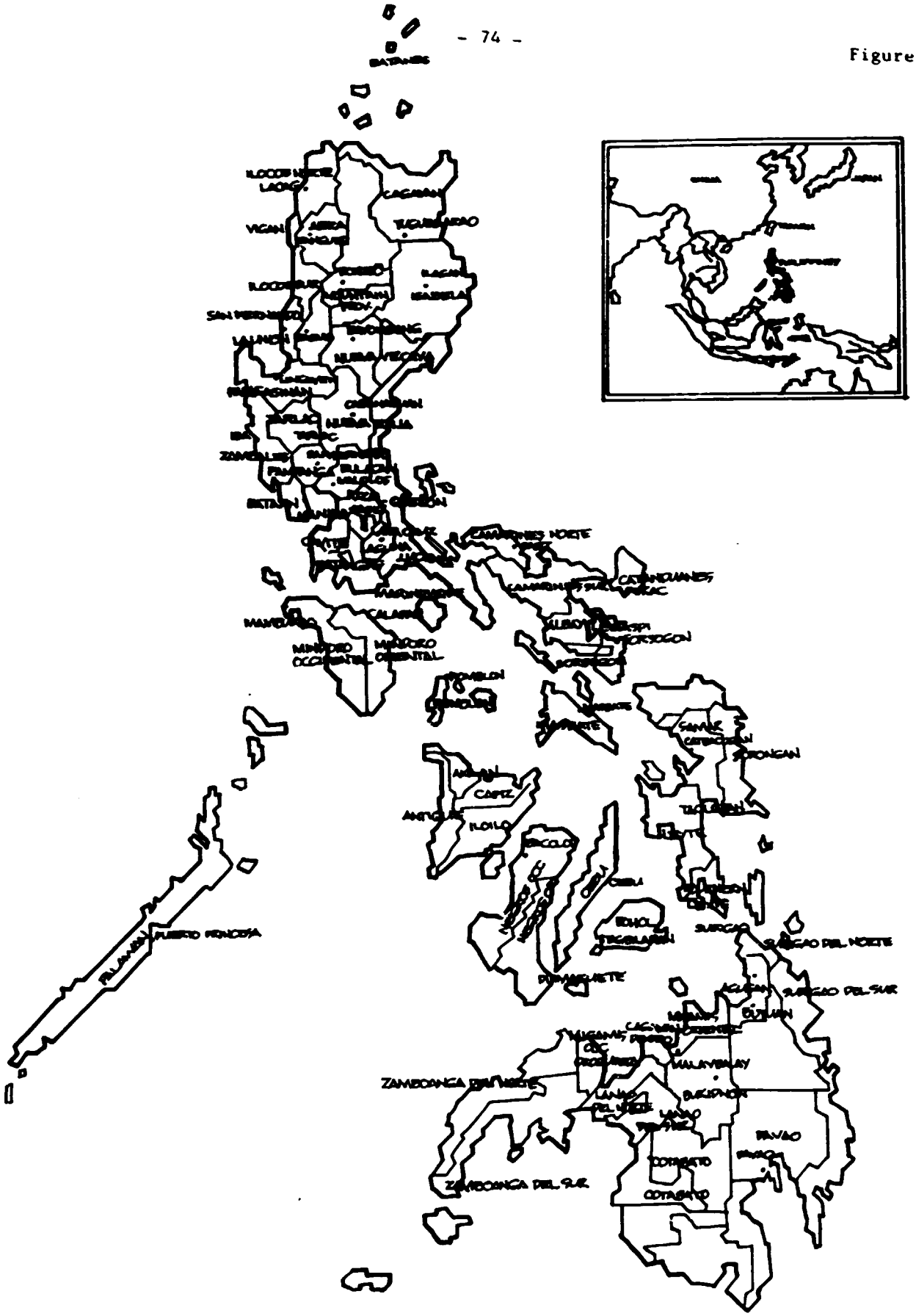
Although generally mountainous, the Philippines has almost every variety of topographical feature ranging from swamps, such as those at the head of Manila Bay, to the high mountain masses culminating in Mount Apo, 9,690 feet, in the southern island of Mindanao. The country has extensive fertile coastal and central plains and rolling uplands. Large valleys, traversed by big rivers, lie between mountain ranges. Situated in the great volcanic chain surrounding the Pacific, the country is dotted with many active and extinct volcanoes of which Taal Volcano and Mount Mayon, with its almost perfect cone shape, are the most famous.

3.1.2 Climate

The climate is generally warm and humid most of the year. There are three seasons: the hot, dry season from March to end of May, terminated often by violent thunderstorms and short torrential rains; the rainy season from June to end of October, during which rain may be expected almost daily, particularly at its peak which is usually during the month of July; the cooler, dry season from November to the end of February. Manila, by far the largest city, has a mean annual temperature at 70°F (26°C). Average relative humidity ranges from 69 percent in April to 84 percent in August and September. Ocean breezes of moderate strength are regular but they fail to bring relief from the heat because of the humidity.

Typhoons are common in the Philippines during the rainy season. Most typhoons occur during the months of August to October, but they may come as early as May or as late as December. Manila is rarely struck severely, but wind velocities may reach 60 miles an hour or more when the center of the typhoon passes nearby. During heavy rains many streets in Manila are subject to flooding.

Figure 10



MAP OF THE PHILIPPINES

Earth tremors occur frequently but are usually of minor intensity. In 1969, 1970 and 1974, however, fairly heavy earthquakes struck the Manila Area, causing some loss of life and damage.

3.1.3 Religion

The population is predominantly Roman Catholic (74%). There are many churches in the country, some of which date back to the sixteenth century. Masses and sermons are generally given in English and in Pilipino, or other local dialects.

There is an active Protestant minority (9%), with several large churches in Manila, its suburbs and elsewhere. They include the following denominations: Methodist, Church of Christ in the Philippines (Joint Presbyterian and Congregational) Episcopal, Lutheran, Christian Scientists, Seventh Day Adventist, Mormon and Baptist. The Philippine Independent Church and Inglesia ni Cristo are two denominations founded by Filipino religious leaders.

Followers of Islam, some 7% of the population, are concentrated in the southernmost islands of the Philippines. Moslem rites are regularly held at the Manila (Golden) Mosque located in Quiapo, Metro Manila. There is a small but active Jewish community, and regular services are held in synagogues. A Hindu temple and a Sikh temple mainly serve the Indian community. There are several Chinese temples, including a Chinest Buddhist temple.

3.2 Demography

3.2.1 The Population

The Philippines annual population growth rate declined from 3.0% in the sixties to 2.7% in the seventies (SGV, 1988). From a level of 48.3 million in 1980, the population grew to 57.4 milion in 1987, or at an annual growth rate of 2.48%. The national population density correspondingly increased from 140 persons in 1975 to 192 in 1987.

The number of males per 100 females fluctuated from 99.0 in 1970 to 102.3 in 1980 and to 100.7 in 1985 (SGV, 1988) In 1987, the country had a nearly balanced number of males and females with a sex ratio of 101 males per 100 females (Population Commission).

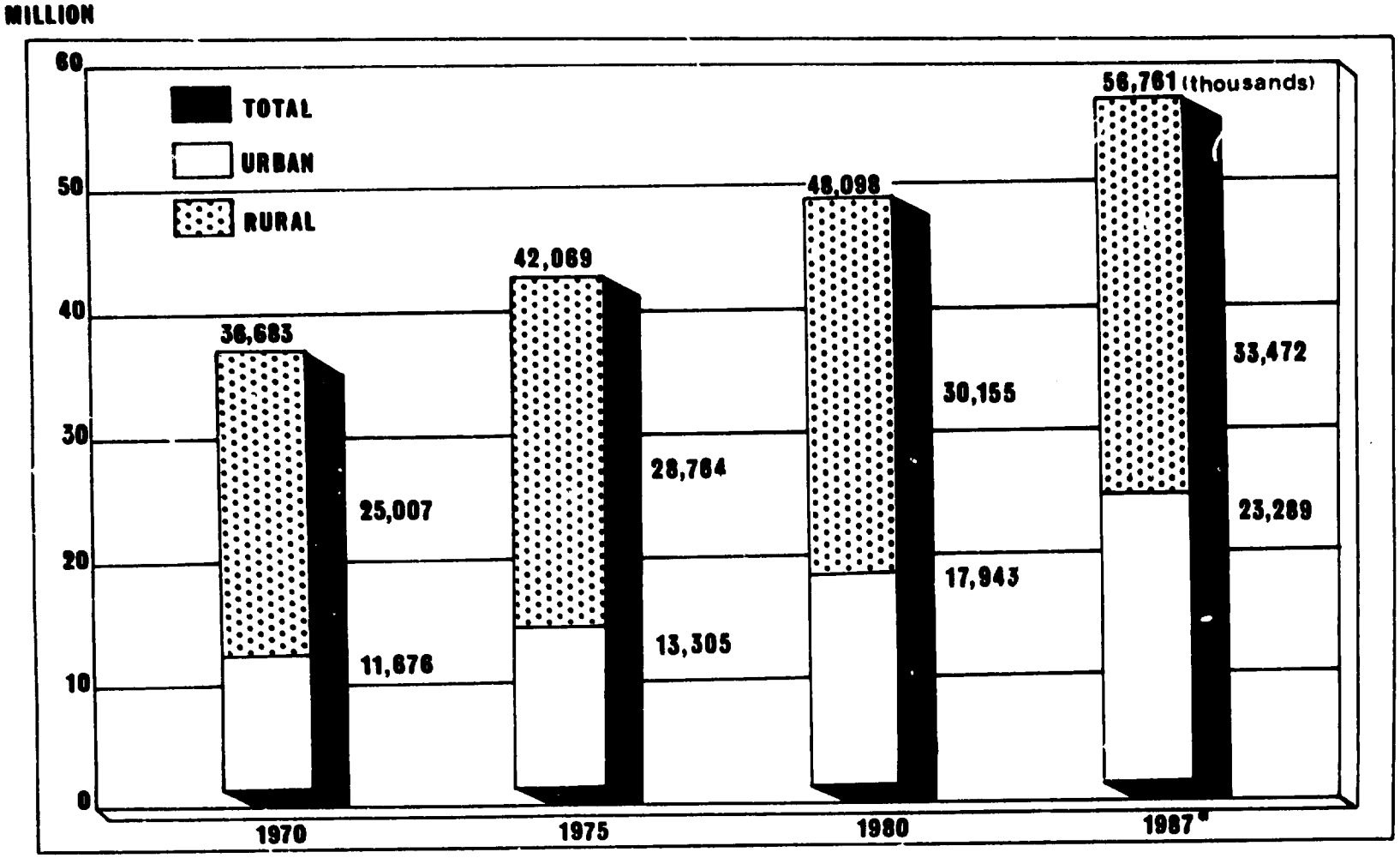
Table 17
Demographic Profile: Philippines, 1987

Population	57.4 million
Land Area	300,000 sq. km.
Population Density	192 persons/sq.km.
Crude Birth Rate	31.24 births/1,000
Crude Death Rate	7.6 deaths/1,000
Rate of Natural Increase	2.4 percent
Population Aged 0-14	28.9 million
Population Aged 15-64	26.5 million
Population Aged 65 & older	1.9 million
Dependency Ratio	86 per 100
Sex Ratio	101 males/100 females

With the increase in population and the country's movement towards industrialization, the volume of urban population has likewise increased from 37.3% in 1980 to 41.0% in 1987 (Figure 11).

The age-sex pyramid of the Philippine population is shown in Figure 12. It is clear from the pyramid that the Philippine population is young as evidenced by an expansive age distribution despite slightly increasing proportion in the young adult ages (NEDA, 1983)

URBAN AND RURAL POPULATION

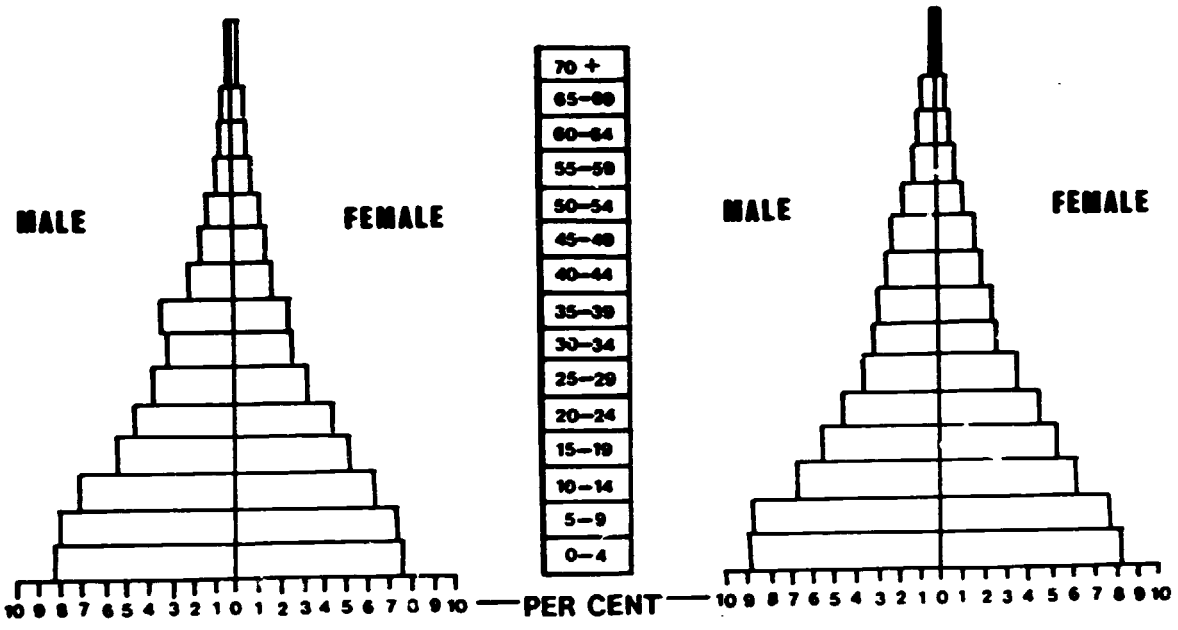


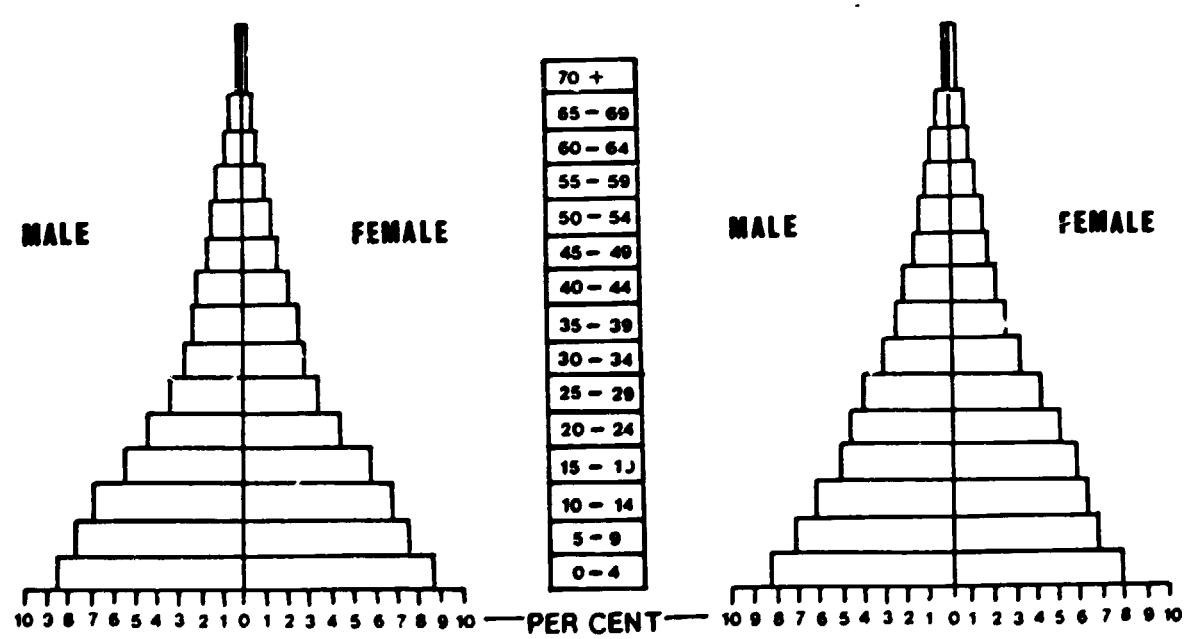
SOURCE : PHILIPPINE STATISTICAL YEARBOOK 1987,
STATISTICAL YEARBOOK OF THE PHILIPPINES 1984.

*PROJECTED

Figure 11

FIGURE 12
AGE-SEX PYRAMIDS, 1948-1980





SOURCE: NEPA 1988

3.2.2 Components of Population Growth

Filipinos can look forward to an increasing life expectancy which has increased by 5 years from 1970 to 1985. The average life expectancy in 1985 of 63.1 years is comparable with most countries of Southeast Asia but is still below the life expectancy rate in most developed countries (UNICEF, 1987).

From 1970 - 1985, there was a decline in crude birth rate. It was observed that during this period, there was an increase in the proportion of women in child-bearing age, a decline in the mean age at marriage and only a slight decrease in the total fertility rate (UNICEF, 1987).

During the same period, crude death rate also declined.

Table 18
Components of Population Growth, Philippines, 1970 - 1985

Component	1970	1975	1980	1985
1. Life expectancy (years)	55.8	58.8	61.6	63.1
2. Crude Birth Rate (1,000 population)	39.3	35.2	33.7	32.2
3. Crude Death Rate (1,000 population)	10.8	9.2	8.7	7.9
4. Infant Mortality Rate (1,000 Livebirths)	82.2	72.7	63.2	56.8
5. Total Female Fertility Rate	6.3	5.2	5.0	4.8
6. Total Marital Fertility Rate	9.6	8.8	8.3	8.0
7. Population Levels (millions)	36.7	42.1	48.1	54.7

Source: NCSO, Cited in UNICEF, Situation of Children and Women in the Philippines, 1987.

3.2.3 Population Projections

3.2.3.1 Population Estimates

Estimates of the size of the Philippine population by the year 2000 used the 1980 population age and sex structure. The projection entailed the setting up of three different time periods for attaining replacement fertility and two alternative paths for mortality (UPPI, 1984).

Replacement fertility refers to that level of reproduction whereby a population is supposed to stabilize eventually and stop growing. In demographic terms, it means a net reproduction rate of unity (NRR = 1). It is roughly equivalent to a completed family size of 2 (NEDA, 1983). The three time periods for attaining replacement fertility are as follows:

a. High series which projects the realization of replacement fertility by the year 2000;

b. Medium series which anticipates the attainment of a two-child family by the year 2010;

c. Low series which projects that the population will replace itself by the end of the century.

The two alternative mortality paths are as follows:

a. A mortality path predicting moderate improvement in life expectancy;

b. A path assuming a more favorable mortality condition resulting from the vigorous implementation of a primary health care program.

The projected population by the year 2020 under each of the three fertility assumptions and under each of the two mortality paths is shown in the table below:

Table 19
PROJECTED POPULATION BY THE YEAR 2000

	FERTILITY ASSUMPTION		
	Low Series	Medium Series	High Series
	Assumption 1 (Rapid Fertility decline)	Assumption 2 (Moderate Fertility Decline)	Assumption 3 (Slow Fertility Decline
	Fertility will decline from its 1980 level such that a net reproduction rate of 1 will be achieved by the year 2000.	Fertility will decline from its 1980 level such that a net reproductive rate of 1 will be achieved by the year 2010.	Fertility will decline from its 1980 level such that a net reproductive rate of 1 will be achieved by the year 2020.
Moderate Mortality Improvement	71,320,000	75,224,000	77,209,000
More Favorable Mortality Conditions	71,954,000	75,903,000	77,912,000

Source: UPPI, 1984

Using the assumptions of moderate fertility decline and moderate mortality decline, the estimated population for 1988 is 58,721,307 and is expected to reach 64,258,611 in 1992 (Table 20).

Table 20
Population Projections for the Philippines, 1980 - 1992
(Medium Assumption: Moderate Fertility Decline & Moderate Mortality Decline)

Year/Age Group	0-14	15- 64	65 +	Total	Growth Rate
1980	20,313,098	26,359,634	1,643,771	48,316,503	2.50
1981	20,652,054	27,193,532	1,690,436	49,536,022	2.52
1982	20,995,720	28,051,242	1,736,103	50,783,065	2.52
1983	21,343,433	28,930,340	1,781,597	52,055,370	2.51
1984	21,696,057	29,827,839	1,827,324	53,351,220	2.49
1985	22,053,185	30,741,541	1,873,603	54,668,332	2.47
1986	22,412,090	31,671,792	1,920,248	56,004,130	2.44
1987	22,768,046	32,620,354	1,967,642	57,356,042	2.41
1988	23,114,980	33,589,215	2,017,144	58,721,307	2.38
1989	23,446,200	34,580,758	2,070,030	60,096,988	2.34
1990	23,755,166	35,597.625	2,127,389	61,480,180	2.30
1991	24,036,287	36,646,549	2,189,704	62,872,540	2.26
1992	24,287,702	37,717,144	2,256,765	64,258,611	2.21
Average					2.40

Source: NEDA, 1988

3.2.3.2 Estimates of Life Expectancy

The estimates of life expectancy under the two mortality paths are shown in Table 21. The basic assumption is that gains in life expectancy would continue to be realized even towards the end of the projection period. During the next twenty years, the gains will be substantial with expectation of life at birth increasing at an annual increment of 0.3 year under the first assumption, and of 0.4 year under the second assumption. By the year 2030, life expectancy will be around 73.5 years (NEDA, 1983).

There will also be a narrowing of the sex differences in life expectancy. As of 1980, Filipino females live 3.6 years longer than the Filipino male. By the year 2030, this gap will be reduced to only 1.5 years.

Table 21
Estimates of Life Expectancy Under Two Alternative Paths of Mortality Decline 1980 - 2030

Year	Life Expectancy At Birth (in years)		
	Both Sexes	Male	Female
	Alternative 1 - Moderate Mortality Decline		
1980	61.6	59.8	63.4
1990	64.6	62.8	66.4
2000	67.6	66.0	69.2
2010	70.3	68.8	71.8
2020	72.4	71.2	73.6
2030	73.5	72.8	74.4
	Alternative 2 - Rapid Mortality Decline		
1980	61.6	59.8	63.4
1990	65.[illegible]	64.3	67.6
2000	70.3	68.8	71.8
2010	72.4	71.2	73.6
2020	73.5	72.8	74.4
2030	73.9	73.4	74.8

Source: NEDA, 1983

3.2.3.3 Estimates of Total Fertility Rate

The estimates of total fertility rate under each of the three assumptions is shown in Table 22. Under conditions of replacement fertility (Assumption 1), Filipino couples will have, on the average, 2.2 children. Under Assumption 2, each couple will have 3 children, and under Assumption 3, 3-4 children.

Table 22
Estimates of Total Fertility Rate According to Three Alternative Paths: 1980 - 2030

Year	FERTILITY ASSUMPTION		
	Assumption 1 (Rapid Fertility Decline)	Assumption 2 (Moderate Fertility Decline)	Assumption 3 (Slow Fertility Decline)
1980	4.70	4.70	4.70
1990	3.46	3.86	4.06
2000	2.21	3.01	3.42
2010	2.15	2.17	2.78
2020	2.08	2.10	2.14
2030	2.02	2.02	2.02

Source: NEDA, 1983

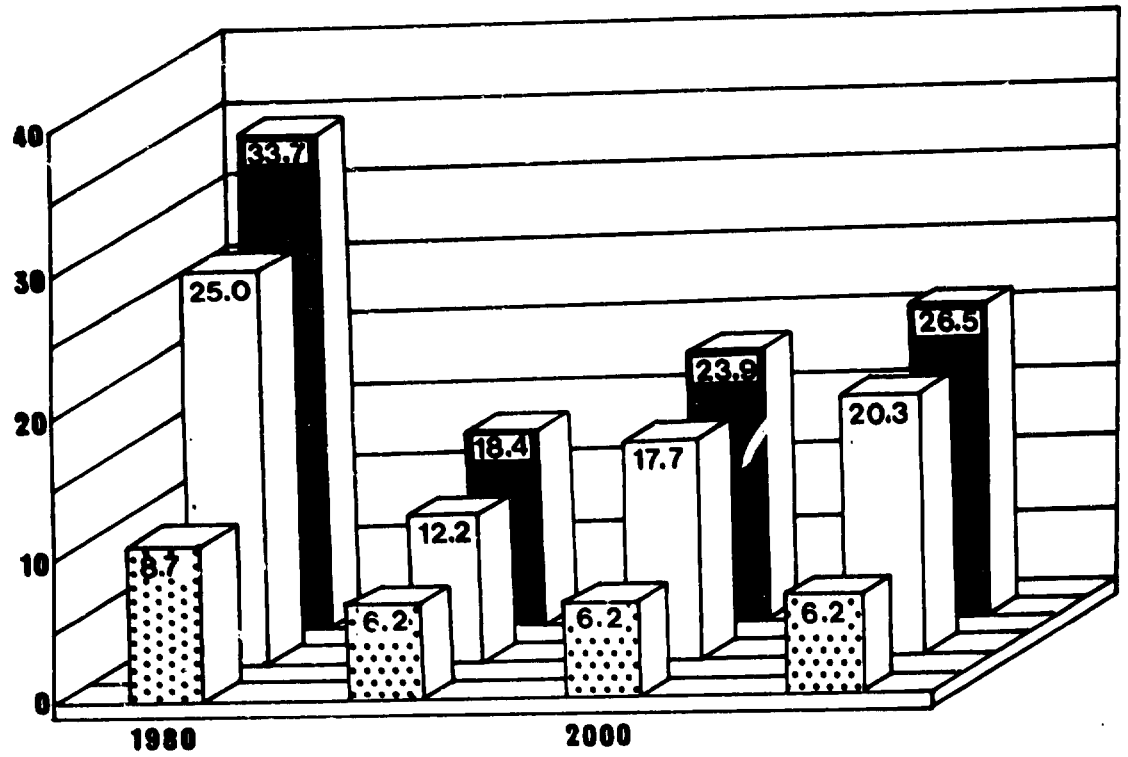
3.2.3.4 Estimates of Vital Rates

Figure 13 shows the estimates of vital rates under the three assumptions. From a level of 33.7 in 1980, crude birth rate wi'l dramatically decline to 18.4 under Assumption 1. However, the decline will not be as dramatic under Assumption 2 and 3 where the crude death rate of 8.7 in 1980 will go down to 6.2 regardless of the assumptions used.

FIGURE 13

VITAL RATES: 1980 AND 2000

(PER 1,000 POPULATION)



LEGEND:

- CRUDE BIRTH RATE
- RATE OF NATURAL INCREASE
- CRUDE DEATH RATE

SERIES 1	SERIES 2	SERIES 3
RAPID FERTILITY DECLINE; N.R.R. OF 1 ACHIEVED BY 2000	MODERATE FERTILITY DECLINE; N.R.R. OF 1 ACHIEVED BY 2010	SLOW FERTILITY DECLINE; N.R.R. OF 1 ACHIEVED BY 2020

SOURCE:

POPULATION OF THE PHILIPPINES: CURRENT PERSPECTIVES AND FUTURE PROSPECTS. 1985.

The yearly estimated vital rates and life expectancy for the period 1980 - 1999 is indicated in Table 23.

Table 23
Estimated Vital Rates and Life Expectancy at Birth in the Philippines, 1980 - 1999

Year	Crude Birth Rate	Total Fertility Rate	Infant Mortality Rate	Death Rate	Life Expectancy
1980	33.7	4.7	63.2	8.7	61.6
1981	33.4	4.6	61.9	8.5	61.9
1982	33.2	4.5	60.6	8.4	62.2
1983	32.9	4.5	59.2	8.2	62.5
1984	32.5	4.4	57.9	8.1	62.8
1985	32.2	4.3	56.6	7.9	63.1
1986	31.7	4.2	55.3	7.8	63.4
1987	31.3	4.1	54.1	7.6	63.7
1988	30.8	4.0	52.8	7.5	64.0
1989	30.3	3.9	51.5	7.4	64.0
1990	29.8	3.9	50.3	7.2	64.6
1991	29.2	3.8	49.0	7.1	64.9
1992	28.6	3.7	47.7	7.0	65.2
1993	28.0	3.6	46.5	6.9	65.5
1994	27.5	3.5	45.2	6.8	65.8
1995	26.9	3.4	43.9	6.7	66.1
1996	26.3	3.4	42.6	6.6	66.4
1997	25.7	3.3	41.4	6.5	66.7
1998	25.1	3.2	40.1	6.4	67.0
1999	24.5	3.1	38.8	6.3	67.3

Source: NEDA, 1988

3.3 Population and Family Planning

3.3.1 The Philippines in the Context of a Global Population

The world's population is rapidly growing. Every day, 220,000 infants are born; every year, the world's population grows by over 80 million. By the turn of the century, the world's population is expected to be 6.1 billion (Manila Bulletin, August 17, 1988).

In July 1987, the global population passed the 5 billion mark. Of this number, 60% (or 3 billion) are found in Asia making it the most populous region. Seven babies are born in Asia every second, or 150,000 each day (Manila Bulletin, August 14, 1988).

According to projections of the United Nations, (UNFPA, September 1987), the population of the Philippines in mid-1987 was 57 million, making the country the world's 17th most populous nation. To date, there are 58 million Filipinos. This number is expected to increase to 84 million in the year 2000 and to 116 million by the year 2016 (Manila Bulletin, August 27, 1988).

During the period 1985-1990, the Philippines is expected to have a growth rate of 2.25 percent. This is relatively high when compared to the 1.63 percent projected growth rate of Asia as a whole (including China), 1.68 percent for Southeastern Asia, 1.94 percent for the less developed regions of the world, 0.60 percent for the more developed regions and 1.63 percent for the world as a whole (UNFPA, September, 1987). During the period 1985-1990, the estimated growth rate in Thailand, Indonesia and Singapore was 2%, 1.9% and 1.2%, respectively. Only Malaysia in ASEAN has highest growth rate than the Philippines. The expected growth rate in Vietnam is 1.9%. This shows that the family planning and population control measures in the Philippines are less efficient than in most of the countries in the sub-region.

With an average annual population increase of 1,295 million, only 11 countries surpass the Philippines in term of absolute growth of population (Table 24). The annual increment of the Philippines is comparable with the total increment of all countries in Eastern and Western Europe (1,350 million).

Table 24
Average Annual Population Increment
1985 - 1990
(In Thousands)

Country	Population 1985	Population 1990	Increment	Ave. Annual Increment
1. India	758,927	827,152	68,225	13,645
2. China	1,059,521	1,123,815	64,292	12,858
3. Nigeria	95,198	113,343	18,145	3,629
4. Indonesia	166,440	181,539	15,099	3,020
5. Brazil	135,564	150,368	14,804	2,961
6. Bangladesh	101,147	115,244	14,097	2,819
7. USSR	278,618	291,822	13,204	2,641
8. Pakistan	100,380	112,226	11,846	2,369
9. USA	238,020	248,429	10,409	2,082
10 Mexico	78,996	89,012	10,016	2,003
11 Iran	44,632	51,259	6,627	1,325
12 Philippines	54,498	60,973	6,475	1,295
13 Vietnam	59,713	66,153	6,440	1,288
14 Egypt	46,909	52,536	5,627	1,125

Source: World Population Prospects, 1986. Cited in Report of Third Mission on Needs Assessment for Population Activities, UNFPA, 1987.

3.3.2 The Philippines and Other Asian Countries

The Philippines' crude birth rate of 30.8% is higher than the average crude birth rate of Southeast Asia, which is 28.7%. and Asia as a whole, which is 25.4%. On a per country basis, only 10 other Asian countries will have crude birth rates higher than the Philippines (Table 25).

Table 25
Crude Birth Rate Per 1000 Population
1895 - 1990, Asia

Japan	12.3
Hongkong	16.5
Singapore	16.5
China	18.4
Republic of Korea	23.2
Thailand	23.5
Sri Lanka	24.2
Malaysia	27.1
India	28.1
Indonesia	28.6
Burma	28.8
Democratic People's Republic of Korea	28.9
Vietnam	29.6
Philippines	30.8
Mongolia	34.7
Bhutan	37.0
Laos People's Democratic Republic	38.1
Islamic Republic of Iran	38.5
Nepal	39.4
Pakistan	40.4
Democratic Kampuchea	41.4
Bangladesh	41.2
East Timor	43.8
Afghanistan	47.5

Source: World Population Prospects p. 80. Cited in Report of Third Mission on Needs Assessment for Population Activities, UNFPA, 1987.

Crude death rate in the Philippines (7.6%) and infant mortality rate (45) are both lower when compared to Southeast Asia and Asia as a whole. Life expectancy is likewise higher in the Philippines (Table 26).

Table 26
Population Indicators for Asia, Southeast Asia & the Philippines

	Asia		Southeast Asia		Philippines	
	1985	1990	1985	1990	1985	1990
Population density	102	111	89	98	182	203
Rate of annual change	1.63%		1.89%		2.25%	
Urban growth	2.9 %		3.8 %		3.6 %	
Rural growth	1.1 %		1.1 %		1.1 %	
Crude birth rate/1000	25.4 %		28.7 %		30.8 %	
Crude death rate/1000	9.1 %		9.7 %		7.6 %	
Total fertility rate	3.14%		3.52%		3.91%	
Gross reproduction rate	1.29%		1.71%		1.90%	
General fertility rate/1000	101		113		123	
Infant mortality rate	74		64		45	
Life expectancy	61.1 %		59.3 %		63.5 %	

Source: World Population Prospects, p. 157. Cited in Report of Third Mission on Needs Assessment for Population Activities, UNFPA, 1987

3.3.3 Problems Associated With Population Growth

The Philippines is experiencing a very rapid population growth. Its population increased 2.5 times in three decades - from 19 million in 1948 to 48 million in 1980. (Herrin, 1988). Between 1970 and 1980, the population still grows at an average annual rate of 2.7 percent. (Table 27)

Table 27
SELECTED POPULATION INDICATORS

1970 - 1985

INDICATOR	1970	1975	1980	1985
POPULATION LEVEL (IN MILLIONS)	36.6	42.1	48.1	54.7
POPULATION GROWTH RATE (INTERCENSAL)	3.01	2.78	2.71	2.44
CRUDE BIRTH RATE (PER 1,000)	39.2	34.8	33.7	32.2
CRUDE DEATH RATE (PER 1,000)	10.2	9.8	8.7	7.9
RATE OF NATURAL INCREASES	2.9	2.6	2.5	2.4
TOTAL FERTILITY RATE (CHILDREN PER WOMEN)	5.89	5.19	4.70	4.30

SOURCE:

NATIONAL CENSUS AND STATISTICS OFFICE, CENSUS REPORTS FOR VARIOUS YEARS.

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY, POPULATION PROJECTIONS 1980 - 2030.

Using as a basis the 1980 rate of growth of 2.5 percent, it is estimated that Filipinos will double in number in 28 years. Other less developed countries like Kenya and Uganda will double their populations in a period of time even much shorter than the Philippines. However, more developed countries will have a much longer lead time for their population to double (University of the Philippines Population Institute, 1984).

In a developing country like the Philippines, rapid population growth exerts tremendous pressure on the economy's ability to adequately provide goods and services and meet the demands of an increasing population. Overpopulation has been traced as a major cause of the Philippines' poverty (Manila Bulletin, August 27, 1988).

The population crisis is closely associated with the condition of the Filipino families belonging to 60% of the population living below the poverty line. These families comprise upland and small farmers, sustenance fishermen, cultural minorities and the urban poor (Manila Bullletin, September 2, 1988).

The population problem will have implications for 1) labor, 2) education and 3) health and nutrition.

3.3.3.1 Labor

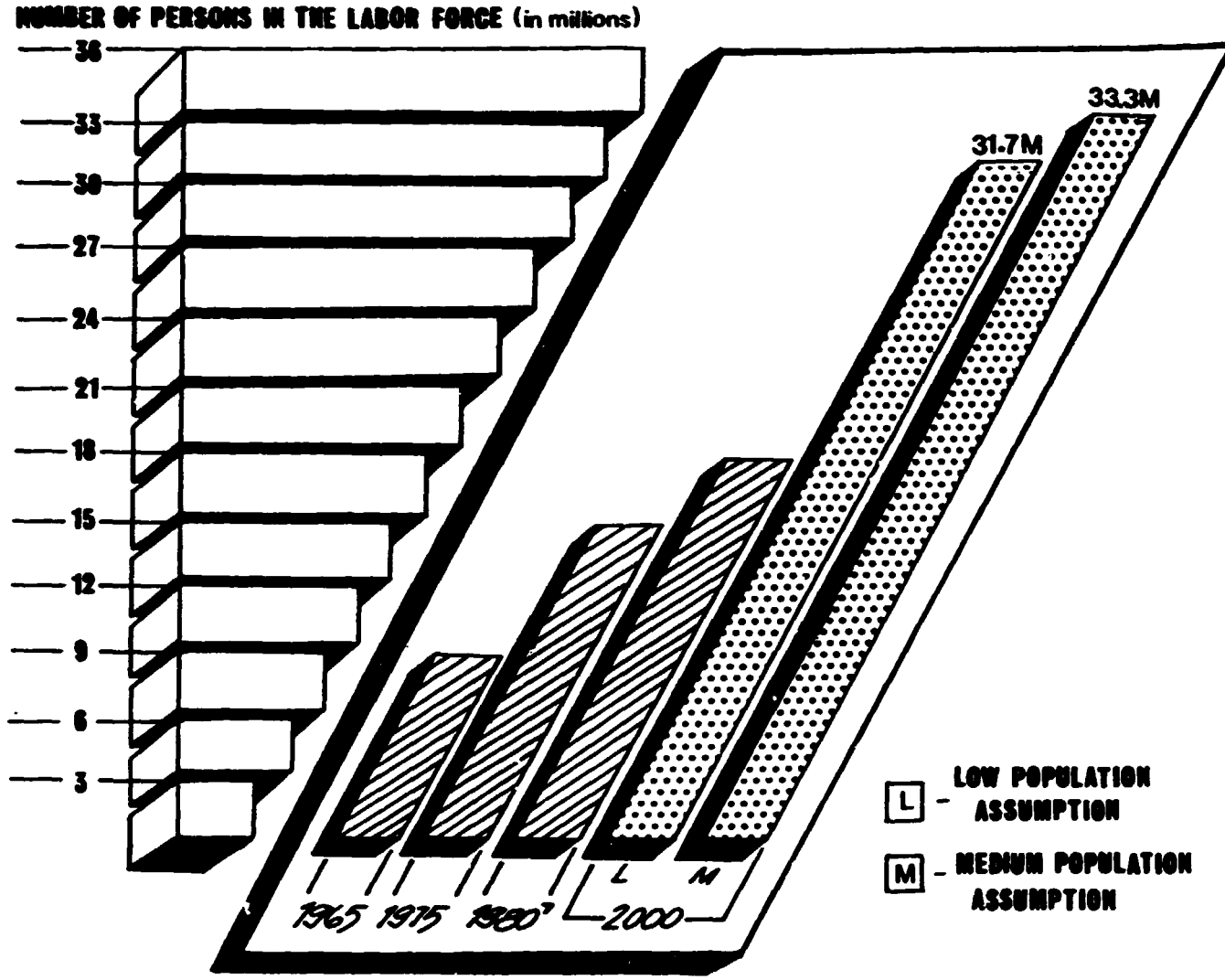
The total number of those seeking employment will almost double from 1980 to the year 2000. Using the low population assumption, total labor force is estimated to be 31.7 million by the year 2000. If the medium population assumption is used, the total labor force is estimated to be 33.3 million. (Figure 14) This implies that more employment and enterpreneurial opportunities will have to be provided to approximately 31-33 million men and women who will be in the labor market by the year 2000 (Population Fact Sheets, 1983).

3.3.3.2 Education

More resources will have to be provided to the educational system. Elementary enrolment will be between 8-12 million. (Figure 15) Enrolment in the secondary level will be between five and six million students in the year 2000. Tertiary enrolment is projected to reach two million. (Population Fact Sheets, 1983).

FIGURE 14

ACTUAL AND PROJECTED LABOR FORCE[5]
1965-2000[6]



SOURCE: COMMISSION ON POPULATION

[3]LOW POPULATION ASSUMPTION: POPULATION GROWTH RATE OF 1.6% WITH A POPULATION LEVEL OF 70 MILLION IN THE YEAR 2000.

[4]MEDIUM POPULATION ASSUMPTION: POPULATION GROWTH RATE OF 2.8% WITH A POPULATION LEVEL OF 85.4 MILLION IN THE YEAR 2000.

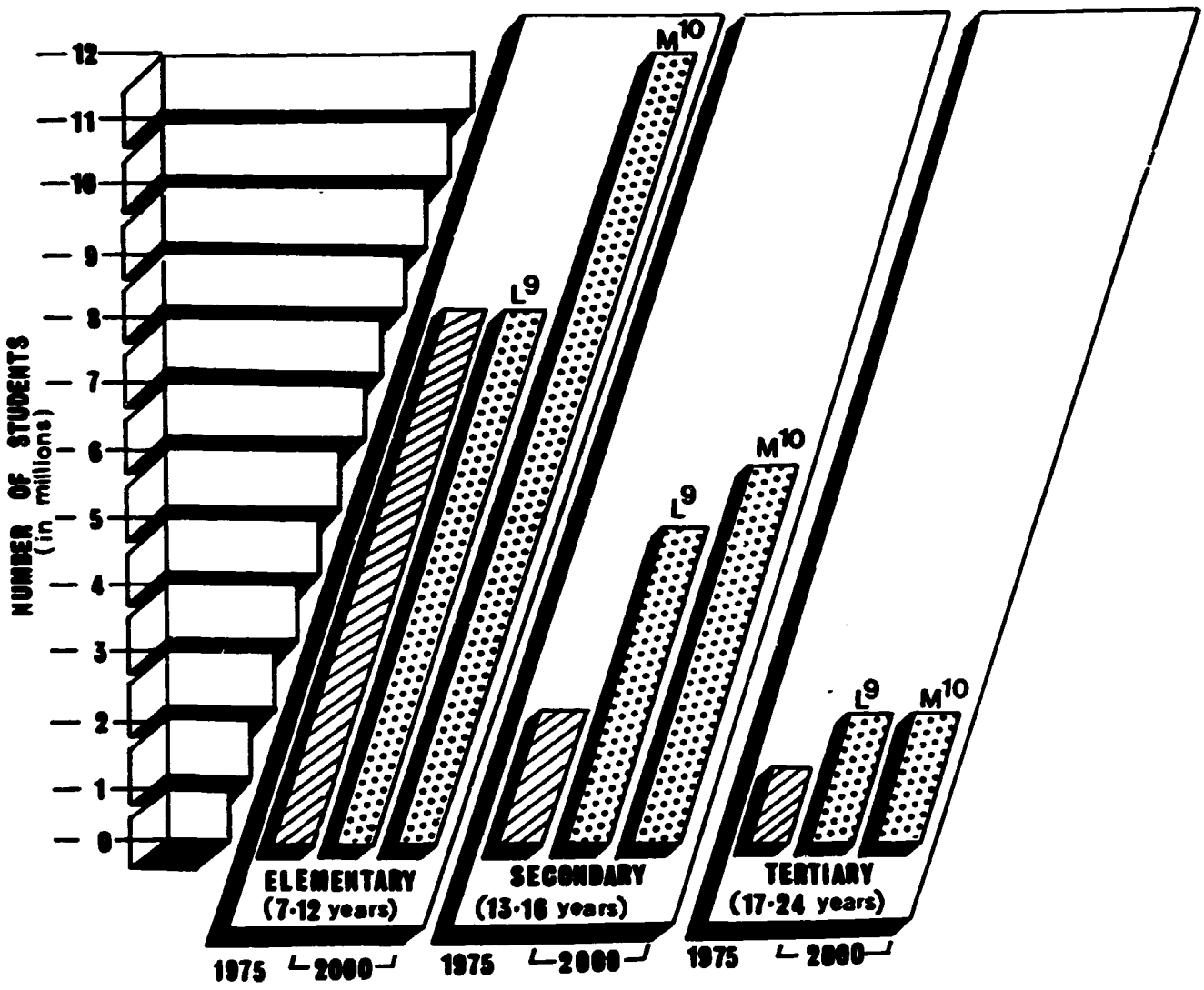
[5]LABOR FORCE FROM 1965 TO 1975 IS COMPOSED OF THE NUMBER OF PERSONS 10 YRS. OLD AND OVER. FOR 1980 TO 2000, LABOR FORCE IS COMPOSED OF THOSE 15 YRS. OLD AND OVER.

[6]1965-1975 - NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY. 1982 PHILIPPINE STATISTICAL YEARBOOK, MANILA. 1982.
1980 - NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY. 1981 PHILIPPINE DEVELOPMENT REPORT, MANILA. 1982.
2000 - NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY. LONG-TERM PHILIPPINE DEVELOPMENT PLAN UP TO YEAR 2000. MANILA. 1977.

[7]THE 1980 FIGURE IS AN AVERAGE OF THE 3RD AND 4TH QUARTERS.

FIGURE 15

ACTUAL AND PROJECTED SCHOOL ENROLMENT
1975 AND 2000



[9] NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY. LONG-TERM DEVELOPMENT PLAN UP TO THE YEAR 2000. MANILA. 1977.

[9] LOW → POPULATION GROWTH RATE OF 1.6 PERCENT WITH A CORRESPONDING POPULATION LEVEL OF 70 MILLION IN THE YEAR 2000.

[10] MEDIUM → POPULATION GROWTH RATE OF 2.6 PER CENT WITH A CORRESPONDING POPULATION LEVEL OF 88.4 MILLION IN THE YEAR 2000.

SOURCE: COMMISSION ON POPULATION

3.3.3.3 Health and Nutrition

According to an analysis of the situation of children and women in the Philippines and the United Nation's Chlidren's Fund, some progress has been made in the situation of children in the 15 years between 1970 and 1985. However, with the downward trend in the Philippine economy in the 1980's, there has been a reversal in gains made. The report cited the following facts:

1. Infant mortality rates (56.75 infant deaths per 1000 livebirths in 1985) are still high.

2. There is still a high prevalence of communicable diseases. Seven out of 10 major causes of infant deaths from post-war years to present time have been pneumonia, respiratory conditions of the newborn, diarrhoea, measles, meningitis and dysentery.

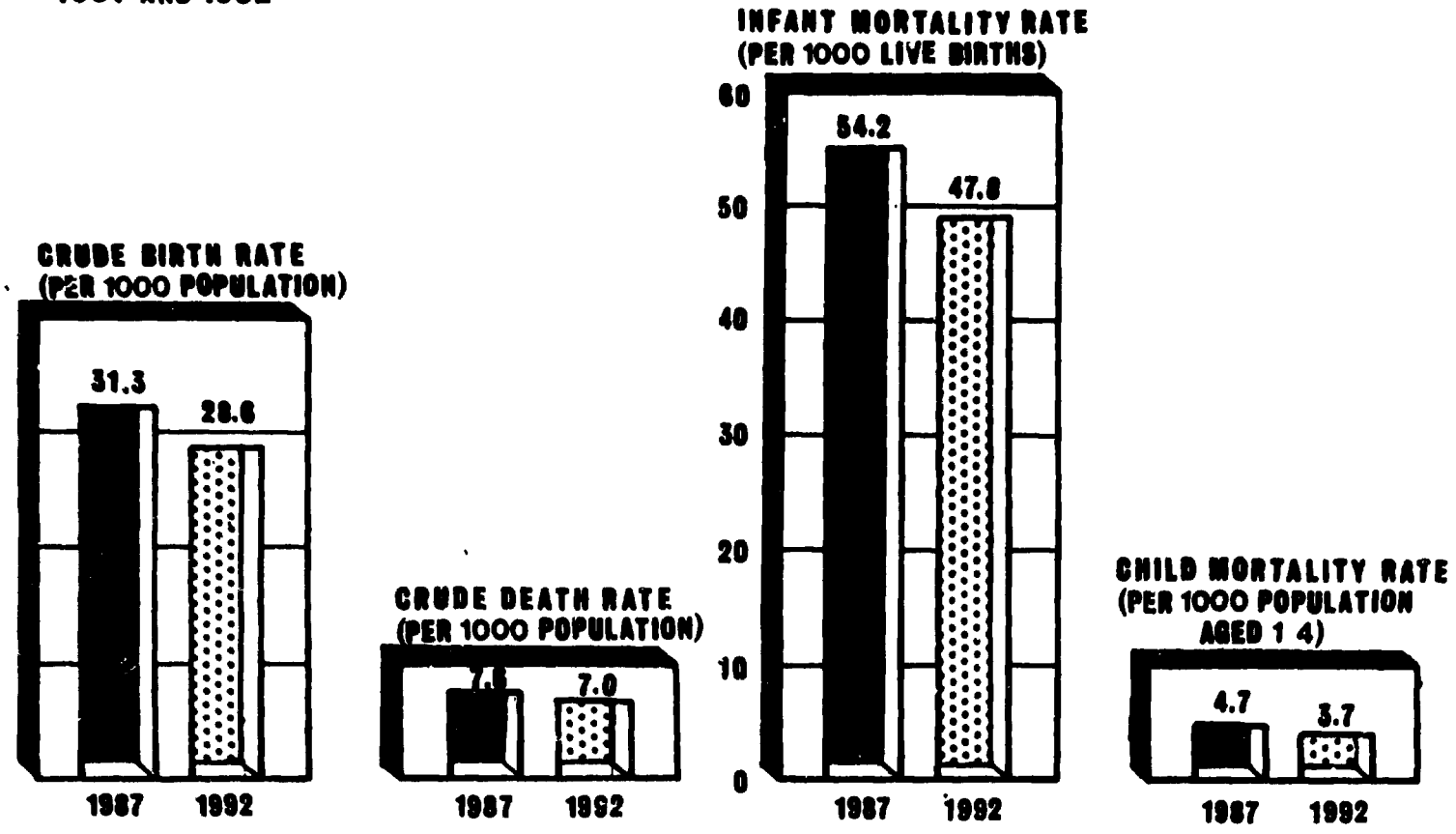
3. There is an increase in child malnutrition among 0-6 year old children. The percentage of underweight preschoolers increased from 20% in 1984 to 30% in 1985.

4. 18 percent of the 5000 babies born everyday are in low birth weight categories.

5. There is a slow decline from 2.1 maternal deaths per 1000 livebirths in 1963 to 1 maternal death per 1000 livebirths in 1983 or at an annual rate of 3.6%

In view of these facts, there will be a greater demand on the government to provide more health services and facilities to meet the health targets set between the period 1987-1992 (Figure 16).

FIGURE 16
KEY HEALTH INDICATORS
1987 AND 1992



SOURCE: MEDIUM-TERM
PHILIPPINE DEVELOPMENT PLAN
1987-1992

3.3.4 The Philippine Population Program

3.3.4.1 Goal

Aware of the consequences of an unchecked population growth on resources, the government developed a new five-year population plan (1989-1993).

The ultimate goal of the Population Program is the improvement of the quality of human life in a just and humane society. The 1987 Philippine Constitution reaffirms the Government's committment to this goal. Section 9. Article II provides! " The state shall promote a just and dynamic social order that will ensure the properity and independence of the nation and free the people from poverty through policies that provide adequate social services, promote full employment, a rising standard of living and an improved quality of life for all."

3.3.4.2 Principles

The Philippine population program adheres to the following principles:

1. Orientation towards the over-all improvement of family not just fertility reduction
2. Respect for the right of couples to determine the size of their family and choose voluntarily the means which conform with their moral convictions and religious beliefs
3. Promotion of family solidarity and responsible parenthood
4. Rejection of abortion as a means for controlling fertility
5. Recognition of socio-cultural variations among localities within regions
6. Promotion of self-reliance through community based approaches
7. Coordination and integration of development efforts at various levels of government
8. Enhancement of public-private sector partnership through the complementary participation of non-government organizations
9. Maximum utilization of participative and consultative approaches

3.3.4.3 Thrusts

There are differences between the present and past population programs. In the past, the population program was contraceptive-oriented focusing only on fertility reduction. However, the Philippine population program for 1989-1993 is broad to include population distribution, infant mortality, women in development, value formation, mortality and morbility, migration and population structure (Manila Bulletin, August 8, 1988). The present strategies are not confined to mere population control, fertility reduction and contraception alone but are geared towards the over-all improvement of family life (Manila Bulletin, August 12, 1988)

The Philippine Population Program has two sub-programs:

1. Family Planning and Responsible Parenthood Program

The aim of this program is to provide individuals and couples with the quality and levels of services that they need to enable them to effectively practice responsible parenthood in the light of their own conscience, values and informed free choice within accepted norms and methods for the management of the variable that affect family size, fertility and maternal and child health.

2. Intergrated Population and Development Program

The program aims to promote and support the integration of population concerns, including migration variables and family welfare considerations into the development management process so that these would be taken into account in the formulation of policies and in the design, planning, execution and evaluation of programs undertaken, supported or encouraged by government.

3.3.4.4 Objectives and Strategies

The specific objectives and strategies of the Philippine Population Program are as follows:

1. To expand the coverage of the Family Planning and Responsible Parenthood Program to include an additional 1.5 million eligible couples who desire to practice family planning while continuing to serve the 3.8 million couples who are already covered in order to contribute in the reduction of the Population Growth Rate (PGR) from 2.44% with a population base of 56.0 million in 1986 to 2.16% with a base of 65.7 million in 1993.

   In order to attain this objective the following strategies will be employed:

   a. Improve the deployment and quality of family planning service delivery system

   b. Integrate the delivery of nutrition, health care and family planning services

   c. Strengthen and focus the information, education and communication (IEC) and motivational efforts of the program to address priority requirements

   d. Provide critical support functions, that is, through manpower development and logistics

   e. Develop a more relevant research program and information base for the formulation of policies, decision-making, and program implementation

2. To promote policies and measures that will support the integration of population concern in the planning of programs and projects that have impact on population variable and ensure that the economic, social, moral and physical well-being of the individual and the family are addressed in developmental programs.

The following strategies will help attain the abovenamed objective:

a. Integrate population concerns into various socioeconomic plans, programs and projects at all levels

b. Strengthen the information and research base for policy-making and decision-making

c. Strengthen the information, education and communication (IEC), motivational human resource development, logistics and other support services

3.3.4.5 Accomplishment as of 1987

In 1987, a modest increase, was noted in the family planning prevalence rate (FPPR). According to the 1986 Contraceptive Prevalence Survey, the FPPR reached a level of 44% for the period covering mid-1986 to mid- 1987 as against a target of 38.1% for the year 1987. (Philippine Development Report, 1987). However, the same survey noted that the family planning method mix favored less effective methods. Moreover, those engaged in family planning were found to be relatively late child-bearing stages of 30 years and above.

There are 3,545 family planning clinics service outlets both in the government and private sectors which provide family planning services (Philippine Development Report, 1987). The Department of Health has the most number of family planning service outlets totalling to 2137 (1,779 rural health units, 308 hospitals and 50 special clinics) (Department of Health, 1988). Complementing the above 39 comprehensive itinerant teams are sent to areas beyond the reach of the static clinics. These service outlets are supported by 1,753 full-time outreach workers (FTOW's) and 51,000 Barangay Supply Point Officers (BSPO's) who motivate and refer prospective users to family planning clinics and resupply oral contraceptives and condoms to continuing users.

Other projects are those directed toward the youth, namely the 1) Population Education Program which integrates population education into the school curricula at all levels and 2) the Adolescent Fertility Program which offers information and counselling services in 12 centers. There is also an integrated research on indigenous herbal contraceptive where six medicinal plants are currectly being studied for their fertility regulating quality.

However, inspite of these accomplishments, the performance of the family planning program did not post any substantial gains in 1987 (Philippine Development Report. 1987). Actual accomplishments fall short of the targets in the year (Table 28)

Table 28
Family Planning Program Indicators[1/]

Indicator	Actual 1986	Target 1987	Actual 1987
Number of family planning clinics/service outlets	3,506	5,257	3,545
Number of full-time outreach workers (FTOWs)	1,934	1,816	1,753
Number of barangay supply point officers (BSPO's)	52,000	52,000	51,000
Number of program workers in place	10,388	15,771	10,388[2/]
Number of new acceptors recruited	540,601	889,166	520,572

1/ Based on Table 7.1, Philippine Development Report 1987 p. 223

2/ As of first quarter of 1987

The setback in the implementation of the program was traced to the following reasons:

1. lack of consensus on the interpretation of the population policy
2. lack of a plan that defines the implementation strategies of the program, and
3. inadequacy of and delays in financial support

3.3.4.6 Scenario For the Future

The failure of the population program to contain the growth of the population has caught the attention of the Philippine legislators. In the Senate, there is a resolution urging the strengthening of the National Population Program of the Government. In the House of Representatives, four resolutions on population have been filed:

1. House Bill No. 7281 - "An act providing for a more effective policy on population control, amending for the purpose Presidential Decree No. 79, otherwise known as the Revised Population Act of the Philippines"

2. House Bill No. 8168 - "An act authorizing and instituting the census - taking of the population of the Philippines in the year 1990, appropriating the necessary funds therefor, and for other purposes"

3. House Resolution No. 40 - "Resolution directing the Committee on Population to conduct an inquiry in aid of legislation into the status of our population management in the face of our high population rate increase of 2.5% which has contributed to urban sprawl, the rise of criminality, unemployment and other social ills and to recommend such measures as may be necessary to place our rate of population increase at manageable levels"

4. House Resolution No. 55 - "Resolution providing for an inquiry, in aid of legislation, into the problem of population explosion, its implications on all other components of national life, and the status of the National Population Program"

Calling the population problem as the "silent emergency", the legislators convened the Philippine Parliamentarians' Conference on Human Survival: Population and Development on September 2, 1988 in order to find solutions to survival - related problems. (PARLCON '88 Bulletin). Specifically, the Parliamentarians' Conference aims:

1. To generate national awareness of and consensus on critical population and development issues related to the economic and social development recovery program of the country

2. To identify a common legislative agenda for action geared towards promoting appropriate policies and measures on human survival, particularly in response to the "silent emergency", and

3. To establish a continuing collaboration mechanism among the concerned legislative committees and appropriate government instrumentalities aimed at adopting a human approach to development

Hopefully, the concern manifested by Philippine legislators will, in the immediate future, be translated into more concrete programs which will eventually keep population growth at a more manageable level.

References

1. The Family Planning Program Manual. Department of Health, 1988

2. Herrin, Alejandro, N. Population, Human Resources and the Philippine Future. Papers of the Core Group Meeting of the Philippine Parliamentarians' Conference. February 8, 1988.

3. Manila Bulletin, August 14, 1988

4. Manila Bulletin, August 17, 1988

5. Manila Bulletin, August 27, 1988

6. Manila Bulletin, September 2, 1988

7. Medium-Term Philippine Development Plan 1987-1992. National Economic and Development Authority, 1986.

8. PARLCON '88 Bulletin, September 1988

9. Philippine Development Report 1987. National Economic and Development Authority, 1988.

10. Population Commission. The Philippine Population Program medium Term Plan 1989-1993. April 1988.

11. Population Fact Sheet No. 12 Population and Development. Commission on Population, 1983.

12. United Nations Fund for Population Activities. Report of Third Mission on Needs Assessment of Population Activities. Manila, Philippines, 1984.

13. University of the Philippines Population Institute. The Philippines: Profile, Problem Prospects on Population and Family Planning. 1984

3.4. The Economic Situation in the Philippines

3.4.1 An overview of the Philippine Economic Performance

3.4.1.1. General Introduction

This report evaluates the Philippine economic performance from 1986 to first quarter 1988, and examines its prospects for growth. The discussion is structured in such a way as to provide an overview of the capability of the economy to meet its projected medium-term requirements and goals.

3.4.1.2 The Context

While the discussion begins with the 1986 economic performance of the economy, it is appropriate at this point to situate recent economic developments to the rate and pattern of growth in the pre-1986 period of the Marcos government.

The earlier years(1970-1978) of the Marcos era was marked by substantial progress as gleaned from the economic indicators. Real GNP posted average annual increases of 7% per annum. Agriculture and industry grew by an average of 5% and 9%, respectively. While the oil price hike in 1973 wrought annualized inflation rates averaging at 15%, the economic progress was significant. Industrial progress, particularly in manufacturing, was boosted by government support in the form of tariff protection. The economy also enjoyed the easy accessibility of foreign financial inflows during the period.

The squeeze came with the second oil price hike in 1979-1980, and the international recession accompanying it. The investment strategy which relied on heavy import substitution and foreign finance suffered from the tight monetary conditions. The basic structural weaknesses of the economy were exposed. Investments utilizing foreign funds failed to generate enough returns to service the external debt. By the end of 1983, the current account deficit and external position was unsustainable. By 1982, current account deficit had risen to 8.1% of GNP. By 1983, the external debt rose to $24.8B with the debt service ratio(as a percent of export receipts) rising to 36%. Massive capital flight worsened the situation following the assassination of Benigno Aquino, a major political opposition figure. The annual inflation rate continued to accelerate, reaching a peak of 65% in September-October, 1984.

The period 1983-1985 was one of severe economic recession. Restrictive economic policies following the adjustment program under the auspices of the International Monetary Fund depressed the economy. Real per capita incomes fell from P1,897 in 1983 to

P1,640 in 1985. The fall in GNP per capita was accelerated by the declining peso exchange rate. Compared to 1981 figures, the peso depreciated by as much as 63% against the dollar. By 1985, private estimates showed that 70% of the country's population were subsisting below poverty lines. Agriculture was the only sector that achieved a modest growth rate while industry, particularly manufacturing, declined by 14%.

3.4.1.3. Recent Economic Developments

After an uncertain start in 1986, the Philippine economy has shown recovery signs. After the continuous decline in the previous period, real GNP rose to 5.7% in 1987 from the 2% increase registered in 1986.

A favorable macroeconomic environment characterized by relatively low real interest rates and a relatively stable exchange rate(average monthly depreciation of 3.5%) prevailed for the most part of the past two years. Single-digit inflation rates were posted, with prices increasing by an average of 3.8% in 1987. For the first quarter of 1988, preliminary estimates from the national income accounts show a continued strengthening of Philippine economy. Real GNP grew at an annualized rate of 7.6%, the highest growth posted on a quarterly basis since 1986.

Total consumption(both government and private) grew by 5.7% compared with the 1986 levels. Private consumption account for 74% of total GNP in 1987. The consumer-led growth was supported by several factors: a)upward adjustments in salaries of all employed; b) higher copra prices; and c) government spending through its massive employment program(CEDP). Real domestic investments grew 19.7%, a dramatic reversal from the declines felt since 1982. These trends reflected the overall improvement in the investment climate, fiscal stimulus and supportive monetary reforms, as well as external stability.

In terms of sources of demand, household consumption spending rose by 5.3%, while government consumption spending grew by 6.7%. Investments, which consist of construction, expenditures for durable equipment, and changes in inventory, was the fastest growing component of domestic demand. Investments posted were accounted for mainly by inventory build-up(58.8%), durable equipment expenditures(21.2%) and private construction(10.5%). Public investment in construction posted negative growth rates of 4.8%.

On the production side, industry led all sectors with an increase of 8% in 1987, accounted for mainly by the growth in the manufacturing, electricity, gas and water subsectors. Manufacturing output grew by 7.1% and construction by 17.2%.

Agriculture lagged behind, growing by only 0.4% in 1987, following adverse weather conditions. The production of major

crops such as palay, coconut, sugarcane, coffee and banana registered negative growth rates during the period. Other export crops however posted production gains. First quarter 1988 figures showed that combined value-added in the fishery and forestry subsectors increased by 1.4% livestock and poultry also posted increases in production, cushioning the unfavorable performance of the other agricultural crops.

Total exports of goods and non-factor services declined by 4.5% in real terms while merchandise trade grew by only about one percent. Imports on the other hand rose by 23.2%, twice the growth registered during the first quarter last year. The surge in imports was heavily influenced by transport equipment and base metals. The import liberalization program also heightened the surge in importations. This led to widening current account deficits in the recent period, after a surplus in 1986. While foreign investments rose significantly in response to the debt-equity swap arrangements of the Central Bank. Total external debt reached $28.6B with the debt service ratio at 48%.

3.4.1.4 Prospects

The growth prospects of the Philippine economy will be defined by the debt management program that it will undertake. At present, the foreign debt burden remains a drag on economic performance, especially when growth prospects are compared with other Asian economies. The capacity to service the debt can be improved along with the economy's production capacity. First semester reports in 1988 showed a 6.8% GNP growth rate. Investment rates are expected to exceed the year's targets. Private economists predict that if merchandise exports, which grew by more than 20% in the first half, can grow at a steady rate of 15.5% in the next five years, a downward trend in debt burden indicators may prevail. The more cautious moves from the monetary side seem to point to a stable macroeconomic environment. More favorable prospects also stem from a sustained implementation of structural reforms and policy measures conducive to private sector recovery. While world demand may slow down, exports are expected to perform at a reasonable rate.

Certain questions are raised regarding certain areas in the economy that need careful re-examination. These basically concern policies on prices(interest rates), utilization of development assistance grants and energy. While acknowledging that a demand-led, rural-based and employment-oriented strategy remains the hope of the economy in its attempt at full recovery, the report also cautions against a neglect of equity considerations in the pursuit of economic growth.

TABLE 29
Summary Tables: Economic Indicators

Indicators:	1985	1986	% Growth '85-'86	1987	% Growth '86-'87
Population (in M)	54.7	56	2.4	57.4	2.4
Labor Force (in M)	20.5	21.4	4.4	22.6	5.6
Employed	17.9	18.9	5.6	20.1	6.3
Unemployed	2.6	2.5	-3.8	2.5	0
Gross National Product (in B Pesos)					
Current	597.7	619.8	3.7	706.3	13.9
Constant	87.8	89.6	2	94.7	5.7
Per Capita GNP (in Pesos)					
Constant	1607	1600	-0.4	1651	3.2
Current	10934	11067	0.9	12310	11.3
Gross Domestic Product (in B Pesos)					
Current	609.5	626.7	2.83	-	-
Constant	89.9	91.3	1.5	95.9	5.11
Balance of Payments (in B US $)	2.3	1.3	-45.8	2.5	78.7
Total Exports (in B US $)	6.4	4.8	4.6	5.7	18.1
Total Imports (in B US $)	5.1	5	-1.3	6.7	33.6
Balance of Trade(in B US $)	-0.5	0.2	58.1	-1.1	-65
Domestic Liquidity (in B Pesos)	132.9	141.1	6.1	159	12.7
Money Supply	35.8	42.6	19	51.9	21.8
Quasi-Money	88.5	93.6	5.7	103.5	10.6
Deposit Substitutes	8.6	4.9	-43	3.6	-26.5
International Reserves (in B US $)	1.1	2.5	131.8	2	-20.3
Exchange Rate (P:$)	18.6	20.3	9.1	20.6	0.9
Consumer Price Index	352.6	355.6	0.7	368.7	3.8
Inflation Rate (in %)	5.7	-0.3	-5.3	5.8	-

Source: Philippine Development Report, 1987

TABLE 30
Selected Macroeconomic Targets

	1988	1989	1990	1991	1992
ECONOMIC POLICY INDICATORS					
Real GNP (% Growth)	6.4	6.7	6.5	6.5	6.5
Inflation Rate (%)	7.7	7	7.1	6.9	7.1
Money Supply	12.02	13.8	12.9	12.3	13.2
Fiscal Deficit (% to GNP)	2.7	2.5	2	1.5	0.8
External Account (% to GNP)	-1.6	-2.5	-2.8	-3	-2.8
Unemployment Rate (%)	10.6	8.8	7.1	5.6	4.6
SOCIAL POLICY INDICATORS					
Life Expectancy	64	64.3	64.6	64.9	65.2
Infant Mortality Rate	52.9	51.6	50.3	49	47.8
Child Death Rate	4.5	4.3	4.1	3.9	3.7
Daily Calorie Consumption	1817	1849	1884	1918	1950
Portion of Households With Less than Minimum Calorie Consumption	62.2	60.5	58.8	59	60
School Enrollment Ratios					
Primary	97.3	97.7	98.2	98.6	99
Secondary	56.1	57.1	58.1	59	60
Higher Education	17.9	18.6	19.4	20.2	21

TABLE 36
Selected Macroeconomic Targets

	1988	1989	1990	1991	1992
Income Distribution (by decile of population)					

Share of Income	Poorest	2nd	3rd	4th	5th	6th	7th	8th	9th	Richest
1985	2	3.2	4	4.9	6	7.2	8.9	11.3	15.6	37
1992	2.11	3.61	4.34	5.24	6.93	7.36	9.24	11.52	14.64	35.01

	1985	1992
Gini Coefficient	0.45	0.42
Kuznets Ratio	0.68	0.62
Share of Poorest 40%	14.1%	15.3%
Share of Richest 10%	37.0%	35.0%

Note: Projections are still tentative and subject to change pending finalization of Draft Updated Plan

Source: NEDA
The Philippine Government's Medium-Term Development Plan, 1987-1992

3.4.2 The Economy in 1986

Section 3.4.2 gives an analysis of Philippine economic recovery in 1986. The assessment covers the trends in macroeconomic variables and the factors contributing to the observed movements. This section serves as a background to the next. Section 3.4.4 presents the Medium-Term Development Plan prepared by the National Economic Development Authority (NEDA) that year. Discussion of the Plan centers on objectives and targets.

3.4.2.1 Performance

3.4.2.1.1. Production and Expenditure

After the EDSA Revolution of 1986, the Philippine economy started showing signs of growth. Prospects turned bullish. Confidence in the system was back.

In the expenditures side, investments rose by 2.6% in the second semester after a 16.5% fall in the first. Growth came mainly from government while businesses--confident as they were--stuck to a "wait-and-see" attitude. In the second semester, public infrastructure spending rose by 17.7% compared to a 0.4% growth of private investments. The conservative stance of the private sector was due to the perceived instability of the new Aquino government and the threat posed by a divided military and the very militant labor unions.

Consumption spending inched up by only 0.9 % as households felt their way into the new political and economic order. Once more, it was government consumption spending which pushed the economy. Government consumption increased by 4.6% in the second semester after a 3.87% growth in the first.

Exports rose by 21.8%. Nontraditional exports--primarily garments and semiconductors--accounted for the good showing of this sector. Imports, however, continued to outpace exports. The high import content of most of our non-traditional exports and the imported raw material requirement of a growing economy led to an over-all real import growth of 25.4%. In nominal terms, merchandise imports fell because of lower oil prices.[1/]

1/ This will be developed later in the external sector portion.

In the production side, agriculture led all other sectors with a 3.7% growth. Crop production went up by 4.7% and livestock by 2.99%. Fisheries increased by 2.9% with most of the growth occuring during the second semester. It was only forestry which performed poorly due to the ban on log exports imposed by the new government.

Industry started to recover in the second semester but the annual performance still showed a decline of 2.7%. This was true for all sectors except mining which continued to post a decline even during the second half of the year. The service sector, on the other hand, grew at a steady rate throughout the year. It posted an annual growth of 2.3%.

Table 31.
The Real Sector, 1986
(in constant 1972 prices)

Sector	1986 (P M)	% growth
EXPENDITURES		
Personal Consumption Expenditure	66597	0.94
Government Consumption Expenditure	8187	-0.41
Gross Domestic Capital Formation	10181	-8.48
Private Construction	3344	-29.92
Public Construction	2161	-7.73
Durable Equipment	4552	-3.40
Increase in Stocks	124	
Exports of Goods & Non-factor Services	23560	21.75
Imports of Goods & Non-factor Services	17555	25.44
Statistical Discrepancy	317	
GROSS DOMESTIC PRODUCT	91287	1.54
Net Factor Income from Abroad	-1676	-17.72
GROSS NATIONAL PRODUCT	89611	1.98
INDUSTRIAL ORIGIN		
Agriculture, Fishery and Forestry	27233	3.74
Manufacturing Industry	28380	-2.14
Service Sector	35674	2.95

Source: NEDA

In the manufacturing sector, consumer goods industries' volume of production grew by 4.7%. Tobacco had a dismal 23% decline mainly because of the new excise tax levied on the industry. Beverage and leather goods also posted a decline on an annual basis because of the large drops in the first semester. For these industries, improved market demand in the second semester was not sufficient to pull up the losses at the start of the year. Other consumer-oriented sectors did fairly well. Wearing apparel production increased by 13.6% due to the combined effect of better domestic conditions and continued strength in the export sector. Furniture, another export-oriented industry, rose by 10.1%. Intermediate goods industries had a minimal 1.9% expansion in production volume despite the improved performance of textiles (21%), printing and publishing (10.5%), and plastics (25%). The local textiles industry, although weakly linked to the garments export sector (65% of textile requirements of garment exporters are imported), grew fast because of the revived domestic market. Printing and publishing benefitted most from the return of freedom of the press as a "newspaper boom" pushed up the demand for paper and publishing. The intermediate industries subsector performance was actually pulled down by the 27.6% decline in the output of wood products. This is consistent with the earlier observation on the effect of the ban on logging. Capital goods industries had a higher growth of 6.3% compared to the consumer-oriented or the intermediate industries. The machinery sector's production volume rose by 16.6%. This, however, should not be interpreted as an indicator of a bullish investment climate since most of the added "output" was simply due to repairs and maintenance of existing machinery.

Table 32
Industrial Performance, 1986
(%-change in production volume over previous year)

Industry	1986
Consumer Goods Industries	4.7
Food	0.9
Beverage	-7.9
Tobacco	-23.0
Wearing Apparel	13.6
Footwear and Leather Goods	-12.0
Drugs and Personal Care Products	6.0
Furniture	10.1
Electrical Appliances	5.0
Intermediate Goods Industries	1.9
Textiles	21.0
Basic Industrial Chemicals	-3.0
Other Chemicals	-2.0
Paper	8.9
Printing and Publishing	10.5
Petroleum	0.3
Rubber	3.2
Plastics	25.0
Wood	-27.6
Glass	0.0
Capital Goods Industries	6.3
Structural Clay	5.5
Cement	0.5
Iron and Steel	-4.9
Nonferrous Metals	0.0
Machinery	16.6
Transport Equipment	-4.4
Professional and Scientific Inst.	15.0

Source: Industry Monitoring Unit, CRC

3.4.2.1.2 Monetary Sector

Several months before the installation of the Aquino government, the banking system was characterized by excess liquidity. For the period December 1985 to February 1986, reserve money increased by P8.9B. As a consequence, money supply ballooned by P11.3B.

In March, the Central Bank moved to restore monetary stability by mopping up excess liquidity. The level of reserve money was not allowed to exceed P40B. By year-end, however, government pump-priming caused a P9.98B expansion in reserve money. This placed the year-end level at almost P50B or 32% higher than the December 1985 figure. Nevertheless, the relatively contractionary stance of the Central Bank for most of the year resulted to only a 7.0% average growth in total liquidity in 1986.

One of the more prominent events in the monetary system was the steep climb of the stock market. More than any other sector of the economy, the stock market greatly benefitted from the return of confidence. Money from abroad and bullish expectations of market players pushed indexes up. There was no preconceived limits and nobody knew how high the market would go. Furthermore, speculation in the stock market was supported by the dull showing of government securities market (treasury bill rates were down) and the generally stable foreign exchange market. Unfortunately, for the Philippines, the link between the equities market and the real sector is very weak. The general tendency for short-term profit maximization may have even resulted to a substitution between real investments (capital formation) and stock market placements.

Table 33
Monetary Aggregates, 1986

Sector	1986 (P M)	% growth
Reserve Money (End-of-Period)	49983	31.72
Reserve Money (Average)	40720	14.08
Money Supply 1 (End-of-period)	42657	19.06
Money Supply 1 (Average)	36037	3.76
Money Supply 2 (End-of-period)	136265	9.65
Money Supply 2 (Average)	122248	4.39
Money Supply 3 (End-of-period)	141140	6.19
Money Supply 3 (Average)	129824	2.50

Source: Central Bank of the Philippines

3.4.2.1.3 Fiscal Sector

Government spending reached P107.2B. This was almost P20B higher than the 1985 level. Revenues, on the other hand, increased by only P10B. Consequently, the budget deficit rose from P11.1B in 1985 to P28.1B in 1986. To finance this, the government had to borrow P26.2B locally and P1.9B from abroad. Government borrowing, at that time, did not result to higher domestic interest rates. The cold attitude of business to additional capital formation led to very minimal loan demand. When the government borrowed, there was nobody else to crowd-out. And fiscal authorities were able to finance the budget gap without the increase in interest rates which would have followed under normal circumstances.

Table 34
The Fiscal Sector, 1986

Sector	1986 (P M)	% growth
Total Government Revenue	17100	-75.20
Tax	65200	6.55
Nontax	13900	78.87
Total Government Expenditure	105300	31.38
Budget Deficit	-26200	

Source: NEDA

3.4.2.1.4 External Sector

Philippine external debt reached $28.26B in 1986. The international banking community accounted for 35% of this amount. With respect to source, 54% were liabilities to foreign commercial banks, 17% to multilateral institutions, and the remaining 29% to foreign governments.

The only way to continue servicing our foreign liabilities without causing a substantial reallocation of resources from local needs to foreign debt service was to develop a vibrant export sector. In 1986, the Philippines seemed to be headed towards this direction.

The trade deficit narrowed by $280M. The improvement came from a $213M expansion in the value of merchandise exports accompanied by a $67M decline in the value of merchandise imports. The fall in import value was, in a sense, accidental. The drop in crude oil prices from $29.60/ba. to $14.74/ba. cut our oil import bill by a whopping $572M.

Table 35
Balance of Payments and External Debt, 1986

Sector	1986 ($ M)	% growth
BOP ACCOUNTS		
Balance of Trade	-202	
(BOT-to-GNP Ratio)	5.40	
Merchandise Exports	4842	4.60
Merchandise Imports	5044	-1.31
Net Nonmerchandise Trade	783	
Net Transfers	441	
Current Account	1022	
(CA-to-GNP Ratio)	1.14	
Capital Account	115	
Other Items	110	
BALANCE OF PAYMENTS	1247	
(BOP-to-GNP Ratio)	1.39	
Gross Int'l Reserves (End-of-period)	2459	131.76
Gross Int'l Reserves (Average)	1600	54.89
EXTERNAL DEBT INDICATORS		
Debt Service Burden	3776	
Principal Repayments	1730	
Interest Payments	2046	
Debt Service Ratio	16.03	
Debt Service Burden / GNP	4.21	
Debt Service Burden / M. Exports	77.98	
Interest Payments / Exports	8.68	
Interest Payments / GNP	2.28	
Interest Payments / M. Exports	42.26	

Source: CB

3.4.2.1.5 Pressure Indicators

Pressure indicators refer to the major price variables in the economy--interest rate, inflation rate, and the peso-dollar exchange rate. Movements in these prices could indicate changing demand and supply conditions in the real, financial, and external sectors.

As if ignoring the Central Bank's relatively tight monetary policy, nominal loan rates dropped from an average of 28.6% in 1985 to 17.53% in 1986. This trend was mainly due to a slackening in loan demand--consistent with our earlier statement of a wait-and-see attitude by business.

Prices rose by 2.4% in the first semester but dropped by 0.84% in the second half. For the whole year, inflation was a negligible 0.76%. The deflationary trend in the second semester was due to excess capacity in the manufacturing sector and lower production costs for industries. Lower crude oil prices and interest rates reduced the operating expenses of firms. Support items like fuel, light and water followed the deflationary trends. Housing and repair indices, which is indicative of construction activity, rose slightly by 7.4%.

Throughout 1986, the peso remained stable against the dollar. Speculation in the black market was minimal as evidenced by the narrow differential between official and curb rates. Adding to the absence of speculative pressures (which seemed to have been attracted by the stock market), the Philippines also had a comfortable level of gross international reserves Gross international reserves reached $2.48B by December.

Table 36
Costs of Doing Business, 1986

Sector	1986	% growth
Commercial Bank Loan Rate (%)	17.534	-38.72
Savings Deposit Rate	8.616	-20.51
Time Deposit Rate	14.255	-35.15
Peso-Dollar Exchange Rate	20.39	9.56
P/$ Black Market Rate	20.25	8.00
IPI GNP	691.7	1.67
CPI (All Items)	355.3	0.76
Fuel, Light, and Water	511.1	-6.78
Housing and Repairs	358.9	7.30
Real Loan Rate (Based on CPI)	16.78	
Real Loan Rate (Based on IPI GNP)	15.86	

Sources of Basic Data: NSO, CB, NEDA

3.4.2.2 The NEDA Five-Year Development Plan

3.4.2.2.1 Objectives

Based on the Medium-Term Development Plan, the goals of economic policy from 1988-92 are:

(a) alleviation of poverty
(b) generation of productive employment
(c) promotion of equity and social justice
(d) attainment of sustainable economic growth

To support these objectives, the short-term strategy is to stimulate a demand-led economic recovery. Higher demand will be generated by increased incomes especially in the rural areas. The centerfold of government policy is the Community Employment Development Program (CEDP). The CEDP's target is an additional one million jobs from July 1986 to Jan 1988. Labor intensive projects will be launched in rural areas to help create employment opportunities and generate higher incomes.

In the medium-term, the development strategy is characterized as employment-oriented and rural-based. The specific sectors to be supported are small-and-medium-sized domestic and export industries and agriculture-based manufactured exports. A favorable environment for the growth of these sectors will be created through price and non-price incentives for exporters and through a public investment program supportive of rural employment.

3.4.2.2.2 Sectoral Objectives

The main theme in the set of objectives for different sectors are given below:

a) Agriculture: To achieve production targets under a competitive environment which fosters economic efficiency and to increase the real incomes of poorer agricultural households

b) Trade and Industry: To develop world-competitive industries which will complement agricultural growth and to pursue policies which can increase foreign exchange earnings necessary to finance imports and meet foreign debt obligations

c) Fiscal Sector: To improve efficiency in revenue mobilization and resource allocation and to ensure that budgetary resources support employment-generating and rural-based activities

d) External Sector: To attain a balance of payments position that allows a respectable growth of national income and to reduce reliance on foreign debt especially commercial borrowings

e) Monetary Sector: To maintain price stability and external balance through a realistic exchange rate policy and an accomodating monetary policy, to improve the efficiency of financial intermediation, and to support growth and other development objectives

4.4.2.2.3 Plan Targets

The macroeconomic targets set in the Plan assumed a favorable world environment with relatively stable oil prices and real interest rates and moderate inflation. The US economy is expected to grow at an average rate of 3.5% for the 1987-92 plan period and world inflation is expected to be 4.4%.

Real GNP is targetted to grow at an average of 6.8% from 1987-92. With population increasing at 2.4%, per capita income is expected to rise by an average of 4.4% in the plan period. This means that the highest real per capita income of P1,933 reached in 1981. will be regained by 1991.

In terms of supply sectors, industry will grow by 8.8% and agriculture by 5.0%. The industrial and agricultural sectors are expected to complement each other as industrial expansion is targetted to be directed to small-scale and labor intensive enterprises in the rural areas.

To achieve the desired economic growth, capital formation is expected to rise by 18%. A growth of 34.4% is targetted for gross domestic capital formation in 1987 after a 3.6% decline in 1986. Private construction activity is expected to lead investment spending with an average growth of 28.5%. With investments growing at this rate, the ratio of investment to GNP will reach 26.7% by 1992. This will bring the Philippine economy at a slightly higher ratio than the 1983 figure.

FIGURE 17

GNP AT CONSTANT PRICES (GROWTH RATE)

1986-'87 AND 1987-'88, QUARTERLY

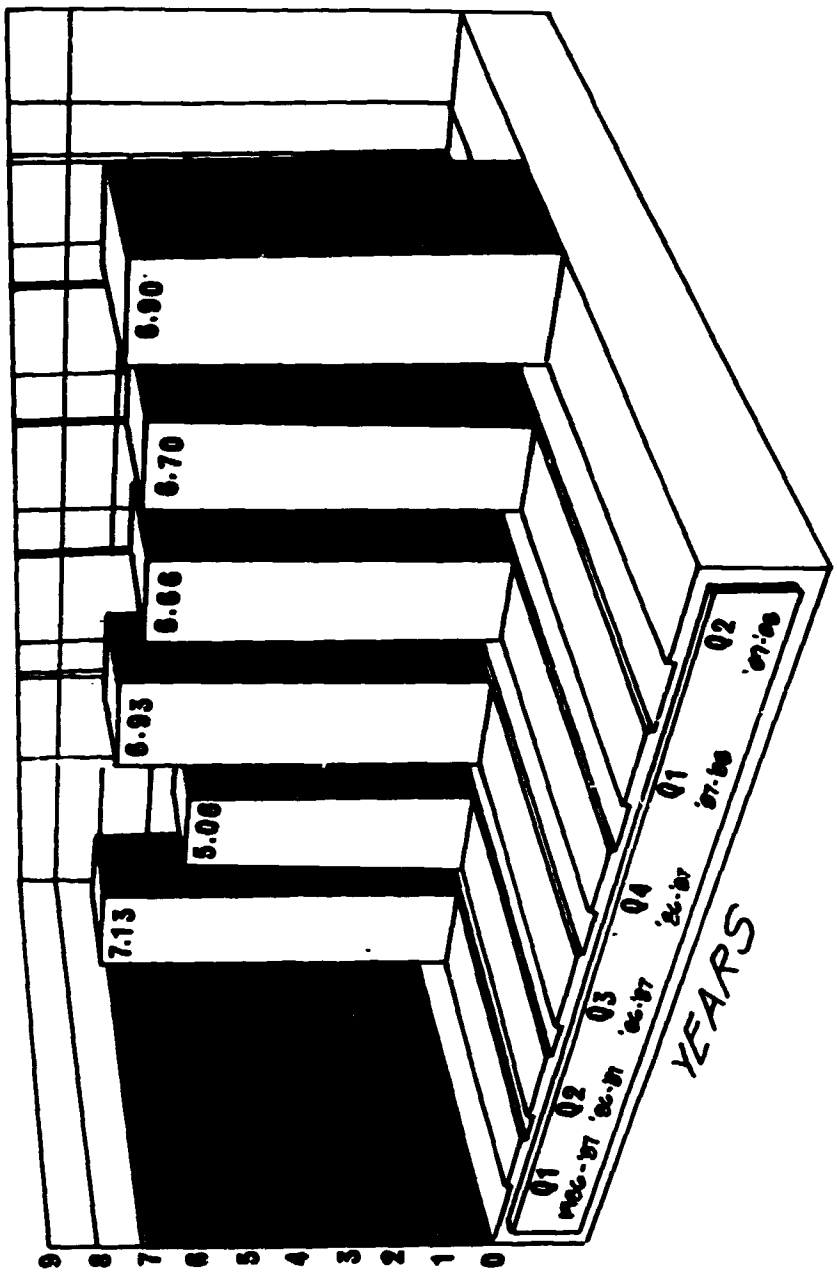


Table 37
Real Consumption, Investment and External Transactions, 1986-92
(Annual Percentage Change)

	1986	1987	1988	1989	1990	1991	1992	Annual Average 1987-92
Consumption								
Personal Consumption	1	3.1	3.7	3.9	4.7	5.2	5.2	4.3
Government Consumption	0.8	1.9	2.8	3.6	4.3	4.8	5	3.7
	2.7	12.7	9.4	5.8	7.6	7.9	6.3	8.3
Gross Domestic Investment								
Fixed Investment	-3.6	34.4	20.4	16.3	14.8	11.3	10.8	18
Construction	-5.6	22.2	19.3	15.2	11.8	13.1	11.6	15.5
Government	-13.8	24.2	20.5	12.3	11.6	12.2	12.7	15.6
Private	11.9	18.8	18.3	8.1	9.2	10	11.9	11.4
Durable Equipment	-27	28.5	28	15	13.1	13.5	13.2	18.6
	4.3	20.2	18	18.1	11.9	13.9	10.4	15.4
External Transactions								
Exports of Goods and nonfactor services								
Imports of Goods and nonfactor services	8	5.4	11.7	10.5	10.3	9.8	8.8	9.4
	19.7	12.3	9.8	9.6	9.9	9	8.9	9.9

Source: NEDA

Table 38.
Gross Domestic Product by Industrial Origin
(In Constant 1972 Prices, P B)

Item	1986	1987	1988	1989	1990	1991	1992	1987-92
Gross Domestic Product	90.9	96.9	103.8	110.8	118.7	126.9	135.3	115.4
Growth Rate (%)	0.4	6.7	7.1	6.7	7.1	6.9	6.7	6.9
Agriculture, Fishery, and Forestry	26.8	27.9	29.1	30.6	32.2	34	35.9	31.6
Growth Rate (%)	3	4	4.5	5	5.5	5.5	5.5	5
Industry	28.4	31	33.7	36.5	39.5	42.9	47.1	38.4
Growth Rate (%)	-1.6	9.1	8.9	8.2	8.3	8.5	9.7	8.8
Manufacturing	21.7	23.2	24.8	26.7	28.8	31.1	33.7	28.1
Growth Rate (%)	0.3	7	7	7.5	7.8	8	8.4	7.6
Mining and Quarrying	1.8	1.9	1.9	2	2.1	2.2	2.3	2.1
Growth Rate (%)	3	3	3.5	4	4.6	4.9	5	4.2
Construction	3.6	4.5	5.5	6.2	6.9	7.7	9	6.6
Growth Rate (%)	-15.1	25.5	20.9	12.7	11.7	12	16.1	16.5
Electricity, gas and water	1.3	1.4	1.5	1.6	1.8	1.9	2.1	1.7
Growth Rate (%)	4	6.5	6	6	9	9	10	8.4
Services	35.7	38.1	41	43.8	46.9	50	52.2	45.3
Growth Rate (%)	0.3	6.8	7.6	6.7	7.2	6.5	4.9	6.6

Source: NEDA

Table 39.
Investment and Savings, 1986-92
(Ratio to GNP, in %)

Item	1986	1987	1988	1989	1990	1991	1992	1987-92
Gross Domestic Investment	15	18.7	21.1	22.9	24.7	25.6	26.7	23.3
Fixed investment	14.7	16.8	18.9	20.4	21.3	22.7	23.7	20.6
Construction	7.8	9.1	10.3	10.9	11.4	12	12.6	11.1
Government	3.4	3.9	4	4.1	4.2	4.3	4.5	4.2
Private	4.4	5.2	6.3	6.8	7.2	7.7	8.1	6.9
Durable equipment	6.9	7.7	8.6	9.5	10	10.7	11.1	9.6
Increase in stocks	0.3	1.9	2.2	2.5	3.3	3	3	2.7
Gross National Savings	16	17.4	18.5	20.1	21.6	22.4	23.6	20.6
Foreign Savings	-1	1.3	2.6	2.8	3.1	3.2	3.1	2.7
Public	5.3	2.7	2.1	2.2	2.6	2.2	1.6	2.2
of which: [a] national government	4.5	2.8	1.9	1.3	1.1	0.8	0.5	1.4
Private	-6.3	-1.4	0.5	0.6	0.5	1	1.7	0.5

a. Gross of transfers.

Sources: NEDA, CB, and MBM

In the external sector, the current account deficit is expected to average at 2.7% of GNP during the plan period. Without foreign debt restructuring, a total financing gap of $15.7B will be required to sustain economic growth at the targetted levels. But with restructuring, a lower additional financing (new money) of $7B is required.

Table 40
External Financing Requirements, 1987-92
(in billion US $)

	1987	1988	1989	1990	1991	1992
BOP Deficit	1.2	1.8	2	2.7	3	3
Amortization of Monetary Debt	0.7	1.4	0.5	0.7	0.7	0.5
Reserve Buildup	0.3	0.3	0.2	0.3	0.3	0.4
Subtotal	2.3	3.5	2.8	3.7	4	4
Less:						
Identified New Money	0.8	0.9	0.9	0.6	0.5	0.5
IMF Purchases	0.2	0.05	-	-	-	-
Total Requirements	1.2	2.5	1.9	3.1	3.5	3.5
Less:						
Restructuring	1.5	1.3	1.4	1.5	1.6	1.5
Additional New Money Required	-	1.1	0.5	1.6	1.8	2
Cumulative Total: $7.0 Billion						

Data as of 5 November 1986.

Source of Basic Data: CBP

3.4.3 The Economy in 1987 onsumer-Led Growth

In section 3.4.3.1 the 1987 figures are compared to the targets set by the Philippine Development Plan. Causes of actual-target discrepancies are also discussed.

3.4.3.1 Performance

3.4.3.1.1 Production and Energy

The Philippine economy took off in 1987 after three years of decline and one year of uncertainty. GNP rose by 5.7%--lower than the estimates given by NEDA at the start of the year but higher than what most private economic analysts expected. Private consumption spending took the center stage with a 5.5% increase. This is significant for the Philippine economy because this private consumption accounts for 74% of total GNP. This confined consumer demand after the economic crisis was supported by several factors which gave way to a consumer-led growth. Higher copra prices and sustained CEDP spending by the government helped improve rural incomes. Higher incomes get translated into more consumption. For example, San Miguel beer sales went up by 30%. Most of this came from the regions. Other businesses, especially those in the consumer-oriented industries, recorded sales growth of 20-30%. Industrial sector wages were also higher mainly due to the 10-15% average wage hike unions were able to get for their members. And to support this environment, inflation was very moderate at 3.79% and hardly eroded the purchasing power of consumers.

Government consumption spending also went up by 7.2% because of the adjustment in salaries of public sector workers.

Investments increased by 19.73%. This is better than the 8.48% decline for 1986 but not at par with Plan targets. The improved investment climate in 1987 was supported by the approval of the Omnibus Investment Code in July and the low real interest rates. The drag in the investment sector came from public construction expenditures which rose by only 5.74%. Private sector construction grew by 21.35%, while Government construction fell below expectations.

In the supply side, industry was the pacesetter. Manufacturing output grew by 7.1% and construction by 17.2%. These sectors contributed greatly to the 8.0% over-all performance of the industrial sector. Construction spending responded to higher housing demand by the A and B markets. Within the manufacturing sector, the consumer-oriented industries experienced brisk sales--another indication of the consumer-led nature of recovery. Production volume of food manufacturing rose by 7.5%. Beverages increased by 22%. This was a large jump compared to the 8% decline in 1986. Tobacco production, however, remained depressed because of the continued enforcement of higher excise taxes. Furniture and electrical appliances recorded growth of 20% and 15%, respectively. Higher furniture production was supported by an expansion in export sales and a receptive local market with available competitive financing which made furnitures more affordable to average income-earners. Intermediate goods industries also performed well with an average expansion in production volume of 7.8%. Textiles grew by 16% because of a bullish export market, higher consumer incomes, and election spending by candidates. Glass and plastics increased by 15% as consumer-oriented industries increased their demand for packaging materials. Capital goods industries showed a 14.6% growth in production. Increased construction activity pushed up cement production by 20%. Iron and steel, which are also important inputs in the construction sector, rose by 9% after a 5% decline in 1986. But within this sector, it was professional and scientific equipment (including computers) which posted the highest growth rate of 30%. This was made possible by the demand for instrumentation equipment and devices of local assembly, repair, and maintenance industries.

Table 41
Industrial Performance, 1987
(%-change in production volume over previous year)

Industry	1987
Consumer Goods Industries	8.0
Food	7.5
Beverage	22.0
Tobacco	-11.0
Wearing Apparel	9.0
Footwear and Leather Goods	5.0
Drugs and Personal Care Products	10.0
Furniture	20.0
Electrical Appliances	15.0
Intermediate Goods Industries	7.7
Textiles	16.0
Basic Industrial Chemicals	4.0
Other Chemicals	-5.0
Paper	6.0
Printing and Publishing	9.0
Petroleum	7.5
Rubber	8.0
Plastics	15.0
Wood	4.5
Glass	15.0
Capital Goods Industries	14.6
Structural Clay	11.0
Cement	20.0
Iron and Steel	9.0
Nonferrous Metals	5.0
Machinery	12.8
Transport Equipment	13.0
Professional and Scientific Inst.	30.0

Source: Industry Monitoring Unit, CRC

Agriculture proved to be the the disappointment of the year with a 0.4 % growth. Unlike its performance in 1986, agriculture lagged behind all other sectors. Agricultural crops hardly moved with a 0.1% growth. With the exception of sugarcane, all major agricultural crops recorded growth in the first quarter of 1987. By the third quarter of the year, however, all of them showed declines. It was at this period when the effects of the drought--the El Nino--was deeply felt.

With lower crop production, the supply of raw materials for feeds also suffered. Fisheries inched up by 1.9%. Forestry fell by 0.9%.

Table 42
The Real Sector, 1987
(in constant 72 prices)

Sector	1987 (P M)	% growth
EXPENDITURES		
Personal Consumption Expenditure	70260	5.50
Government Consumption Expenditure	8774	7.17
Gross Domestic Capital Formation	12190	19.73
Private Construction	4058	21.35
Public Construction	2285	5.74
Durable Equipment	5293	16.28
Increase in Stocks	554	
Exports of Goods & Non-factor Services	23299	-1.11
Imports of Goods & Non-factor Services	21982	25.22
Statistical Discrepancy	3407	
GROSS DOMESTIC PRODUCT	95948	5.11
Net Factor Income from Abroad	-1268	-24.34
GROSS NATIONAL PRODUCT	94680	5.66
INDUSTRIAL ORIGIN		
Agriculture, Fishery and Forestry	27331	0.36
Manufacturing Industry	30656	8.02
Service Sector	37961	6.41

Source: NEDA

The 5.7% GNP growth last year was accompanied by a 6.5% increase in the consumption of primary energy. Capital goods industries accounted for a large amount of the consumption of petroleum products in 1987. Power generation took the bulk of petroleum product consumption (40.8%). Land transport and mining had shares close to 4%. Despite the increase in total energy demand, however, consumption of indigenous energy declined. Indigenous sources supplied 38% of our power needs in 1987. Local oil consumption dropped by 39%. Hydroelectric power consumption also fell by 13.2%. Use of nonconventional energy sources like bagasse and coconut husk went down by 15.6 and 11.1%, respectively. On the other hand, imported energy (oil and coal) consumption shot up by 19.2%. This apparent shift from local to foreign sources of energy last year was due to the drought which reduced the output of

hydropower plants, the poor quality of local coal which made it unsuitable for industry specifications, and the depletion of oil output from Nido, Cadlao, and Matinloc. The 19,000 barrels contribution of a new oil production site, Tara South, was not sufficient to offset these declines.

3.4.3.1.2 Employment and Wages

There has been a marked improvement in the employment situation in the country in 1987. This is evidenced by the labor force participation rate(LFPR) which rose from 63.8% in 1986 to 65.5% in 1987. Women's participation increased to 48.1%, from 46.5% in 1986. LFPR among males continued to rise from 81.6% in 1986 to 83.1% in 1987.

The national unemployment rate fell from 11.8% in 1986 to 11.2% in 1987. Most of the regions experienced declining unemployment rates. Metro Manila reported the highest unemployment rate of 19.1%.

The agricultural sector absorbed 48.5% of the country's labor force. The share of agriculture was only a 3.22% increase over the previous year. The services sector absorbed 37.3% of the labor force while industry's share was 14.01%. This share of industry is 20.62% higher than previous 1986 figures. Nearly one-fifth (19.32%) of the increase in the share of industry could be accounted for by the manufacturing sector.

Underemployment rates declined significantly from 35.6% in 1986 to 33.6% in 1987. The problem of labor underutilization remained acute in the rural areas where the underemployment rate was at 41%.

The labor situation has stabilized considerably. The actual number of strikes declined by 25% in 1987 with the number of workers involved and man-days lost falling by 46.7% and 47.6%, respectively.

Despite the government's policy of non-intervention in wage setting, the minimum wage was adjusted through Republic Act 6640 in December, 1987. The adjustments resulted in nominal wages ranging from P69.33 for non-agricultural workers within and outside Metro Manila, to P58.50 and P47.12 for agricultural plantation and non-plantation workers, respectively.

3.4.3.1.3 Monetary Sector

The Central Bank assumed a cautious monetary policy. Reserve money was held very stable. During most of the second semester, there was even a net contraction of reserve money. Reserve money stood at P49B in end-June. This went down to P48.2B by end-October. The build-up of national government deposits with the Central Bank and the increase in blocked peso deposits of the national government with the Central Bank accounted for this decline. By end-December, however, reserve money shot up to P56.9B. The government had to finance redemption of maturing treasury bills and had to withdraw money from the Central Bank. The government's demand for money was further pushed by the increase in capital outlays before the year ended--a repetition of the 1986 movements.

For the whole year, there was a moderate expansion of total liquidity. Despite this, the net domestic credits of the monetary system fell by 13.3% from December 1986 to December 1987. There was a 130.6% drop in net domestic credits to the public sector as the national government's deposits with the Central Bank was higher than that for 1986. Net domestic credits to the private sector rose by 18.7%. This was absorbed by manufacturing, trading, agrobusiness, and business services.

Table 43
Monetary Aggregates, 1987

Sector	1987 (P M)	% growth
Reserve Money (End-of-Period)	58865	17.77
Reserve Money (Average)	48904	20.10
Money Supply 1 (End-of-period)	52386	22.81
Money Supply 1 (Average)	43077	19.54
Money Supply 2 (End-of-period)	155922	14.43
Money Supply 2 (Average)	137762	12.69
Money Supply 3 (End-of-period)	159918	13.30
Money Supply 3 (Average)	141515	9.01

Source: CB

3.4.3.1.4 Fiscal Sector

The fiscal sector was bugged down by problems in fund disbursements and project identification. This was shown earlier in the low public construction spending figures in the national income accounts. Revenues reached P103.2B while expenditures amounted to P119.9B giving a budget deficit of P 16.7 B. Of the total expenditures, P36.9B went to interest payments for local and external liabilities. Capital outlays and net lending dropped from P39.2B in 1986 to only P24.2B in 1987.

Pump-priming efforts continued despite problems in the implementation of infrastructure projects. Funding for the CEDP doubled from P3.9B in 1986 to P8.6B in 1987. A new program, the National Reconciliation and Development Program, was launced for the rehabilitation of rebel-returnees. P16.9 B was allocated to it. There was also a tremendous increase in expenditures for current operations of the government. The factors responsible for this are wage adjustment of government employees, high maintenance expenses of government offices and departments, rehabilitation of PNB and DBP, and debt-service payments of the national government. Additional government expenditures for wages and salaries came from the 5% across the board raise for all employees, the increase in salaries of military personnel after the August 28 coup attempt, and the adjustment of salaries of teachers in the elementary and secondary levels.

Table 44
The Fiscal Sector, 1987

Item	1987 (P B)	% growth
Current Revenues	103.2	30.3
Tax Revenues	85.9	31.1
Nontax Revenues	17.3	26.3
Total Expenditures	119.9	8.5
Current Expenditures	95.7	43.0
Capital Expenditures and Net Lending	24.2	-38.3
Over-all Deficit	16.7	-46.6

Source: NEDA

3.4.3.1.5 External Sector

The current account recorded a deficit in 1987 after a surplus in 1986. The 1987 trade deficit widened to $1.017B because of the unexpected surge in imports. Import growth was equally distributed between consumption and investment goods. The non-monetary capital account showed some improvement but net medium and long term capital fell by 4.2%. New money inflows were smaller and so were pipeline loans (especially from Japan) as the government showed sluggishness in utilizing Official Development Assistance (ODA) funds. Foreign investments rose significantly in response to the debt-equity swap started by the Central Bank. The program, however, slowed down late 1987 due to the possible inflationary effects on the economy. Overall, the country had a balance of payments surplus of $264M inclusive of restructuring and new money inflows.

Total external debt reached $28.649B. This higher liability of the Philippines pushed the debt burden from $3.8B in 1986 to $4.4B in 1987.

3.4.3.1.6 Pressure Indicators

Inflation was moderate for the whole year. A relatively brisk growth without inflationary pressures was made possible by excess capacities in most industries. The inflation rate took an upturn beginning April 1987. It was only after the second quarter that some business started to give indications of over-heating. For the entire country, the annualized inflation rate for December 1987 was 7.4%, with the January-December rate increasing by an average

Table 45
Balance of Payments and External Debt, 1987

Sector	1987 ($ M)	% growth
BOP ACCOUNTS		
Balance of Trade	-1017	
(BOT-to-GNP Ratio)	6.04	
Merchandise Exports	5720	18.13
Merchandise Imports	6737	33.56
Net Nonmerchandise Trade	-76	
Net Transfers	554	
Current Account	-539	
(CA-to-GNP Ratio)	-0.57	
Capital Account	499	
Other Items	304	
BALANCE OF PAYMENTS	264	
(BOP-to-GNP Ratio)	0.28	
Gross Int'l Reserves (End-of-period)	1959	-20.33
Gross Int'l Reserves (Average)	2296	43.50
EXTERNAL DEBT INDICATORS		
Debt Service Burden	4421	
Principal Repayments	2195	
Interest Payments	2226	
External Debt Burden		
Debt Service Ratio	18.98	
Debt Service Burden / GNP	4.67	
Debt Service Burden / M. Exports	77.29	
Interest Payments / Exports	9.55	
Interest Payments / GNP	2.35	
Interest Payments / M. Exports	38.92	

Source: CB

of 3.8%. This rate is lower than the projected 5.2% for 1987. Fuel, light and water posted the highest annual increment of 9.5% in December. In terms of the year's average, inflation rate for housing and repairs and fuel, light and water was 5.0% and 1.8% respectively.

Interest rates were also generally stable. Starting the second quarter, loan rates showed moderate increases. This can be traced to higher loan demand and inflation and to the increase in treasury bill rates as the government continued to borrow from the domestic market. The annual average loan rate, however, was still lower than 1986.

Despite the deterioration of the gross international reserves from a peak of $2.6B end-January to $1.959B by end-December, the average exchange rate showed a modest depreciation of 3.5 %. Most of this movement, however, came after the August coup attempt and may have been caused by perception of instability in the government. Other factors which contributed to the peso-dollar depreciation in the last quarter were the increased demand for dollars to finance the import surge and the stock market crash in October. The latter resulted to portfolio shift among asset holders from stocks to dollars. (See Table 46)

Table 46
Costs of Doing Business, 1987

Sector	1987	% growth
Commercial Bank Loan Rate (%)	13.338	-23.93
Savings Deposit Rate	5.696	-33.89
Time Deposit Rate	9.833	-31.02
Peso-Dollar Exchange Rate	20.57	0.88
P/$ Black Market Rate	20.95	3.46
IPI GNP	745.9	7.84
CPI (All Items)	368.7	3.79
Fuel, Light, and Water	520.1	1.76
Housing and Repairs	376.8	4.99
Real Loan Rate (Based on CPI)	9.55	
Real Loan Rate (Based on IPI GNP)	5.49	

Sources of Basic Data: NCSO, CB, NEDA

3.4.3.2 Performance and Targets

3.4.3.2.1 Plan Targets vs. Actual Performance

In the real sector, agriculture and public construction spending fell below targets. Agriculture was a victim of the drought. Infrastructure spending

of the government was hampered by administrative and bureaucratic problems. There was also an apparent problem in identifying projects which can be financed by available foreign funds. Last year, $191M of committed ODA funds were left untouched. Had this amount been used for infrastructure spending, GNP could have grown by approximately one-percentage point more. This would have brought the over-all performance of the economy closer to target--despite El Nino.

Base money was slightly above the P59.3B ceiling set by the Plan. This was no cause for concern, though, since inflationary expectations were largely contained by the cautious stance of the Central Bank.

The country's gross international reserves was recorded at a year-end level of $1.959B. This was way below the target of $2.7B for 1987. Central Bank authorities might have under-estimated the strength of the consumer-led spending and the consequent larger leakage in the form of imports. Furthermore, the import liberalization program was already in effect. The recorded gross international reserve level would have been sufficient under normal conditions. But the coup attempt in August was not expected. Had the Central Bank not acted decisively during the critical first few trading days after August 28, this level of reserves might not have been sufficient to dampen speculative pressures by year-end.

A detailed comparison of government targets and actual performance of the economy is given in table 47.

3.4.3.2.2 Policy Reforms

One of the most immediate concerns of the Aquino government after it took over was the elimination of structures which hamper sustained economic growth and equitable distribution of income. In the pursuit of these aims, the sugar and coconut monopolies were dismantled. The government also tried to stick to its commitment of leaving the corporate sector though its privatization program. And to promote industries which are internationally competitive, the import liberalization program was implemented despite bitter criticisms aired by the affected industries against it.

TABLE 47

COMPARATIVE SUMMARY OF
1987 TARGETS AND ACTUAL PERFORMANCE

	1986	1987	
	Actual	Actual	Plan
I. REAL SECTOR (% Change)			
GROSS NATIONAL PRODUCT	2.0	5.7	6.5
GROSS DOMESTIC PRODUCT	1.5	5.1	6.7
Total Consumption			
Private Consumption	0.9	5.5	4.9
Government Consumption	-0.4	7.2	12.7
Gross Domestic Investment	-8.5	19.7	34.4
Construction	-22.6	15.2	24.2
Private	-29.9	21.4	28.5
Public	-7.7	5.7	18.8
Durable Equipment	-3.4	16.3	20.2
Exports	21.8	-1.1	5.4
Goods	13.7	8.4	5.0
Services (Non-factor)	41.8	-20.0	6.3
Imports	25.4	25.2	12.3
Goods	28.5	23.6	12.9
Services (Non-factor)	-4.2	46.5	5.8
Agriculture	3.7	4.0	0.4
Industry	-2.1	9.1	8.0
Mining and Quarrying	-11.9	3.0	-2.4
Manufacturing	0.8	7.0	7.1
Construction	-20.6	25.5	17.2
Utilities	3.0	6.5	10.7
Services	3.0	6.8	6.4
II. PUBLIC SECTOR 1/(Billion Pesos)			
Revenues	79.2	103.2	100.8
Revenue effort (% of GNP)	12.9	14.6	14.5
Tax	65.5	85.9	87.2
(% of GNP)	10.6	12.2	12.5
Nontax	13.7	17.3	13.6
(% of GNP)	2.2	2.4	2.0
Expenditures	110.5	119.5	120.6
(% of GNP)	17.8	16.9	17.3
Current Operating	66.9	95.1	82.4
(% of total)	60.5	79.6	68.3
Capital Outlays and net lending	43.6 2/	24.4	38.2
(% of total)	39.5	20.4	31.7

TABLE 47

COMPARATIVE SUMMARY OF
1987 TARGETS AND ACTUAL PERFORMANCE

	1986	1987	
	Actual	Actual	Plan
Budgetary Surplus (-Deficit)	-31.3	-16.3	-19.8
(% of GNP)	5.1	2.3	2.8
Total Public Investment Program	18.3	17.6	37.8
(% of GNP)	2.9	2.5	5.4
III. MONETARY SECTOR			
Base Money, Outstanding (in P Bill)	56.0	61.3	59.3
Interest Rates, full-year average			
Seduced Loans, all maturities	17.4	13.3	14.2 3/
Treasury Bills, 91 days	14.4	11.4	11.8 3/
IV. BALANCE OF PAYMENTS (Billion U.S. $)			
Trade Balance	-0.20	-1.02	-1.1
Exports	4.84	5.72	5.0
Imports	5.04	6.74	6.1
Services (net)	0.76	-0.07	0.2
Receipts	3.79	3.50	3.7
of which ESF	0.30	0.15	
Payments	3.03	3.57	3.4
of which Interest	2.05	2.23	2.0
Transfers (net)	0.44	0.55	0.4
Receipts	0.44	0.55	0.5
Payments	0.00	0.00	0.0
Current Account	1.00	-0.54	-0.4
(% of GNP)	-3.28	-1.57	-1.3
Capital Account	-1.84	-1.43	-0.8
Direct Investments (net)	0.14	0.21	0.1
Medium and Long-Term Loan (net)	-1.07	-1.78	-1.4
Inflow	0.66	0.42	0.4
Outflow	1.73	2.20	1.8

TABLE 47

COMPARATIVE SUMMARY OF
1987 TARGETS AND ACTUAL PERFORMANCE

	1986	1987	
	Actual	Actual	Plan
Short-Term Capital (net)	-0.81	0.05	0.3
Errors and Omissions	-0.10	0.09	0.0
Monetization of Gold	0.27	-0.36	0.2
Revaluation	-0.07	-0.15	0.0
Gap-Oriented Balance of Payments	-0.64	-1.76	-1.2
New Money	0.8	0.6	-
Rescheduling	1.1	1.4	-
Overall Balance of Payments Position	1.2	0.3	-
Gross International Reserves (Million U.S. $)	2459	1959	2700
Months Worth of Imports	3.6	2.3	3.4

Actual - Refers to actual figures of the said period
Plan - Refers to target Figures of the Original Medium Term Development Plan
1/ Data as of 16 May 1988
2/ Includes P 4.4 Billion in transferred accounts
3/ Projections
SOURCES: CBP, NEDA, DOF and DBM

a) Import Liberalization

In 1987, 171 items were liberalized. This placed the total liberalized commodities from January 1981 to December 1987 to 2,158. The government's trade policy was not really to make access to imports easier but to shift the mode of protection from quantitative restrictions to tariffs. This resulted to a lot of lobbying in Congress for appropriate price protection to specific industries. Furthermore, in an attempt to minimize possible smuggling due to the liberalization program, the government entered into a very controversial contract with the Societe Generale de Surveillance (SGS). Starting April 1, all incoming imports valued at $5,000 and above from Hongkong, Taiwan, and Japan passed through SGS inspection.

b) Privatization

The privatization program was implemented by two agencies--the Asset Privatization Trust (APT) for the government's non-performing assets (NPA's) and the Committee on Privatization (COP) for government owned and controlled corporations (GOCC's). In 1987, 86 GOCC's have been approved for privatization. The program generated P8.1B for government coffers. This amount could be broken down into P3.8B from NPA's, P2.9B from collection on loan accounts, P900M from the sale of GOCC's, and P500M from interest earnings. Among the large companies sold by the government to the private sector were Island Cement Corporation (P503M), United Planters Sugar Mill Co. (P500M), and the Cebu Plaza Hotel (P328M).

Rehabilitation of the two largest government financial institutions (GFI's), the Development Bank of the Philippines (DBP) and the Philippine National Bank (PNB), also took into effect. The objectives of the rehabilitation program was to address the huge NPA's carried by the two GFI's and to restore institutional and financial viability. After this, the government can implement the second phase of the program which is the actual privatization of these banks. For PNB, the plan was to quickly turn it into a profitable expanded commercial bank. This was possible because of the very large resources of PNB. As of end-December 1987, P47.5B NPA's and P55.4B liabilities were transferred to the national government. DBP, on the other hand, aimed at financial soundness and at a gradual movement from direct lending to wholesale lending for development projects through commercial banks. The national government assumed P54B of DBP's non-performing assets and P64B liabilities.

3.4.4 Medium-Term Prospects

3.4.4.1 The Economy in 1988

Consumer spending continued to lead economic growth in the first semester of this year. But there are also signs of a transition to investment-led growth. GNP grew by 6.8% in the first semester with consumption increasing by 5.76%. Total investment spending rose by 6.78% due to the hefty 27.54% increase in expenditures on durable equipment. Over-all, fixed capital formation which went up by only 5.58% in the first quarter, accelerated to 23.18% in the second quarter. Furthermore, the Board of Investments expects P32.26B of investments to come in this year in terms of project costs. This is P12.26B more than the target of P20B initially set for this year. Growth prospects are therefore very upbeat in the short-run.

In the supply sectors, industrial production continued to accelerate from an 8.6% growth in the first quarter to 9.1% in the second quarter. Construction shot up from a 7.8% to 25% for the same period. In the manufacturing sector, only three out of the 20 manufacturing subgroups posted declines in their gross value added(GVA), namely: textile manufacturing, petroleum and coal products and furniture and fixtures. All other sectors recorded notable gains, particularly the food manufacturers group whose GVA surged by P471 million or by 9.98% over year-ago levels. The GVA of food manufacturers group accounted for 41.41% of the over-all production value generated by the manufacturing sector. An examination of within group performance showed that increased demand for processed meat, fish, fruits and vegetables and animal oils and fats has contributed significantly to the upturn in food manufactures. A decline was noted in beverage production which slowed down from 11.3% in the first quarter to 2.5% in the second. These developments can be interpreted as a transition from consumer-led recovery to an investment-led growth.

Table 48
The Real Sector, First Semester 1988
(in constant 1972 prices)

Sector	1988 (P M)	% growth
EXPENDITURES		
Personal Consumption Expenditure	34082	5.76
Government Consumption Expenditure	4788	10.96
Gross Domestic Capital Formation	6838	22.48
Private Construction	2471	15.41
Public Construction	1340	9.12
Durable Equipment	2780	13.84
Increase in Stocks	247	
Exports of Goods & Non-factor Services	11755	2.73
Imports of Goods & Non-factor Services	12407	35.94
Statistical Discrepancy	5345	
GROSS DOMESTIC PRODUCT	51121	6.00
Net Factor Income from Abroad	-185	
GROSS NATIONAL PRODUCT	50937	6.80
INDUSTRIAL ORIGIN		
Agriculture, Fishery and Forestry	14423	2.15
Industry	16840	8.86
Service Sector	19858	6.54

Source: NEDA

Reflecting the continuing pick-up in industrial activity is the country's demand for petroleum products which, for the first seven months in 1988, exceeded by 7.41% the level recorded in the same period last year. The country used up to 41.086 million barrels from January to July this year. Of the total industry consumption of petroleum products, nearly 40% was absorbed by the power generation sector. The next biggest user was the mining industry followed by the manufacturing sector, particularly fertilizer and chemicals production. Of the total energy consumed, 62.1% is imported energy while 37.9% is indigenous energy. Oil-based use accounted for 54.5% of total energy use. Non-oil energy resources, which consists of geothermal, hydropower and other non-conventional sources comprised 38.1% of over-all energy use. Coal usage which comprised the remaining 7.4% of the total energy mix, grew by 24.2% over the same period last year.

Table 49
Industrial Performance, First Semester 1988
(%-change in gross value added in constant 72 prices over previous semester)

Industry	1988 sem 1
Food Manufactures	9.98
Beverage Industries	7.09
Tobacco Manufactures	3.95
Textile Manufactures	-9.70
Footwear and Wearing Apparel	1.40
Wood and Cork Products	19.00
Furniture and Fixtures	-1.54
Paper and Paper Products	17.78
Publishing and Printing	19.30
Leather and Leather Products	19.35
Rubber Products	11.49
Chemical and Chemical Products	5.63
Products of Petroleum and Coal	-6.27
Non-Metallic Mineral Products	21.61
Basic Metal Industries	11.84
Metal Industries	10.47
Machinery Except Electrical	19.84
Electrical Machinery	15.09
Transport Equipment	30.77
Miscellaneous	9.21
Total Manufacturing	8.54

Source: NEDA

Net domestic credits as of end-July was 11.5% higher than the year-ago level. This was caused by the more active role taken by the private sector in the capital markets as the government reduced its borrowings. The country's reserve money dropped by 1.64% as of end-August from the previous month's level. Reserve money as of end-August totaled P52.77B. This however exceeded by P6.9B the P45.81B reserve money for the same period last year. The downtrend maybe traced to the decline in net domestic assets of monetary authorities resulting from the cutbacks in net credits to the national government. Earlier, the government has borrowed heavily and had a large build-up of deposits with monetary authorities(CB) from the proceeds of auctioned treasury bills. An immediate

consequence of this has been to raise T-bill rates with the concomitant rise in nominal lending rates. Bank lending rates as of end-August averaged 15.5% across all maturities, up by 1.65 percentage points from year-ago levels of 13.88%.

Because of high interest rates, some sectors have accused the Central Bank of using interest rate policy to defend the peso. This prompted a policy debate between NEDA and the CB on the appropriate macroeconomic environment for a sustained medium-term growth. NEDA was in favor of measures to lower interest rates in order to encourage investments even more important variable in the decision of investors to invest. Without a stable environment where business can operate with a minimum of risk, asset holders will always think in terms of short-run gains.

In terms of domestic prices, for the first quarter of 1988, the nationwide annual inflation rate averaged 8.9%, compared with the -.6% inflation rate recorded in the same period in 1987. For the first two months of the second quarter, the annualized inflation rate was 9.7% in April and 9.2% in May. The price increases as reflected in the Consumer Price Index for all items went up to 400.6 index points in June, from 367.5 index points in the same period last year (Figure 18). The increase in CPI may be partly attributed to a 2.48% growth in the services sector, which include education services. High prices of plywood, cement and other construction supplies caused the household and repair index to rise to 1.47% nationwide(NSO, cited in Mla. Chron. 7/7/88).

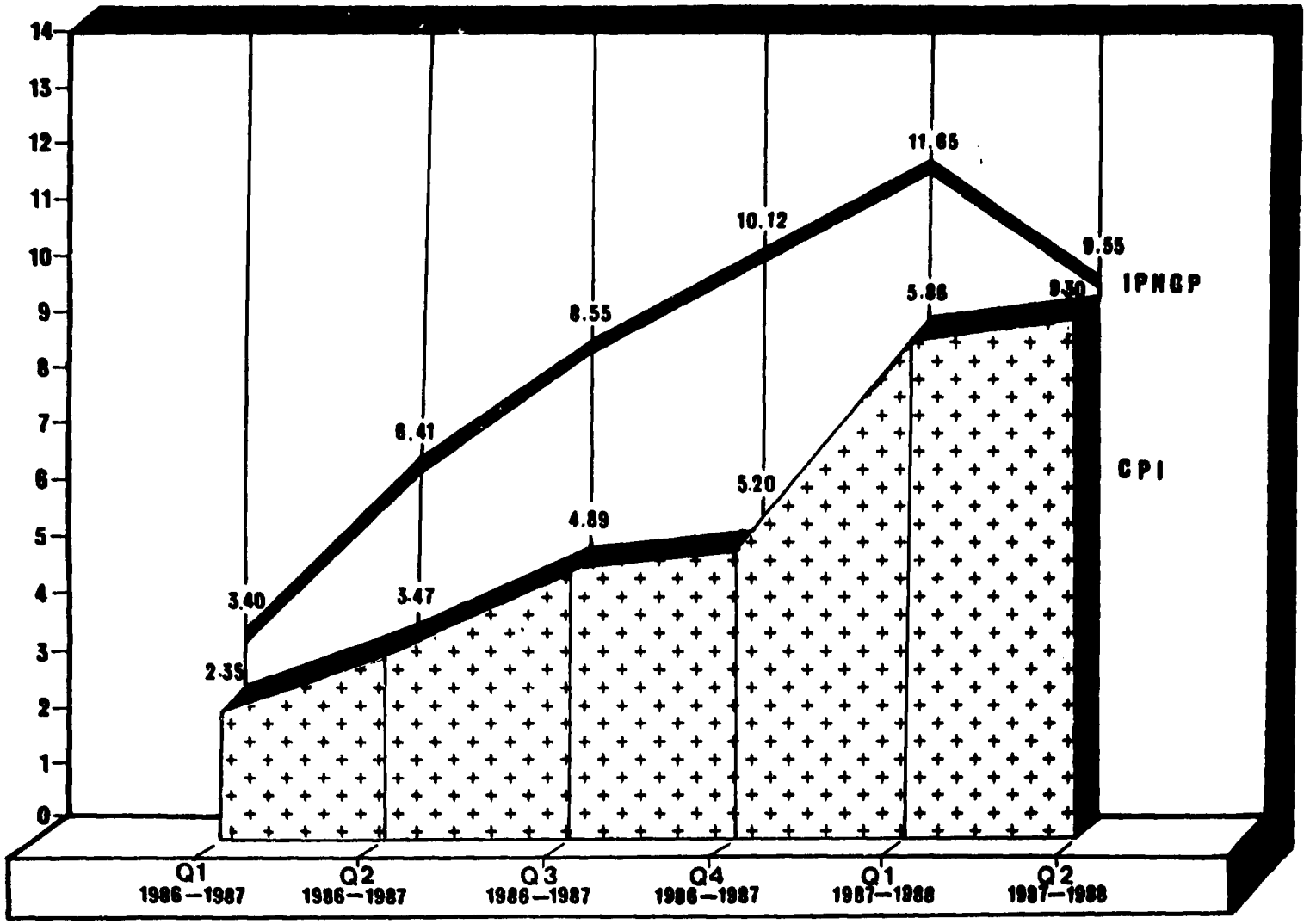
On the employment situation, the LFPR was estimated at 69.1% in April 1988, up from 65.2% during the same period a year ago. Male and female participation rates were 83.5% and 47.4%, respectively, as of the first month in 1988. Underemployment likewise declined to 33.2%. First quarter 1988 estimates showed that the labor situation has further stabilized, with the number of strikes declining by 70.1% compared to the same period last year. The number of workers involved and the number of man-days lost also decreased by 56% and 39.2% respectively. This favorable situation augurs well for investment promotion and reflects the gains by the government in creating more jobs and promoting a more conciliatory approach to labor-management dispute settlement.

During the first seven months of the year, the country's trade deficit contracted by 30.65% compared

FIGURE 18

INFLATION RATE (CPI, IPIGNP)

1986-1987 AND 1987-1988, QUARTERLY



to the same period levels last year. As of end-July, the country's trade deficit stood at $86 million compared to the $124 million gap posted in the same month last year. The country's total merchandise exports registered an FOB value of $616 million, up by 22.71% from the $502 million worth of exported products in July last year. This strong performance in exports was triggered by favorable international prices as well as the successful penetration of non-quota markets. (See Figure 19) Electronics and components, clothing and apparel and coconut oil were the top export grossers. However, imports continued to surge, with an FOB value which was 12.14% higher than importations in July last year. Stepped-up economic activities and the government's import liberalization program raised imports which totaled $702 million last July. Leading imports were mineral fuel, lubricants and related materials, semi-conductor devices and non-electrical machineries.

In the short run, there are some critical factors that should be monitored closely.

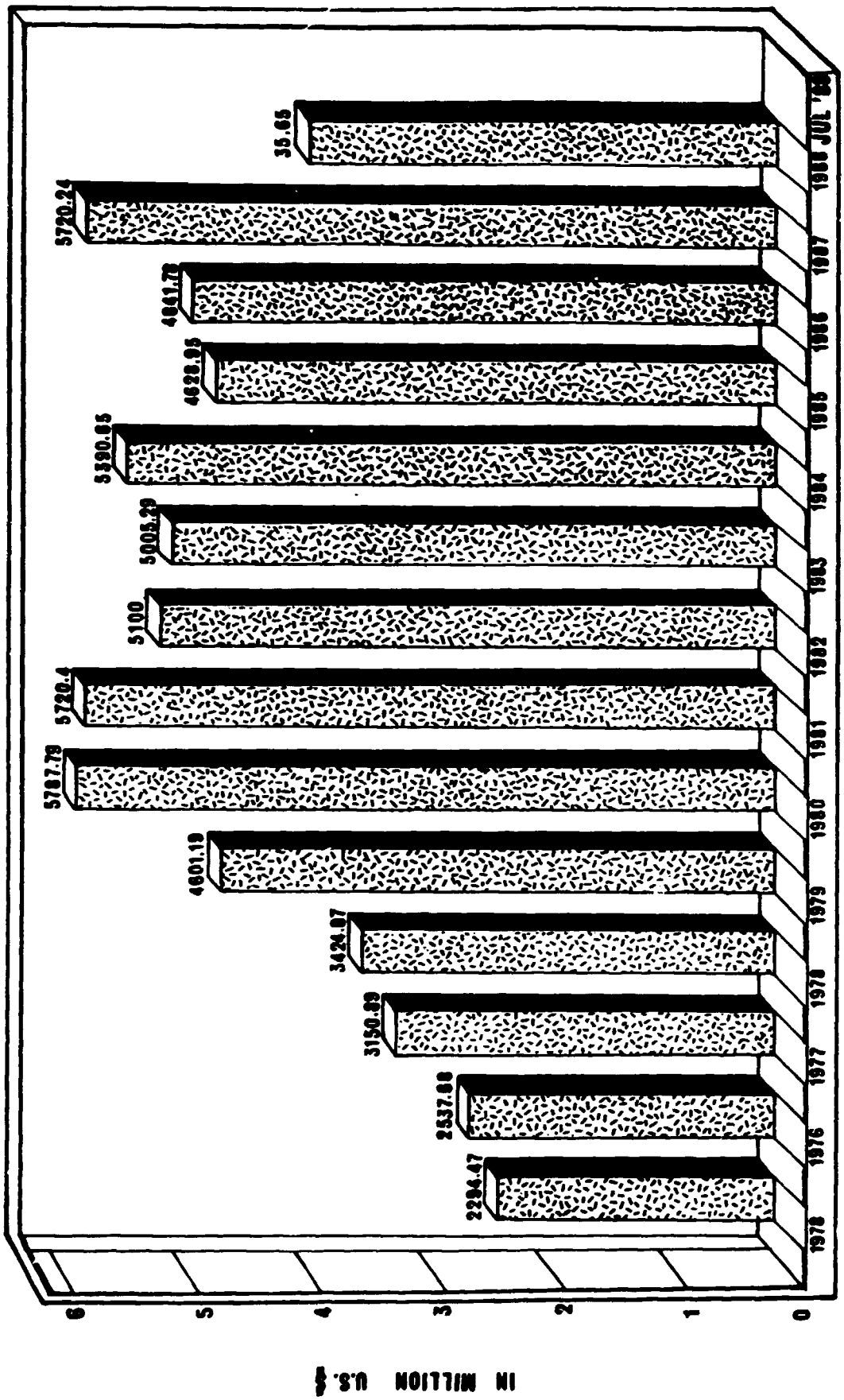
First, inflation is starting to accelerate and the peso-dollar rate has been depreciating fast recently. The Central Bank has stayed away from the market choosing to let the peso fall. If the peso falls too fast or the inflation rate climbs too high, the resulting scenario might trigger speculative activity which the government might find difficult to control later on. There are indications that the Central Bank will defend the peso against this possibility. Treasury bill rates are starting to climb again.

Second, utilization of ODA funds is still sluggish. As of the first eight months of the year, more than $800M worth of ODA's have been cancelled. The project pipeline seems to have remained thin despite efforts of the Project Facilitation Committee to improve fund utilization. Furthermore, another reason for the cancellation of committed ODA's was the government's inability to generate counterpart funds.

Third, investment growth is acceptable as of the first semester of this year. The rate, however, is still below target and may not be sufficient to support the medium-term growth targets of the government. If the Central Bank continues to use interest rates to defend the peso, the high cost of funds might discourage further investments.

FIGURE 19

VALUE OF PHILIPPINE EXPORTS



Fourth, the energy policy should be re-examined. The scrapping of the Bataan Nuclear plant meant a tighter supply of power for the Luzon grid. If the economy grows faster, the government may have to ration electricity again. The industrial sector may not be affected much this year because they will most likely be given priority. But those small and medium enterprises based largely in residential areas will surely suffer.

3.4.4.2 The Revised NEDA Targets

3.4.4.2.1 Policy Directions

Based on a draft of the revised Medium-Term Plan of the government, the development agenda for the next five years will be directed towards "economic development, productivity and growth, and the equitable distribution of opportunities, income, and wealth, including the means of production . . . The private sector shall take the lead role in the overall economic growth with government serving only as catalyst and providing well-defined policy guidelines."[17] The strategy, therefore, remains rural-based with emphasis on agribusiness, small and medium industries, and export-oriented enterprises.

The economic performance in 1987 highlighted some lessons in policy. NEDA cited the following. First, public investments should be geared towards greater efficiency. Second, the level of gross international reserves should be sufficient to support the economy's foreign exchange requirement and maintain stability in the economy. Third, monetary policy should be supportive of investments. Interest rates, therefore, should not be used to support external objectives. And finally, bottlenecks in the importation of agricultural inputs should be removed. This is the only way to prevent agriculture from suffering from the import liberalization program.

Based on these insights, the policy directions NEDA expects to take in the medium-term are as follows.

17/ Revised Medium-Term Development Plan (draft), 1-10.

Fiscal policy will emphasize productive expenditures of the government. Efforts to improve tax collections will be undertaken. Fiscal authorities will minimize competition for funds in the local capital markets. Measures to reduce the debt burden will be undertaken so that the government can effectively channel more resources to public investments.

Monetary policy will seek to rationalize government's role in the financial intermediation process. Appropriate legal action will be taken to eliminate the agri/agra requirement and the gross receipts tax. The reserve requirement will also be gradually reduced. By 1988, the government will completely divest itself of government-owned banks.

3.4.4.2.2 New Targets

A revised set of targets for the period 1988-92 was issued after evaluating the 1987 record.

A slightly lower average growth for GNP is expected in the medium-term. The revision from an earlier target of 6.8% to 6.5% is due to the substantially lower target for agriculture. Another drought is expected in 1991 and this will again pull agricultural production down. In the expenditures side, real export growth was revised downward and import growth upward.

The industrial sector will lead the economy with an average growth of 9.1% in the next five years. The share of industry is expected to rise from 33% in 1988 to 36% by 1992. Within the industrial sector, manufacturing is targetted to grow at a rate of 7.7%. Manufacturing growth can be expected from the continued bullish export sales of garments and semiconductors and growth in domestic industries like textiles, plastics and glass (for packaging), and construction-related industries (cement and iron and steel). Basic and industrial chemicals and plastics also face brighter prospects with the setting-up of the Bataan Petrochemical plant. This project is expected to attract more Taiwanese plastic producers.

Inflation is still expected to remain at the single-digit level because of the management of aggregate demand and expansion in productive capacity.

In the external sector, the outflow of foreign exchange will continue to be large. Next year alone, $2.4B is expected to go to principal repayments of our external debt and $900M for interest payments. Based on NEDA estimates, a financing gap of $3.2B is expected for 1989-90 and $5.2B for 1991-92. This gives a total of $8.4B new money requirement from 1988-92. The $8.4B was a substantial revision from the original $7.7B estimate. An important factor in this revised figure is the larger expected trade deficit arising from a continued economic growth.

A detailed comparison of original Plan targets and the revised estimates are given in table 50.

3.4.4.3 Assessment of Medium-Term Environment

There seems to be a consensus among economic forecasters that the economy will have a sustained growth in the medium-term. The GNP estimates tend to cluster to the 6.0% forecast--lower than NEDA's target but indicative of enough confidence in the economy's ability to sustain recovery. Hence, growth does not seem to be a major issue in the medium-term. There may be downside risks, though, like the energy requirements and the economy's ability to generate enough investments.

3.4.4.3.1 The Philippines and the External Environment

An assessment of the external environment can be divided into positive factors, negative factors, and "swinging" factors. Positive refers to a climate conducive to sustained Philippine economic growth, negative refers to the opposite. Swinging factors are those which are neither positive nor negative at present but which may turn positive or negative depending on policy responses of the government.

On the positive side, continued growth in industrial countries is expected. This year, the United States is expected to grow at 3-3.5%. As of end-March, US unemployment rate of 5.6% is lowest in the 80's. Japan is also expected to show continued expansion in economic activity. Even the protectionist moves in the United States offer positive hopes for us. Removal of the newly-industrializing countries from the GSP list would force many industries in the NIC's to relocate elsewhere in Asia. The Philippines is one area which attracts NIC investors because of our GSP status and unutilized quotas in the American market. As of the first semester of this year, the Taiwanese are the largest foreign investors in the Philippines--

TABLE 50

COMPARATIVE SUMMARY OF TARGETS ON SECTORAL PRODUCTION, 1987 - 92 /a

	1987		1988		1989		1990		1991		1992		Average (1988-92)	
			Orig. Plan	Updated	Orig. Plan	Updated	Orig. Plan	Updated	Orig. Plan	Updated	Orig. Plan	Updated	Orig. Plan	Updated
	Actual	Target	Target	Plan Target	Target	Plan Target	Target	Plan Target	Target	Plan Target	Target	Plan Target	Target	Plan Target
A. Annual Percentage Change														
Agriculture, Fishery and Forestry	0.4	4.0	4.5	2.5	5.0	5.4	5.4	4.0	5.5	3.8	5.5	4.0	5.2	5.4
Industry	8.0	9.1	8.9	9.6	8.2	9.4	8.5	9.0	8.5	8.7	9.7	9.9	8.7	9.1
Mining and Quarrying	-2.4	3.0	5.5	4.0	4.0	5.7	4.0	5.4	4.0	5.4	5.0	5.7	4.4	5.2
Manufacturing	7.1	7.0	7.0	7.9	7.5	7.8	7.6	7.7	8.0	7.7	8.4	7.7	7.7	7.7
Construction	17.2	25.5	20.9	22.7	12.7	20.0	11.7	15.0	12.0	15.8	16.1	14.3	14.7	17.3
Utilities	10.7	6.5	8.0	8.0	8.0	9.0	9.0	9.0	9.0	9.0	10.0	9.9	9.8	9.6
Services	6.4	6.8	7.6	6.7	6.7	6.5	6.2	6.0	6.5	5.8	4.9	5.9	6.6	6.0
Gross Domestic Product	5.1	6.7	7.4	6.2	6.7	6.5	7.1	6.5	6.8	6.3	6.7	6.5	6.7	6.4
B. Percentage Distribution														
Agriculture, Fishery and Forestry	28.5	28.1	26.0	27.4	27.6	26.6	26.3	26.0	26.8	25.4	26.6	26.8	27.3	26.4
Industry	33.0	33.0	32.9	33.0	32.9	33.9	33.3	34.0	33.8	35.5	34.9	36.2	33.4	34.1
Mining and Quarrying	1.6	1.9	1.9	1.6	1.8	1.5	1.8	1.5	1.9	1.5	1.2	1.5	1.8	1.7
Manufacturing	24.2	23.9	23.9	24.6	24.1	24.9	24.3	25.2	24.5	25.5	24.5	25.8	24.3	25.1
Construction	4.1	4.2	5.5	4.8	5.6	5.4	5.8	5.5	6.1	6.5	6.6	6.7	5.9	5.8
Utilities	2.0	1.4	1.4	2.0	1.4	2.1	1.5	2.1	1.5	2.2	1.5	2.2	1.5	2.1
Services	39.6	39.3	39.5	39.6	39.5	39.5	39.5	39.5	39.4	39.0	38.7	39.4	39.4	39.5
Gross Domestic Product	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a Actual and Updated Plan Targets as of 10 June 1988
Source: NSCB and NEDA

Table 50

GROSS NATIONAL PRODUCT AND PER CAPITA GNP, 1987 - 92 /a

	1987 Actual	1988		1989		1990		1991		1992		Average (1988 -92)	
		Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target
Gross National Product (in billion pesos, at constant 1972 prices)	94.7	101.9	100.8	109.6	107.5	116.3	111.5	124.5	121.6	132.7	127.6	116.7	114.8
Growth Rate (%)	6.9	6.9	5.4	6.7	6.7	7.0	6.5	6.8	6.5	6.9	6.5	6.8	6.5
Gross National Product (in billion pesos, at current prices)	766.3	911.8	943.9	821.3	818.7	1075.0	1045.0	1253.9	1182.6	1458.0	1343.8	1101.2	1060.6
Inflation Rate (%)	5.8	6.7	7.7	8.0	7.0	8.3	7.1	8.3	6.9	7.4	7.1	8.4	7.2
Per Capita GNP (in pesos at constant 1972 prices)	1651	1754	1716	1896	1709	1991	1362	1973	1934	2084	2016	1895	1865
Growth Rate (%)	3.9	4.4	4.0	4.5	4.2	4.6	4.4	5.5	5.5	4.4	4.2	4.4	4.1
Per Capita GNP (in pesos at current prices)	12315	13925	13743	15430	15746	17497	16996	18434	16642	22576	20976	17815	17169

/a Actual and Upsated Plan Targets as of June 1988

Sources: NSCB, NEDA and NSO

Table 50

COMPARATIVE SUMMARY OF TARGETS ON EXPENDITURE COMPONENTS 1987 - 92 /a

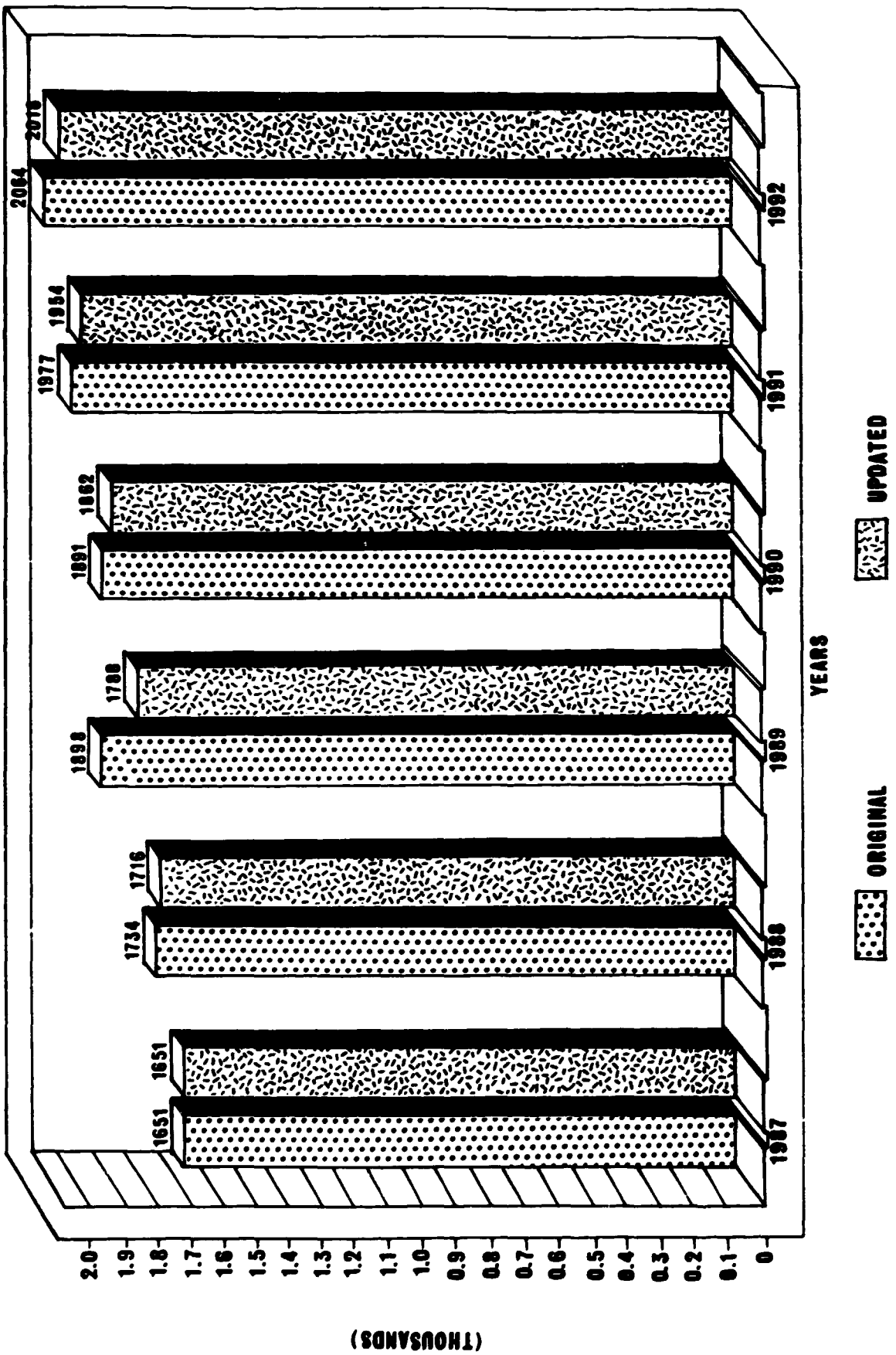
	1987		1988		1989		1990		1991		1992		Average (1988-92)	
	Plan Target	Actual	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Target	Orig. Plan Target	Updated Plan Targ
DOMESTIC DEMAND AND EXTERNAL TRANSACTIONS (% Change)														
Total Consumption	5.1	5.7	5.7	5.1	4.4	4.4	4.8	4.9	5.2	5.4	5.3	5.4	4.5	5.0
Private	4.9	5.5	2.8	4.0	5.6	4.0	4.5	4.5	4.8	5.1	5.0	5.5	4.1	4.6
Government	12.7	7.2	9.4	12.3	5.0	7.2	7.6	12.0	2.9	4.9	6.3	5.1	7.4	7.9
Investment	34.4	19.7	20.4	28.2	16.5	24.6	14.8	13.8	11.3	13.0	10.8	12.4	14.7	19.0
Private Construction	20.5	21.4	20.0	21.2	15.0	21.3	13.1	16.9	15.5	16.1	13.2	17.3	16.6	17.8
Public Construction	18.8	5.2	10.3	11.9	8.1	21.8	9.2	12.1	13.0	7.4	11.9	14.9	9.9	14.6
Durable Equipment	20.2	16.3	18.0	18.0	19.1	21.4	11.9	16.5	13.9	14.8	10.4	14.5	14.5	17.1
Exports	5.4	1.1	11.2	8.2	10.5	9.8	10.3	9.5	9.8	9.3	8.6	9.0	10.2	9.0
Merchandise	5.0	8.1	11.6	9.1	10.1	10.0	10.2	10.0	10.4	10.5	9.4	10.0	10.3	10.1
Nonfactor Services	6.3	-20.0	12.0	5.2	11.5	6.1	10.5	5.8	8.4	5.8	7.5	5.8	10.0	5.8
Imports	12.5	25.2	9.8	10.8	9.6	9.1	9.9	9.4	9.8	9.2	8.9	9.8	9.4	9.5
Merchandise	12.3	25.6	9.9	9.7	9.5	9.5	10.0	9.5	9.8	9.2	8.5	8.8	9.5	9.5
Nonfactor Services	5.8	46.5	10.4	15.2	13.2	13.2	9.4	10.6	8.5	9.2	12.6	11.4	10.8	11.4
GROSS NATIONAL PRODUCT	6.3	5.9	6.9	6.4	6.2	6.2		6.5	6.9	6.5	6.7	6.5	6.8	6.5
SAVINGS AND INVESTMENTS (% to GNP)														
Gross Domestic Investment	18.7	18.6	21.1	17.3	22.9	19.8	24.2	21.5	25.6	22.6	26.7	23.6	24.2	21.6
Gross National Savings	17.4	18.6	18.5	15.5	20.1	17.1	21.6	18.6	22.4	19.7	23.6	20.9	21.2	18.4
Gross Foreign Savings	1.3	0.0	2.6	1.8	2.8	2.7	3.1	2.9	3.2	2.9	3.1	2.7	3.0	2.6

a/ Actual and Updated Plan Targets as of June 1988

SOURCE: NSCB and NEDA

FIGURE 20

PER CAPITA GNP 1987-1992



overtaking their American counterparts. Taiwanese investments are expected to reach $200M this year. The Japanese, however, are also catching up. Asahi Glass and Republic Glass Corporation have announced a joint venture worth $100M. Mitsubishi is also expected to increase its investments in electronics because Japanese computer component manufacturers are reaching their capacity limits. Another large Japanese investment is the $28M project by an automotive component manufacturer to improve inputs for Japanese assembly operations in the Philippines. Korean businessmen are also looking at the possibility of setting-up joint ventures with Filipino companies. South Korean investors are expected to put in $100M this year.

On the negative side, inflation is starting to creep into the picture. This is true not only in the Philippines but also in other Asian countries. Based on the Merrill Lynch Asian Commentary(Appendix 1), the Philippines and India are expected to break into the double-digit rate this year. Malaysia, Singapore, and Taiwan are also expected to post higher inflation rates (although still at the single-digit level). Inflationary factors are generally attributed to the continued growth in these countries and faster wage increases. The burden of servicing our foreign debt is also a negative factor. Furthermore, a recent development may also pose greater problem for the Philippines especially in negotiating for standby-credit. In previous years, once the IMF gives its seal of approval, creditor banks would also start giving trade credits to the Philippines. Recently, the process has been reversed. The Philippines has to negotiate with the 483 creditor banks first before the IMF opens its ESF facility.

The major swinging factors are the outcome of the US Military Bases re-negotiation and the polysectoral aid package (popularly known as the Mini-Marshall Plan). Officially, there is no connection between the $1OB package for the Philippines and the bases agreement. A number of political scientists, however, have hypothesized that the polysectoral plan is actually a bargaining chip of the Americans in the current negotiations.

After identifying the critical factors in the external sector, it would also be helpful to examine the Philippine position in the Asia-Pacific region vis-a-vis other countries(Appendix 2). In the next 1 or 2 years, Thailand and Malaysia are the Philippines's strongest competitors for foreign investments. Malaysia is slowly gearing its economy towards more exports as evidenced by the recent 26%

growth in manufactured exports. Malaysia also has a very moderate inflation rate. Thailand, on the other hand, is the accepted leader among the new NIC's-to-be because of its superior infrastructure facilities. Thailand has in recent years adopted a very outward-looking stance and has recorded a 7% GNP growth last year (most of which came from a 20% expansion in private investments). A recent World Bank report, however, identified India and China as the two more dynamic economies in Asia. India's incentive-oriented industrial policy is starting to show results. Indian exports have grown by over 10% in the past three years. This permitted them to build-up international reserves despite higher food imports after the drought. China, on the other hand, appears determined to continue restructuring its economy. China has moved to increase individual enterprise and reduce government intervention in the production process. In 1987, China had a 9.4% GNP growth with a moderate inflation of 7.5%.

3.4.4.3.2 Prospects for Growth

a) The Foreign Debt Burden

The external debt drag remains a major problem and has often been regarded as a source of slower growth in the medium-term. Last year, the debt service ratio was recorded at 48%. The ratio of interest payments to exports was 24.2%. This year, CRC estimated the debt service ratio and the interest-payment-to-export ratio to be lower at 39.6% and 16%, respectively. Hence, although the absolute level of external debt is increasing, the Philippines's capability to service our debt is also improving. If merchandise exports can grow at a steady rate of 15.5% in the next five years, the downward trend in debt burden indicators will prevail. Using CRC's figures again, the average debt service ratio from 1988-92 will be 30.2%. Average interest-payments-to-export ratio will remain at 16%. (Figures 21 & 22)

The recent furor in Congress about the very large allocation to debt servicing is exaggerated. The 40%-of-budget figure which is always quoted in various reports is actually debt servicing for both local and foreign debt. Approximately one-half of the Philippine government's debt is to local commercial banks. Hence, the external debt burden does not eat as much money as the 40% rate would imply. Furthermore, foreign creditor banks have always been pictured as villains in the debt issue. It is enlightening to note that the largest commercial bank holder of Philippine debt is the Philippine National Bank. This happened because PNB has been buying Philippine debt papers under the debt-equity conversion scheme of the Central Bank.

Nevertheless, foreign debt remains a problem because of the need to generate enough dollars to service them. Debt servicing may tighten the allocation of resources for domestic uses. But the debt burden is not an excuse for below-average growth performance in the medium-term.

b) Industrial Performance

As discussed earlier in this section, industry is targetted to grow at 9.1% in the medium-term. This is a far cry from the -0.47% average growth in the past eight years. The government target is attainable given present trends. But there are also some factors which could eventually determine the performance of each industry within the manufacturing sector. These factors are summarized in the Appendix 2.

c) Agricultural Production

Despite the sluggish growth in the agricultural sector(average annual growth of 4% for about 2 decades), agricultural growth and rural development remains the key towards self-sustaining development for the country. This is by virtue of the fact that it is this sector that employs about 50% of the labor force and contributes 30% to total production and 35% of merchandise exports. The capacity of the economy to generate internal demand depends on the economic situation in the rural areas.

The Comprehensive Agrarian Reform Program(CARP) which was signed only this year is the centerpiece program for rural development. Despite its flaws, it signifies a serious attempt to redress inequalities. The land reform program is not expected to affect to a significant extent the output in basic crops, i.e. palay, corn and coconut, since most of these are operated by small farmers, with farm sizes falling below the retention limits. For that matter, the recent deferment in the implementation of certain provisions in the CARP, allowing for a 10-year reprieve on commercial crops, puts the situation back to status quo. Over the next five years, the livestock and poultry industries, high-value exports such as prawns, processed vegetable and fruits, coffee, cocoa, and spices appear to have the greatest potential for increasing farm incomes and employment, generate export earnings and conserve foreign exchange through import replacement. Quick yields in these areas will attract investments, even with the 10 year grace period.

FIGURE 21

DEBT SERVICE BURDEN

1970-1987

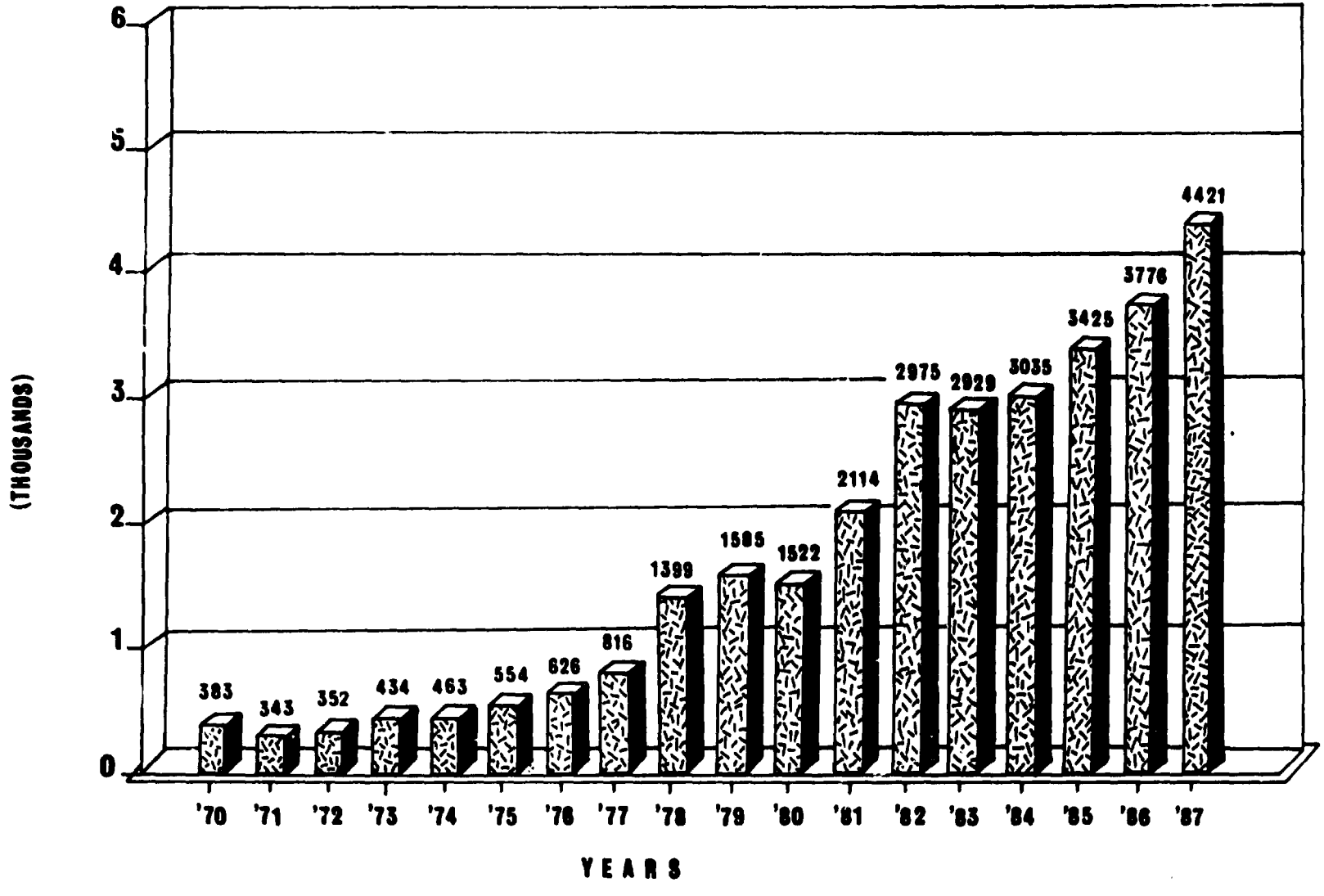
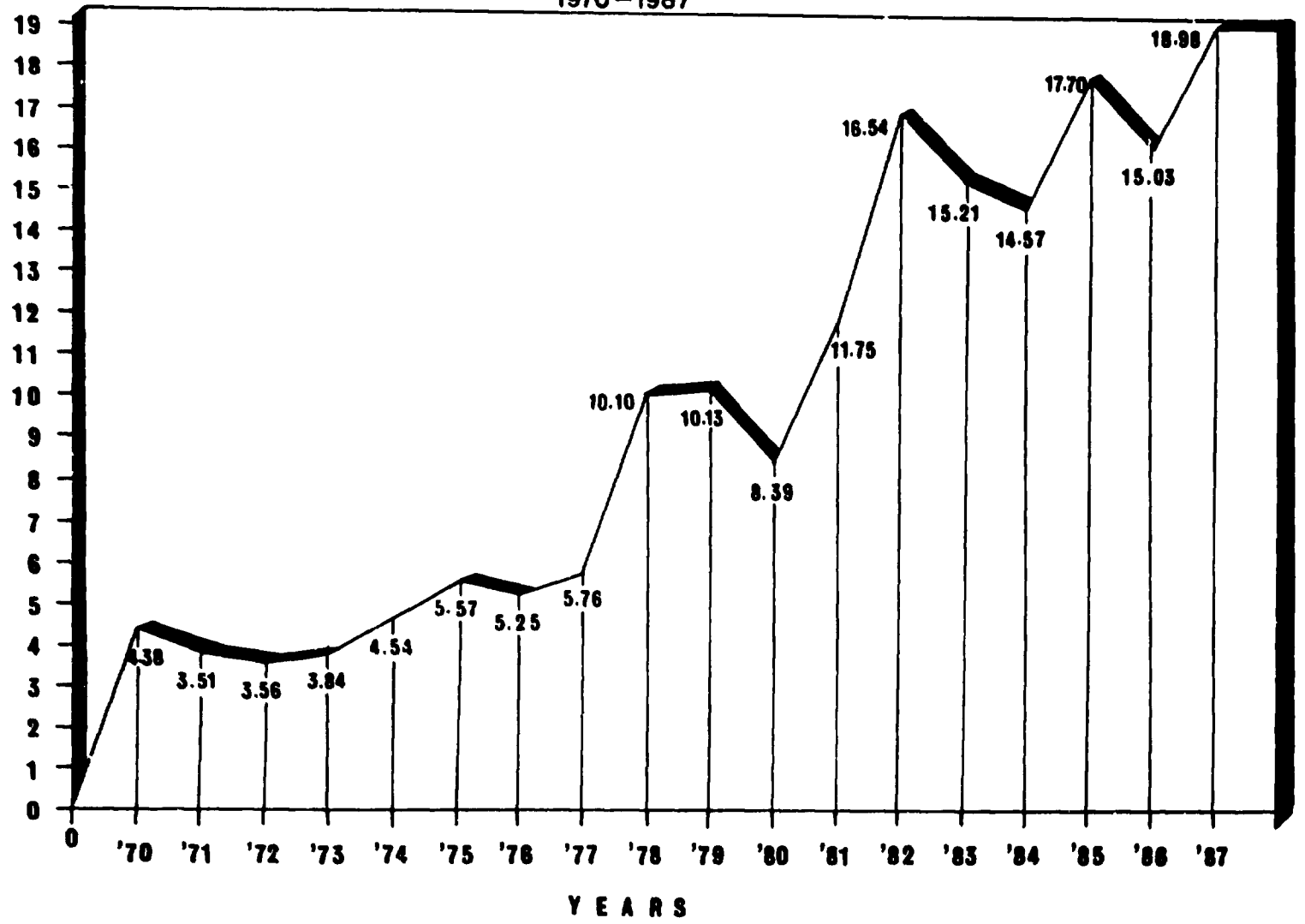


FIGURE 22

DEBT SERVICE RATIO

1970–1987



Aquaculture remains the most bouyant sector. A slowdown of an annual average growth of 3% is expected for this 10-year reprieve, but long term growth projection of 4% is expected to realized after the 10 year period. Incentives for private sector investments in these areas as well as in storage and processing facilities would enhance productivity and profitability in this sector.

d) Construction

In the revised medium-term targets of NEDA, construction activity is expected to lead over-all investment activity with an average growth of 17.4% for private construction and 14.6% for public infrastructure spending. We support the argument that private construction activity will remain robust in the next five years. The highest growth rate of approximately 20% will be reached in 1989 after which private construction spending will slowly decelerate to a growth of 13-15% by 1992. This is due to the limited absorptive capacity of the market for construction spending. There are, however, some downside risks in this outlook. First, there is an upward pressure on the prices of construction materials. The average wholesale price index(WPI) of eight selected construction materials reached 395.63 index points in July, up by 11.15% in the same month last year. Second, there is a shortage of materials like steel and cement. And third, in the public sector, procedural red tape and low fund utilization for public construction projects will create a drag on total construction growth.

e) The Energy Scenario

The over-all power situation in the country last year was generally stable. Existing plants met the additional demand from a growing economy. For this year, however, the demand-supply condition may be tight. A study by the Center for Research and Communication showed that the critical area in terms of power condition is the Luzon grid. At least in 1988, a surplus of 0.7 - 1.2 B gwh of electricity is still expected. This estimate, however, did not allow for systems loss and maintenance. If one plant breaks down, power rationing may be the only alternative. While it may be true that part of Napocor's P68B expansion program for the next five years are two gas turbines (capacity of 250 mw each), these plants will not be operational until the second half of 1989. Hence, by 1989, an energy shortage of 0.5 - 1.7 B gwh in the Luzon grid is expected. As pointed out earlier, the industrial sector will most likely be given preference in power allocation at the expense of residential areas.

A proposal submitted to the government by the Manila Electric Company(MERALCO), would lower industrial power rates if approved. The proposal calls for a two-year phase-out of subsidy to small-users and a reduction of subsidy burden for industrial users from 58 centavos per kilowatt hour to 20 centavos. The present set-up have industrial users subsidizing small electric user (those with consumption below 150 kwh). This may account for the lowest average residential rates(P98 per kwh) enjoyed in areas covered by the Meralco, compared to other electric utilities in Asia(Appendix 1c). A similar comparison with industrial use, showed Metro Manila to have the second highest industrial rates(P1.90 per kwh). While recent power rate cuts have occurred, latest figures place electricity cost in the country to be 1.4 to 2.33 times those of our Asean neighbors.

3.4.4.4.3 Conclusion

Growth is not an issue in the next five years. A more relevant question now is whether growth will be sufficiently distributed to cause a general increase in people's welfare. The Medium Term Plan calls for the creation of about one million jobs annually, and a reduction of the number of families below poverty line from 59% in 1985 to 45% in 1992. This is important not only for equity considerations but also for the continued stability of the economy. A widening gap between income classes will create social tension which might, in the medium-term, prove to be a greater obstacle to economic growth.

APPENDIX I

Comparative Asian Statistics

1

A. Selected Indicators

	GNP per Capita 1986 (in US$)	Growth rate (in percent)	Inflation Rate (in percent) 1965-80	1980-86
Malaysia	1830	4.3	4.9	1.4
Thailand	810	4	6.8	3
India	290	1.8	7.6	7.8
Philippines	560	1.9	11.7	10.2

2

B. Inflation

Average % annual increase in consumer price indices

	1980-1983	1983-1986	1987	1988	1989
Hong Kong	13.3	6	5.5	7.5	4.5
Singapore	6.9	0.7	0.5	1.5	1
South Korea	19.1	2.6	3.2	6.5	4.5
Taiwan	12.8	0.5	0.6	2.5	1.5
Indonesia	13.4	8.2	9.3	8.5	9
Malaysia	7.4	2.2	1.1	2.5	2
Philippines	13.8	21.1	3.8	10.5	7.5
Thailand	12.6	2.2	2.5	5.5	4.5
China	4	5.9	7.3	9.5	7.5
India	10.8	8.6	8.8	10.5	8.5
Weighted average	10.4	5.8	5.9	8	8.2

3

C. Power Costs

	Average Residential Rates (P/kwh)	Average Industrial Rates (P/kwh)
MERALCO (Philippines)	0.98	1.9
TAIPOWER(Taiwan)	1.4	1.2
MEA (Thailand)	1.45	1.23
PUB (Singapore)	1.6	1.26
CLCPCO(Hongkong)	1.61	1.4
KELECCO (Korea)	1.7	1.26
NEA/B (Malaysia)	1.7	1.3
PULN (Indonesia)	1.9	1.3
KEPCO (Japan)	2.92	2.3

Sources: 1/ The Manila Chronicle, Sept. 19, 1988, p. 18
2/ The Manila Chronicle, July 19, 1988, p. 18
3/ Business Day, January 19, 1987

APPENDIX 2

Growth Factors	Negative Factors
CONSUMER GOODS INDUSTRIES	
WEARING APPAREL	
Large scale training programs to upgrade skill levels.	Requires more raw material support from the textile industry.
Bilateral trade agreement with the US which covers a five-year period up to the end of December 1991.	
Abolition of the polyester monopoly by lowering tariff rates on polyester fiber from 30% to 20%.	
Income tax holidays (for 3 to 4 years) for firms exporting to non-quota countries.	
Delisting of Taiwan, Hongkong, Singapore, and South Korea from the US's GSP.	
FURNITURES AND FIXTURES	
Gaining good reputation in terms of quality and design.	Deteriorating local supply of rattan.
Relocation of firms from Asian newly industrialized countries (NICs) to other countries in Asia which still enjoy GSP status.	Indonesia's ban on its rattan exports by 1990 It is also an emerging competitor in rattan furniture.
INTERMEDIATE GOODS INDUSTRIES	
TEXTILES	
Expanding market as it rides on the robust garments export business.	Import liberalization.
The textile modernization program will allow textile firms to expand and modernize their facilities.	
Government incentives (e.g., advance tax credit scheme) have made local fabrics attractive to garment exporters.	
Lower production costs due to tariff reduction on major inputs.	

APPENDIX 2

Growth Factors	Negative Factors
CONSUMER GOODS INDUSTRIES	
FOOD	
Aquaculture exports will spur growth when the US, Japanese, and European markets are vigorously pursued. Also, sugarlands are being converted into aquaculture pons due to depressed world sugar prices.	Stiff competition from other Asian countries -Thailand on processed fruits and vegetables -Indonesia/Malaysia on prawns
Drought in the US may increase demand for sugar in the short term.	Farm subsidies to US and EEC farmers: indirectly subsidizing their poultry and swine production.
Exports financing rates have declined.	Implementation of CARP may: -discourage large-scale ventures -affect practice of intercropping
Increasing per capita consumption in the US and Europe augurs well for processed fruits and vegetables.	Increasing production costs (e.g., tin cans, sugar).
Improvement in "farm to market" roads.	
BEVERAGES	
Easing of raw material imports	Highly import-dependent.
	Oligopolistic markets.
	Stiff competition in softdrink and beer markets.
TOBACCO	
Improved purchasing power.	Strong anti-smoking campaign, both locally and worldwide. Pending bill to ban the advertising of tobacco products.
	Lack of government support: slow disbursement of allocated funds for the industry.
FOOTWEAR AND LEATHER GOODS	
Inexpensive and skilled labor force.	Lack of quality and cheap raw materials; obsolete equipments.
Taiwan and South Korea's exports are becoming more expensive due to appreciating currencies.	Lack of organization among a large number of small firms.
	Large orders for exports can't be met.

APPENDIX 2

Growth Factors	Negative Factors
CONSUMER GOODS INDUSTRIES	
WOOD	
Availability of loan packages for reforestation program.	Peace and order situation in plantation areas.
The industry is one of the preferred investment areas under the 1988 Investment Priority Program.	Inadequate infrastructure and port facilities Dismal reforestation accomplishment.
High export potential of processed wood products.	
PAPER	
Numerous applications as a packaging material.	Obsolete machinery.
PRINTING AND PUBLISHING	
Large demand for high-quality books and commercial jobs, both here and abroad.	Only a number of firms can meet high-quality set by the export market.
RUBBER	
Availability of raw natural rubber.	Stiff competition from imports.
Broad resurgence of forward markets (e.g., auto vehicles).	High tariff on imported raw materials (synthetic rubber and steel cord).
Local tire manufacturers' investment of P700 million for retooling and modernization of its plants in the next 2 to 3 years.	
CHEMICALS	
Increasing range of indigenous raw materials (e.g., cocochemicals) as inputs to consumer chemicals.	Obsolete manufacturing facilities.
PETROLEUM	
Relative decline of oil prices in the medium term.	Declining utilization of indigenous energy sources

APPENDIX 2

Growth Factors	Negative Factors
CONSUMER GOODS INDUSTRIES	
NON-METALLIC MINERAL PRODUCTS	
Lifting of price controls for cement.	
Modernization program for cement plants.	
CAPITAL GOODS INDUSTRIES	
ELECTRICAL MACHINERY	
The National Telecommunication Project being undertaken by the government using fibre-optic will help the industry attain the targetted 6.4% average growth for the perio 1988-92.	The import liberalization policy of the government is detrimental to the local industry's growth.
In addition to improving telecommunication service in the rural areas is the government's electrification project.	Inability of local manufacturers to adopt to high-technology.
	Low labor productivity as a result of some obsolete equipments still being used. This results in lower quality of finished products.
The ten-year power development program of the National Power Corporation.	
Exports can substantially increase with the increase in income in US and OECD countries.	
Improved purchasing power will mean a shift in the buying preferences of consumers to higher-value appliances and consumer durables.	

APPENDIX 2

Growth Factors	Negative Factors
CONSUMER GOODS INDUSTRIES	
MACHINERY OTHER THAT ELECTRICAL	
Potential growth in the domestic market due to the industrialization thrust of the government.	Import liberalization policy of the government is detrimental to the growth of the local industry.
Need for improvement and development of machineries/equipments. R&D efforts will prove helpful.	Continued and unchecked smuggling of equipments and machineries.
ASEAN countries are potential market for equipments and machineries with the member-countries putting stress on inter-ASEAN trade.	Foreign competition, specially among ASEAN countries, in terms of exports.
	Lower labor productivity as a result of using obsolete equipments. This results in lower quality of finished products.
	Inability of local manufacturers to adopt to high-technology.
BASIC METALS	
Imports easing of certain steel products to benefit downstream products.	Increasing prices of imported steel and base metal products.
TRANSPORT EQUIPMENT	
Thrust of the motor vehicle development program to create a parts and components manufacturing industry.	Japanese carmakers monopoly of the domestic market can put pressures on prices to increase as the yen continues to appreciate.
Growing necessity for motor vehicles.	Increasing dominance of Japanese carmakers in the ASEAN region which can inhibit the putting up of intra-ASEAN automotive complementation program.
Higher income can shift buying preferences of the public to higher consumer durables.	Continued smuggling of vehicleswn and vehicle parts and components.
Existing assembly and other related facilities.	Exorbitant prices of motor vehicles
	Low assembly plant capacity utilization due to financial and other constraints and the lack of necessary raw materials producers.
	Import-dependent on major automotive components.

APPENDIX 2

	Growth Factors	Negative Factors
CONSUMER GOODS INDUSTRIES		
OTHER SUBSECTORS		
CONSTRUCTION	Robust private construction activities will prevail.	Upward pressures on construction material prices. Shortage of construction materials (e.g., steel, cement). Procedural red tape and low utilization of funds for infrastructure projects.
MINING AND QUARRYING	Increasing investmentess in mining activities.	Steady decline of world metal prices.

Source: CRC

3.5 Social Conditions

3.5.1 Labor Situation

3.5.1.1 The Status of the Labor Force

The Philippine labor force, consisting of persons who are 15 years and above and are willing to work, has grown at an annual rate of 4.9% since 1980 (SGV, 1988). Although labor force participation rate grew from 59.8% in 1980 to 63.4 in 1985, unemployment rate also gradually increased from 5% in 1980 to 7.1% in 1985 (Table 51)

Table 51
Labor Force Status, 1980-1985

Indicators	1980	1981	1982	1983	1984	1985
Working Age Population (000)	28,967	29,847	30,748	31,676	32,679	33,646
Labor Force (000)	17,308	18,422	18,473	20,310	21,180	21,318
Labor Force Participation Rate (%)	59.8	61.7	60.1	64.1	64.2	63.4
Employed Persons (000)	16,434	17,452	17,371	19,212	19,632	19,801
Unemployed Persons (000)	874	970	1,102	1,099	1,548	1,517
Unemployment Rate (%)	5.0	5.3	6.2	5.4	7.3	7.1
Underemployed Persons (000)	3,437	4,178	4,438	5,732	7,149	4,391
Underemployment Rate (%)	20.9	24.0	25.5	29.8	36.4	22.2

Source : NCSO as cited in UNICEF, 1987

From 1986 to 1987, the labor force grew by 5.6 % while the number of persons employed increased by 6.3%. (Table 52) there was a rise in the labor force participation rate, from 63.8% in 1986 to 65.5% in 1987. During this period, women's participation in the labor market rose from 46.4% in 1986 to 48.1% in 1987. Labor force participation rate among males also increased from 81.6% to 83.1%.

Table 52
Employment Indicators, 1986-1987

	1986	1987	Growth Rate
Labor Force (000)	21,368	22,568	5.6
Employed (000)	18,855	20,050	6.3
Unemployment rate (%)	11.8	11.2	-0.6
Metro Manila	25.8	21.8	-4.0
Outside Metro Manila	9.7	9.7	0
Underemployment rate (%)	21.6	20.3	-5.6
Urban	21.6	20.3	-1.6
Rural	42.8	41.1	-1.7

Source: NCSO as cited in Philippine Developement Report, 1987

Agriculture remained the country's major employer, absorbing 48.6% of total number of employed persons. The services sector absorbed 37.4 % of those employed, while the industry sector was able to absorb only 14.0% (Philippine Development Report, 1987). See also Figure 23.

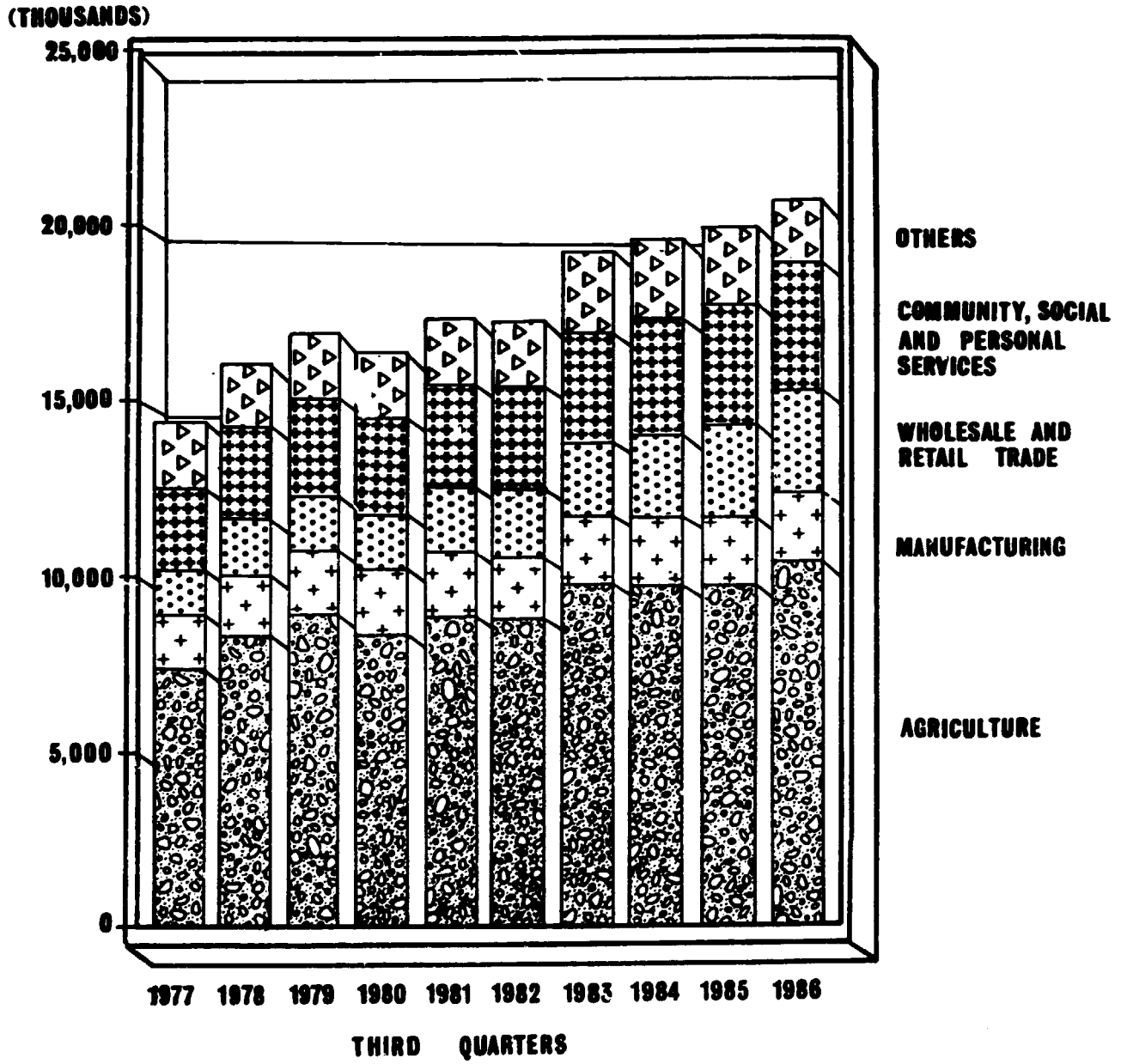
3.5.1.2 The Problem of Unemployment

Although the 1987 unemployment rate of 11.2% was still an improvement from the 11.8% recorded in 1987, this figure is still more than double the unemployment rate of 5% recorded in 1980. In terms of absolute numbers, the unemployment rate of 11.2% translate to 2.5 million individuals who are willing to work but could not find jobs.

The unemployment rate in Metro Manila for 1986 and 1987 was greater than the national unemployment rate for either year. While there was a decrease of 4% in the unemployment rate in Metro Manila from 1986 to 1987, there was no change in the unemployment status in places outside of Metro Manila.

FIGURE 23

EMPLOYED PERSONS BY MAJOR INDUSTRY GROUP: 1977 TO 1986



In April, 1988, the National Statistics Office registered an unemployment rate of 13.4% a figure higher than the rate recorded in 1987 (Busines Star, October 9, 1988). The high rate of unemployment was traced to several factors among which include 1) entry of new university graduates into the labor force, 2)higher incidence of fighting in rebel-infested regions causing the disrupted operations of major business, and 3) seasonal manpower recruitment of some agri-business industries.

3.5.1.3 Underemployment

Labor underutilization as measured by the underemployment rate is a more serious problem considering that 6.7 million or one-third of the total number of employed persons worked for less than 40 hours per week. Of the 6.7 million underemployed in 1987, 10.6% worked for less than 20 hours, 10.1% worked for 20-29 hours and 13% worked for 30-39 hours (Philippine Development Report, 1987). Underemployment was more acute in rural areas than urban areas.

3.5.1.4 Workers' Income

To ameliorate the living conditions of workers, national policy-makers instituted adjustments in the legislated maximum wages. These changes are shown in Table 53.

Table 53
Legislated Daily Minimum Wage By Broad Sector, 1980-87 (in Pesos)

Period	Non-Agricultural		Agriculture	
	NCR	Areas Outside NCR	Plantation	Non-Plantation
1980	29.85	28.76	24.70	18.67
1981	31.82	30.74	26.18	19.65
1982	31.82	30.74	26.18	19.65
1983				
January June	31.82	30.74	26.18	19.65
July-September	34.40	33.32	27.75	20.73
October	35.40	34.32	27.75	21.73
November	39.49	38.40	32.42	23.81
December	42.07	40.99	34.42	25.90
1985				
January-April	42.07	40.99	34.42	25.90
May	43.67	42.58	35.75	26.75
June-October	51.92	50.03	42.50	32.00
November-December	57.00	56.00	46.65	35.65

1985 January-December	57.00	56.00	46.65	35.65
1986	57.08	56.00	44.67	35.67
1987	58.27	57.24	47.67	36.49

Source : National Wages Council as cited in UNICEF, 1987 (for 1980-85 data) and Philippine Development Report 1988 (for 1986-1987 data).

Despite the increase in the daily minimum wage, real wages have deteriorated. The legislated real wage rate is derived by computing the total legislated money wage (the sum of the daily minimum wage, cost of living allowance and the daily equivalent of the 13th month pay) and the consumer price index (CPI). Since this ratio relates to the changes in the general prices of consumer goods and services normally purchased by an ordinary wage-earner to the corresponding changes in the nominal wage rate or money wage, it provides and measure of the average worker's real earning capacity. (Business Star, August 22,1988). Table 54 shows the real legislated wages in 1980-1987, while Table 55 shows the real legislated wages in Metro Manila only.

Table 54
Real Legislated Wages, 1980-1987
(in Pesos at 1978 Prices)

Period	Non-Agriculture		Agriculture	
	NCR	Areas Outside NCR	Plantation	Non-Plantation
1980	21.32	21.05	18.08	13.67
1981	20.38	20.01	17.04	12.79
1982	18.07	17.81	15.17	11.38
1983	17.52	17.48	14.51	11.03
1984	16.63	16.60	13.89	10.48
1985	16.62	15.88	13.23	10.11
1986	15.41	15.90	13.25	10.12
1987	14.73	15.74	13.11	10.04

Source: NCSO, NAtional Wages Council as cited in UNICEF, 1987 (for 1980-85 data) and Philippine Development Report, 1988 (for 1986-87 data)

Table 55
REAL LEGISLATED WAGES IN METRO MANILA
January 1986 to July 1988
(in pesos at 1978 Prices)

	1988	1987	1986
January	16.61	15.02	15.47
February	16.38	14.86	15.45
March	16.29	14.79	15.39
April	15.26	14.80	15.54
May	14.88	14.91	15.58
June	14.62	14.66	15.61
July	14.56	14.52	15.48
August		14.52	15.42
September		14.27	15.39
October		14.37	15.28
November		14.36	15.22
December		16.81	15.07

Source : National Wages Council

The decline of real wages beginning January, 1988 was attributed to the steady rise in consumer prices which brought higher monthly inflation rates compared to the 1987 levels. The inflation rate in Metro Manila from January to July 1988 was 10.4% up by 5.02% from the 5.39% average for the same period in 1987. This resulted in real wages declining by an average of 1.99% during the seven month period of 1988 (Business Star, August 22, 1988).

3.5.1.2 Rules Governing Hours of Work

Added to the increase in daily minimum wages, the government protects the welfare of the employed through a number of labor and social legislations among which include laws governing hours of work (SGV, 1988).

According to the Labor Code, an employee may be required to work for only eight hours a day or 48 hours a week at his regular rate of pay. Additional hours of work must be paid for at a rate of at least 125% of the employees regular rate. This law applies to all employees except government employees, managerial employees, field personnel, domestic help, those in the personal services of another, workers paid per piece and workers who are members of the family of the employees and dependent on him for support.

Workers are guaranteed a 24-consecutive hour rest period for every six consecutive normal work days. An employee required to work on his scheduled rest day or on special holidays must be paid at least 130% of his regular rate. If work is performed in a special holiday that falls on the scheduled rest day, the compensation should be at least 150% of the regular rate. A worker is paid his regular daily wage during unworked regular holidays. If he works on a regular holiday, he will get a compensation equivalent to 200% of his regular rate. Overtime work on such regular holidays must be paid at a rate of 130% of the rate of work in such holiday.

Night shift employees must be paid a differential of not less than 10% of the regular wage for work performed between 10:00 PM and 6:00 AM.

3.5.1.3 Social Security and Insurance Benefits

The funds for the social security and insurance benefits of employed individuals in the Philippines are managed by the Government Services Insurance System (GSIS) for those employed by the National Government and its political subdivisions and instrumentalities, and the Social Security System (SSS) for those who are employed by private companies or are self-employed.

3.5.1.3.1 The Social Security System

Coverage under the Social Securities System was initially limited to private companies with at least 50 employees. Today, all private companies with at least one employee are covered. Filipino workers employed by foreign governments or international organizations can be covered on a voluntary basis (Primer on the SSS) The funds of the SSS come from monthly contributions from employer and employee.

TABLE 56

Monthly Contribution to the Social Security System

Salary Bracket	Range of Compensation	Monthly Credit	Monthly Contribution Employer	Employee	Total
I	1- 149.99	P 125.00	P 6.40	P 4.10	P 10.50
II	150- 199.99	175.00	9.00	5.70	14.70
III	200- 249.99	225.00	11.40	7.50	18.90
IV	250- 349.99	300.00	15.20	10.00	25.20
VI	350- 499.99	425.00	21.60	14.10	35.70
VI	500- 699.99	600.00	30.40	20.00	50.40
VII	700- 899.99	800.00	40.50	26.70	67.20
VIII	900-1,099.99	1,000.00	50.70	33.30	84.00
IX	1,100-1,399.99	1,250.00	63.30	41.70	105.00
X	1.400-1,749.99	1,500.00	76.00	50.00	126.00
XI	1,760-2,249.99	2,000.00	101.30	66.70	168.00
XII	2,250-2,749.99	2,500.00	126.00	83.30	210.00
XIII	2,750-over	3,000.00	152.00	100.00	252.00

Source: Primer on the SSS

3.5.1.3.2 The Government Service Insurance System

The law provides that all permanent employees below sixty years of age, shall upon employment, be compulsary members of the Government Service Insurance System (GSIS) Monthly contributions from employee and employer at specified rates (Table 57) are sources of the funds managed by the GSIS.

Table 57
Monthly Contribution to the Government Service Insurance System

Range of Compensation		Percentage of Monthly Compensation Payable by	
		Employee	Employer
I	P200 or less	7.5%	10.5%
II	Over P200 up to P3,000	8.5%	9.5%
III	Over P3,000		
	First P3,000	8.5%	9.5%
	In excess of P3,000	3%	9.5%

Source : Information Primer on Presidential Decree 1146 (Revised Government Service Insurance Act of 1977).

3.5.1.3.3 Benefits Under the SSS and GSIS

Employees which are covered by either system enjoy the following benefits:

1. Compulsory health insurance through the MEDICARE.

2. Employee's compensation in case of employment-connected injury, sickness, disability or death.

3. Social security benefits which include sickness benfit, disability benefit, and death benefit.

1 Health Insurance

The Medicare Program is a health insurance program covering both employees and their dependents. Medicare benefits include a) hospital accommodations for a maximum of 45 days per year, b) allowances for drugs and laboratory examinations, c) professional consultations, d) surgical operations and e) vasectomy or tubal ligation. The schedule of benefits for GSIS and SSS members are shown in Table 58 where the numbers 1, 2, 3 refer to primary hospital, secondary hospital and tertialy hospital respectively.

Table 58
SCHEDULE OF BENEFITS FOR MEDICARE CLIENTS

SERVICES1/	SSS			GSIS		
	1	2	3	1	2	3
Room-Board/Day	₱ 30	₱ 35	₱ 45	₱ 20	₱ 24	₱ 33
Drugs/Confinement						
Ordinary cases	175	200	300	150	175	250
Serious cases	375	400	500	250	300	350
Laboratories/X-ray/ Confinement						
Ordinary cases	75	150	350	50	75	100
Serious cases	125	200	500	100	125	250

Source : Intercare, 1987

1/ Medical and Dental practitioners fee of ₱15/visit not to exceed ₱200 for ordinary cases and ₱300 for serious ones

At present, alternative mechanisms for increasing health insurance coverage and lowering out-of-pocket hospital costs to patients are being developed. One of these alternative systems is a tie-up between Medicare and private health insurance companies whereby regular members of GSIS or SSS now covered under Program I are given the option to avail themselves of the program of private health insurance companies or remain under the regular Program I. A member who chooses to transfer to Medicare coverage to this experiment will be provided with out-patient care services and in-patient care services at rates higher than those in hospitals affiliated with private insurance company. At any time, a Medicare member can return to the regular program (Philippine Daily Inquirer, August 9, 1988; Manila Bulletin, July 1, 1988).

2 Employees Compensation Program

The Employees Compensation Program aims to help workers and their dependents in the event of employment-connected injury, sickness, disability or death, promptly receive meaningful benefits. Contributions to the Program are paid in their entirety by the employer. The contribution is equivalent to one percent of the employee's salary (Primer on the Employees Compensation and State Insurance Fund).

Under this Program, the compensation which is payable to the employee or his beneficiaries shall be in the following forms:

A. Cash income for temporary total disability, permanent partial disability, permanent total disability or death

B. Medical and/or related services for work-connected injury or sickness

C. Rehabilitation services to permanently disabled employees

3 Social Security Benefits

The social security benefits provided the employees are shown in Table 59.

TABLE 59
SOCIAL SECURITY BENEFITS

	Amount of Benefit	
	S S S	G S I S
1. Maternity Benefits	Maximum of ₱4,500	Paid leave of absence equivalent to employees' two-month salary
2. Sickness Benefits	Maximum of ₱75/day	Maximum of ₱20/day
3. Death Benefits	Maximum monthly pension of ₱400 paid to beneficiaries or lump-sum granted to beneficiaries	Maximum of ₱500
5. Funeral Benefits	₱4,000	₱1,000

Source: Information Primer on Presidential Decree 1146 (Revised Government Service Insurance Act of 1977) and Primer on the SSS

3.5.1.4 Labor Relations

As a general rule, employees in commercial, industrial and agricultural enterprises and in religious, charitable, medical or educational organizations, have the right to form, join or assist labor organizations for purposes of collective bargaining.

Legitimate labor organizations have the right to strike and picket while employees have the right to lock-out.

In the case of strikes, the law provides that a strike decision must be approved by a majority of the total union membership through secret ballot. A lock-out, on the other hand, may be approved by a majority of the board of directors of the employer corporation or of the partners in a partnership. If a deadlock occurs in the bargaining, a 30-day strike or lock-out notice is required to be filed with the Labor Department. A 15-day notice is required for strikes due to unfair labor practices. For industries engaged in energy generation or distribution, public utilities, banks, hospital and industries in export processing zones, the Labor Department can assume jurisdiction over a dispute , decide on it, or certify it to the National Labor Relations Commission. At anytime, however, the President can intervene and exercise jurisdiction over any labor dispute affecting the national interest.

Quite unlike the past years where the labor sector was very restive, the present year has witnessed the tapering off of strikes. The number of actual strikes cases handled by the Department of Labor and Employment (DOLE) dropped significantly by 53.29% as of the end of July 1988 from a level registered a year ago. Actual strikes handled totaled 291 from January to July 1988, from 623 in the same period in 1987. Similarly, strike notice filed with the labor department as of July 1988 numbered 2,251 down 20.35% from the 2,826 filed the previous year (Business Star, August 24, 1988).

Table 60
STRIKE NOTICES AND ACTUAL STRIKES
(January 1987 to July 1988)

	Strike notices	Actual strikes
1988[1/]		
January	318	45
February	288	43
March	320	28
April	308	42
May	325	39
June	346	40
July	346	54
T o t a l	2,251	291
1987		
January	342	95
February	385	96
March	439	106
April	443	84
May	425	97
June	395	81
July	397	64
Subtotal	2,826	623
August	398	62
September	437	79
October	446	69
November	394	55
December	386	51
Subtotal	2,061	316
Grand Total for 1987	4,887	939

1/ preliminary

Source: Bureau of Labor and Employment Statistics (BLES)

The decrease in the number of strikes has been attributed to a generally improving labor situation in the country. The government has also introduced preventive mediation wherein the employees and management can seek the conciliation and mediation services of the newly-created National Conciliation and Mediation Board instead of filing a strike notice or declaring a strike or lock out (Business Star, August 8, 1988).

3.5.1.5 Overseas Contract Workers

The limited employment opportunities in the Philippines have driven many Filipinos to seek employment in other countries. The number of overseas workers has increased from 36,035 in 1975 to 414,461 in 1986 (Table 61).

Table 61

OVERSEAS CONTRACT WORKERS 1975-1986

Year	Total	Land-based	Sea-based
1975	36,035	12,501	23,534
1976	47,835	19,221	28,614
1977	70,375	36,676	33,699
1978	88,241	50,961	37,280
1979	137,337	92,519	44,818
1980	214,590	157,394	57,196
1981	266,243	210,936	55,307
1982	314,284	250,115	64,169
1983	434,207	380,263	53,944
1984	425,081	371,065	54,016
1985	389,200	337,754	51,446
1986	414,461	357,687	56.774

Source: Philippine Overseas Employment Administration as cited in the Philippine Statistical Yearbook 1987

Majority among the Land-based overseas contract workers are production process workers, transport equipment operators and laborers (Figure 24).

In terms of place of employment, the Middle East remains the biggest employer of Filipino contract workers (Figure 25).

3.5.2 Family and Family Income

3.5.2.1 Income trends

Over-all distribution of family income in the Philippines for the period 1961 to 1971 had undergone a very slight improvement. The bulk of the nation's income remained concentrated in the hands of the higher income groups (Table 62)

Table 62
Percent Share of the Total Income by Broader Groups of Income Recipients: 1961, 1965, 1971, 1975 and 1985

	Percent share of the total income				
Income recipient	1961	1965	1971	1975	1985
Top 10 percent	41.0	40.1	37.1	38.8	36.4
Top 20 percent	56.5	55.5	54.0	53.3	52.1
Top 50 percent	82.4	82.7	82.4	79.5	79.7
Lowest 50 percent	17.6	17.3	17.6	20.5	20.3
Lowest 20 percent	4.2	3.5	3.6	5.5	5.2
Lowest 10 percent	1.5	1.1	1.2	2.1	2.0

Source: Philippine Yearbook 1987

In 1985, the top ten percent income recipients shared more than one third of the total income of the country while the lowest 10% shared 2% of the total income.

FIGURE 24

NUMBER OF PROCESSED LAND-BASED CONTRACT WORKERS BY MAJOR OCCUPATIONAL GROUP: 1975 to 1986

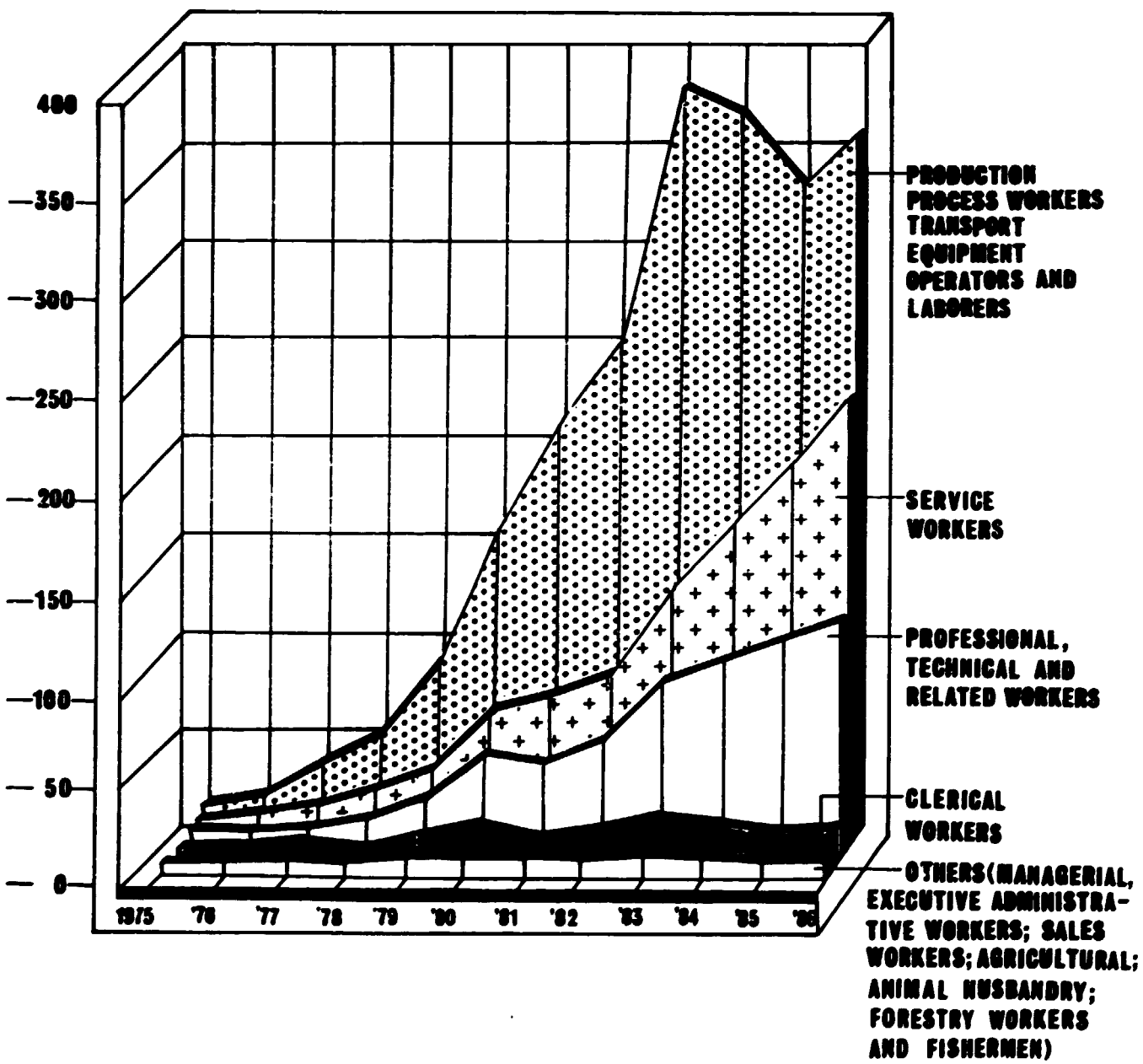
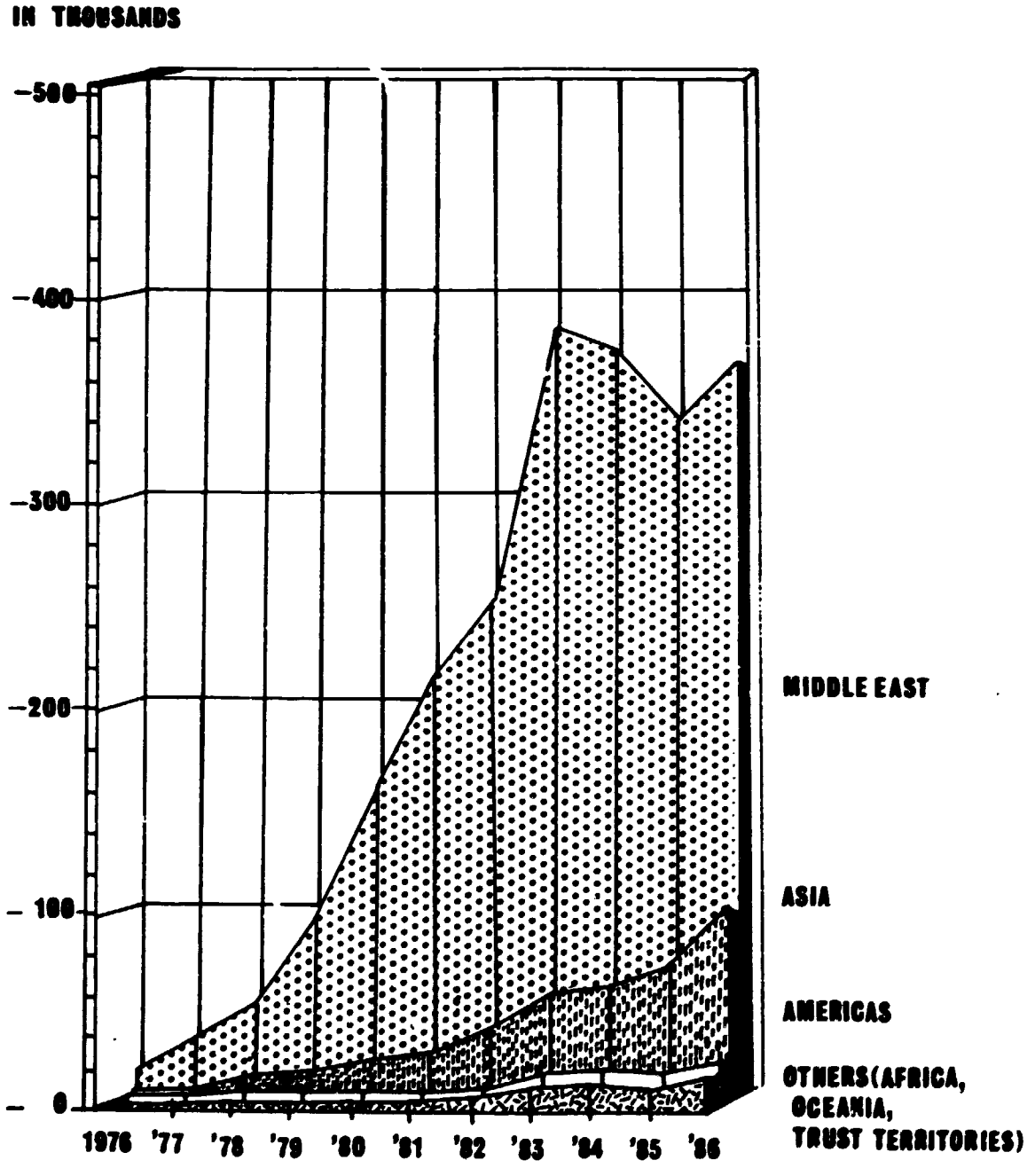


FIGURE 25

NUMBER OF PROCESSED LAND-BASED CONTRACT WORKERS BY MAJOR WORLD GROUPING: 1975 TO 1986



From 1961 to 1985, there was an actual decrease in the share of the top ten percent from 41.0% to 36.4%. The share of the lowest 10% consequently increased from 1.5 % to 2.0 % in the same period.

3.5.2.2 Income distribution by Income Class

The total number of families in 1985 reached 984,700. These families generated an income of ₱ 305,775,274 - 563.7 percent more than the 1975 income of ₱46,069,131. The average income each family would get if all income was distributed equally was ₱ 31,053 (Philippine Yearbook, 1987). Table 63 shows the percent distribution of families and total family income by income class.

Table 63
Percentage Distribution of Families and Total Family Income by Income Class: 1975 and 1985

Income Class	1985		1975	
	Families	Income	Families	Income
Total (Thousands)	9,847	₱305,775,274	6,878	₱46,069,131
Percentage total	100.0	100.0	100.0	100.0
Under ₱ 6,000	3.82	0.56	71.58	27.13
₱ 6,000 - 9,999	11.34	3.01	14.84	16.97
10,000 - 14,999	18.06	7.26	6.78	12.20
15,000 - 19,999	15.64	8.75	2.70	6.90
20,000 - 29,999	19.66	15.49	2.00	7.18
30,000 - 39,999	11.02	12.23	0.76	3.88
40,000 - 59,999	10.60	16.52	0.39[a]	2.62[a]
60,000 - 99,999	6.35	15.44	-	-
₱100,000 and over	3.51	20.73	0.95[b]	23.13[b]

[a] For income class ₱ 40,000 - ₱ 49,999

[b] For income class ₱ 50,000 and over

Source: National Statistics Office

In 1985, 20 percent of the total number of families fell under the ₱ 20,000 - ₱ 29,999 income market. This income class received the highest percentage distribution of families and contributed 15.49 % to the nation's total income.

Twenty percent of the nation's income is in the hands of only 3.5% of the population leaving the lowest group less than 1% share of the country's income.

However, it is noteworthy that the number of families earning less than ₱ 6,000 decreased from 71.58% in 1975 to 3.82% in 1985.

3.5.2.3 Major Sources of Income

Sources of income as of 1985 were classified into three major categories, namely 1) wages and salaries, 2) entrepreneurial activities, and 3) other sources.

In 1985, 40.9% of the total number of families generated their income from entrepreneurial activities (which may include crop farming and gardening; livestock and poultry raising, fishing, wholesale and retail, construction, transportation, social, recreational and personal services). An almost equal number of families (40.3%) derive their income from wages and salaries, while 18.8% depend on other sources which may include net share of crops, fruits and other agricultural products from other households, cash receipts from abroad, interest from deposits and loans, pension and retirement. Table 64 shows the total number of families by main source of income.

Table 64
Total Number of Families by Main Source of Income
(in thousands)

Source of income	1961	1965	1971	1985
Total	4,426	5,126	6,347	9,847
Wages and salaries	1,595	1,996	2,727	3,966
Percent to total	36.0	38.9	43.0	40.3
Entrepreneurial activities	2,567	2,877	3,235	4,026
Percent to total	58.1	56.1	51.0	40.9
Other sources	261	253	384	1,855
Percent to total	5.9	4.9	6.0	18.8

Source: NCSO

References

1. Business Star, October 9, 1988
2. Information Primer on Presidential Decree 1146 (Revised Government Service Insurance Act of 1977)
3. INTERCARE, Country Study on the Health Care Financing in the Philippines, 1987
4. Manila Bulletin, July 1, 1988
5. National Economic and Development Authority, Philippine Development Report, 1987.
6. National Economic and Development Authority, Philippine Statistical Yearbook 1987.
7. Philippine Daily Inquirer, August 9, 1988
8. Primer on the Social Security System
9. SGV Group, Doing Business in the Philippines, SGV and Co., Manila, 1988
10. United Nation International Children's Emergency Funds. Situation of Children and Women in the Philippines, Manila, 1987

3.5.3 Poverty

3.5.3.1 Poverty Incidence

The proportion of Filipino families living in poverty grew by 10 percentage points from 49.3 percent in 1971 to 50.3 percent in 1985. In terms of magnitude, about 5.7 million families in 1985 did not have the basic necessities in life, valued at an average of ₱ 2,382 a month in a family of six (Table 65).

Poverty in rural areas is more severe than in urban areas in 1971 and 1985. In 1985, rural poverty incidence was highest in Bicol and Western Visayas regions with more than 75% of the families living in poverty (Table 66).

Table 65
Poverty Incidence and Magnitude, 1971 and 1985

Areas	1971		1985	
	Magnitude[1/] (000 Families)	Incidence[2/] (%)	Magniture (000 Families)	Incidence (%)
Philippines	3,173	49.3	5,812	59.0
NCR	175	33.3	575	43.9
Outside NCR	2,998	50.8	5,237	61.3
Urban	533	38.4	1,362	56.1
Rural	2,465	55.6	3,875	63.3

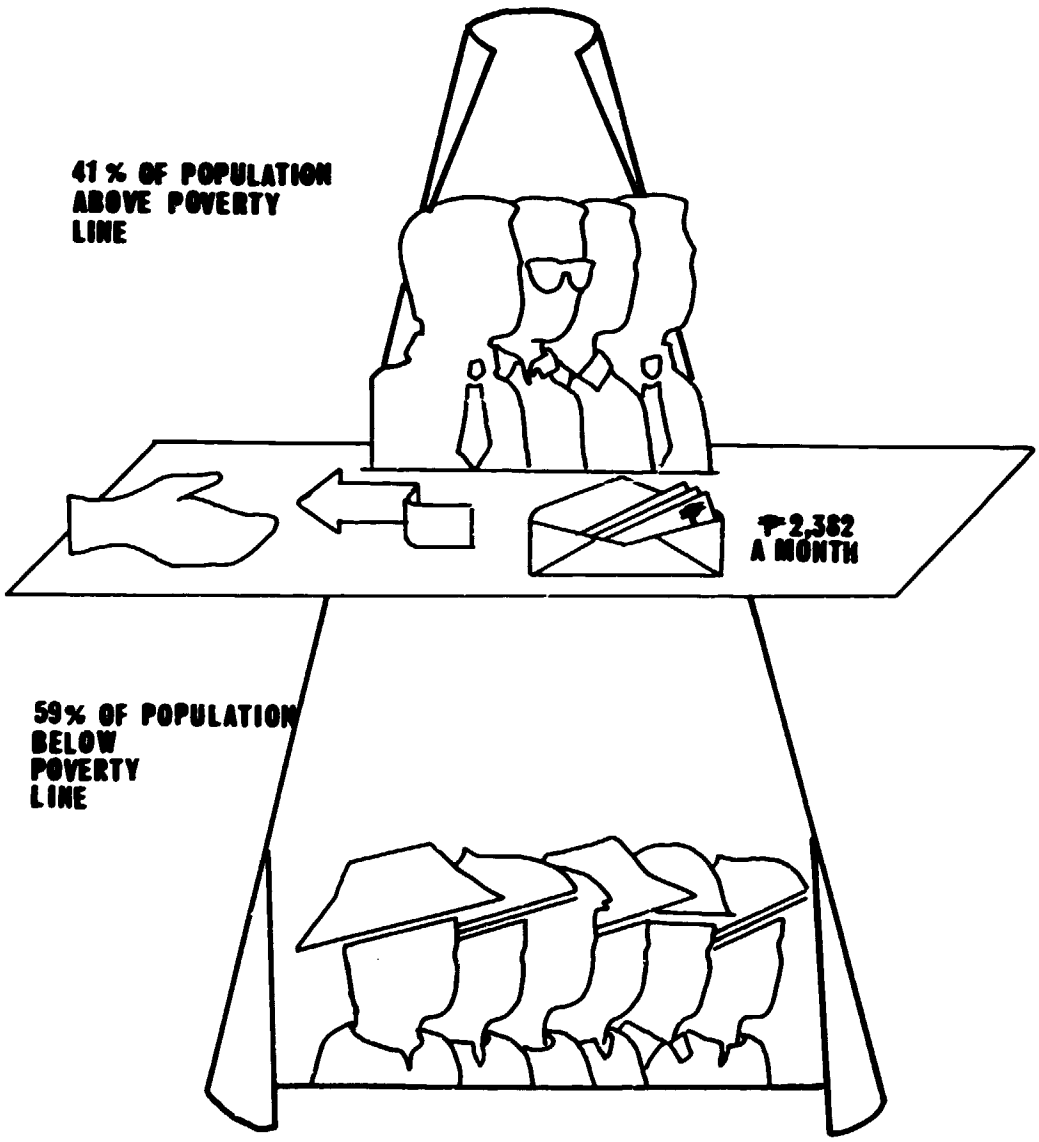
1/ Refers to the total number of families below the poverty line. The poverty lines are as follows: ₱ 2,382 in the Philippines; ₱ 3,282 in NCR; and ₱ 2,285 areas outside of NCR, with different lines in urban and rural areas of ₱ 2,912 and ₱ 2,066 respectively.

2/ Refers to the proportion of families that fall below the poverty line out of the total number of families.

Source: Medium Term Philippine Development Plan 1987-1992

FIGURE 26

DIVISION OF POPULATION ACCORDING TO FAMILY INCOME



NOTE:
EACH HUMAN FIGURE REPRESENTS
10% OF POPULATION

SOURCE: NEDA

Table 66
Regional Poverty Magnitude and Incidence, Urban-Rural Area, 1985

Region	Total Magnitude (000 families)	Total Incidence (%)	Urban Magnitude (000 families)	Urban Incidence (%)	Rural Magnitude (000 families)	Rural Incidence (%)
Philippines	5,676.6	59.3	1,875.9	52.1	3,800.7	63.7
NCR	550.5	44.1	550.5	44.1	--	--
Ilocos	364.9	52.3	89.7	56.2	275.2	51.1
Cagayan Valley	246.3	54.6	31.3	48.6	215.0	55.6
Central Luzon	420.0	44.4	178.5	45.2	241.5	43.8
Southern Tagalog	712.2	55.9	241.7	50.6	470.5	59.1
Bicol	466.0	73.2	81.3	62.3	62.3	76.0
Western Visayas	632.0	73.1	154.1	65.0	478.3	76.2
Central Visayas	530.6	68.8	142.7	58.9	387.9	73.4
Eastern Visayas	385.4	70.4	81.9	70.1	303.5	70.5
Western Mindanao	316.5	65.3	47.2	61.6	269.3	66.0
Northern Mindanao	355.4	66.2	91.7	65.7	263.7	66.3
Southern Mindanao	426.0	61.7	143.1	59.6	282.9	62.8
Central Mindanao	272.4	65.2	42.2	56.8	230.2	67.0

Source : Medium Term Philippine Development Plan, 1987 - 1992

3.5.3.2 Poverty groups by occupation of household head

The major social groups in poverty which have been interchangeably called low-income families or the assetless poor in the country include: upland farmers, lowland farmers, agricultural wage workers, sustenance fishermen and urban poor. Poverty incidence among those in the poor occupational grouping in agriculture was estimated at 53.4 percent. By 1985, poverty incidence was estimated to have grown by 10 percentage points (UNICEF, 1987).

Table 67
Poverty Groups by Occupation of Household Head, 1971

Occupation	Number of Families ('000)	Number of Poor Families ('000)	Incidence of Poverty (%)
A. Agriculture			
1. Farmer owners	1,037	504.4	48.6
2. Farmer part-owners	187	96.3	51.2
3. Farmer tenants	986	584.0	59.2
4. Farmers not specified and Tuba gatherers	286	164.8	57.6
5. Farm Laborers	287	148.8	51.9
6. Sustenance fishermen	323	173.2	53.6
7. Others in agriculture and mining	71	24.9	35.1
Total Agriculture	3,177	1,696.4	53.4

Table 67 (Con't.)

B. Non-agriculture

1. Transport and Communication Workers	360	103.5
2. Craftsmen, production workers and laborers	907	287.5
3. Services, sports and recreation workers	293	84.2
4. Sales workers	469	94.0
5. Occupation not adequately defined	589	169.1
6. Professional, administrative, clerical	552	24.3
Total non-agriculture	3,170	759.6
TOTAL	6,347	2,456.0

Source : World Bank, 1980 "Aspects of Poverty in the Philippines: A Review and Assessment" as cited in UNICEF, 1987.

References:

1. National Census & Statistics Office, Philippine Yearbook 1987

2. National Economic & Development Authority. Medium Term Philippine Development Plan 1987 -1992

3. National Economic and Development Authority, Population of the Philippines: Current Perspectives and Future Prospects, 1983.

4. National Economic and Development Authority. Mimeographed materials, 1988.

5. SGV Group, Doing Business in the Philippines. SGV & Co., Manila, 1988.

6. United Nations International Children's Emergency Fund. Situation of Children and Women in the Philippines, Manila, 1987.

7. University of the Philippines Population Institute. The Philippines: Profile, Problems, Prospects on Population and Family Planning, 1984.

3.6 Health and Epidemiology

3.6.1 General Situation

The transition from an agricultural to an industrial state has been characterized generally by improvements of health conditions along with general economic developments. In the Philippines, the number of people falling below the threshold of poverty has remained high, 59.3% of families falling below the total poverty threshold of P2382 in 1985, an increase in 10 percentage points from 49.3% in 1971, and improvements have been quite slow, despite massive infusion of financial aid from global institutions. Similarly, the country's health status has not shown major change from 1980 to 1985--except, perhaps, for an increase in cardiovascular and neoplastic diseases. A quick glance at the Philippines' health statistics confirms this:

Table 66
Vital Statistics, Philippines, 1975 and 1980-1986

	Crude + Birth Rate (per 1,000 population)	Crude + Death Rate	Total + Fertility Rate*	Infant + Mortality Rate (per 1,000 livebirths)	Maternal# Mortality Rate
1975	35.2	9.2	5.2	75.0	1.4
1980	33.7	8.7	4.7	63.2	1.1
1981	33.4	8.5	4.6	61.9	1.1
1982	33.2	8.4	4.5	60.6	1.0
1983	32.9	8.2	4.4	59.3	1.0
1984	32.5	8.1	4.4	58.0	1.0
1985	32.2	7.9	4.3	56.6	1.0
1986	31.7	7.8	4.2	55.3	1.0

*Note: Total fertility rate is the average number of children ever born per ever-married woman in the reproductive ages.

Source: + 1986 Economic and Social Indicators, National Statistical Coordination Board, Economic and Social Statistics Office
Philippine Statistical Yearbook 1987, NEDA

In the 1970s, life expectancy increased by 4.5 years from 1970 to 1975, and by 2.8 years from 1975 to 1980. From 1980 to 1985, the increase was barely 1.5 years.

The crude death rate decreased by 3 percentage points from 1970 to 1980, and by only 0.8 percentage points from 1980 to 1985.

The infant mortality rate decreased by 19 percentage points from 1970 to 1980, and by only 6.6 percentage points from 1980 to 1985. (UNICEF, 1987)

The population growth rate has stabilized at 2.6 percent per annum from 1980 to 1985. This was slightly lower than the rate of 2.75 percent from 1970 to 1980 (UNICEF, 1987), and of 3.1 percent in the '60s. At this rate, the population is projected to be 75 million by the year 2,000, from 1985's level of 55 million. The massive rural to urban migration in the last decade of this century coupled with this natural increase will exert tremendous pressure on the environment, with harmful consequences on the health conditions of the people.

The following diseases are the top ten leading causes of mortality in the Philippines, with the number of death reported, from the year 1982 up to 1987:

Table 69
LEADING CAUSES OF MORTALITY, 1982-1987

DISEASES	1982	1983	1984	1985	1986	1987
1. Pneunomia	45,373	45,686	45,971	52,888	50,621	50,928
2. Disease of the heart	36,819	28,208	31,347	36,242	39,163	28,829
3. Tuberculosis, all forms	28,309	28,208	27,999	31,650	30,604	23,500
4. Diseases of the vascular system	21,511	20,593	27,107	27,184	29,402	20,842
5. Malignant Neoplasm	16,832	15,703	17,700	18,143	18,395	10;985
6. Diarrhoea	12,735	14,964	11,553	11,516	10,839	7,998
7. Measles	7,136	6,098	7,987	8,043	6,249	-
8. Nutritional Deficiencies	6,068	7,463	6,825	7,114	6,145	1,706
9. Accident	5,863	9,712	10,445	10,070	10,348	9,716
10. Nephritis, nephrotic syndrome, and nephroses	4,470	4,262	4,916	5,470	5,273	-

---

Source: 1982-1986- Philippine Health Statistics (PHS)
1987 - DOH Annual Report

In terms of case fatalities per 100 sick people, the following were reported, covering 1982-1987:

Table 70
CASE FATALITIES PER 100 SICK PEOPLE

DISEASES	1982	1983	1984	1985	1986	1987	% DECREASE
PNEUMONIA	42.6	37	23.8	25.8	26.6	23.7	- -
DIARRHOEA	35.2	26.5	20.4	23.6	25.6	14.4	43.7
MEASLES	70.0	51.3	26.0	26.0	24.7	- -	- -
TUBERCULOSIS	- -	- -	32	28.1	27.8	15.6	43.8
HEART DISEASE	- -	- -	25.1	25.8	23.4	13.6	- -
CANCER	35.4	60.8	15.4	18.3	18.3	10.5	- -

* CASE FATALITIES RATE = NOS. OF DEATHS/ NOS. OF SICK PEOPLE

Source:Philippine Health Statistics, 1982-1986
Department of Health Annual Report, 1987

Based on the above, it can be interpreted that the Health System is reaching more people, and there is general improvement in the health profile as the indicators cited above show. It is also clear from the above table that diarrhoeal diseases and TB case fatality rates fell between 1986 to 1987; and these figures are statistically significant.

The leading causes of illness, with the number of cases reported, from the year 1982 up to 1987, follow:

Table 71
LEADING CAUSES OF MORBIDITY, 1982-1987

DISEASES	1982	1983	1984	1985	1986	1987
1. Bronchitis	280,431	352,447	606.880	586,427	602,851	725,818
2. Diarrhoeal Diseases	221,191	275,068	551,560	522,762	552,613	722,972
3. Influenza	226,237	256,534	453,926	447,550	397,715	578,514
4. Pneumonias	106,563	123,420	193,594	205,387	190,208	215,368
5. Tuberculosis, All forms	104,715	106,300	154,021	153,406	153,129	200,534
6. Malaria	40,496	55,019	107,485	121,975	124,153	135,231
7. Accidents **	-	-	84.637	96,684	105.886	133,421
8. Diseases of the Heart	-	-	70,596	70,238	78,516	80,744
9. Measles	35,989	43,684	75,290	62,959	59,375	76,232
10.Malignant Neoplasms	26,867	23,838	24,191	24,270	26,985	-

Source: 1982-1986 - Philippine Health Statistics
1987 - DOH Annual Report
** Declared notifiable diseases in 1984

The decline in communicable diseases mortality coincides with the progressive increase in deaths due to diseases of the heart and malignant neoplasms. Still, 40% of the total deaths per year is accounted for by the leading communicable diseases. (Source: Health Intelligence Service, DOH, 1985). This is often related to unsanitary environmental conditions (Situation of Children and Women in the Philippines, 1987).

The mortality attributed to communicable diseases has been aggravated even further by poor nutritional status of some segments of the Philippine society. Based on the report by Bocobo, D. L. and Bondad, M. in April 1988, the four "major forms of malnutrition in the Philippines are as follows: protein-energy malnutrition, vitamin A deficiency, iron deficiency anemia and iodine deficiency diseases. Protein-energy malnutrition is prevalent in 19.0 percent or about 2.2 million children 0-6 years old. About 3.2 percent of preschool children surveyed in 1982 were found to manifest signs and symptoms of vitamin A deficiency. Iron deficiency was prevalent in more than one half of the infants and approximately one-third of children below 12 years of age. Goiter was prevalent in 3.1 per cent of children who were covered in the same survey." In other words, one out of every five Filipino children suffers from second and third degree malnutrition. This has a very serious implication on the health of the nation as a whole, considering the fact that children comprise more than half of the total population of the Philippines with 52.8% of Filipinos less than 20 years of age; 40.0% are less than 14 years old and 19.9% less than 7 years old.

Looking at a special segment of the children population, the public elementary school children, the following data concerning the diseases affecting them were gathered:

Table 72
DISEASES AFFECTING PUBLIC ELEMENTARY SCHOOL CHILDREN, 1987-1988

Diseases	Percentage
Intestinal parasitism	87.7%
Dental caries	60.1%
Malnutrition (protein-calorie deficiency)	24.9%
Respiratory trac' infection	13.9%
Skin diseases	12.9%
Pediculosis (kuto)	10.1
Nutritional deficiency	9.4%
Minor injuries	1.6%
Otitis media	1.5%
Eye diseases	0.9%

Source: Department of Education, Culture and Sports, Publication Data, September, 1988

3.6.2 Transmissible Diseases

3.6.2.1 Diseases Controlled by Vaccination

If all diseases can be prevented through immunization and maintenance of clean environment, much money will be saved and much sufferings will be averted. Realizing this, the Department of Health and the Philippine Council for Health Research and Development (PCHRD) have been working together in giving priority to immunization programs and providing encouragement to vaccine production. As a concrete example, PCHRD has been supporting a project entitled "Pilot Manufacture of Hepatitis B Virus (HBV) Reagents and Raw Materials for Vaccine and Research Uses," (PCHRD Annual Report, 1987) while the Department of Health has been implementing the Expanded Immunization Program which has been trying to give immunization to all qualified children, considering that deaths from six immunizable diseases accounted for 12.1% of all deaths in the Philippines in 1983 (UNICEF, 1987). As a result, nowadays, diphtheria and poliomyelitis, to mention but two, are declining in significance. In 1985, however, the following were the cases and deaths attributable to diseases which are highly preventable by immunization and having a high standard of environmental sanitation:

Table 73
CASES AND DEATHS ATTRIBUTABLE TO DISEASES PREVENTABLE BY VACCINATION

	Cases	Deaths
Primary Complex (TB)	153,406	31,650
Diphtheria	1,669	316
Pertussis	19,628	45
Tetanus	3,474	1,033
Measles	62,959	8,043
Rubella		
Mumps		
Hepatitis A & B	16,022	607
Poliomyelitis	557	61
Cholera El Tor	1,096	353
Typhoid fever	15,706	1,071
Rabies		
Smallpox		
Chickenpox	3,844	10
Meningitis	2,375	472
Total	280,736	43,661

Source: Philippine Health Statistics 1985, DOH

3.6.2.2 Diseases controlled mainly by hygiene

Again, with good educational campaign programs, plus maintenance of clean environment and adequate supply of clean water, the following diseases, reported in 1985 to be the cause of quite a large number of cases and deaths, can be prevented:

Table 74
CASES AND DEATHS FROM DISEASES CONTROLLED BY HYGIENE

	Cases	Deaths
Streptococcal sore throat		3
Meningococcal infection		65
Acute rheumatic fever		25
Acute bronchitis and bronchiolitis	586,427	2,078
Pneumonia	205,387	52,888
Influenza	447,550	1,400
Diarrhoeal diseases	522,762	11,516
Helminthiasis		165
Dengue hemorrhagic fever	2,096	210
Malaria	121,975	1,166
Schistosomiasis	9,764	416
Filariasis	259	2
Food poisoning		192
Total	1,896,220	70,126

Source: Philippine Health Statistics 1985, DOH

Based on the above table, the number of deaths attributed to schistosomiasis, 416, appears to be lower than the actual number. This can be explained in two ways: (1) under-reporting, (2) the disease is not as fatal as pneumonia or myocardial infarction. It is a chronic disease that contributes much to morbidity; but since it is less fatal, its contribution to mortality is less.

To complement the malaria control program of the Department of Health, the PCHRD has been supporting projects entitled "Microbial Control of Malaria and Related Species of Mosquito Larvae in Palawan Using PG-14 Bacillus Thuringiensis" and "Experimental Infection of Mosquitoes with Malarial Parasites." To combat schistosomiasis, on the other hand, PCHRD has been supporting the project "Immunology of Schistosomiasis Japonica: Schistosoma Japonicum Antigen Preparation for Immuno-Diagnosis and Research Application" together with the project "Mass Treatment of Schistosomiasis in Leyte." (PCHRD Annual Report, 1987). From these projects, cost-effective diagnosis and treatment of schistosomiasis patients will be developed.

3.6.3. Carciovascular Diseases

Examining closely the list of disease entities below, except for rheumatic heart disease which is caused by a streptococcal strain, they have one common origin: the risk factor for cardiovascular diseases, including hypercholesteroiemia, hypertension and the resultant accelerated atherosclerosis. All the others are complications of hypertension and atherosclerosis. Because of this, the Philippine Council for Health Research and Development has been spearheading researches on coconut oil which tends to lower serum cholesterol when used as part of the diet, based on the findings of Halden and Lieb in 1961 (Kintanar, Q. L. and Castro, J. S.: Is Coconut Oil Hypercholesterolemic and Atherogenic? A Focused Review of the Literature, 1988). Furthermore, the Philippine Heart Center, one of the hospitals under the supervision of the Department of Health, has been carrying out research on the incidence and prevalence of cardiovascular diseases, particularly hypertension, in a certain area of the Philippines so that these diseases can be controlled at the soonest time possible when primary intervention is still feasible. In 1985, however, the Disease Intelligence Center of the Department of Health reported the following:

Table 75
MORTALITY ATTRIBUTABLE TO CARDIOVASCULAR DISEASES

	Deaths
Acute rheumatic heart disease	25
Chronic rheumatic heart disease	2,216
Hypertension without heart involvement	9,746
Hypertension with heart involvment	1,868
Acute myocardial infarction	9,861
Ischemic heart disease	4,479
Cerebrovascular disease	14,526
Atherosclerosis	1,811
Venous thrombosis and embolism	54
Total	44,586

Source: Philippine Health Statistics 1985, DOH

The deaths attributed to acute rheumatic heart disease is low; this is possibly due to under-reporting as a result of the difficulty in giving diagnosis. Based on physical examination findings and history alone, the disease can be mistaken for other diseases. Laboratory examinations are needed to confirm its presence.

3.6.4. Malignant Neoplasms

Due to rising incidence of cancerous conditions, the Department of Health included cancer control as one of its impact programs. Recent data on malignant neoplasms, in 1985, show the following:

	Cases	Deaths
Total	24,270	18,143

Source: Philippine Health Statistics 1985, DOH

3.6.5. Obstetrical Complications

Knowing the importance of preventing wasted lives of newborn and mothers, one of the impact programs of the Deparment of Health is maternal and child health (MCH). This is supported by the PCHRD which has MCH program as one of its priority research areas. Based on 1985 data, deaths due to obstetrical complications are the following:

Table 76
MORTALITY DUE TO OBSTETRICAL COMPLICATIONS

	Deaths
Miscarriages and abortions	117
Hemorrhages	
Prepartum	124
Postpartum	489
Hypertension	307
Normal Delivery and other complications related to pregnancy	452
Birth trauma	76
Birth injury and difficult labor	1,311
Total	2,876

Source: Philippine Health Statistics 1985, DOH

3.6.6. Nutritional Problems

Although malnutrition problem is prevalent in the Philippines, the root cause is not only the lack of food supply. Lack of knowledge on the right kind of food to take in is the most important single cause. It is a lamentable fact that most Filipinos starve in the midst of plenty. To obviate the irreversible consequences of malnutrition, education on the nutritional content of various food groups has been going on and the Food and Nutrition Research Institute has already established baseline data on the nutritional status of Filipinos, paving the way for nutritional rehabilitation programs. In 1985, data on protein-energy malnutrition were the following:

Table 77
MORTALITY ATTRIBUTABLE TO PROTEIN-ENERGY MALNUTRITION

	Deaths
Protein-energy malnutrition	
Marasmus	241
Kwashiorkor	602
Others	1,201
Other nutritional deficiencies	5,070
Goiter, thyrotoxicosis, hypothyroidism and other endocrine and metabolic disorders	2,851
Anemias	2,269
Total	12,234

Source: Philippine Health Statistics 1985, DOH

3.6.7. Accidents (Occupational Diseases)

To protect the workers' health, the government, with the help of the Japanese government, established a new Institute on Occupational Diseases. When this agency becomes operational, the 1985 data on deaths due to work accidents are expected to decrease. Below are data on work-related accidents:

Table 78
MORTALITY DUE TO WORK-RELATED ACCIDENTS

	Deaths
Accidental poisoning	186
Accidental falls	576
Accidents caused by fires and flames	53
Accidents caused by submersion, suffocation and foreign bodies	1,793
Total	2,608

Source: Philippine Health Statistics, DOH

3.6.8 Road Accidents

Prevention of road accidents has not escaped government's attention. In line with its reduction, the government has constructed a light railway system which bisects the Metro Manila area, and it plans to construct some more lanes in the near future. To complement this, expansion of primary national roads has been going on. In 1985, the following data were reported:

	Deaths
Railway Accidents	74
Motor Vehicle Traffic Accidents	1,954
Total	2,028

Source: Philippine Health Statistics 1985, DOH

3.6.9 Conclusion

As in the majority of the developing countries, health statistics are incomplete and do not necessarily reflect the exact morbidity and mortality situation. More often than not, the declared notifiable diseases are much lower than should normally expected, either because they are not properly diagnosed and declared or not registered. A typical example would be, for instance, the 1985 deaths due to Acute Rheumatic Heart Disease and those due to Venous Thrombosis and Embolism of 25 and 54 cases, respectively, in the entire country with a then population of 54.67 millions.

Table 79

LEADING CAUSES OF MORBIDITY, 1982-1987

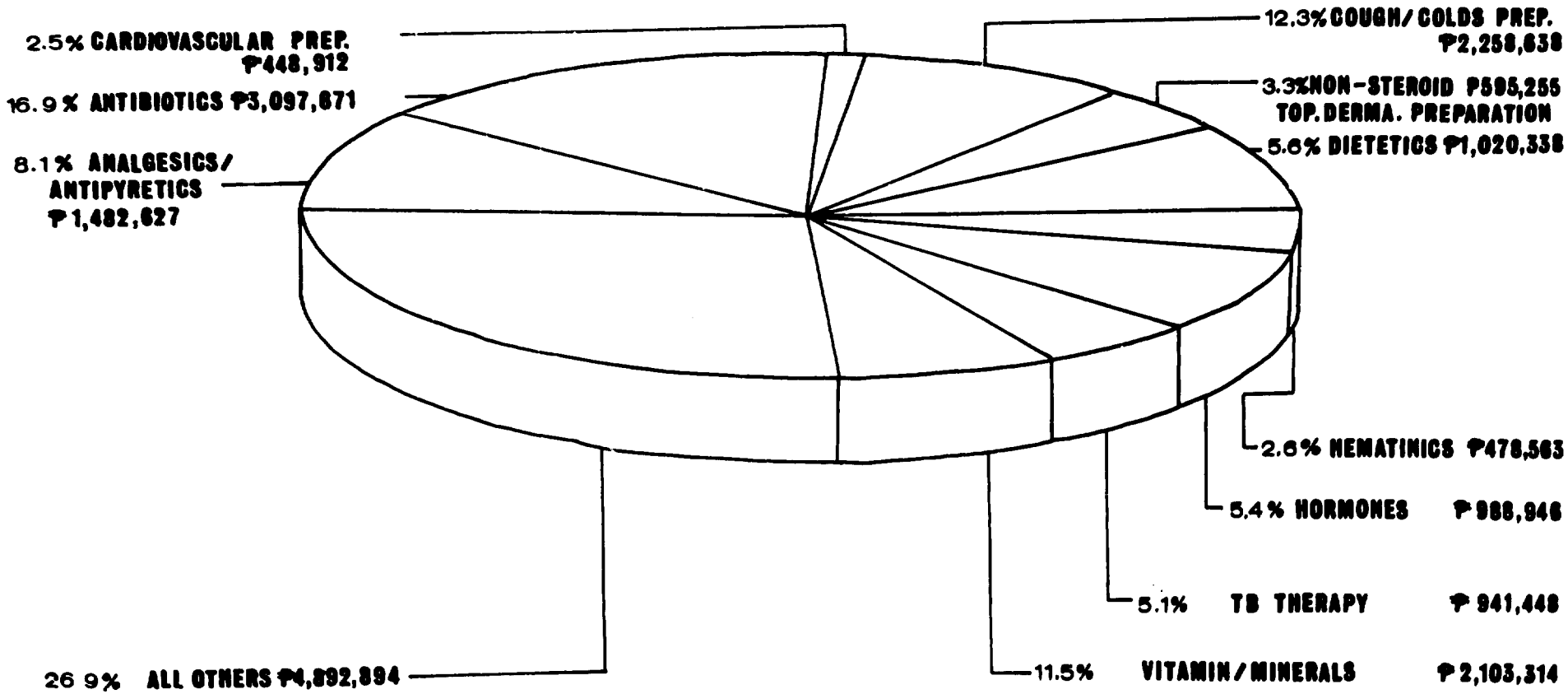
DISEASES	1982	1983	1984	1985	1986	1987
1. Bronchitis	280,431	352,447	606,880	586,427	602,851	725,818
2. Diarrhoeal Diseases	221,191	275,068	551,560	522,762	552,613	722,972
3. Influenza	226,237	256,534	453,926	447,550	397,715	578,514
4. Pneumonias	106,563	123,420	193,594	205,387	190,208	215,368
5. Tuberculosis, All forms	104,715	106,300	154,021	153,406	153,129	200,534
6. Malaria	40,496	55,019	107,485	121,975	124,153	135,231
7. Accidents **	-	-	84,637	96,684	105,886	133,421
8. Diseases of the Heart	-	-	70,596	70,238	78,516	80,744
9. Measles	35,989	43,684	75,290	62,959	59,375	76,232
10. Malignant Neoplasms	26,867	23,838	24,191	24,270	26,985	76,232

Source: 1982-1986 - Philippine Health Statistics
1987 - DOH Annual Report
** Declared notifiable diseases in 1984

FIGURE 27

SALES BY THERAPEUTIC CLASS

JANUARY - SEPTEMBER
1968



SOURCE: BUSINESS MONTH - DEC., 1968

3.6.10. National Health Programs

3.6.10.1 Control of Diarrhoeal Diseases

1. Objectives

The general objective of the national CDD program is to reduce mortality and morbidity due to diarrhoea, particularly in children under five years of age.

The specific objectives are:

1. Use of ORT will have increased from 33% to around 70%;
2. At least 90% of mothers with children under five (5) years of age will have known how to use ORT;
3. At least 50% of the private medical practitioners will have been prescribing ORS of approved formulation for diarrhoeal diseases; and
4. ORT will have become a routine treatment protocol at government hospitals and rural health units.

2. Primary Impact Targets

	Estimated National Average		
	1986	1989	1992
Diarrhoea mortality (Deaths per thousand children under 5 years of age)	8.6	6.3	4.5
Diarrhoea morbidity (episodes per child per year)	2.8	2.5	2.0

The above targets were formulated on the basis of a desired 50% mortality reduction over five (5) years (30% reduction during the first 2 years), and a 20% morbidity reduction over five (5) years (10% reduction in the first 2 years).

3. Secondary Impact Targets

	Estimated National Average		
1. Those supportive of mortality reduction	1986	1989	1992
ORS Supply	-	60%	100%
ORS Access	75%	80%	85%
Proper ORS use by mothers	-	30%	35%
Proper ORT use by mothers	-	70%	80%
ORT in private hospitals	-	50%	70%
Proper ORS use by private MD	-	25%	50%
Cases treated with ORS in Private hospitals	-	25%	50%
2. Those supportive of morbidity reduction			
Breastfeeding	-	90%	95%
Childnutrition	20%	10%	28%
Water supply coverage	-	71.8%	75%
Sanitary toilet coverage	-	77%	80%

4. Strategies

The basic approach to mortality reduction is proper diarrhoea case management through oral rehydration therapy (ORT). The following are the policies of the Department of Health regarding the proper management of diarrhoea cases:

1. Prevention of dehydration and nutritional damage at home by:

   a. continuing breastfeeding
   b. provision of small amounts of nutritious, easily digestible foods
   c. giving extra fluids
   d. providing food-based home fluids with acceptable concentration of sugar and sodium

2. Timely and appropriate consultation with trained health workers when

   a. the diarrhoea worsens
   b. the child does not get better
   c. the child is unable to eat or drink
   d. the child has a high fever
   e. the child exhibits one or more signs of dehydration
   f. there is blood inthe stools

3. Treatment in dehydration of health workers

4. Appropriate use of drugs and IV therapy to support ORT

5. Appropriate and prompt esponse to diarrhoea epidemic outbreaks

Morbidity reduction measures can be grouped into two (2) broad categories, namely maternal and child health practices, and environmental health practices. Included in these two broad categories are seven (7) interventions based on the WHO recommendation.

1. Maternal and child health care practices to improve host resistance to infection

   a. promotion of breastfeeding
   b. proper weaning practices
   c. improved maternal nutrition
   d. measles immunization

2. Environmental health pratices to reduce transmission of pathogenic agents of diarrhoeal disease

   a. promotion of handwashing
   b. provision and use of adequate and clean water
   c. provision and use of sanitary toilets

5. Supporting Policies

To attain the mortality reduction targets, secondary policies have been set by the program supportive of mortality reduction. These largely pertain to the various aspects of ORT availability and use.

To propagate ORT as the standard intervention in the management of acute diarrhoeas, the following strategies shall be pursued:

1. Use of ORT in the outpatient and ward units of both public and private sectors of the health system.

2. Promotion and increase of acceptance, use and advocacy of ORT by the pediatrician who provides the professional leadership in the clinical care of diarrhoea.

3. Promotion of acceptance and use of ORT in the private sector throuh informational and promotional messages using the various mass media, training, education, and administrative measures.

4. Promotion of acceptance and use of ORT in the private sector through various professional promotional activities spearheaded by the Philippine Pediatric Society (PPS), and assurance of the commercial availability of ORS for use in hospitals.

5. Incorporation of ORT in the formal education of physicians, nurses and midwives to assure complete understanding of its scientific basis, and its acceptance and use by new health professionals.

To promote wider access of suitability formulated ORS products, the program shall encourage private commercial and for profit production and distribution of ORS. At the same time, the programm shall sustain free distribution of the government produced ORS.

Research activities that will address the technical and operational issues of implementation are encouraging by the national CDD unit.

6. Activities

The activities of the DOH-CDD Program are concerned with
1. Planning and management;
2. Operations and Logistics;
3. Training;
4. Inforamation, education and communication;
5. Health information system; and
6. Evaluation.

The following have been the major CDD Program implementation activities:

1. Clinical case management training
   - 1.1 Training of regional and provincial trainers
   - 1.2 District MD/RN clinical training
   - 1.3 Retraining/new trainers

2. Supervisory skills management training
   - 2.1 Regional coordinators/training officers
   - 2.2 Provincial/district

3. Integrated clinical/supervisory training
   - 3.1 Municipal MD/RN/MW

4. Implementation of preventive measures
   - 4.1 Organization and training of regional breastfeeding coordinators
   - 4.2 Training of RSI

5. Distribution of ORS
   - 5.1 Supply to government facilities (hospitals, health centers, BHWs)
   - 5.2 Supply to private hospitals
   - 5.3 Supply to private drugstores/pharmacies
   - 5.4 Supply to private practitioners/dispensing physicians

6. Public promotion
   - 6.1 Mass media campaign to promote ORS
   - 6.2 Mass media campaign to educate mothers on home treatment of diarrhoea
   - 6.3 Communication aids for face to face communication

7. Professional promotion
   - 7.1 Regional PPS workshop
   - 7.2 Supply of detailing aids to private physicians
   - 7.3 Clinical training of private sector trainers
   - 7.4 Training pharmacists
   - 7.5 Production and distribution of diarrhoea newsletter

8. Management organization
   - 8.1 Expansion of national staff organization
   - 8.2 Quarterly regional coordinators conference
   - 8.3 Support to regional training officers
   - 8.4 Support to regional breastfeeding coordinators
   - 8.5 Monitoring and supervision of of provincial and district CDD coordinators

9. Evaluation and monitoring
   - 9.1 General program reporting
   - 9.2 Regional, provincial and district monitoring visits by national staff
   - 9.3 Special evaluation of pilot regions
   - 9.4 Impact evaluation

7. Accomplishments of the National CDD Program

A status report of the accomplishments of the national CDD program as of September 1987 follows.

1. Clinical Management Training Course (July to September 1987)

Institution	Physicians	Personnel Nurses	Trained Others	Total
National Rehydration Treatment and Training Center	57	40		97
Regional Health Office No. 7	65	57	1	123
Regional Health Office No. 10	17	15		32

2. Supervisory Skills Training Course

Institution	Physicians	Personnel Nurses	Trained Others	Total
International Institute for Rural Reconstruction (IRR)	13	10	4	27
Regional Health Office No. 7	22	23	1	46

3. Oresol Production/Distribution

1. Production ---------- 996,153
   - July ---------- 267,300
   - August ---------- 346,403
   - September ---------- 382,450

2. Distribution ---------- 904,500
   - Region 1 ---------- 50,000
   - Region 2 ---------- 50,000
   - Region 3 ---------- 50,000
   - Region 4 ---------- 132,500
   - Region 5 ---------- 53,000
   - Region 6 ---------- 105,000
   - Region 7 ---------- 110,000
   - Region 8 ---------- 50,000
   - Region 9 ---------- 50,000
   - Region 10 ---------- 50,000
   - Region 11 ---------- 50,000
   - Region 12 ---------- 50,000
   - N C R ---------- 44,500
   - Others 59,000

4. Health Education Materials Distribution 79
   - CDD posters 65
   - Leaflets 5
   - Pamphlets 8
   - Flipcharts 1

5. Number of Diarrhoea Cases Seen and Given Oresol

	Cases seen	No. of cases given Oresol
Regions 1-12	536,271	472,044
N C R	16,583	16,583
Total	552,854	488,627

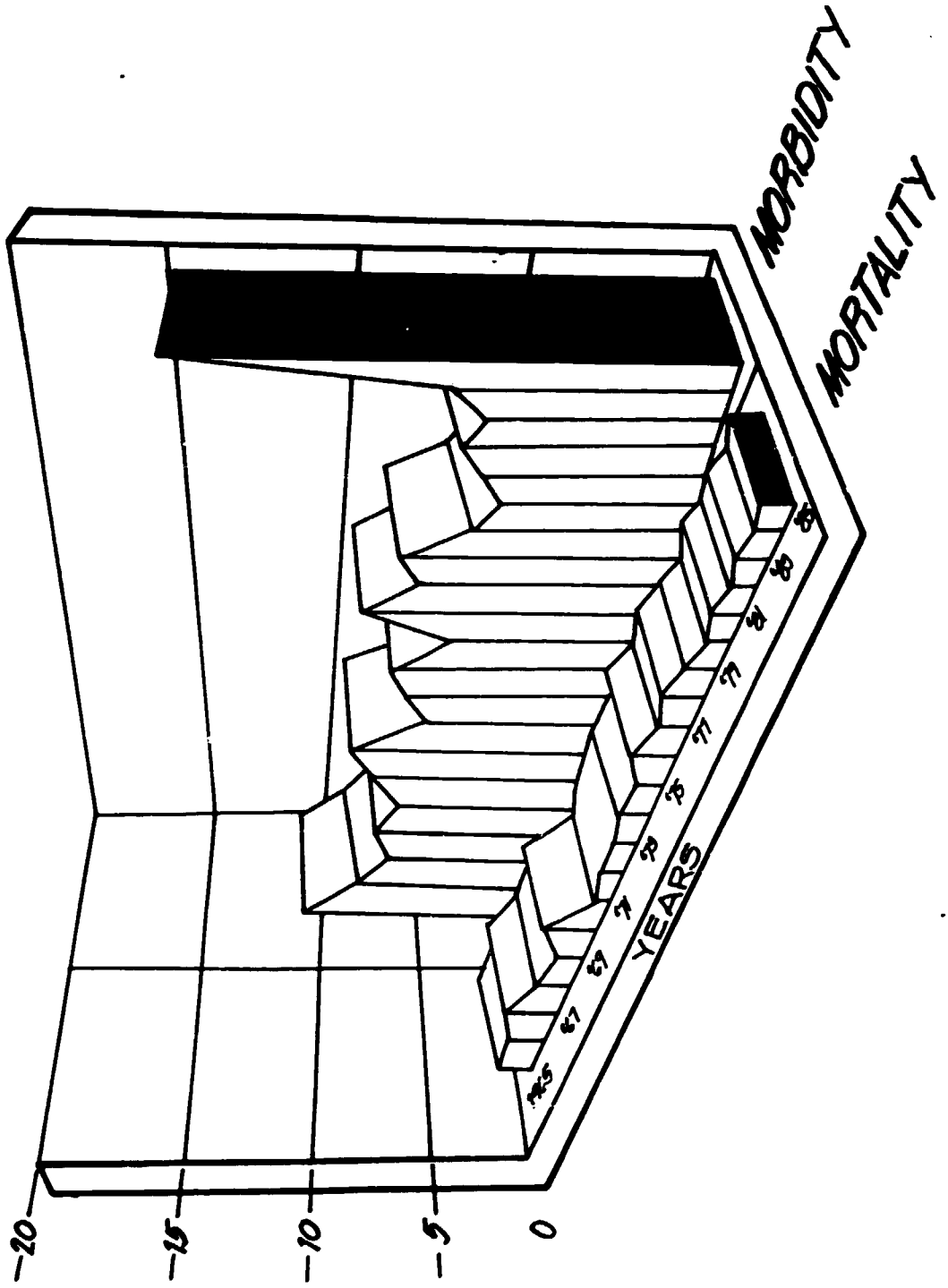
3.6.7.2 Schistosomiasis Control Program

A. The Problem

Schistosomiasis (or Bilharziasis) is a chronic or slow, progressive, and debilitating disease caused by a parasite worm called Schistosoma japonicum. It is primarily rural in distribution affecting mostly farmers and their families. The mortality and morbidity trends attributable to the disease is shown in Figure 28.

As of 1987, there are 24 endemic provinces distributed in eight regions, namely. Oriental Mindoro in Region IV; Sorsogon in Region V; Bohol in Region VII; Leyte and the Samar provinces in Region VIII; Zamboanga del Norte and Zamboanga del Sur in Region IX; Bukidnon, Misamis Occidental, the two provinces of Agusan, and Surigao del Norte in Region X; Surigao del Sur, the

FIGURE 28
SCHISTOSOMIASIS
MORBIDITY AND MORTALITY TRENDS
RATE PER 100,000 POPULATION
1965-1985



three Davao provinces and South Cotobato in Region XI; North Cotobato, the two Lanao provinces, Sultan Kudarat, and Maguindanao in Region XII.

In all these endemic places, there is a total of 2,987 snail areas with an approximate area of 28,731 hectares or 287,310,000 sq.m..

It is estimated that there are 335,379 schistosomiasis cases out of a total exposed population of 5,103,524 in the 167 municipalities of the 24 affected provinces by 1987.

B. The Control Measures and Their Constraints

1. Case Finding and Treatment of Cases

With the recent discovery of Praziquantel (marketed as Biltricide or Distocide). a dramatic drop in the prevalence of the disease has been observed not only in the pilot areas here in the Philippines (Leyte and two barangays in Sorsogon) but also in other endemic areas of the world. The major thrust of the schistosomiasis control program has, therefore, shifted from transmission control to morbidity control. The problem of drug resistance by the parasite is not, however, a remote possibility.

The DOH has projected the following number of schistosomiasis cases for treatment from 1989-1993:

TABLE 80

PROJECTED NUMBER OF SCHISTOSOMIASIS CASES FOR TREATMENT

YEAR	No. of Schistosomiasis Cases
1989	81,555
1990	68,122
1991	48,960
1992	35,960
1993	25,200

Source: DOH

Constraints:

1. Under the vertical set up, prior to 1983, there was not so much problem of microscopists for they can concentrate on stool examination. Under the integrated set-up, the microscopists has to examine also blood for malaria or filaria infections and sputum for PTB. Quota for stool examinations has, therefore, been reduced from 600 to 375 stools per month per microscopist. Manpower resources, therefore, are inadequate. Ideally, there should be one microscopist, or medical technologist per endemic municipality.

2. More medical manpower will also be needed to treat all cases discovered during the case finding operations.

2. Environmental Sanitation

Constraints:

1. Problem of cost and maintenance in the provision of safe sources of water supply.

2. Problem of attitudes and practices in the provision of sanitary latrines. It will take decades of public health education for the people in the rural areas to construct and use sanitary toilets.

3. Snail control through agro-engineering methods and the use of chemicals

Constraints:

1. This is a non-medical approach and is beyond the capability of the DOH personnel to implement.

2. This is also a very expensive method requiring frequent maintenance. In Leyte alone, under the Health Component of the National Irrigation System Improvement Project - Package I (NISIP-I), about 98 million pesos went to snail control just for its initial phase.

3. Molluscicide or chemical control is, likewise, very expensive and has only a temporary effect if no preliminary agro-engineering measures are carried out. "Bayluscide," the best chemical so far in the market, costs more than P500 per kilo and can only cover about 333 sq.m. at three successive monthly applications per year. The overall snail areas throughout the Philippines measures approximatly 287 million.

The application of chemicals is only recommended in limited areas of high epidemiological importance ans as a terminal measure after the agro-engineering activities when the remaining snails are already confined to pockets that can hardly be drained.

4. Public Health Education

Constraints:

1. Admittedly, health education is a slow process, but is very necessary. Hopefully, the continuous use of IEC materials will improve the knowledge, attitudes, and practices of the people in a shorter period of time.

C. The Program Thrusts

With the huge expenses for stopping transmission, control measures by the DOH are now directed more towards morbidity or disease control mainly through case finding and treatment of cases and health education using IEC materials. Whenever possible, monitoring of the activities of other agencies of the government that will redound to transmission control especially by the National Irrigation Administration (NHA), Department of Public Works and Highways (DPWH), Department of Agriculture and Food (DAF) and other government agencies will be made. (Please refer to responsibilities of various agencies whose work is related to the control of the snail intermediate host of Schistosoma japonicum).

1. Manpower

Since the start of the DOH reorganization, which resulted in decentralization and integration in 1984, all health services have become a responsibility of the Integrated Provincial Health Offices. Manpower resources directly responsible for field health services are barangay health workers, RHU midwives, microscopists, and all personnel of the RHU, the district hospitals and the provincial health offices.

2. Coverage

Based on available resources for 1988, instead of spreading efforts too thinly in all endemic municipalities, and to cope with manpower constraints, only 50% of the endemic barangays or endemic municipalities in 16 of the 26 endemic provinces will be covered for 1988, and the other 50% for 1989 and alternately thereafter up to 1992. In the endemic provinces with less than four endemic municipalities (Bohol, Zamboanga del Norte, Davao del Sur, Davao Oriental, South Cotobato, Sultan Kudarat, Lanao del Sur and Maguindanao) ,a 100% coverage will be targetted for case finding and treatment of cases. This scheme is expected to have an impact in terms of reduction in the prevalence of the disease in six years time by about 75 to 90%.

3. Technical Assumptions

To attain the expected reduction in the prevalence of the disease, a 100% submission of stools and treatment of cases is being assumed in at least 50% of municipalities or barangays endemic for schistosomiasis covered every other year. This is expected, as mentioned above, to reduce the prevalence of the disease by 90% in six years time.

3.6.10.3 Malaria Control Program

1. Epidemiology

Naturalistic control methods against the principal malaria vector in the Philippines differ from that of other countries because of the difference in breeding habitat of the species Anopheles flavirostris. This species prefers slow flowing, partly shaded streams with greasy edges and clean water found in foothills and mountainous areas. It is distributed throughout the country except in altitudes above 3,000 feet and in some islands were breeding conditions are unfavorable. The three secondary vectors are Anopheles mangyanus, also a clean stream breeeder; Anopheles balabacensis, a forest rain pool breeder; and Anopheles litoralis, which breeds in brackish water. Anopheles maculatus, also a stream breeder, is a potential vector in high altitude areas.

The salient features of malaria in the Philippines are as follows:

1) All provinces have areas that are endemic, varying widely from hypo-endemic to hyper-endemic;

2) The temperature (20°C - 34°C) is perennially adequate for transmission of both P. vivax and P. falciparum, the latter predominating in the ratio of 70:30;

3) Rainfall and humidity (84 - 89%) conditions are ideal for vector breeding and long survival;

4) The primary vector is essentially zoophilic;

5) Transmission is perennial with two peaks, one at the beginning and the other at the end of the rainy season.

6) Malaria is unstable with a tendency to develop into epidemics; and

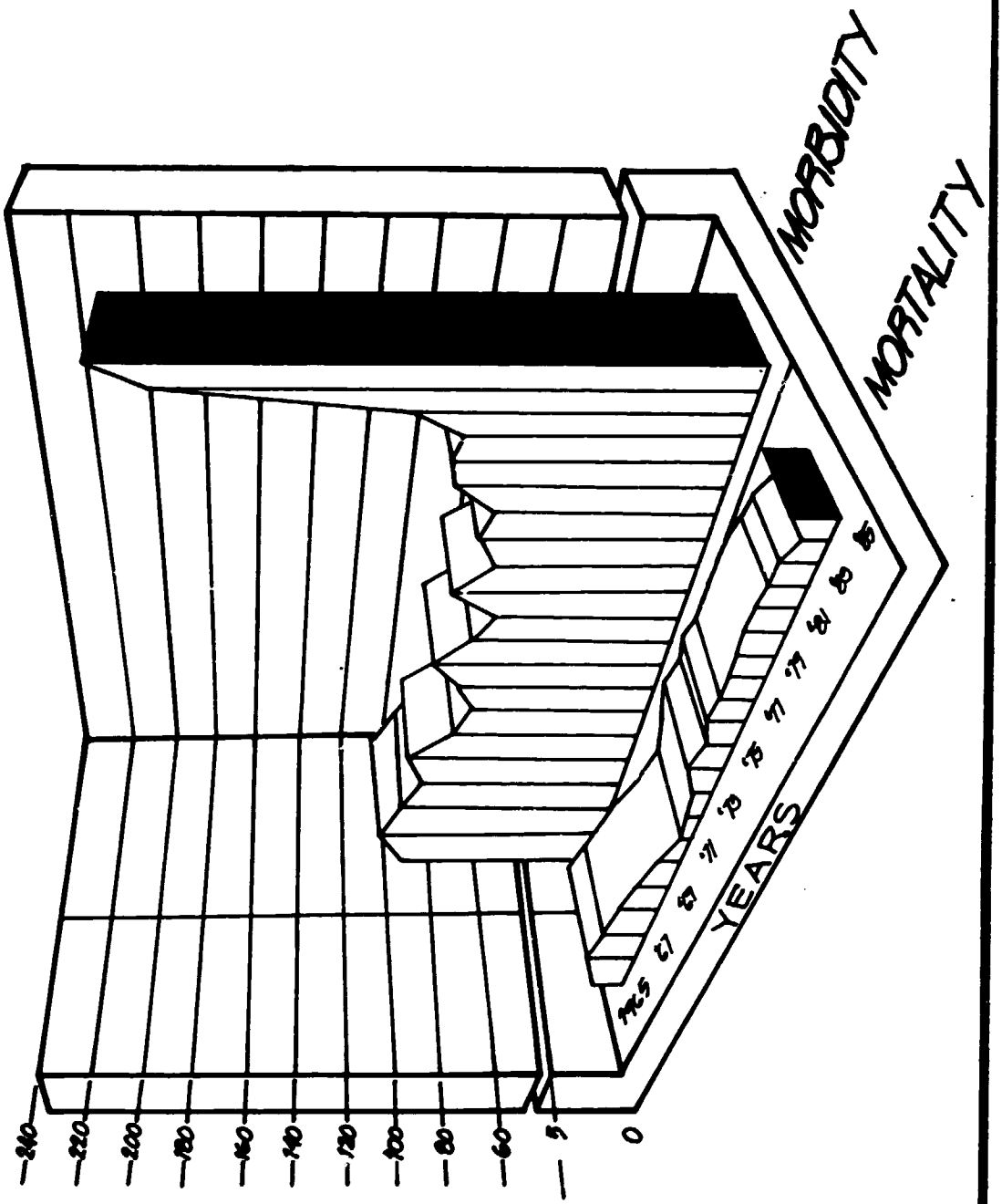
7) Due to the characteristics of the vector, malaria in the Philippines is a disease affecting rural areas.

The mortality and morbidity trends due to malaria are shown in Figure 29.

2. Malaria Control in the Philippines

During the early 1900s control consisted of administration of quinine which has its proper place in the clinical cure rather than the prevention of malaria. The U.S. Army used mosquito nets to minimize man-vector contact. This practice has continued to be an important preventive measure to the present day. Gambusia fish (minnows) were

FIGURE 29
MALARIA
MORBIDITY AND MORTALITY TRENDS
RATE PER 100,000 POPULATION
1965-1985



introduced from Texas to Hawaii and then to Manila in 1913. This did not significantly reduced malaria rates (Ejercito, 1936).

In 1922, the Rockfeller Foundation took active interest in the malaria problem and its control. In November 1926, a Division of Malaria under the Bureau of Health was established. The Office was responsible for developing information and procedures for the control of malaria in the Philippines. The rationale for mosquito contol then was based on the knowledge that the vector was a stream breeder rather than a stagnant water breeder, a fact discovered by Whitmore at Fort Stosenburg in 1904. This led to the introduction of Paris Green as larvicide which was effective to a certain extent; however, the method was not economically feasible for nationwide application. Thus, chemotherapy remained the only control measure used widely.

By 1930, naturalistic and mechanical control methods were tried such as damning, periodic flushing, exposure of streams to sunlight by cutting vegetation, clean-cutting and sloping banks, chanelling, and packing with vegetation and larvivorous fish . These measures were considered impractical and tedious for rapid nationwide control operations. Today, these measures are being revived and encouraged in conjunction with residual spraying of houses and as activities which the community can undertake in the context or primary health care.

The discovery of the insecticidal property of DDT usherred in a new era in the history of malaria control. The Mindoro DDT Pilot Project in 1952-1954 demonstrated that residual spraying inside houses is applicable to the Philippines. Based on this finding, "A Six-year Philippine American Plan of Malaria Control" was launched in 1954 which called for three years of one cycle spraying of houses in endemic areas. After succesfully attaining its objective the concept of eradication was adopted in 1956. In 1958, malaria was very close to defeat. For the first time in the nation's history, due to reduction in disease, it became possible to settle, farm, and exploit the vast hinterlands. Spraying was withdrawn in consolidated areas. One year after the withdrawal of spraying, there was considerable resumption of transmission. Meanwhile settlers have moved into regions with highest risk. The frontiers migration extend fast and wide beyond the provisions and capabilities of field service units to accommodate. The malaria eradication service could not cope with these expanding frontiers on account of limited resources.By 1960, the Department of Health was reorganized and the operation of the program was decentralized under eight regional health directors who had their own priorities. The next six years saw further exacebation of the malaria situation.The malaria program was reverted to a centralized administrative set up through R.A. 4832 in July 1966 and a nation wide eradication

campaign was launched.USPH/USAID and WHO extended assistance and success seemed inevitable. With phasing out of USAID assistance and a global reccession in the 1970s, logistics support diminished and the program deteriorated.Consequently, and in line with the global concept of primary health care, Executive Order No. 851, dated December 2,1982 decentralized the malaria program once more and integrated it with the Field Service of the DOH by 1983. The problem of inadequate provisions remained, residual spraying was limited to containing flare-ups and only a portion of the house was sprayed which worsened the malaria situation.

3. Current Status

From 1946-1951 malaria was the leading cause of morbidity and mortality in the Philippines. By 1970, malaria morbidity has fallen to sixth place while mortality is no longer one of the 10 leading causes of death. Since 1973, the anti-malaria program encountered financial difficulties which led to the deterioration of the malaria situation, but the program has maintained the gains it has achieved.

At the start of the integration in 1983, the malaria incidence was 5.9/1,000 population which gradually increased year by year to 15/1,000 population in 1987. The statistical indices below will show the trend of the disease during the integration:

	Annual Parasite Incidence	Slight Positivity Ratio	Annual Blood Examination Rate
1982	5.9	10.7	5.5
1983	5.9	12.5	4.7
1984	6.9	15.1	4.5
1985	9.2	23.5	3.9
1986	7.8	16.5	4.7
1987	15.0	14.3	10.5

With the change in national leadership, Executive Order No. 119 dated January 30, 1987 was issued. This order is essentially the same as E.O. 851 as far as the structure of the malaria program is concern. However, to strengthen the program, Department Order No. 167 dated July 14, 1987 was issued to standardize the structural organization in the regions and in the provinces. Regional and provincial malaria control program coordinators were created. Vector control which was neglected, is the direct responsibility of the Provincial Health Officer who is assisted by an Epidemiological Unit. Case finding and treatment are the responsibility of the District Health Offices. Adequate financial support to the program is embodied in Department Memorandum No. 2, dated October 16, 1987 which identifies

allocations malaria in the budget. Prior to this provision the ogram was left to the discretion of the PHO. In the past spraying to avert the build up of vector densities. This situation, hopefully, will be corrected this year as the budget for 1988 provides for adequate insecticide to undertake one cycle spraying in areas with annual parasite incidence (API) of 5/1000 to <10/1000 population and two spray cycles in areas with API> 10/1000 population and in areas with high economic potential. These measures are expected to reduce the incidence of the disease by 50% during the first year.

Case finding has been done mostly through random surveys and not through a wider surveillance network. Bioenvironmental activities, previously done sporadically, will be intensified through better community participation.

At the central office, the Malaria Control Service (MCS) staff have continued monitoring the conduct of field control operations as well as research and training activities. These are listed below:

1. The efficacy of four kinds of insecticides - K-Othrine, Ficam, Solfac and Sumithion were tested as vector control agents for reducing malaria incidence. the residual action of these insecticides lasts for only three months which means that at least three cycles of spraying would be needed per year to be maximally effective. This and higher cost as compared to DDT justify the retention of DDT as the insecticides of choice except when vector resistance occurs.

2. Clinical trial with the drug combination of quinine, quinidine, and cinchonine as an alternative in the treatment of drug resistant malaria has been completed in collaboration with RITM. It has been found to be effective in the treatment of uncomplicated cases of P.falciparum infection. In vitro microtests showed 100% resistance to the 4-aminoquinolines, chloroquine and amodiaquine.

3. Extensive monitoring of areas with P. falciparum resistance to chlorquine, amodiaquine, mefloquine, quinine and sulfadoxine-pyrimethamine has been made through in vitro and in vivo techniques. The distribution of resistant cases and/or isolates has been mapped. In vivo tests show RI-RII levels of resistance to chloroquine and amodiaquine and none for sulfadoxine-pyrimethamine. However, higher doses of chloroquine and amodiaquine are still curative.

4. Production of portable field incubators and test kits for drug resistance assays in collaboration with WHO, for world-wide distribution.

5. Fielding of monitoring teams to assist in malaria control operations.

6. Augmentation of allocation on logistics support specifically, insecticides, drugs, reagents, spraycans, and spare parts.

7 Preparation of a 1988 Directional and Operational Plan.

8 Reassignment and promotion of central staff personnel for better efficiency.

9. Improved reporting of field workers through the institution of brief and concise reporting forms.

10. Cooperation and coordination with other government agencies, e.g. the Armed Forces of the Philippines.

3.6.10.4. Tuberculosis Control Program

1. Epidemiological Findings

1. TB Infection

The result of the National Prevalence Survey (NPS) of 1981-1983 showed that about 54% of the unvaccinated population had evidence of a tuberculosis infection, i.e., an induration of 8 mm or more to the tuberculin test. The proportion was 7% at 1-4 years, 16% at 5-9 years, 42% at 10-14 years and reached a peak of 80% at 40-49 years.

In 1951, a picture of the TB infection of the country was made available after the WHO-UNICEF assisted mass BCG immunization campaign which had a national coverage. The information gathered revealed that the population was heavily infected with an overall prevalence of 70%. The age specific rates were of 18% among 0-6 years, 48% in 7-14 years, 80% among 15-19 years and 90% above these ages. It also showed that among school entrants 28%, while among the school leavers (grade six) 80% were infected. The prevalence was relatively the same in all regions of the country but higher rates were obtained in the cities than in rural areas. Twenty years after, estimates of the TB infection showed that the prevalence of infection among 0-6 years is 8%, 25% among 7-14 years, 50% among 15-19 years, 85% among the 20

years and over. The prevalence of infection among school entrants was 15% and among school leavers or Grade six, 40%. In some countries, the rate at 14 years of age had decreased to 3-5% which is getting closer to 1% targetted by WHO as criterion for the elimination of TB as a health problem in the country.

2. TB Disease

In persons aged 10 years or over, the estimated prevalence of bacteriologically confirmed tuberculosis was 1.25%; the prevalence of smear positive cases was 0.95%. Since the bacteriologically positive cases are rare among those below 10 years of age, the corresponding prevalence rate in the population of all ages would be 0.86% and 0.66%, respectively.

In persons aged 10 years or over, 4.2% had radiographic abnormalities suggestive of tuberculosis. Of these, 2.5% had minimal lesions and 1.7% were in moderate and far advanced TB categories.

Projecting the above figures to the 1988 population of 58,721,307, there will be 477,956 cases with sputum microscopy. X-ray examination of the total population would show that about 1,702,918 would have radiographic abnormalities suggestive of tuberculosis of which 1,010,007 are with minimal lesions; 405,177 with moderately advanced lesions without cavity; 82,210 with moderately advanced lesions with cavity; 82,210 far advanced without cavity; and 82,210 far advanced with cavity.

3. TB Mortality

Prior to 1953, TB had been the first leading cause of death in the Philippines. However, in 1953, pneumonia became the leading cause of mortality while TB became the second ranking cause of death in the country. It had continuously remained in such position until 1978 when it became the third ranking cause of death.

Based on 1985 health statistics, tuberculosis of all forms was still the third among the ten leading causes of mortality claiming 31,650 deaths which is 9.5% of the total deaths with a rate of 57.9 per 100,000 population. It was manifested in pulmonary forms in 98%, attacked males more than females, and the adult more than the young. It is worth noting that almost 75% of TB death occurred

among the age-groups 15-65. The highest prevalence rate of the disease was observed in Region 6 (87.1/100,000 followed by Region 5 (77.3/100,000). The lowest mortality rate was observed in region 12 (25.8/100,000) and Region 9 (31.9/100,000).

The mortality and morbidity trends for Tuberculosis are shown in Figure 30.

2. Sociological Findings

In persons 20 years of age or over, 28% had experienced symptoms suggestive of TB, namely cough, fever, chest and/or back pains, and hemoptysis; 17% of these were classified as TB symptomatics according to the standard definition of the National Tuberculosis Program (cough for two weeks, fever and back pains for at least one month, and hemoptysis of any duration).

Action taking for the relief of the experienced symptoms was 65% among the symptomatics. Of the 65% who took action, 39% resorted to self-medication, 25% went to private practitioners, 21% attended health centers of various types, 10% went to hospitals, and the remaining 4% took other action. Among non-action takers, 55% thought that the symptoms were not serious; 20% considered treatment facilities inadequate, inconvenient or inaccessible; and 14% had no time or were lazy to take action; 9% had other reasons, and the rest did not give any reason.

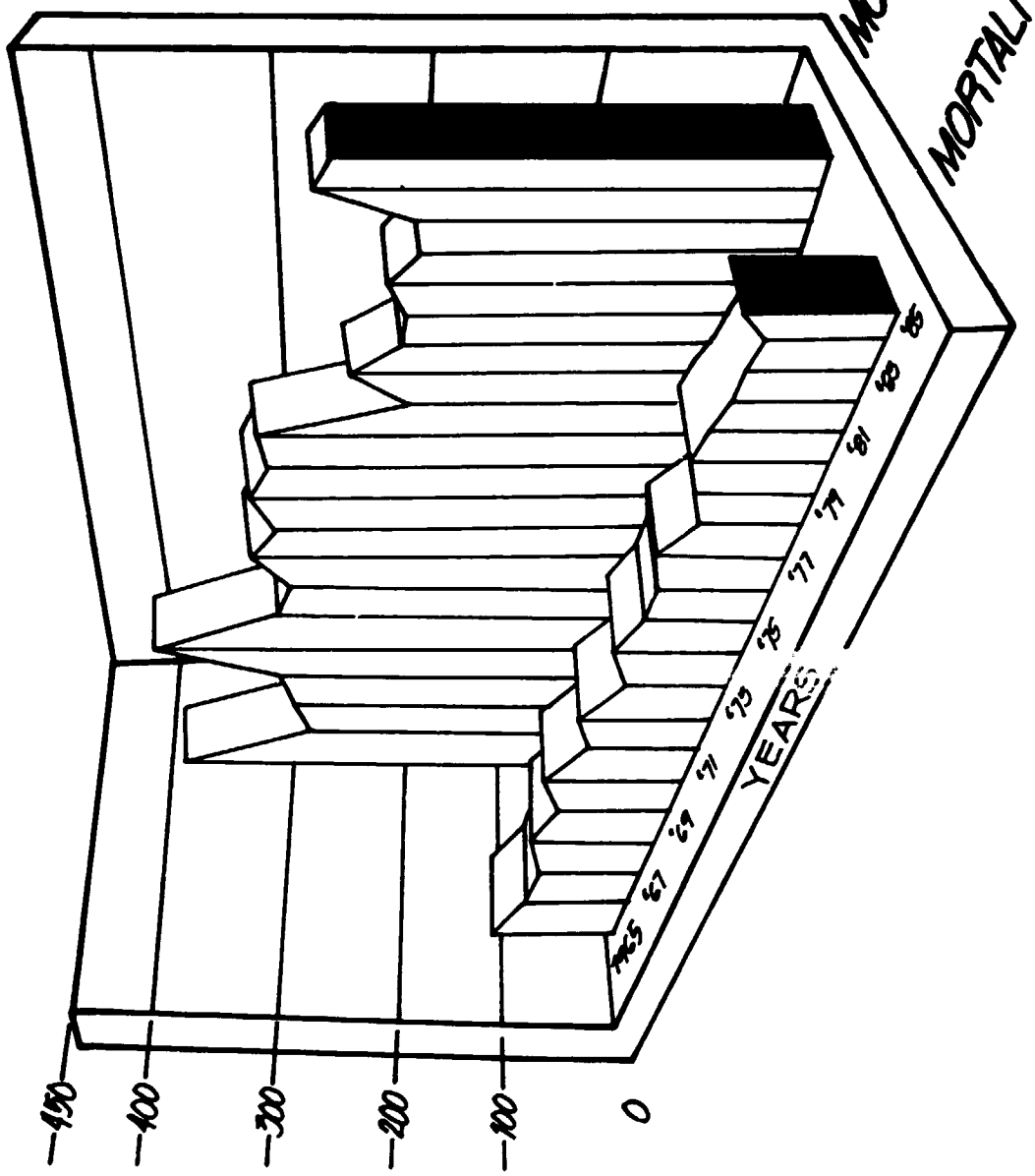
Self-medication was minimum (17%) among bacteriologically confirmed TB cases, low (26%) for those with radiographic abnormalities suggestive of TB, and highest (43%) among those with symptoms but no evidence of TB.

Of the bacteriologically confirmed cases who sought medical help, the highest proportion (34%) contacted private practitioners, followed by health centers (25%) and hospitals (21%).

3. Drug Sensitivity Tests

Of the 156 sputum (+) patients confirmed bacteriologically positive, 52 or 33% had Isoniazid resistance, 30 or 19% Streptomycin resistance and 22 patients or 14% resistance to both INH and Streptomycin.

FIGURE 30
TUBERCULOSIS, ALL FORMS
MORBIDITY AND MORTALITY TRENDS
RATE PER 100,000 POPULATION
1965-1985



4. The Strengthened National Tuberculosis Program (NTP)

A. Objectives

a. Long-Term Objective: To achieve control of tuberculosis to a level where it is no longer a public health problem.

b. Medium-Term Objectives: The medium term targets of the TB program in accordance with the recommendations of the WHO in the Western Pacific Region are as follows:

1. The disease should no longer be among the 10 major leading causes of death, and the mortality rate from all forms of tuberculosis should be lower than 10/100,000 population annually.

2. The prevalence of infectious pulmonary tuberculosis based on microscopic examination of sputum should be lower than 1/1000 (The present rate is 6.6/1000).

3. The risk of tuberculosis infection should be lower than 1% per year, (the present rate is 2.5%) and that the percentage of tuberculin reactors among the unvaccinated children at the time of school entrance should be lower than 5% (The present rate is 12% of the unvaccinated).

c. Specific Objectives

1. To vaccinate with BCG the eligible population under the EPI scheme in homes, schools, and hospitals with 90% coverage.

2. To identify at least 40% of the total prevalence of infectious cases annually.

3. To treat effectively and adequately all sputum (+) cases identified for a period of 6 months with the use of the short course chemotherapy (SCC) with a completion rate of at least 80% and a conversion rate of 95%. This includes also those with moderate and far advanced radiographic abnormalities with cavitary lung lesions.

B. Activities

1. BCG Vaccination

BCG vaccination is given to the 0-11 months old, pre-schoolers (1-6 years) and school entrants not only by the DOH personnel but also by the private sector. The mechanics of implementation of BCG vaccination has been carried out by the Expanded Program in Immunization since 1976.

2. Case Finding

Diagnostic services, primarily aimed at the identification of infectious sources with the use of direct microscopy among TB symptomatics, are offered free at all government health institutions. Chest clinics/hospitals of government and voluntary or private agencies serve as referral centers for x-ray examinations of sputum negative TB symptomatics. At present, there are 1,384 microscopy centers and almost 10,000 collection centers.

3. Treatment

The government has now embarked on a treatment program based on a SCC. The rationale for adopting the SCC is based on a study conducted by the National Institute of Tuberculosis where a significant improvement in terms of compliance to treatment was observed under program conditions. Compared with the 38% treatment completion rate noted in the past using the standard treatment of INH and Streptomycin for 12 months duration, the application of the SCC has more than doubled the number of patients completing treatment. Therefore, the adoption of the SCC in the TB control program is expected to minimize patient default.

4. Health Education

Health education to support NTP is an integral part of the entire health education program of DOH which aims to create awareness of symptoms and encourage people's participation in accepting and availing of the NTP services.

5. Research and Training

Program-oriented training and retraining and operational researches to find solutions to problems in the program implementation will be conducted.

6. Records and Reports

Standard and systematic recording and reporting systems are regularly established and maintained at all levels of health institutions to facilitate supervision, monitoring, and evaluation of the program.

C. Accomplishments

1. Case Finding

Since the start of the SCC (October 1986) up to September 1987, the 12 regions, including the NCR, were able to accomplish 1,077,738 sputum examinations which represent 58.72% of the target 1,835,393 sputum examinations on TB symptomatics.

A total of 76, 366 sputum positive cases or 50% of the target 151,420 were discovered. The positivity rate of 7.09% is considered to be within the satisfactory level.

2. Treatment

There were 100,780 patients eligible for treatment of which 76,366 were sputum (+) and the rest cavitaries. Of those eligible for treatment 91,531 or 90.8% were admitted and started on treatment with SCC. Based on the reports received, the following shows the progress or status of treatment of these patients:

- 38,126 or 52.22% have completed treatments
- 9,825 or 10.7% were prematurely discharged due to deaths, drop out, transfer, and development of adverse reaction; and
- 43,580 or 47.7% are still undergoing treatment.

However, a more detailed evaluation of the treatment program through cohort analysis was done in Region III and this analysis shows the following:

- 3,585 patients who started treatment covering the period October to December 1986 showed that 84.7% completed treatment, 6.05% stopped treatment due to toxic reaction, 1.5% were lost, 1.22% were transferred, 2.9% died, 2.9% refused to continue treatment, and 0.8% got pregnant. The conversion rate of sputum (+) cases to negative was 91.27%.

3. Training

Training courses on sputum microscopy are regularly conducted. So far, 195 medical technologists from the regional offices of the Department of Health; 20 physicians and medical technologists from the Department of Education, Culture and Sports; and 27 microscopists from non-governmental organizations had availed of these courses.

A training on repair and maintenance of microscopes attended by 28 medical technicians from various regions was also conducted.

4. Supervision and Monitoring

The TB Monitoring Team from tne National Office had conducted supervisory visits to 12 Regional Health Offices and 35 Provincial Health Offices.

3.6.7.5 Acute Respiratory Infections Program

Acute respiratory infections (ARIs) are the leading cause of morbidity and mortality in the Philippines. ARI is a very general term; it includes diseases like pneumonia, bronchitis, bronchiolitis, influenza and measles. As of 1984, ARI accounted for 18.2% of total deaths in all ages in the Philippines. And with regard to total ARI mortality during that year, 29.6% occurred in infants and 38.2% in children 1-4 years old.

1. The ARI Research Program

In September 1979, a National Steering Committee was organized by the Department of Health for the purpose of formulating a national program of control of this important health problem. An ARI research program was initiated to define the magnitude of the problem and identify specific areas where intervention might be applied. Specifically, research was to be directed toward developing primary health care interventions that would be effective and feasible for national implementation and thus form the basis of a national program of management and control.

The ARI research program was envisioned to go through three phases: the descriptive phase, the intervention phase and the evaluation phase.

A descriptive study to determine ARI incidence, risk factors for morbidity, and predictors of mortality in an urban community was thus undertaken as an initial

phase of the research program. This two year study was done in a depressed area in Quezon City which is within the catchment area of secondary health care facility, the Quezon City General Hospital. The monitoring was started in 1981 and ended in 1983.

This study showed that children less than five years of age had the highest incidence of ARI, with annual rate of 3.2-4.0 for infants and 3.0-3.4 for children one to four years of age. Low socioeconomic status proved to be the most significant risk factor for ARI morbidity. Poor housing facilities, crowding , malnutrition, financial constraints, educational limitations and resulting ignorance contribute to the association. Non-compliance with childhood immunization was more prevalent in the lower socioeconomic group.

Age less than one year was another risk factor for ARI morbidity. This has been associated to the infants' susceptibility to infections due to decreasing protection from maternally derived antibodies and nutritional deficiencies as a result of weaning. The promotion of breastfeeding therefore assumes importance in ARI control and prevention.

Malnutrition was the most important determinant of ARI mortality. The risk of dying from ARI in children with 3^{o}, 2^{o}, 1^{o} malnutrition ranged from 27 to 4.4 times higher than in normal children.

A positive blood culture was demonstrated to be another important determinant of mortality. Shann and co-workers have shown that bacteria, particularly Streptococcus pneumoniae and Hemophilus influenzae, are the predominant causes of pneumonia in children in developing countries. Therefore the timely administration of antibiotics for such children would be an important strategy for reducing mortality due to ARI.

Guidelines for a standard plan for case management within the primary health care level have been prepared by the WHO. The guidelines emphasize the development of skills to recognize severe disease on the basis of critical signs that a minimally trained health worker can learn to recognize. Three signs constitute the basis for management decision in dealing with a child with cough: (1) chest-indrawing, inability to drink or both indicate severe ARI which requires antimicrobial therapy and referral to hospital; (2) respiratory rate >50/min indicates moderately severe ARI which requires antimicrobial therapy at home; and (3) absence of the above three signs indicates mild ARI, which requires only supportive therapy at home.

On the basis of efficacy, safety, and cost, oral cotrimoxazole, amoxycillin or intramuscular procaine penicillin is recommended for moderately severe ARI whereas benzyl penicillin or chloramphenicol is recommended for hospital therapy of severe ARI.

Reduction in ARI mortality with the implementation of WHO recommended program has been documented as 84% in Goroka, Papua New Guinea, and 65% in Chandigar, India.

This case management program has been on field trial in Bohol since 1984. With this project, the intervention and evaluation phase of the ARI research program, was started. The objective of the Bohol ARI project is to reduce ARI mortality in children five years of age by at least 25% through the implementation of a control program within the context of primary health care. Baseline ARI mortality rate in child 0-4 was 6.7/1000, occurring at 15.8/1000 infants and 3.1/1000 in 1-4 years old. Among the children who died of ARI, 70% had not been seen by doctors. After two years of program implementation, the project showed an insignificant reduction in mortality of only 16.4%. This insignificant reduction was explained by the fact that health education, which is a very important component of program, was implemented only in April 1987.

To reduce deaths from severe ARI, mothers must bring in their severely ill children for treatment. Mothers must, therefore, be taught when to do this. Information, education and communication (IEC) materials about ARI were developed in 1985. Developing the IEC materials involved a KAP survey (knowledge, attitudes, and practices) and focus group discussions which identified mothers' attitudes and behavior to ARI in their children.

The KAP survey and focus group discussions revealed the following:

1. Mothers regard cough as a "usual" child's illness which is life threatening only when "prolonged" and accompanied by fever.

2. Mothers cannot identify critical signs of severe ARI and therefore do not promptly refer severely ill children.

3 Mothers initially resort to home remedies when a child gets an ARI.

4. Cost of care, and trust in the ability of the medical practitoner to manage the child's

illness appear to be the primary considerations in the mother's choice of health service provider.

From the above findings, pertinent messages were formulated, put into graphic form, pretested among mothers could use to distinguish whether a child's illness was getting better or worse. Appropriate actions were specified. Mothers were also advised to have their children immunized to prevent serious illness.

The comic book summarized the key messages for the health education program for ARI. Following the development of the IEC, actual implementation of the HEP was done in Alabang. Thirty seven community health workers were trained. The health workers were tasked to do health education of mothers and ARI case finding. Process monitoring showed that health education by health workers improved immunization coverage and ARI case management by mothers. This same health education program is being implemented in Bohol.

While the WHO-proposed ARI management decision tree has been validated in foreign studies, the validity of the clinical signs and the antibiotic usage were still put to a test.

Rapid respiration defined as respiratory rate (RR) of greater than or equal to 50/min is used to distinguish mild ARI from pneumonia where antibiotic is needed. A prospective study was carried out in the outpatient clinic of RITM in 1985. Out of 199 children with cough, 138 (69%) had pneumonia as proven by the presence of infiltrates in the chest X-ray. A RR >50/min showed a sensitivity of 63%, specificity of 80%, false (+) rate of 20% and a false (-) rate of 37%, positive predictive value of 88%, and negative predictive value of 49%. With a RR >40, sensitivity was 81%, specificity 52%, false (+) value of 80%, and the negative predictive value 55%.

With a RR >50, 37% (false (-) rate) of children with pneumonia would be denied antibiotic therapy. Given a severe ARI prevalence rate of 12% in the community, this means that 4.5/100 children will be denied antibiotics with a cut-off of 50 compared with 2/100 children with a cut-off of 40. With a RR of 50, 18/100 children will be overtreated compared with 40/100 with a cut-off of 40. Considering the need to avoid inappropriate use of antibiotics, a RR >50 is a valid cut-off for the identification of moderately severe and severe ARI in children.

The antibiotic usage for moderately severe and severe ARI presupposes the bacterial etiology of these conditions. A study of the etiology of childhood ARI in the hospital and community was conducted from August 1984 to March 1987 in Alabang where ARI incidence was 6.6 per child/year, with severe ARI noted to occur at 0.5 per child/year.

Preliminary reports reveal low isolation rates (11.5%) from blood cultures. Of the isolated pathogens, Hemophilus influenzae alone or in combination with other pathogens, ranked first. This was followed by Streptococcus pneumoniae. The other organisms isolated were Staphylococcus aureus, Enterobacter, Salmonella typhi. Salmonella species, Klebsiella, Pseudomonas aeruginosa, Streptococcus viridans, E. coli, and Streptococcus pyogenes.

All blood isolates of Streptococcus pneumoniae were highly susceptible to penicillin.

All H. influenza isolates for blood were sensitive to ampicillin, chloramphenicol, and cotrimoxazole.

The low isolation rate of bacteria emphasizes the need for more rapid and practical methods of etiologic determination.

The recommendation for use of cotrimoxazole for moderately severe ARI is based on efficacy, cost, and compliance on the part of mothers.

Efficacy, cost and safety are the main reasons for the sue of Pen G/chloramphenicol in hospitalized severe ARI cases.

Cost efficiency studies of the standard ARI case amangement in the hospital are presently being done in Bohol.

Summary

The ARI research program has determined ARI incidence in the urban and rural settings. It has identified the risk factors for morbidity and the predictors for mortality. It has validated the use of the respiratory rate of >50 in the WHO proposed management oriented decision tree for ARI. This case management is presently being implemented in Bohol. Its impact on childhood ARI mortality is still being evaluated. Etiology studies have to be furthered to provide the rationale for antibiotic use.

More important, the program has identified child care practices of mothers regarding ARI. This has been the basis for the development of health education materials. It has been shown also that the utilization of these IEC materials by community health workers for mothers' health education may improve child care practices.

With improved health seeking behavior of mothers, the local health facilities have to be strengthened. The attitudes and capabilities of health providers have to be improved. In areas where health services are inaccessible, it is recommended that nurses, midwives or BHWs be allowed to administer antibiotics to moderately severe cases of ARI.

2. Present DOH Program

Presently, the DOH sees each ARI case as a sick consultation whose management is individualized, varying with the assessment and experience of the attending health personnel (not necessarily physicians), and according to the availability of resources especially antibiotics.

The absence of a long term, organized program to control the infection, improve health workers' skills in management and increase public awareness is the major weakness.

Hence, as of May 1987, the Secretary of Health has mandated that a National ARI program be designed to strengthen this weakness. Research findings of Research Institute for Tropical Medicine will be used as one of the important basis for the National Plan.

3. Future DOH Management Program (1988-1992)

Tentative Activities:

1. National Workshop to finalize National ARI Directional Plan

2. National Survey 1988

3. Implementation of the National ARI Case Management patterned after RITM Bohol

4. Preventive Programs
   - Health Education
   - Immunization especially measles

5. Supportive Programs
   - Promotion of breastfeeding
   - Nutrition programs, including Vitamin A supplementation

6. Ancillary Programs
   - Anti-smoking campaign
   - Socio-economic development programs

3.6.7.6. Expanded Program on Immunization

The Expanded Program on Immunization (EPI) was launched in July 1976 by the Ministry of Health with the assistance of the World Health Organization (WHO) and the United Nations International Children's Fund (UNICEF) to prevent and control the following diseases by immunizing eligible children and pregnant women:

a. Measles
b. Poliomyelitis
c. Diphtheria
d. Pertussis
e. Tetanus
f. Tuberculosis

The program started by giving BCG vaccination to school entrants in 1976. It gradually expanded in terms of the range of diseases and areas covered. Seven years later, in 1983, immunization against the six childhood immunizable diseases was given nationwide.

The latest figures (1985 - 1987) of the EPI coverage are reflected in Table 81.

Table 81
Expanded Program on Immunization Coverage,
1985 - 1987

Percent Accomplishment
PHILIPPINES

	1985	1986	1987
BCG infant	62.2	75	91.44
DPT	45.8	55	73.25
Polio	47.6	54	73.10
Measles	43.2	53	67.78
Tetanus toxoid	18.0	25	27.28
Fully immunized	21.3	53	62.63

The coverage figures indicate an increasing trend, however, the data on the ten leading causes of infant mortality in 1985 show that there is still a need to improve coverage specifically for measles immunization.

Measles is number six of the leading causes of mortality among infants in 1985. The figure may even

be higher if it is taken into account that deaths from pneumonia and nutritional deficiency are results of measles complications.

There is also an emerging perception by health practitioners that measles among infants occur at as early as six months, indicative of inadequate maternal antibodies transferred to the newborn.

Misconceptions and cultural resistance is a major factor why there is a low coverage, for instance for tetanus toxoid. There is a persistent belief that it is not advisable for pregnant women to get injections as this will cause abortion. Considering immunization availability, the coverage can be increased.

3.6.7.7. Leprosy Control Program

1. Background Information

The problems concerning leprosy have not changed much during the last 20 years. The national prevalence rate still stands at 0.7 per 1,000 population, for an estimated 56,000 cases all over the country. Sulu has the most number of cases per 1,000 population. Metro Manila is estimated to have a prevalence rate of 1.5 per 1,000 population.

The case detection rate has stood at 0.03 per 1,000 population for the past five years, the number of new cases being registered at about 3,000 cases a year.

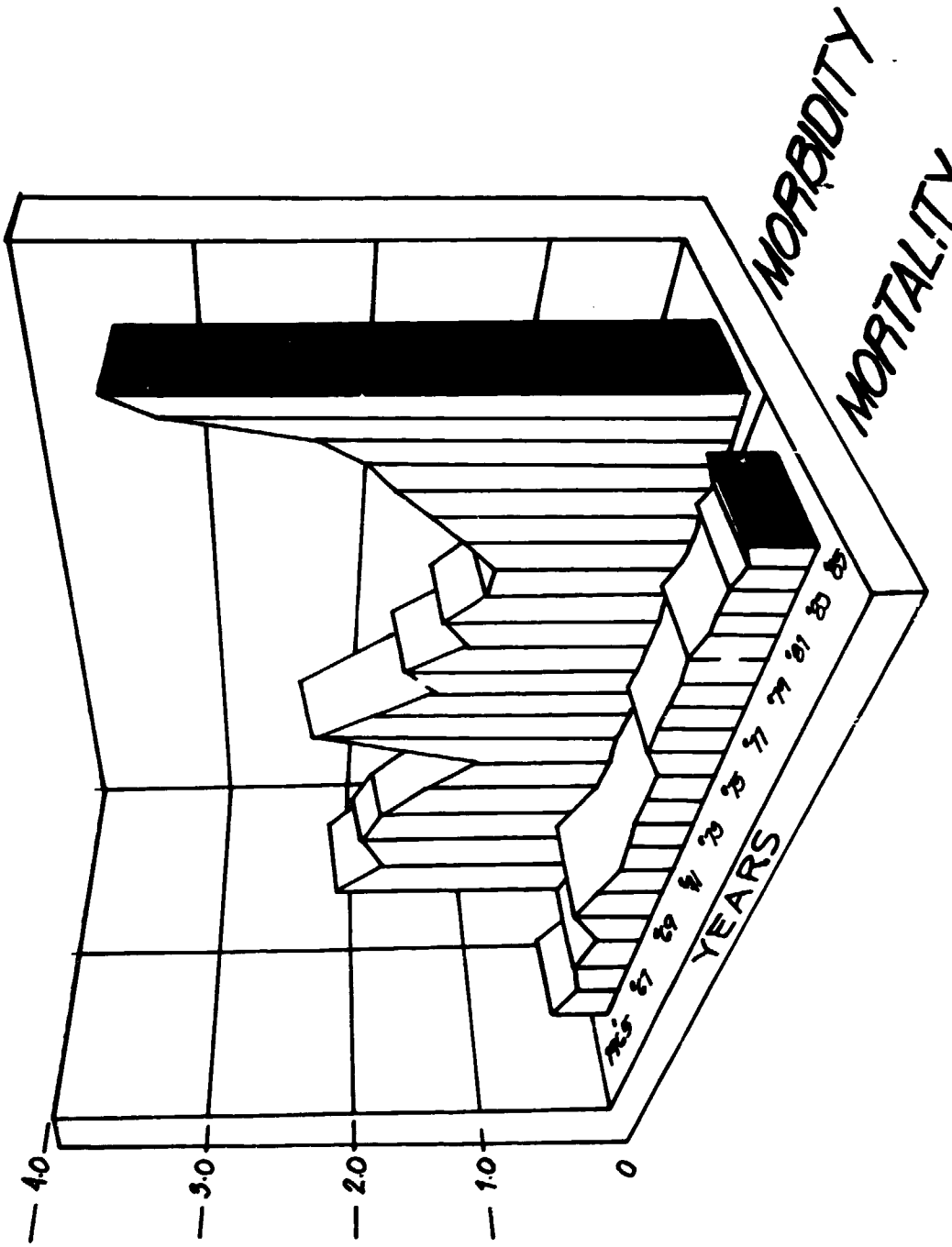
The proportion of paucibacillary to multibacillary cases reported as new cases has crept uncomfortably to 35:65, from the reported ratio of 50:50 established five years ago. Twelve percent of newly detected cases belong to the 0-14 age group. About 20% of newly detected cases have some form of disabilities on registration.

2. Control Measures

From the era of isolation in leprosaria practiced since the early 1900s to the present integrated delivery of health services to the Hansenite, nothing much has been achieved in terms of reducing the actual number of leprosy cases in the country.

Dapsone has been, since 1951, the mainstay for the chemotherapy of leprosy and, while thousands of

FIGURE 31
LEPROSY
MORBIDITY AND MORTALITY TRENDS
RATE PER 100,000 POPULATION
1965-1985



cases had been rendered bacterio-negative by the drug both at the institutional and home levels, the problem of relapse arising from either resistant or persisting crganisms have posed increasing difficulties to the patient as well as managers of the leprosy control program. In the various leprosaria in particular, bacterio-negative patients refuse to be discharged for fear of relapse. Because of the long duration of treatment with Dapsone, 70 of patients, even at the home level, eventually falter, become irregular, and/or fail to complete the treatment program.

Continuous transmission of the disease in the country has not been curtailed. Proof is the rather high percentage of children cases among those newly detected. New foci of leprosy in the country are found every now and then.

3. New Strategy of Control: Multi-drug Therapy (MDT)

The introduction of Rifampicin and Clofazimine in the chemotherapy of leprosy has rekindled the enthusiasm of leprosy experts. In view of this, it is hoped that control, and eventually eradication of leprosy could be achieved in the near future.

The World Health Organization (WHO) in 1982 took the lead in recommending MDT for all forms of leprosy. In 1985, two provinces in the Philippines, Cebu and Ilocos Norte, were chosen as pilot areas for MDT implementation. MDT was given to almost 3,000 patients in the two provinces; 70% of those who started on the new treatment strategy completed the prescribed regimens. What was significantly achieved in the pilot areas was that all the activities of MDT implementation - from case finding to case holding and treatment - were carried out by the general health service staff, from the barangay health workers to the rural health physicians.

Following the experiences gained in the pilot provinces, the Department of Health opted in 1987 to implement MDT nationwide. As of this writing, a number of activities preparatory to actual MDT implementation has already been carried out. MDT drugs good for 30,000 cases had already been procured and will be in place in the health centers by April 1988. A massive training, information, and education drive has already begun. Every district hospital, main health center, and barangay health station in the country is envisioned to have the capability to manage leprosy in general and its complications in particular.

Moving along the chemotherapy aspect of leprosy control is the program for the physical as well as the socioeconomic rehabilitation programs for the cured Hansenite. Tala will be primarily developed to handle the physical rehabilitation aspect of the program, while Cebu is envisioned to provide the necessary basic institutional and operational research activities. Culion and its rich resources shall address itself to the economic aspects of rehabilitation. On the other hand, the other leprosaria shall remain as short-term centers for management of leprae reactions and minor complications of leprosy.

In the future, activities towards the increasing use of serological tests for early detection of leprosy as well as the mass use of effective vaccines against leprosy shall be considered. The search for drugs active against M. leprae shall continue. Much shorter duration of treatment for multibacillary leprosy will have to be sought to sustain the interest of the patient and assure the completion of treatment.

Table 82
Number of Leprosy Cases Per Region

	Region*	No. of Cases
1.	NCR	13,846[1]
2.	Region No. 1	5,595
3.	Region No. 3	2,732
4.	Region No. 4	2,577[2]
5.	Region No. 7	2,568
6.	Region No. 9	2,522
7.	Region No. 8	2,139
8.	Region No. 6	1,665
9.	Region No. 2	1,261
10.	Region No. 11	1,222[3]
11.	Region No. 10	1,148[4]
12.	Region No. 5	1,087
13.	Region No. 12	546
	TOTAL	38,908

*No. of cases reported to CDCS, excluding cities
1. Reported from DRTS, 1986 figures, of which 5,722 were regularly reporting at the treatment center
2. Excluding Romblon and Aurora Province
3. Excludes Davao Oriental
4. Excludes Camiguin, Misamis Occidental

3.7. Health Infrastructure

3.7.1. Medical Doctors, Nurses, Pharmacists

The ratio of government physicians to population has declined considerably in the past eight years while nurses to population ratios have varied almost every three years during the same period, and the other paramedical workers in the government health machinery have likewise changed, during the said period (1978-1985). The increase in government health personnel has been consistent with the increase in enrollment in both private and public colleges, and the DOH has absorbed a certain proportion of these graduates in its upgrading program. The ratio of Government Medical and Selected Medical Workers to Population, 1978-1985 is given below:

Table 83
Actual Number of Government Health Staff, 1978 - 1985

(year)	1978	1979	1980	1981	1982	1983	1984	1985
Physician	6157	6839	7259	7378	7378	8132	8132	8511
Nurse	7467	8523	9606	9644	9644	10306	10306	10423
Midwife	6157	8698	9329	9470	9470	9574	9574	9793
Dentist	790	777	1029	1090	1090	1123	1123	1146
Nutritionist	305	502	618	599	599	619	619	634
Sanitary Inspector	1502	1499	1565	1928	1928	1880	1880	1933

Sources: DOH, NCSO

Table 84
Population per Government Health Worker, 1978 - 1985

(year)	1978	1979	1980	1981	1982	1983	1984	1985
Physician	1:7437	6877	6656	6714	6883	6401	8560	6423
Nurse	1:6132	5518	5029	5136	5265	5050	5176	5245
Midwife	1:7437	5407	5179	5230	5362	5437	5572	5582
Dentist	1:57967	60537	46954	45445	46589	46353	47507	47704
Nutritionist	1:150146	93700	78181	82697	84779	84095	86189	86228
Sanitary Inspector	1:30489	31379	30873	25692	26339	27689	28378	28282

Sources: DOH, Planning Service; DOH and NCSO, Population Studies Division

. The number of pharmacists increased from 19,076 in 1970 to 26,854 in 1986, or an increase of almost 41%.The latter figure gives 4.80 pharmacists (government and private) per 10,000 population, or a ratio of 2085 population per pharmacist. Correspondingly, there were 9.56 physicians per 10,000 population, 4.01 dentists for every 10,000 Filipinos, and 27.12 nursing personnels per 10,000 population, in 1986.

3.7.2. Hospital Bed Ratios, Clinics, Health Centers

The number of hospitals almost tripled to 1,846 in 1986 from 650 in 1970. Two-thirds of these are privately owned and operated.

Table 85
Number of Hospitals

Year	1970	1975	1980	1985	1986
Total	650	927	2020	1815	1846
Public	220	316	413	624	617
Private	430	611	1607	1191	1229

Meanwhile, bed capacity still fell short of the desirable level (WHO). Admissions per 10,000 population during 1986 was 41 persons while the ratio of bed to population was 3.1 to 10,000 (or 3,273 population per available hospital bed per year). Number of beds in public hospitals reached 48,906 by 1986, an average of 79 per hospital while private hospitals (1229) had 40,265 beds that year (ave. of 33/hospital).

The Rural Health Units increased in number, but their ratio to the population continued to decline, as the figures below indicate:

Table 86
RATIO OF RURAL HEALTH UNITS TO POPULATION, 1975 - 1986

Year	RHU number	Ratio
1975	1705	1:24785
1979	1928	1:24452
1980	1991	1:24267
1981	1991	1:24875
1982	1991	1:25485
1983	1991	1:26145
1984	1991	1:26796
1985	1991	1:27458
1986	1991	1:28129

Ideally, as the population increases, there must be a corresponding increase in the number of Rural Health Units (RHUs) so as not to congest the existing RHUs. However, as shown in the abovecited data, from 1980 up to 1986, the number of RHUs was not increased; hence, the number of people per RHU continually increased starting 1980 up to 1986, and it continued to be below the prescribed standard of one RHU per 20,000 population set by the DOH. As a last ditch effort to decongest the RHUs, the government adopted the strategy of constructing more Barangay Health Stations (BHSs), satellites of the main RHUs. In 1986, 161 new BHSs were set up all over the land; however, the move failed to neutralize the tremendous effect of increase in population, considering that the number of people per BHS continued to increase. In 1986, the number of people per BHS was 6,870, below the ideal ratio of one BHS per catchment area of 5,000 people set by the DOH. Below is the number of BHSs for a particular year, with their corresponding ratio to population:

Table 87
RATIO OF BARANGAY HEALTH WORKERS TO POPULATION

Year	BHS number	Ratio
1975	3075	1:13743
1979	4552	1:10357
1980	7353	1:6571
1981	7991	1:6198
1982	7991	1:6350
1983	7991	1:6514
1984	7991	1:6676
1985	7991	1:6841
1986	8152	1:6870

These figures only give a part of the total health picture since drug procurement and distribution by the Department of Health varied from year to year, and drug consumption patterns of the population are affected by various factors.

3.7.3. Hospitalization days

Average length of stay in the hospital regardless of type of hospital is not available in any of the sources used above, but in tuberculosis centers, this was gathered to be 22 days per patient in 1986 (bed occupancy in these hospitals was 76%);in mental hospitals, average length of stay was 28.9 days (bed occupancy rate for the same year was 76.9%); and in maternity hospitals, the same statistic was put at 2.2 days per mother per year (bed occupancy rate was 69%).

3.7.4. Development program (Hospital human and other resources)

The estimated number of physicians,nurses and midwives in 1987, and at the end of 1992 are shown below, including the percent increase this projected build-up is to generate:

Table 88
PROJECTED NUMBER OF HEALTH MANPOWER RESOURCES, 1988 - 1992

Personnel type	1987 (ratio)	1988-1992 (ratio)	%increase
Physicians	8817 (1:6505)	12852 (1:5000)	45.8%
Nurses	10612 (1:5405)	13855 (1:500)	30.6%
Midwives	9783 (1:5889)	25704 (1:2500	162.7%

ADDITIONAL REFERENCES

1. SEAMIC Health Statistics, 1987, Southeast Asian Medical Information Center, International Medical Foundation of Japan.

2. 1986 Economic and Social Indicators, National Statistical Coordination Board, Economic and Social Statistics Office.

3. Philippine Health Statistics 1985, Health Intelligence Service, Department of Health, Manila.

4. Compendium of Philippine Social Statistics, National Economic and Development Authority, 1986.

5. Philippine Statistical Yearbook 1987, National Economic and Development Authority.

6. Draft of the Health, Nutrition and Family Planning Chapter of the Updated Medium-term Philippine Development Plan, 1988-1992 (Emphasis on Health Component).

7. Situation of Children and Women in the Philippines, Republic of the Philippines and United Nations Children's Fund (UNICEF), Manila, 1987.

8. Philippine Council for Health Research and Development Annual Report, 1987.

9. Report of the Technical Committees on Various Diseases, Created in Connection with the 3rd National Health Congress, Sponsored by the Philippine Council for Health Research and Development.

10. Bocobo, D. L. and Bondad, M.: Report on the Nutrition Situation in the Philippines, National Nutrition Council of the Philippines, April, 1988.

11. Kintanar, Q. L. and Castro, J. S.: Is Coconut Oil Hypercholesterolemic and Atherogenic? A Focused Review of the Literature, 1988.

3.8 Health Care Financing

This portion on health care financing is based on the Country Study on Health Care Financing in the Philippines which was commissioned to the Integrated Health Care Services by the Asian Development Bank in preparation for the Regional Seminar on Health Care Financing which was held in Manila in July, 1987. The study focused on the estimation of aggregate health care expenditures in 1981 to 1985 and determined their sources and user, highlighting public and private sector participation, regional distribution and community involvement in financing health care.

Findings from the study are summarized as follows:

3.8.1 Levels of Expenditure

The financing of health activities in the Philippines is dominated by the private sector. Of the estimated ₱14.5 billion total health care expenditure (HCE) in 1985, 73.8% or ₱10.7 billion was accounted for by the private sector. The balance of ₱3.8 billion contributed by government represent a little over 1/4 or 26.2% of total HCE. Viewed in a 5-year perspective, private share in health expenditures has steadily increased from a level of 65.8% in 1981 to almost three-fourths in 1985. In real terms (1972 pesos), private HCE grew by 5% from 1981-1985 while public HCE declined by 35%. The net effect was that total HCE in 1985 declined to 91% of 1981 levels.

Table 89
Philippine Health Care Expenditures (HCE) in Current Terms
1981-1985 (in millions)

YEAR	GOVERNMENT HCE	PRIVATE HCE	PHILIPPINE HCE
1981	2,736	5,143	7,879
1982	3,309	6,014	9,323
1983	3,921	7,025	10,946
1984	3,596	8,760	12,356
1985	3,779	10,717	14,496

Source: Health Care Financing in the Philippines, Intercare, 1987

3.8.2 Locus of Spending

The Department of Health is the major agency which accounted for public spending in health. It accounted for an average of 73% of total health spending of the national government and about 65% of total public health expenditures from 1981 to 1985. The other agencies of the national government accounted for an average of 24% of total public HCE while local governments accounted for about 11% of total.

Table 90
Component Shares of National Government Health Funds, Philippines 1981-1985

	1981	1982	1983	1984	1985
A. Department of Health	73.4%	71.7%	74.5%	71.6%	74.0%
B. Other National Government Agencies	22.2	24.1	21.7	22.9	20.3
C. Personnel Benefits Fund	2.8	2.6	2.6	2.9	2.8
D. Social Pricing and Development	-	-	-	1.5	1.6
E. National Assistance to Local Government Units	1.7	1.5	1.3	1.2	1.2
Total	100%	100%	100%	100%	100%

Source: Health Care Financing in the Philippines, Intercare, 1987

Table 91
DISTRIBUTION OF GOVERNMENT HEALTH FUNDS, 1981-1985

Year	National Government						Local Government		Grand Total	
	Department of Health		Other Ministries		Total					
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1981	P1,001.80	65.8	P652.00	23.8	P2,453.90	89.7	P282.40	10.3	P2,736.30	100
1982	2,149.80	65.0	848.10	25.6	2,997.80	90.6	311.60	9.4	3,309.40	100
1983	2,661.00	67.9	912.90	23.3	3,573.80	91.2	347.00	8.8	3,920.80	100
1984	2,271.60	63.2	902.80	25.10	3,174.40	88.3	422.00	11.7	3,596.40	100
1985	2,425.30	64.2	850.20	22.5	3,275.40	86.7	503.70	13.3	3,779.1	100

Source: Health Care Financing in the Philippines, Intercare, 1987

Household or Family spending accounted for 49.5% of private health care expenditure. Health insurance payments and benefits accounted for about 5% of total HCE in 1981-84, while the balance of 44.9% was accounted for by other spenders, including private company and corporate benefits, community-financed health efforts, private voluntary organizations, civic groups and philanthropic societies.

3.8.3 Uses of Health Funds

Curative care accounted for the greater share in health care. In the governmment sector, an average of 57.7% of the annual budget was used for curative care, while 33.1% was spent on preventive care.Administrative cost took up 8. 8% of government HCE while training activities accounted for 0.4% of public HCE.

Table 92
Uses of All Government Health Funds
(Amount in P million)

Year	Preventive Care Amount	%	Curative Services Amount	%	Training Amount	%	Administrative Services Amount	%	Total Amount	%
1981	P 954.00	34.9	P 1,503.20	54.9	P 16.20	0.6	P 262.90	9.6	P2,736.30	100
1982	1,212.70	36.6	1,786.40	54.0	14.60	0.4	295.70	8.9	3,309.40	100
1983	1,263.00	32.2	2,315.80	59.0	14.00	0.4	328.00	8.4	3,920.80	100
1984	1,234.90	34.3	2,017.00	56.1	14.10	0.4	330.40	9.2	3,596.40	100
1985	1,071.10	27.2	2,389.30	64.2	14.40	0.4	304.30	8.2	3,779.40	100
Average	P 1,147.10	33.1	P 2,002.30	57.7	P 14.70	0.4	P 304.30	8.8	P3,468.40	100

Source: Health Care Financing in the Philippines, Intercare, 1987

Within the Department of Health budget, an average of 22.3% of yearly expenditures was spent on preventive care as apposed to 68.7% spent on curative care. Administrative services accounted for 8.3% of DOH expenditures while training accounted for 0.7%.

In the case of other agencies of the National Government, it is noted that a proportionately higher share of 41.0% was allocated for preventive care as opposed to the 46.0% spent for curative care. It is also noted that other government agencies spent a proportionately higher share of 14% for administrative costs.

As regards private HCE , data on the uses of funds is very limited. Informed judgement suggests that the bulk of private health spending went to curative care. Data on household health expenditures in 1965 and 1971 indicate that the greater portion of health spending went to provider fees (39.9%), hospital charges (26.6%) and drugs and medicines (32.9%). Together they accounted for 93.9% of total household spending in health.

Drugs and medicine use up a considerable amount of both public and private health spending. Sales record of the Drug Association of the Philippines indicate that drug sales doubled from P3.3 billion in 1981 to P6.7 billion in 1985. This represents roughly 46.2% of total HCE in 1985. Government hospitals accounted for roughly P262 million or 4% of total drug sales. The rest were sold by private hospitals and

drugstores around the country. Luzon and Manila together account for 34% of total drug sales, while Mindanao and Visayas accounted for 20.9% Department of Health purchases of drugs and medicines amounted to P165 million in 1985. This is roughly 2.5% of total drug sales recorded in the year. Informed views of selected physicians suggest that 77-97% of total drug usage were curative in nature.

Table 93
Sales of Pharmaceutical in Current Prices, 1981-1985 (in million pesos)

	1981	1982	1983	1984	1985
I Hospitals					
Private	558.4	643.8	573.4	643.6	725.3
Government	213.5	247.2	234.5	218.0	262.0
Total	771.8	890.9	807.9	861.6	987.3
II Drugstores					
Manila	1,248.2	1,450.0	1,675.7	2,001.6	2,772.5
Luzon	549.1	590.1	801.9	1,083.3	1,515.9
Visayas	444.6	509.0	528.3	556.5	805.7
Mindanao	303.1	311.1	362.1	506.1	589.3
Total	2,545.1	2,860.2	3,368.1	4,254.4	5,683.4
Grand Total	3,316.9	3,751.1	4,175.9	5,116.0	6,670.7

Source: Health Care Financing in the Philippines, Intercare, 1987

3.8.4 Financing the Health Sector

The public and private sector differed significantly in their mode and sources of financing for health care. The private sector relied mainly in market mechanisms to support their operations while the public sector was supported primarily by tax revenues of the government.

3.8.4.1 Sources of Funds for the Public Sector

Taxes accounted for the bulk of public sector health financing in 1981 to 1985. It supplied approximately 80% or ₱2.2 billion of total public health revenues in 1981. Tax share in public health financing declined a bit in 1984 and 1985 but it still accounted for the major part of government resources for health. Local government funds for health much of which had also come from taxes, contributed 8%-13% of health resources from 1981-1985. Operating income provided for 4%-6% of public health expenditures, while foreign assistance provided for 2.5 % to 7% in the same period.

Table 94
Government Health Funds By Source, 1981-1985
(in million pesos)

	1981		1982		1983		1984		1985	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
A. National Government	2,453.90	89.7	2,997.80	90.6	3,573.80	91.2	3,174.40	88.3	3,275.40	86.7
1. Taxes	2,200.70	80.4	2,689.20	81.3	3,211.00	81.9	2,859.90	79.5	2,848.60	75.4
2. Operating Income	185.10	6.8	173.70	5.2	190.40	4.9	149.30	4.2	160.00	4.2
3. Foreign Loans and Grants	68.10	2.5	134.90	4.1	172.40	4.4	165.20	4.6	266.90	7.1
B. Local Governments	282.40	10.3	311.60	9.4	347.00	8.8	422.00	11.7	503.76	13.3
Total	2,736.30	100	3,309.40	100	3,920.80	100	3,596.40	100	3,779.10	100

Note : Figures (%) may not add up to total due to rounding

Source: Health Financing in the Philippines, Intercare, 1987

Development assistance in the form of foreign loans showed an increasing trend in 1981 to 1985. From a level of ₱68.1 million in 1981, foreign loans for the health sector increased to ₱266.9 million in 1985. The largest source of credit was the United States Agency for International Development (USAID) with ₱331.8 million, representing 40.7% of total loan assistance for the health sector in 1981-1985. International Development Assistance (IDA) and the International Bank for Reconstruction and Development (IBRD) ranked second and third as

largest creditors for health respectively, contributing 36.1% and 21.5% of total loan assistance. The Asian Development Bank (ADB), on the other hand, contributed only ₱13.9 million representing 1.7% of total loan assistance. Foreign loan assistance support went mainly to population and other primary health care activities.

Table 95
Sources of Foreign Loans of Health Services of the National Governement, 1981-1985
(in million pesos)

Year	C R E D I T O R S				Total Loans for the Year
	USAID	IDA	IBRD	ADB	
1981	₱ 4.6	₱ -	₱ 63.1	₱ .367	₱ 68.1
1982	38.4	59.1	36.7	.676	134.9
1983	94.2	71.3	6.1	.874	172.4
1984	80.9	55.1	26.5	10.5	173.1
1985	113.7	108.7	43.0	1.5	266.9
1982-1985 Total	331.8	294.2	175.4	13.9	815.4
% of Creditors Loan to Total Loan	40.7%	36.1%	21.5%	1.7%	100%

3.8.4.2 Financing the Private Sector

Private health expenditures were supported from out-of-pocket payments by users of health services, insurance payments, company-financial health benefits, community-generated resources and donations of cash, material or technical services from concerned individual and groups.

A crude estimation of the breakdown of private health financing, based on available secondary data such as family expenditures, insurance benefits and others, indicate that user charges (out-of-pocket payments) supported approximately ₱5.3 billion or 49.5%, insurance

supported ₱600 million or 5.6% and others accounted for ₱4.8 billion or 44.8% of private HCE. The large proportion of others is difficult to further breakdown to its components which include company-financed benefits payments, community-generated resources to support health activities and donations of materials and services to privatee health efforts.

3.8.5 Sources of Funds for the Health Sector, 1985

The sources of financing for the health sector in 1985 and the estimated amounts and proportions of their contribution to total HCE are summarized below:

Sources	Amount (in billion)	% Contributions
Taxes	₱ 2.85	19.6
Government Operating Income	0.16	1.1
Foreign Assistance	0.27	1.8
Local Aid	0.50	3.4
Household spending	5.37	36.9
Insurance Benefits	0.60	4.1
Others (private)	4.80	33.1
Total	₱14.55	100.0

RESTRICTED

17397
(2 of 3)

DP/ID/SER.A/1166/Add.1
9 March 1989
ORIGINAL: ENGLISH

PHILIPPINES PHARMACEUTICAL INDUSTRY DEVELOPMENT STUDY

DP/PHI/87/019

PHILIPPINES

Technical report: Environment and possibility of the Pharmaceutical Industry in the Philippines of upstream integration*

Prepared for the Government of the Philippines
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Dr. K. Ivanov, Chief Technical Adviser
Drs. William Padolina and Modesto Chua - Biotechnology and Human Resources
Atty. Hiram Mendoza - Law, Mr. Nicanor Gabunada and
Dr. Ruperto Alonzo - Economics

Backstopping Officer: Dr. Zoltan Csizer, Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

V.89-52791

TABLE OF CONTENTS

ADDENDUM 2

IV THE PHILIPPINE PHARMACEUTICAL INDUSTRY

4.1 Elements of Growth

4.1.1 Development of the Industry

The formal beginning of the Philippine drug industry was in the turn of the twentieth century with the establishment of Laboratory Hizon in 1900. Thirteen years later, Manuel Zamora commercialized the production of a vitamin B complex he discovered (locally known as the original tiki-tiki) against beri-beri.

Other companies followed later, with Arambulo Products, Inc., Santos Ocampo, Inc. and the Philippine American Drug Company (now Botica Boie) introducing home remedies extracted from medicinal plants. These companies were followed by Farmacia de Fernando and later by Lexal Laboratories. At this stage, the processing and compounding of pharmaceutical products were mostly manual, rather than by machines. In effect, production was limited. Hence, there were other groups who started buying drugs from abroad and sold them in the local market.

In the meantime, rapid advancements were made in the field of chemotherapeutics in the United States and Europe. These developments were generated in part by an upsurge in new drug discoveries and war-time production requirements. A great number of these products found their way into the Philippines. Filipino physicians found in these imported products a potent and standard commodity. Thus, imported medicines flooded the Philippine market and stunted the growth of the indigenous pharmaceutical industry.

After World War II, multinational drug companies began to set up manufacturing facilities in the country. Some went into joint ventures such as the Japanese company Takeda with Botica Boie, and the American company Wyeth with Suaco. Many others, such as Eli Lilly and Abbot Laboratories had been in the Philippines even during the US colonial period and retained 99% ownership with a 1% share given to representatives from local banks or law firms.

In 1950, the government imposed strict import and exchange controls. Drug companies responded to this by establishing plants here in the Philippines. Meanwhile, some pre-war drug distributors and processors rehabilitated and expanded their operations incorporating modern methods and equipment. By 1954,

there were 46 drug manufacturers; 31 of which were owned by Filipinos. Fifty percent of the industry's P15 million investments then were foreign-owned. This is a striking contrast to the pre-war years' record when almost all of the 30 operating firms were controlled by Filipinos.

The number of major multinational companies setting up manufacturing facilities in the Philippines grew through the years: 11 were incorporated before 1960, another 17 between 1960 and 1969, 5 in 1970 and 4 from 1981 to 1983.

4.1.2 The Record of Growth of the Industry

Historical data have shown that the drug industry's performance closely parallel the general economic environment. Table 96 for example, which shows the historical growth record from 1957 to 1981, shows that in times of GDP upturns, the industry's growth is fast; and in times of GDP slow downs, the industry's growth is slow. The same table also shows that the drug industry's performance is significantly better than those posted by the general economy. From 1957 to 1981, drug sales and production (net of price increases) grew at an average annual rate of 9.5 and 18.2% respectively. The corresponding growth rate of real GDP is only 5.6%.

The 1956 to 1981 record is replicated in the available industry data from 1982 to 1987. Table 97 shows this.

Gabunada (1983)* found out that growth of the industry is mainly caused by the pull of two elements: the growth of markets and the increased use of factor inputs.

Accounting for just the direct effects of market elements on the output growth of the industry shows that: (a) 77.5% of output growth is due to increases in the final domestic demand; (b) only 1.2% to export expansion; (c) a negative 18.6% to import substitution; and, (d) the remaining 39.8% to intermediate demand.

---

* Gaounada,Nicanor, Jr.. "The Drug Manufacturing Industry in the Philippines: Growth Record, Issues and Prospects and Future Prospects". Center for Research and Communication. Manila. 1983

Table 96
Average Annual Growth Rates of Drug Sales, Drug Production, Drug Price Index, Inflation Rate and the Gross Domestic Product (GDP), 1957 to 1981.

Sub-period	Average Annual Growth Rates (in %)				
	Drug Sales	Drug Production	Drug Price	Inflation	GDP
1957 - 60	22.9	25.3	(0.7)	2.4	6.3
1961 - 63	6.2	11.2	7.0	5.2	7.7
1964 - 66	5.4	16.9	5.0	5.6	3.4
1967 - 69	5.4	8.5	1.8	3.0	7.4
1970 - 72	9.4	9.3	14.5	15.0	2.6
1973 - 74	6.9	8.6	10.4	25.3	9.8
1975 - 79	9.2	12.5	8.6	10.0	5.8
1980 - 81	8.5	10.5	8.7	12.1	4.4
1957 - 81 Average	9.5	12.2	6.3	8.5	5.6

Source: Gabunada,Nicanor. "The Drug Manufacturing Industry in the Philippines: Growth record, issues and Prospects and Future Prospects". Center for Research and Communication. Manila. 1983

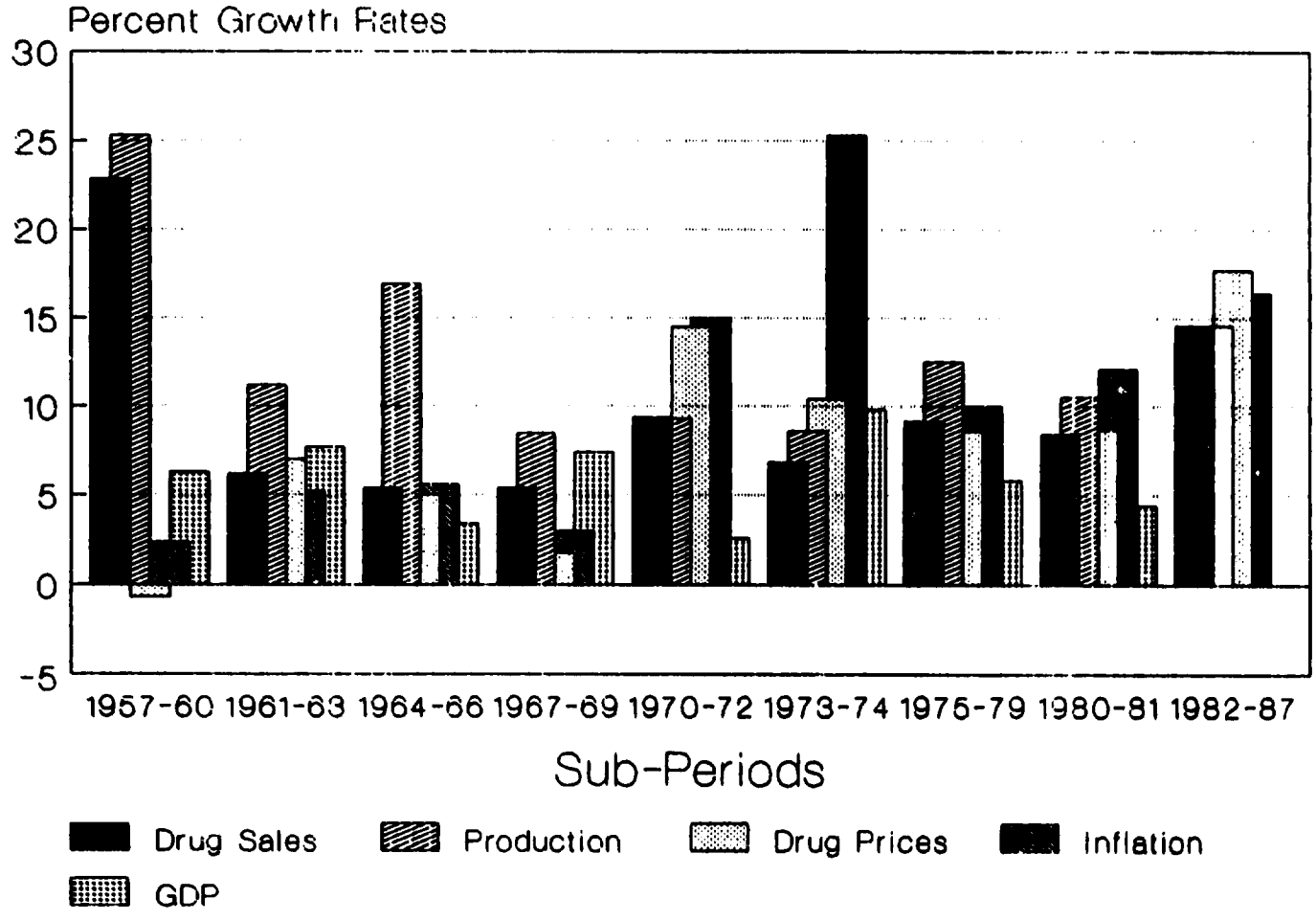
Table 97
Average Annual Growth Rates of Drug Sales, Drug Price Index, Inflation Rate and the Gross Domestic Product (GDP), 1982 to 1981.

Sub-period	Average Annual Growth Rates (in %)			
	Drug Sales	Drug Price	Inflation	GDP
1982	4.4	7.6	10.2	2.9
1983	(8.7)	29.0	9.9	0.9
1984	(9.3)	39.2	50.3	(6.0)
1985	22.7	9.0	23.0	(4.4)
1986	1.7	13.2	0.9	1.7
1987	14.6	8.2	3.8	5.1
1982 - 87 Average	4.2	17.7	16.4	0.03

Source: IMS, various years; National Economic and Development Authority, 1988

FIGURE 32

Historical Growth Rates in the Drug Industry and Macroeconomic Variables



When both the direct and indirect effects of the growth in markets are taken into consideration, the distribution of the demand sources of growth is estimated as: (a) 93.5% is due to the direct and indirect effects of increased domestic final demand; (b) 4.9% to export expansion; (c) negative 17.2% to import substitution; and, (d) 18.8 to technological changes in the buying sector.

From the factor input side, the relative contribution of each factor of production and of productivity to total output growth of the indusrty is: (a) 3.9% for the increase in the use of labor; (b) 55.5% for capital; (c) 98.8% raw materials; and, (e) negative 55.3% for productivity.

The results suggests that the Philippine drug industry has clearly pursued a home market orientation in its marketing strategies. While in the past decade the government has been encouraging industries to assume a more outward market orientation, the industry has been dependent mainly on the growth of final domestic demand (i.e., on the local market). It was unable to tap foreign markets. Export expansion is therefore nil and its contribution to the industry's growth is minimal.

Import substitution, which is the main spark plug for the development of the industry in the 1950s, contributed negatively to the growth and structural change in the industry. After initially motivating the industry to grow during its fledgling period, the import substitution strategy that followed lost steam. Again, this brings to light the increased dependence of the industry on imported raw materials and bulk drugs, most of which are merely re-packaged and re-compounded by local manufacturers. Moreover, this also highlights the failure to produce locally the basic chemicals for drug manufacture, and also the inability to take-off from being a mere "re-compounder" and "re-packager" of drugs.

While there are exceptions like the efforts at producing ampicillin, amoxycillin, cloxacillin and cephalexin substances by Chemfields and the herbal medicine program of the government, these efforts is but a drop in the bucket when compared to the prevailing practice.

As a general tendency therefore, the industry is highly import-dependent. As such it is susceptible to government policies on importations. It also makes itself vulnerable to suspicions of transfer pricing because raw materials are bought by local subsidiaries from their parent companies abroad. Furthermore, the situation also implies a dependence upon financing -- particularly import financing -- thereby subjecting drug firms to the vicissitudes of credit policy and foreign exchange availability.

Another weak area of the industry is productivity. Instead of spurring the industry's development, it has been a negative contributor to the industry's output growth. It appears that production-based requirements for ever-rising productivity has not been given much attention by most entrepreneurs in the industry. The results suggest that much is to be desired in the way raw materials are processed, in the way capital is utilized, and in the little things which could make labor more efficient. And with reason: for the value added of a re-compounding/re-packaging operation is understably lower than that of a full-pledged processor.

4.2 Salient Features and Operating Conditions in the Pharmaceutical Market

4.2.1. Demand

4.2.1.1 Total Drug Sales

As of year-end 1987, total drug sales is estimated at Pesos 9900.3 Million at manufacturers' prices. This is broken down as follows:

Table 98
Drug Sales By Type of Market, 1986 and 1987
(in million Pesos at outlets' purchase price*)

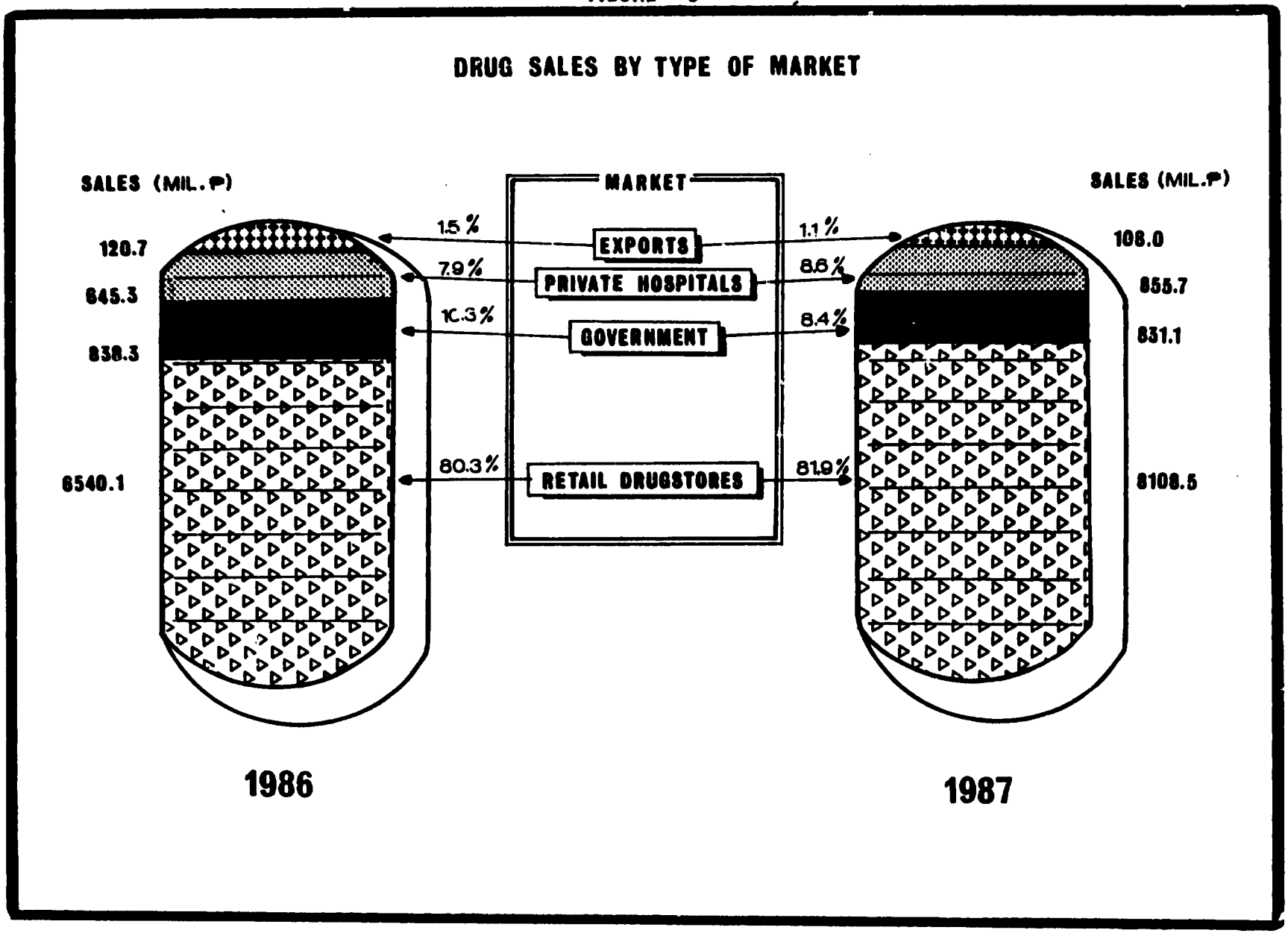
Market	1986	% Share	1987	% Share
Retail drugstores	6540.1	80.3	8108.5	81.9
Private Hospitals	645.3	7.9	855.7	8.6
Government	838.6	10.3	831.1	8.4
Exports**	120.7	1.5	108.0	1.1
Total	8144.7	100.0	9903.3	100.0
Per capita domestic consumption (Pesos)	143.29		170.65	

* The values are costed at the purchase price of the market; e.g., values for retail drugstores are at the purchase prices of the drugstores.

** Peso estimates uses the average annual exchange rates of US$1:P20.385683 for 1986 and US$1:P20.5677 in 1987

Sources: IMS 1986 and 1987; DOH,8/31/88; Foreign Trade Statistics of the Philippines, 1988

FIGURE 33


DRUG SALES BY TYPE OF MARKET
SALES (MIL.₱)
MARKET
SALES (MIL.₱)
120.7
645.3
838.3
6540.1
1.5 %
7.9 %
10.3 %
80.3 %
EXPORTS
PRIVATE HOSPITALS
GOVERNMENT
RETAIL DRUGSTORES
1.1 %
8.6 %
8.4 %
81.9 %
108.0
855.7
831.1
8108.5
1986
1987

The biggest market for drug manufacturers and distributors are the retail drugstores representing 82% of total sales as of 1987. Private hospitals and the government on the other hand, account for 8.6% and 8.4% respectively of the total sales. Export sales meanwhile is still a minuscule part of the total market with only 1.1% share.

Drug consumption per capita, represented by total sales net of exports per person in the country was only P143.29 in 1986 and P170.65 in 1987. These figures however, are misleading.

Independent studies conducted by private companies show that the industry do not actually cater to all segments of the population. One estimate is that aired by an executive of the country's leading company, that only 50% of the population can be considered as the market for drugs: 25% accounting for 75% of the market and the other 25% accounting for only 25% of the market.

Another estimate is that given by an association of drug companies that only 30% of the population can be considered as the market for drugs: 10% accounts for 75% of sales while the other 20% accounts for only 25% of sales.

Estimates derived from the latest available nationwide survey of family expenditures done by the National Statistics Office in 1985 and released in 1987 showed that 11% of the population has not spent anything on drugs and medical care, 60% of the population accounts for 33% of drug expenditures; 29% accounts for 67% of drug expenditures.

Table 99
Estimates of the Divisions in the Pharmaceutical Market
(in % of the population to % of the market ratio)

Large Filipino Manufacturer	Foreign Drug Manufacturers	Based on the 1985 FIES
50: 0	70: 0	11: 0
25:25	20:25	60:33
25:75	10:75	29:67

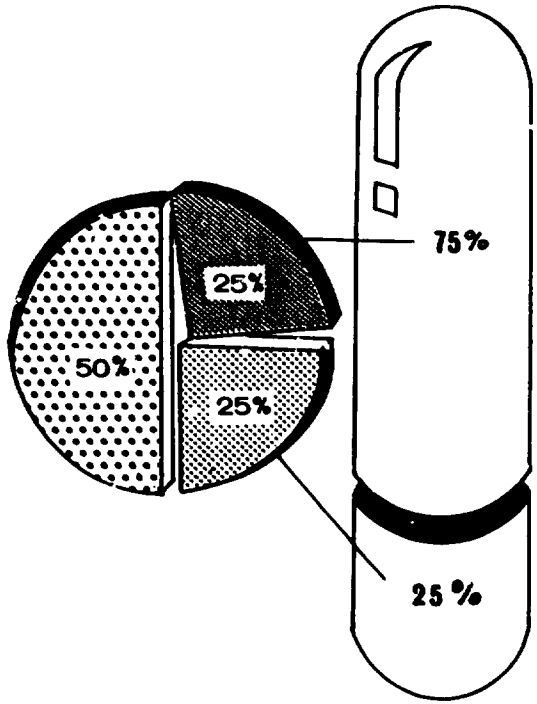
Source: Private Sources, 1985 FIES

FIGURE 34

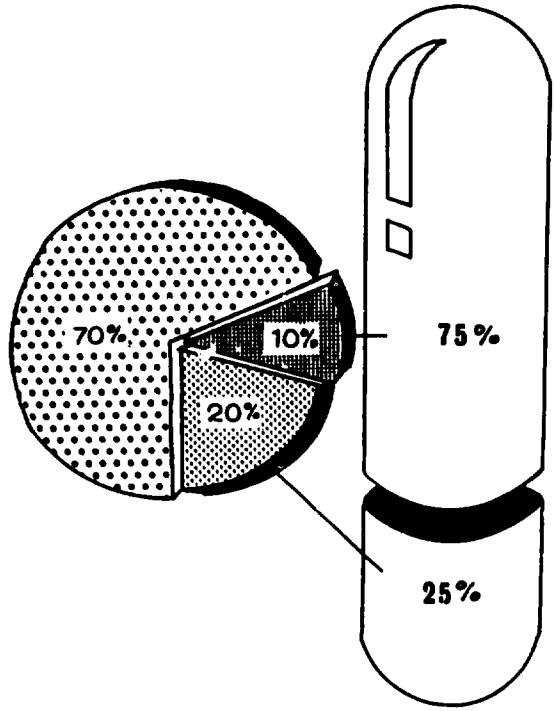
DIVISION OF THE PHARMACEUTICAL MARKET OF THE PHILIPPINES

THE 1985 FAMILY INCOME AND EXPENDITURE SURVEY

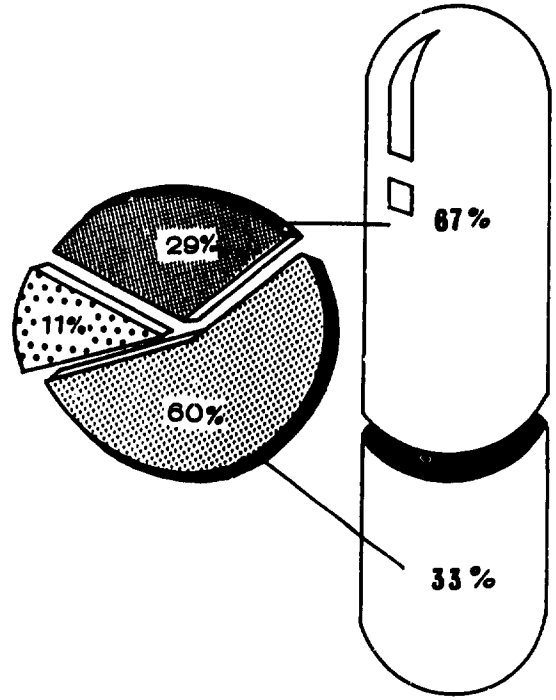
A. LARGE FILIPINO MANUFACTURERS



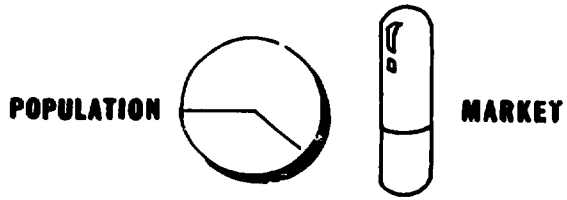
B. FOREIGN MANUFACTURERS



C. BASED ON S. I. E. S.



LEGEND:



While there are variations in the above estimates, one thing is clear: drug sales in the country do not come from all persons in the population. Rather, it is just accounted for by certain segments. As we shall see later, income levels has a lot of bearing on drug purchases. Any marketing man therefore will have to consider market niching in targetting potential sales sources.

4.2.1.2 Domestic Sales

Domestic sales, represented by sales to drugtores, private hospitals and the government account for 99% of the total sales. In 1987, this was estimated at around Pesos 9795.3 million, a 22.1% increase over the 1986's level of Pesos 8024 million.

These estimates are culled from two main sources: IMS Philippines for the drugstore and retail sales and the Department of Health for government purchases.

The IMS data is based on a monthly audit of a nationwide sample of drugstores and hospitals. A main drawback of the IMS data for drugstores is that it does not include the Mercury Drug chain in their audit thereby resulting in an underestimate of the drugstore sales. Industry sources, citing discrepancies with their actual shipments, claim that the underestimate is around 22%.

The data from the Department of Health on the other hand, is furnished by a Budget Officer of the said office and is based on the DOH's budget/appropriations for the purchase of drugs and medicines. Only a certain percentage of this amount is actually purchased by the central office; the rest are appropriated to the recipient special hospitals and regional/provincial health units of the DOH. The total budget/appropriation of the DOH in 1986 and 1987, for example, was disbursed according to the schedule shown in Table 100 There is no available record to date on whether these allocations were all consumed for drug purchases, and if so, what types of drugs and what quantities were purchased.

Another important thing to consider in interpreting the IMS data is that it is based on manufacturers' prices to the drugstores. The actual sales to consumers therefore, is higher than the IMS valuation by as much as the retailers' trade margin.

Table 100
Estimated Total DOH Budget/Appropriation for Purchase of Drugs and Medicines, 1986-1987
(in million Pesos)

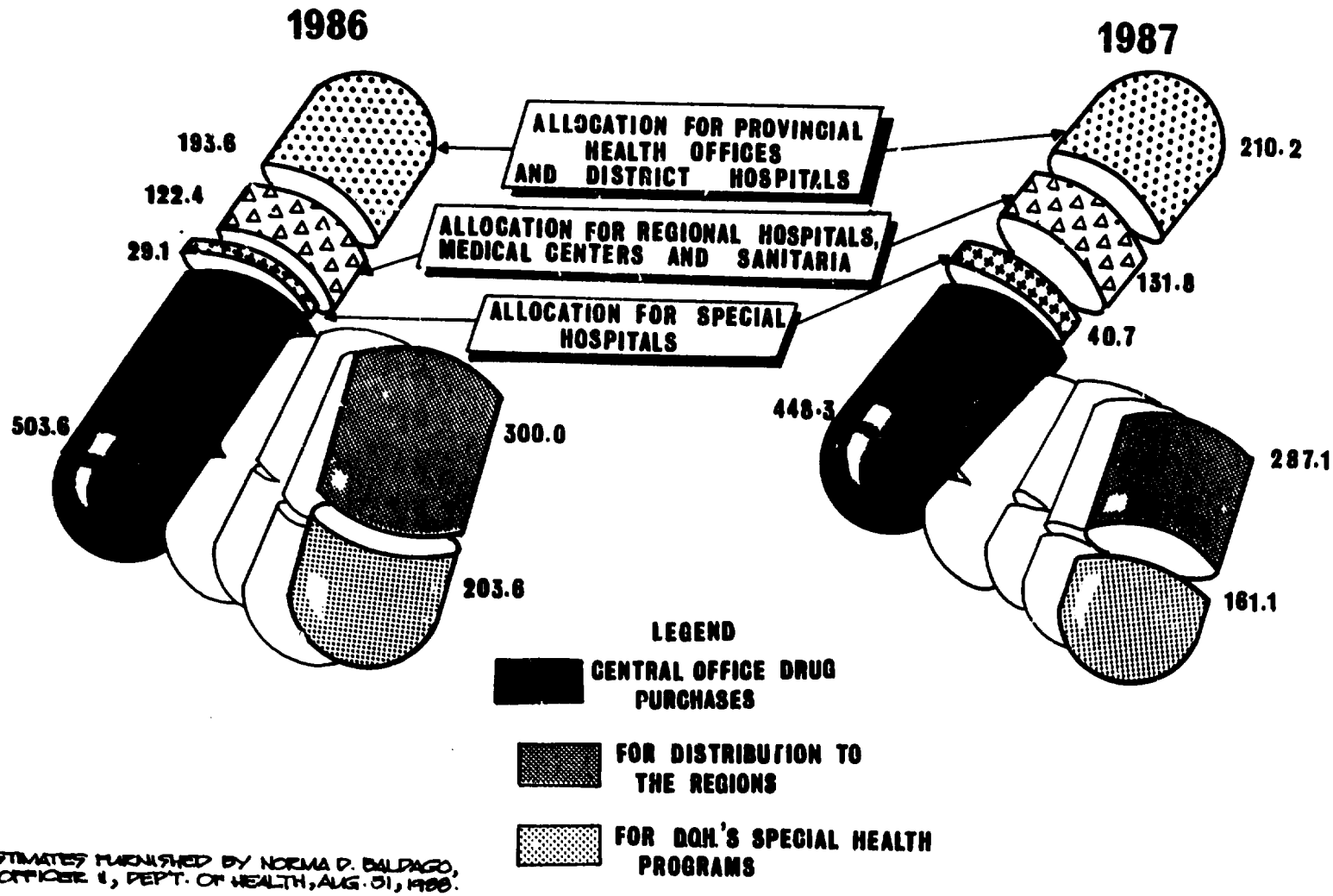
	1986	1987
Central Office Drug Purchases	503.6	448.3
- for distribution to the regions	300.0	287.1
- for DOH's special health programs	203.6	161.1
Allocation for Special Hospitals	29.1	40.7
Allocation for Reg'l Hospitals, Medical Centers and Sanitaria	112.4	131.8
Allocation for Prov'l Health Offices and District Hospitals	193.6	210.2

Source: Estimates furnished by Norma D. Baldago, Budget Officer II, Department of Health, August 31, 1988

FIGURE 35

ESTIMATED TOTAL DOH BUDGET/APPROPRIATION FOR PURCHASE OF DRUGS AND MEDICINES,

IN MILLION PESOS



SOURCE: ESTIMATES FURNISHED BY NORMA D. BALDAGO, BUDGET OFFICER II, DEPT. OF HEALTH, AUG. 31, 1988.

4.1.1.3 Exports

The export market is a minuscule portion of the local industry's total demand. The levels vary from year to year as there is really no permanent export market to speak of. The local industry is essentialy geared to produce and repack for the local market.

The value of total exports of pharmaceutical products reached $5 million in 1987 from $3 million in 1978.

The growth in exports has not been spectacular and in some years showed negative growth rates. For example, the 1983-84 and 1986-87 export trends showed negative growth rates while the exports of antibiotics decreased by 47.9% in 1985-87.

Exports of vitamins and similar preparations comprised one-fifth of total exports while about 65% are from other drug items not classified elsewhere.

Major export markets for medicines in 1987 were Hongkong, Taiwan and Malaysia.

Table 101 and Figure 36 show the export picture of the industry.

Table 101
Value of Philippine Exports of
Medicinal & Pharmaceutical Products
by Sub-Groups 1978 - 1987
(US$ '000 F.O.B.)

Product Description	1978	1980	1982	1984	1985	1987
Total	3,503	6,234	7,138	5,874	6,727	5,251
Vitamins & Vitamin Preparations	6	852	894	1,348	1,448	1,402
Bacteriological products, sera, vaccines	0	0	0	0	0	11
Pennicillin, streptomycin, tyrocidine, antibiotics	183	372	915	638	737	384
Opium alkaloids, cocaine, caffeine, quinine and other alkaloids, salts and derivatives	67	108	29	67	45	68
Medicinal & pharmaceutical products, N.E.S.	3,247	4,901	5,301	3,822	4,497	3,385

Source: Foreign Trade Statistics of the Philippines, various years

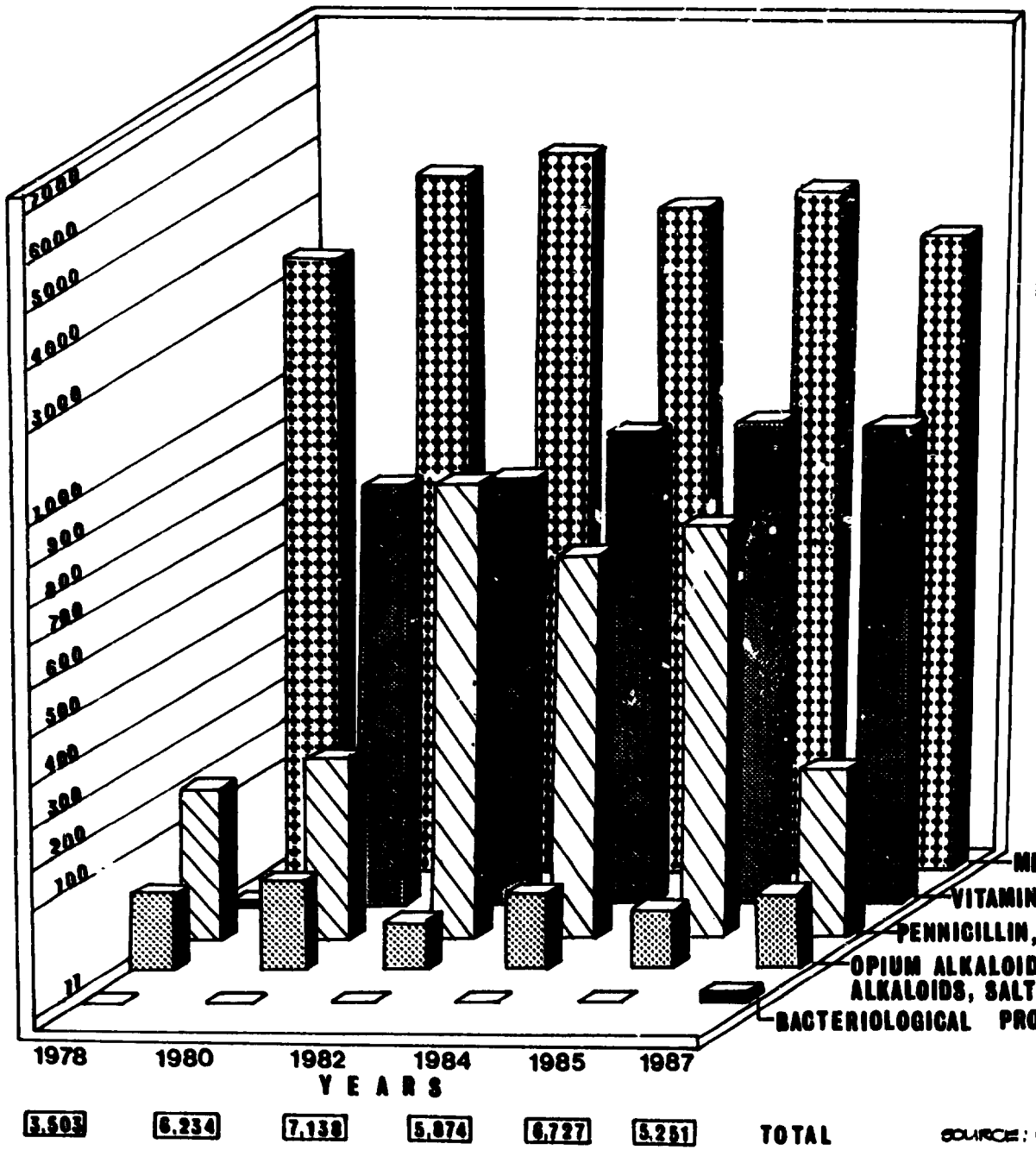


FIGURE 36

VALUE
OF PHILIPPINE EXPORTS OF
MEDICINAL AND PHARMACEUTICAL PRODUCTS
BY SUB-GROUPS 1978 -1987
(U.S. $ '000 F.O.B.)

SOURCE: FOREIGN TRADE STATISTICS OF THE PHILIPPINES

4.2.1.4 Sales By Therapeutic Class

The top selling drugs in the country at the major therapeutic class level are systemic anti-infectives. These drugs, which includes antibiotics, systemic antifungals, sulphonamides, tubeculostatics including streptomycins, antifungals, sera, vaccines and other anti-infectives, accounted for 24.2% of sales to drugstores and private hospitals in 1987. The proportion could be higher if government purchases are included. For example, of the total DOH budget for 1987, 18.1% is specifically allocated for the TB Control program of the DOH. Purchases for regional distribution, for government hospitals and for regional/provincial health units will most likely increase this proportion.

Following systemic anti-infectives are drugs for the respiratory system raking in 16% of total drugstore and private hospital sales and drugs for alimentary tract and metabolism with a 16.9% share.

Table 102 shows the relative shares of each major therapeutic classes in 1986 and 1987.

Table 102
Drugstores and Private Hospital Sales By Major Therapeutic Class, 1986 and 1987 (in '000 Pesos)

	1986	% Share	1987	% share
Alimentary Tract & Metabolism	1,192,343	16.6	1,517,138	16.9
Blood & Blood Forming Organs	387,178	5.4	501,912	5.6
Cardiovascular System	471,147	6.6	629,316	7.0
Dermatologicals	352,376	4.9	454,937	5.1
Genito-Urinary Systems & Sex Hormones	224,382	3.1	263,262	2.9
Systemic Hormones	139,871	1.9	158,978	1.8
Systemic Anti-Infectives	1,724,299	24.0	2,171,068	24.2
Cytostatics	14,378	0.2	16,715	0.2
Musculo Skeletal System	207,931	2.9	321,785	3.6
Central Nervous System	519,231	7.2	650,040	7.3
Parasitology	85,763	1.2	106,071	1.2
Respiratory System	1,265,039	17.6	1,438,560	16.0
Sensory Organs	99,158	1.4	124,582	1.4
Various	502,265	7.0	609,788	6.8
Total	7,185,360	100.0	8,964,152	100.0

Source: IMS, 1986 & 1987

FIGURE 37

DRUG SALES BY MAJOR THERAPEUTIC CLASS

(DRUGSTORES AND HOSPITAL SALES, 1987)

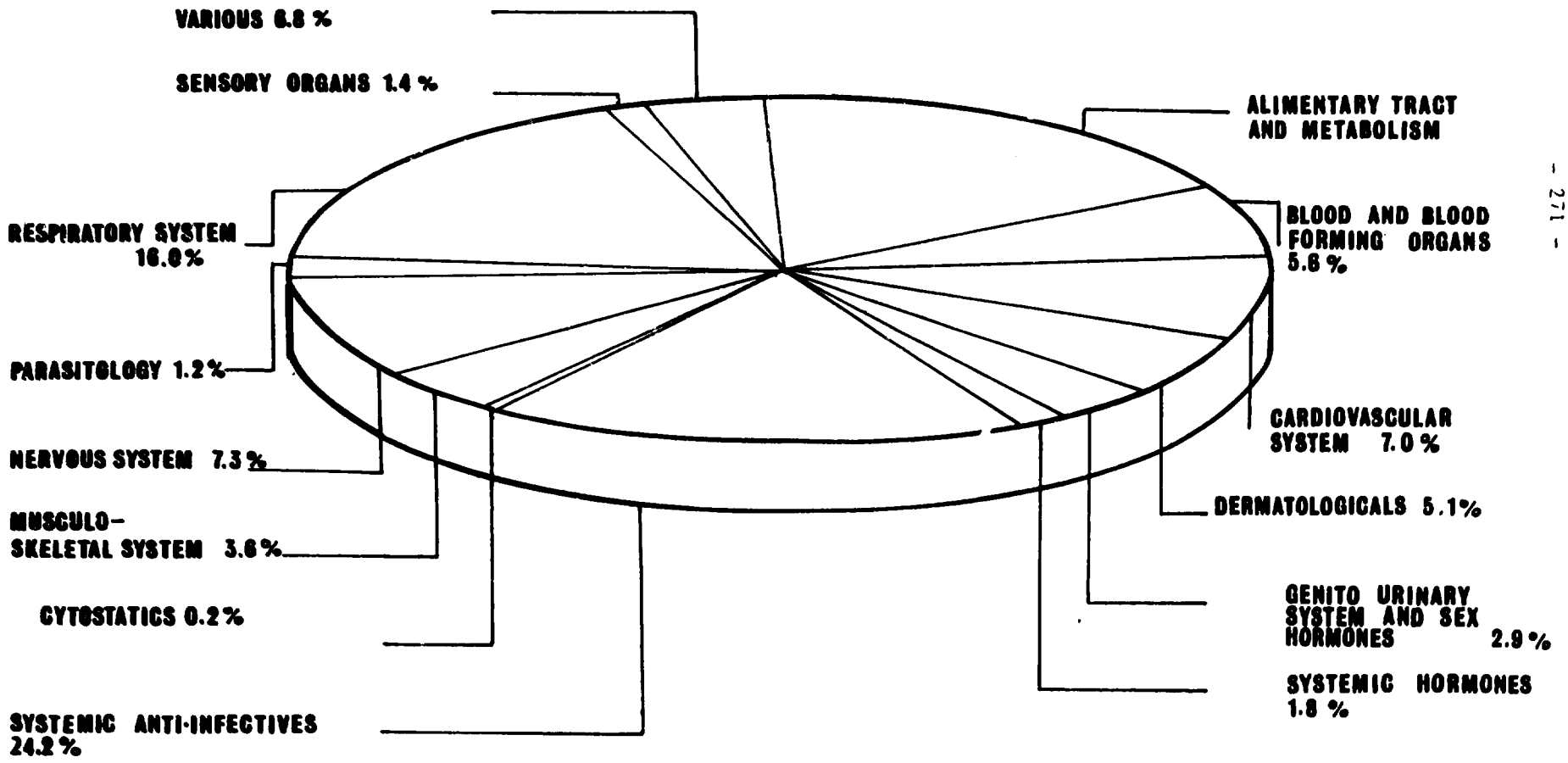
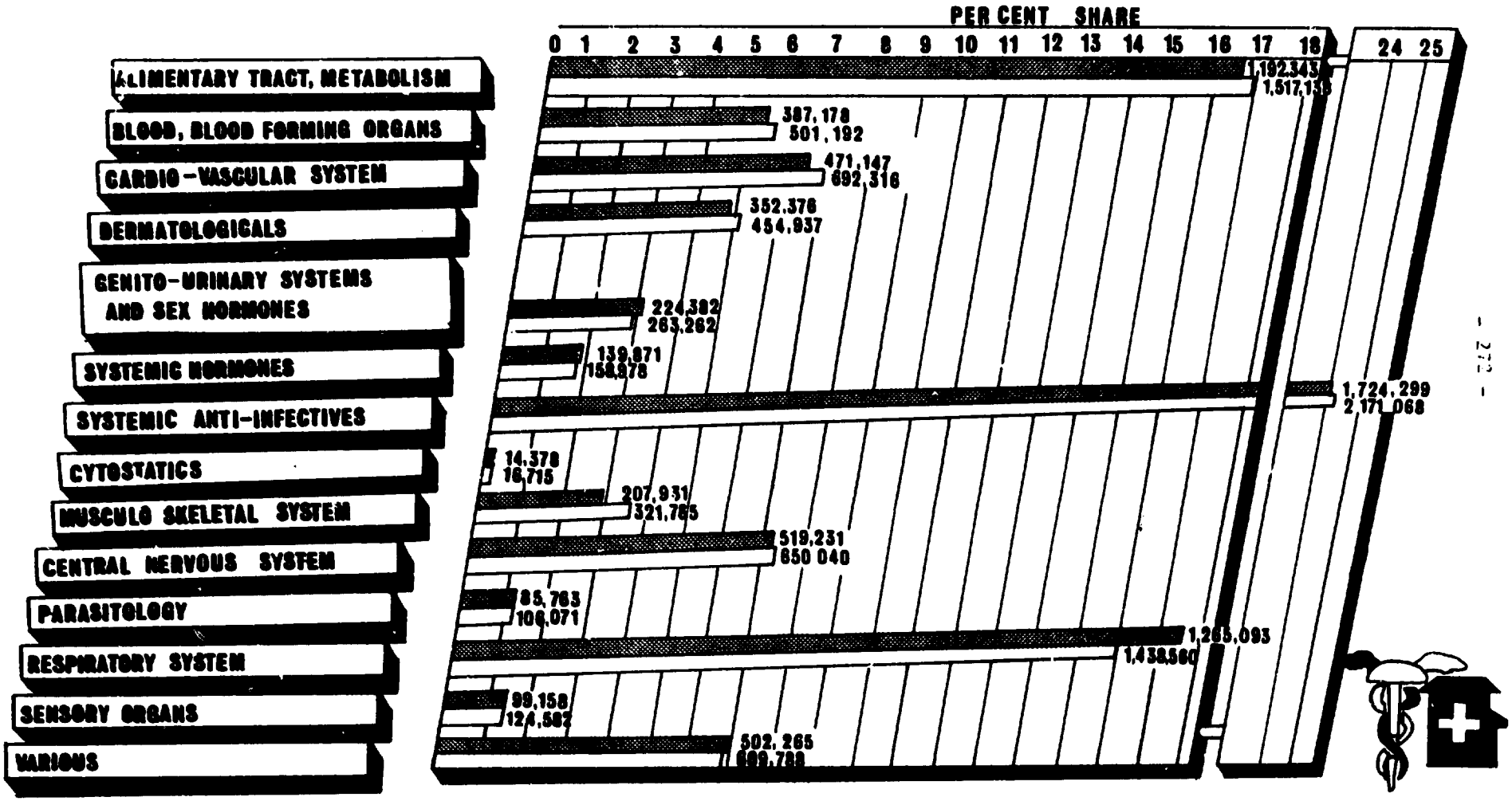


FIGURE 38

DRUGSTORES AND PRIVATE HOSPITAL SALES BY MAJOR THERAPEUTIC CLASS, 1986 AND 1987 (IN THOUSAND PESOS)



LEGEND:

1986 - 7,185,360

1987 - 8,964,152

SOURCE

IMS, 1986 & 1987

At the second level therapeutic class, the top selling drugs are antibiotics chalking up about a fifth of the market (19.8%), followed by cough and cold preparations (10.3%), and vitamins (7.2%).

Table 103
Top Selling Drugs at the Second Level Therapeutic Class Based on Drugstores and Private Hospital Sales, 1986 and 1987 (in '000 Pesos)

	1986	% Share	1987	% share
Antibiotic Systemic	1,381,388	19.2	1,774,528	19.8
Cough and Cold Preparation	803,920	11.2	925,361	10.3
Vitamins	504,922	7.0	648,558	7.2
Analgesics	390,156	5.4	473,924	5.3
General Nutrients	303,981	4.2	408,528	4.6
Tuberculos Incl. Strepto.	272,060	3.8	306,106	3.4
Plasma Substitutes & IV Sol.	219,425	3.1	297,833	3.3
Anti-asthmatics	210,224	2.9	254,328	2.8
Antacids, Antiflatulents and Antipeptic Ulcerants	198,854	2.8	254,610	2.8
Cardiac Therapy	188,902	2.6	133,116	1.5
Systemic Corticosteroids	127,856	1.8	140,110	1.6
Topical Corticosteroids	119,144	1.7	166,981	1.9
Anti-anaemics	113,136	1.6	137,980	1.5
Others	2,351,392	32.7	3,042,189	33.9
Total	7,185,360	100.0	8,964,152	100.0

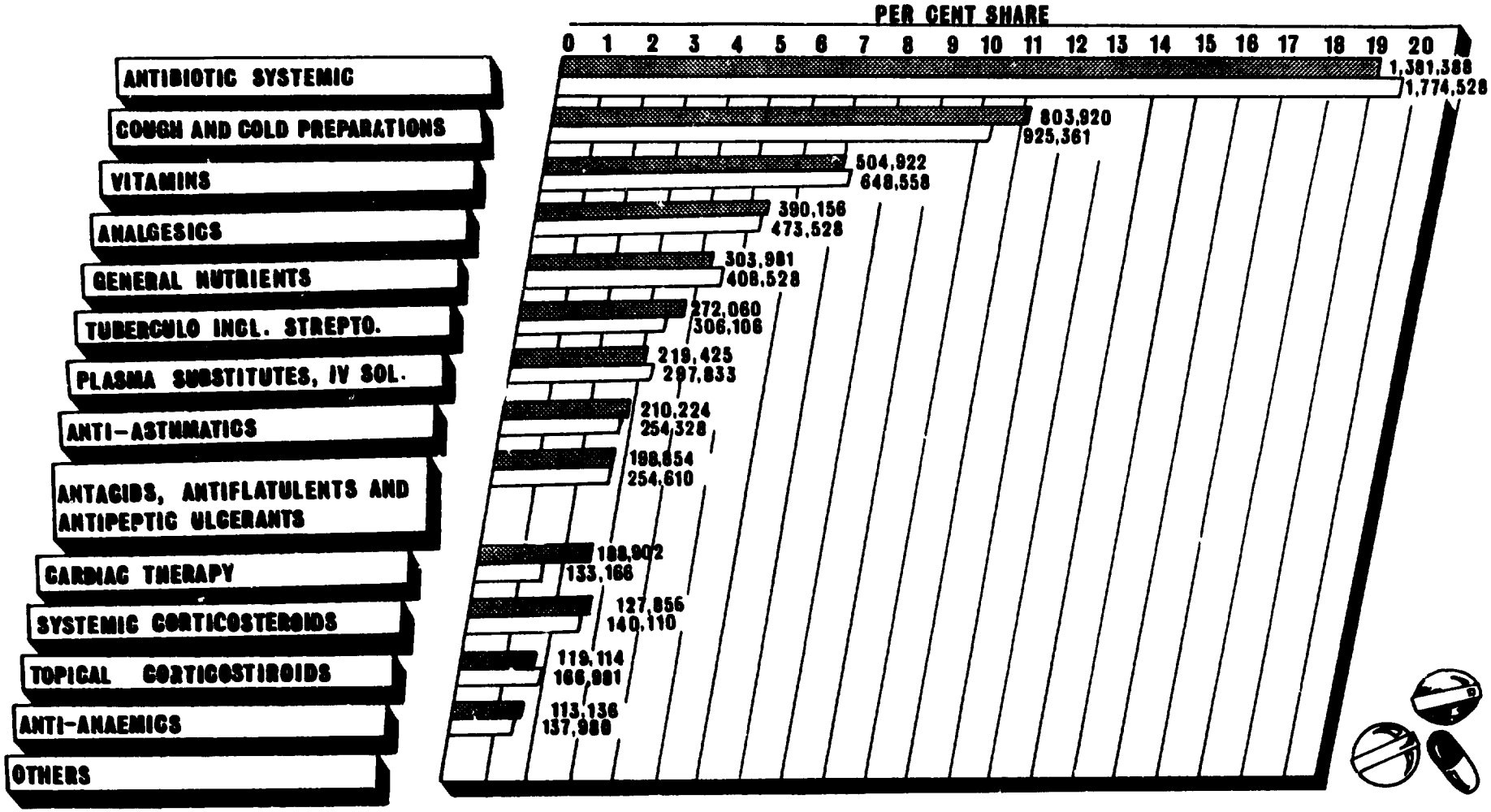
Source: IMS, 1986 & 1987

The relative shares and rankings of sales by therapeutic class hardly changed since 1978. This indicates that the demand structure of drugs has not changed and that there has been no dramatic change in the disease spectrum of the country.

The profile of drug sales by therapeutic class also reflects the prevailing disease patterns of the country where the main diseases are infections, influenza, communicable diseases and malnutrition.

FIGURE 39

TOP SELLING DRUGS AT THE SECOND LEVEL THERAPEUTIC CLASS BASED ON DRUGSTORES AND PRIVATE HOSPITAL SALES 1986 AND 1987 (IN THOUSAND PESOS)



LEGEND:

1986 – TOTAL: 7,185,360

1987 – 8,964,152

SOURCE: IMS, 1986 AND 1987

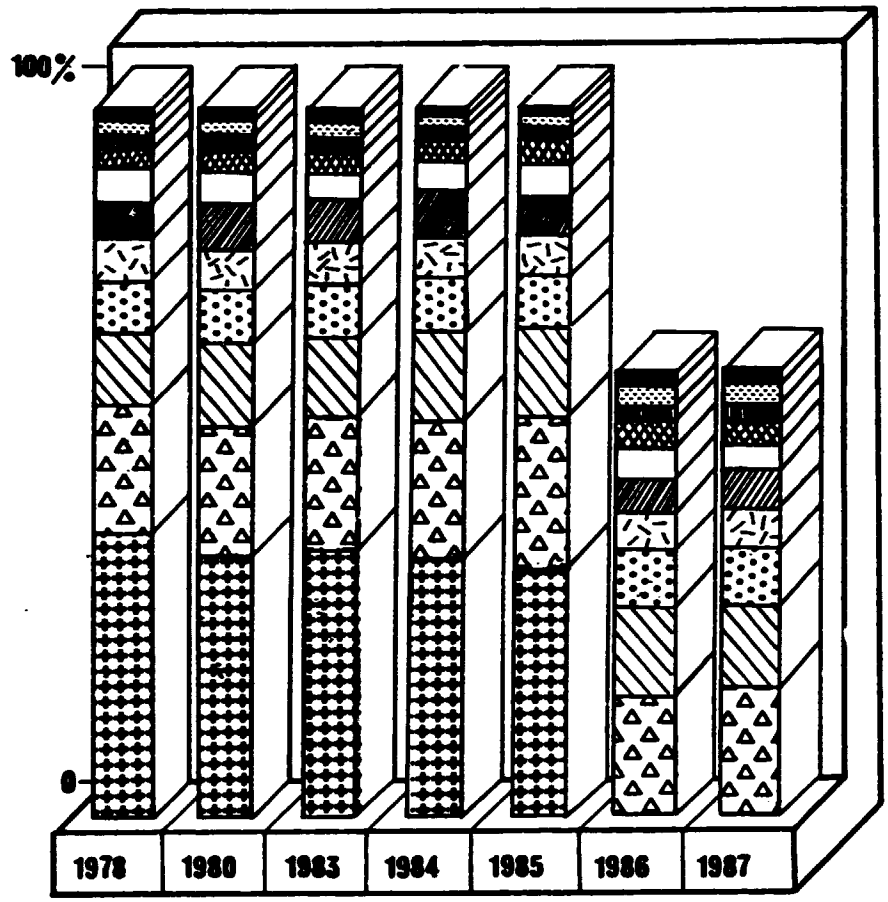
Table 104
Top Selling Drugs at the Second Level Therapeutic Class Based on Drugstores Sales (% Shares, 1978-87)

	1978	1980	1983	1984	1985	1986	1987
Antibiotic Systemic	18.7	18.7	18.9	19.3	21.2	18.5	19.2
Cough and Cold Preparation	9.8	10.9	10.8	11.6	11.4	12.0	11.1
Vitamins	7.5	7.5	7.6	7.6	7.4	7.5	7.8
Analgesics	5.9	5.4	5.1	5.6	5.8	5.6	5.5
General Nutrients	4.8	6.2	6.1	5.3	5.1	4.6	5.0
Tuberculos Incl. Strepto.	4.5	4.1	3.7	4.1	4.1	4.1	3.7
Anti-asthmatics	2.8	2.5	2.5	2.6	3.0	3.1	3.0
Antacids, Antiflatulents and Antipeptic Ulcerants	1.9	2.2	2.6	2.5	2.6	2.7	2.7
Topical Corticosteroids	2.1	2.0	1.9	1.7	1.7	1.8	2.0
Anti-anaemics	1.8	2.0	2.0	1.9	1.7	1.7	1.7
Others	40.2	38.6	38.8	37.7	36.2	32.7	33.9
Sales Value (Pesos Billion)	1.5	2.2	3.4	4.3	5.7	6.5	8.1

Source: IMS, various years

FIGURE 40

TOP SELLING DRUGS AT THE SECOND LEVEL THERAPEUTIC CLASS BASED ON DRUGSTORES SALES (PERCENT SHARES) 1978–1987



LEGEND:

- ANTI-ANAEMICS
- ANTACIDS, ANTIFLATULENTS, ANTIPEPTIC ULCERANTS
- TOPICAL CORTICOSTEROIDS
- ANTI-ASTHMATICS
- TUBERCULOS INCL. STREPTO.
- GENERAL NUTRIENTS
- ANALGESICS
- VITAMINS
- COUGH, COLD PREPARATION
- ANTIBIOTIC SYSTEMIC
- OTHERS

SOURCE: IMS, VARIOUS YEARS

4.2.1.5 Regional Variations In Demand

At the regional level, drug sales is dominated by the Greater Manila Area(GMA). The Visayas and Mindanao regions, on the other hand, experienced declines in their respective shares.

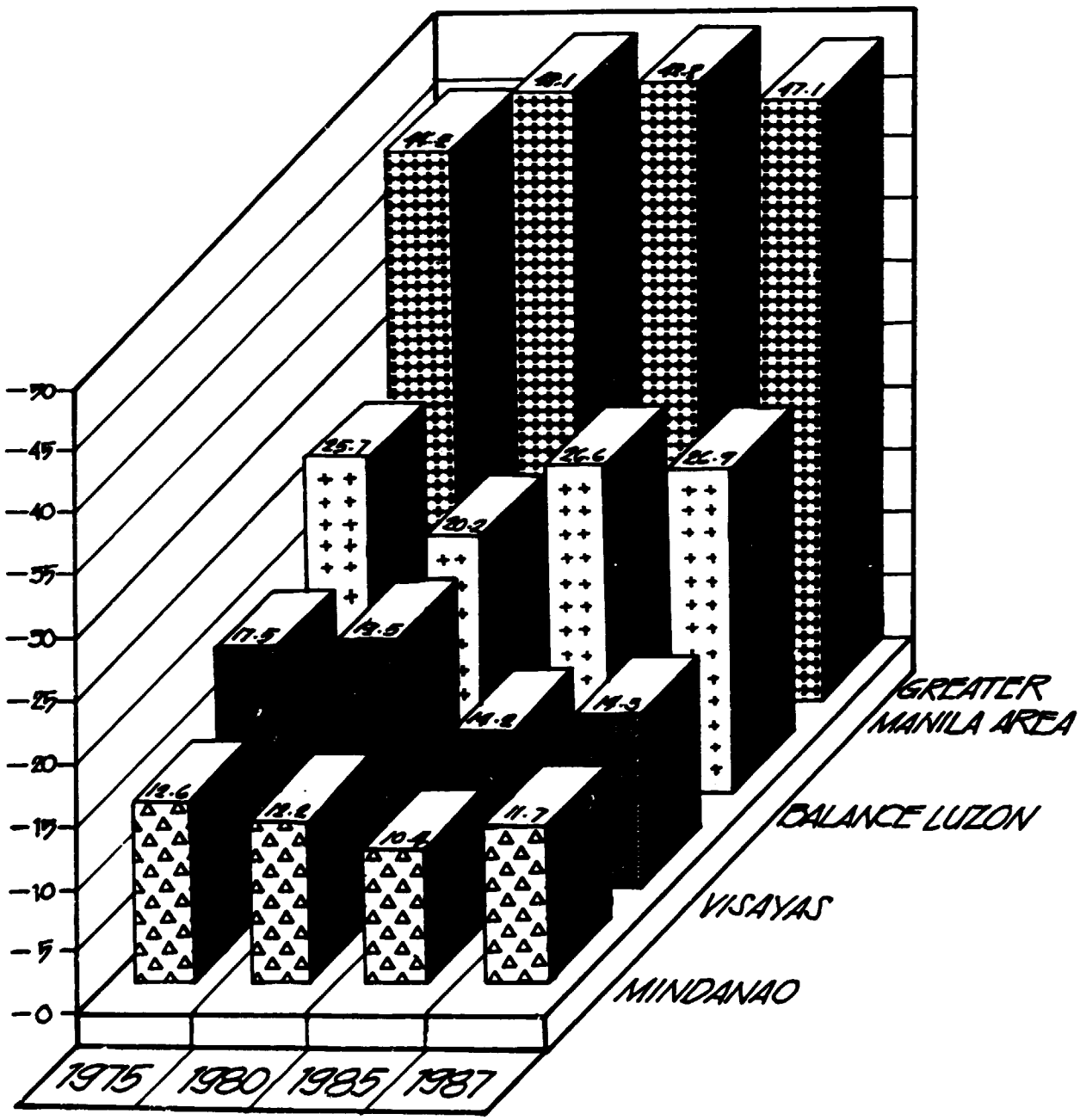
Table 105
Regional Breakdown of Drugstore Sales, 1975-1987

	1975	1980	1985	1987
Total Sales(P mil)	973.4	2155.1	5683.4	8108.5
Share to total(%)				
Greater Manila Area	44.2	48.1	48.8	47.1
Balance Luzon	25.7	20.2	26.6	26.9
Visayas	17.5	19.5	14.2	14.3
Mindanao	12.6	12.2	10.4	11.7

Source: IMS Philippines, various years

Note that the farther away the region is from Metro Manila, the lesser is its market share. The reason is mainly economic and demographic. Apart from the proximity of Metro Manila to drug manufacturing activity, purchasing power is higher in the premier region compared to other areas in the country. Its populace are better informed about the latest drugs available and the merits of health care. In addition, they have greater access to hospitals, clinics, and medical practitioners.

FIGURE 41
REGIONAL BREAKDOWN OF DRUGSTORE SALES
1975 – 1987



SOURCE: IMS PHILIPPINES

4.2.1.6 Factors Affecting Demand

Aside from the usual way of classifying the drug market into the drugstores, the hospitals, the government and the export market, we can also classify the market into three: the proprietary, the ethical, and the institutional market. Classifying the market this way gives us a better insight of the specific characteristics of the demand for drugs.

In the proprietary market, the characteristics are not markedly different from such consumer items as softdrinks, cosmetics and toiletries. The demand for proprietary drugs depends largely on the extent to which consumers suffer from headaches, indigestion, acne, vitamin deficiency, nasal congestion, or a host of other real or imagined ailments. The consumer diagnoses his own need and then shops around for a product that will meet his need.

The nature of demand for prescription drugs is different; at least, where private buyers are concerned. The decision is made for the consumer by his physician when the latter writes out a prescription, generally by brand name. The pharmacist is obligated to fill out the prescription exactly as it is written.

Since the new "Generic Drugs Act" has been promulgated the above practice is different in the case when generics are prescribed hence the generics are chosen by the patients/consumres themselves in cooperation with the drugstore pharmacists.

The institutional market is likewise different. This market refers to such groups as private and public hospitals, industrial clinics, and government agencies. Here, the demand for drugs depends on such factors as hospital patient loads, the number of people eligible to receive drugs through governmental channels, and the health budget of the government.

The above-mentioned observations characterize the nature of the consumer's demand for drugs. From the sellers' viewpoint, the following factors affects the demand for drugs and therefore the sales performance of the industry:

First is the over-all performance of the economy. This is linked via the availability of personal disposable income for drugs and medicines, and the changes in the business accounts of other industries which buy drug preparations.

Second is the size of the population given a certain level and incidence of disease, symptoms, and conditions which requires drug therapy.

Third is the widening of rural markets due to extended medicare coverage and benefits, rural services, and government health programs.

Fourth, is the effect of promotion strategies such as sales force expansion, drug promotion, tri-media advertising, corporate sponsored health programs, and the introduction of new brands with good market potentials.

4.2.1.7 The Effect of Incomes on Demand

4.2.1.7.1 Income and Price Elasticity of Demand: Econometric Results

Econometric analysis using historical data quantifies the effects of income and prices on the demand for drugs. The results show that the national demand for drugs is income elastic; i.e. every one percent rise in incomes (net of inflation) induces demand to increase by a higher rate of 1.02% assuming all other things remain the same. On the other hand, consumers' demand for drugs is not strongly affected by relative drug prices. A one percent increase in relative drug prices will only elicit a 0.51% drop in sales volume.

These results imply three things:

(a) because consumers' income in the country on the average is still low, any increment in income opens up new opportunities to buy more consumer goods including pharmaceuticals;

(b) it is the amount of income that consumers have (or expect to have) that determine to a greater extent his drug purchases. Even though a drug is an essential commodity especially in times of sickness, the overriding deterrent preventing consumers to buy the commodity is the availability of money;

(c) the market is a sellers' market. Anybody who needs the item will buy it (especially if it is mandated by a physician) will look for ways to buy it even if the drug is expensive.

4.2.1.7.2 Income Levels, Medical Care Expenditures & Drug Expenditures

Aside from the econometric analysis using trend data presented above, the 1985 Family Income and Expenditure Survey(FIES) further gives indications of the effect of income on expenditures on drugs.

The FIES shows that 89% of total families surveyed reported expenditures for medical care. The percentage of families reporting medical care however, varies from one income class to another. It runs from a low of 67% for families earning below P6,000; going up as income levels goes a rung higher; and, up to 94% for families earning P100,000 and below.

Table 106 shows the medical care expenditures by income groups from the FIES.

Table 106
Expenditures on Medical Care By Income Class, 1985

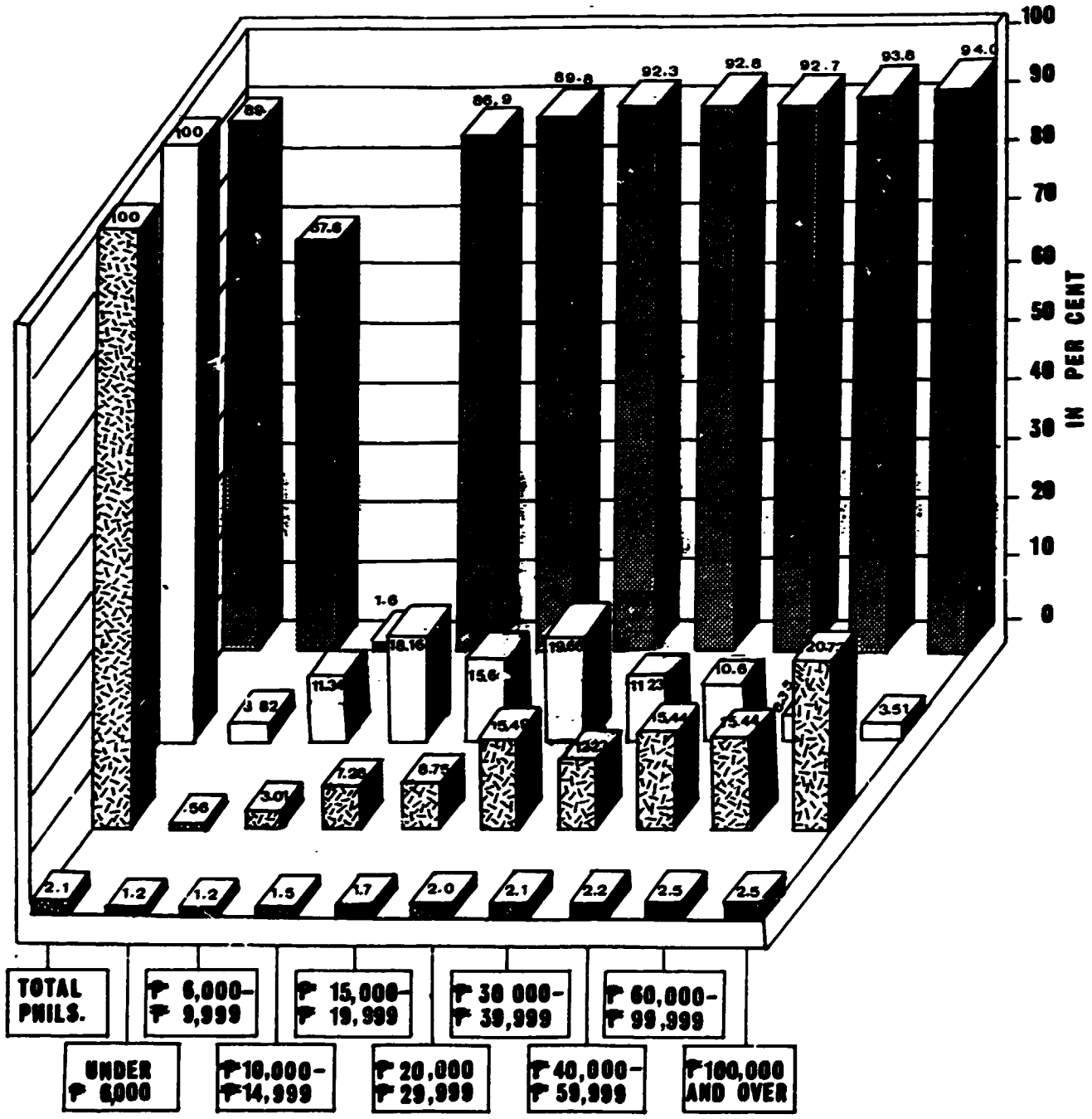
Income Class	% to Total Families	% to Total Income	% reporting Med. Care	Share of Med. Care to Total Expenditures
Total Phils.	100.0	100.0	89.0	2.1
Under P 6,000	3.82	0.56	67.6	1.2
6,000 - 9,999	11.34	3.01	80.6	1.6
10,000 - 14,999	18.06	7.26	86.9	1.5
15,000 - 19,999	15.64	8.75	89.8	1.7
20,000 - 29,999	19.66	15.49	92.3	2.0
30,000 - 39,999	11.02	12.23	92.8	2.1
40,000 - 59,999	10.60	16.52	92.7	2.2
60,000 - 99,999	6.35	15.44	93.8	2.5
100,000 & Over	3.51	20.73	94.0	2.5

Source: Unpublished Table No.4 FIES 1985
NSO, Population Institute Division

The same table above also shows that as income levels goes up, the shares of the upper income families to total income likewise goes up. At the same time, the share of medical care to their total expenditures likewise goes up. To the marketing man, this simply means that the market is not the lower income groups comprising the majority in the country, but rather the relatively few but upper-income segment of the population.

FIGURE 42

EXPENDITURES ON MEDICAL CARE BY INCOME CLASS, 1985



SOURCE: UNPUBLISHED TABLE NO. 4 FIES, 1985 NSO, POPULATION INSTITUTE DIVISION

The 1985 FIES did not tabulate the proportion of medical care expenditures that was spent on drugs. However, the Drug Association of the Philippines estimated that only one-fifth(20%) of medical care expenditures are for drug purchases while the rest go to hospitalization and medical consultation. The FIES results for censal years 1965 and 1971 on the other hand, showed that expenditures for medicines and vitamins accounted for 28.1% of total household outlays for health.

Both estimates, if applied to the estimates of total family spending for the year (estimated at P265 Billion) gives a total drug spending figures which are less than the retail sales figures for drugs posted in 1985.

4.2.1.7.3 Medical Care Expenditures & Other Household Expenditures

Medical care do not occupy a top priority in Filipino households' spending outlays. As mentioned earlier, only 2.1% of total spending is for medical care. Priority expenditures are Food (51.9%), Housing (11.4%), Fuel, Light and Water (5.5%), Transport and Communication (4.4%), Education (3.5%).

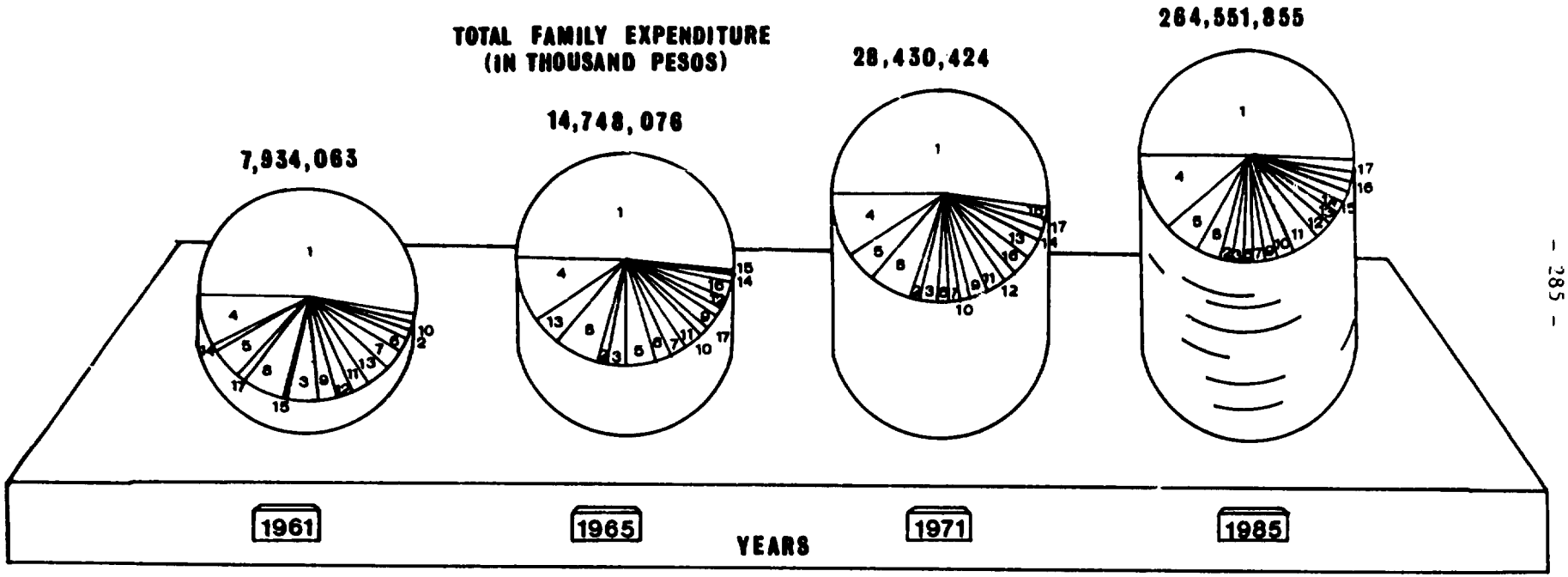
The above trend is also true regardless of the income class of the family, although there are differences in the percentages.

Further highlighting the fact that medical care is low among the household's list of priorities is the fact that families earning below P100,000 spent more on alcoholic beverages and tobacco than medical care.

Figure 44 show the spending patterns of households by income class.

FIGURE 43

PERCENTAGE DISTRIBUTION OF TOTAL FAMILY EXPENDITURES BY MAJOR EXPENDITURE GROUP, PHILIPPINES: 1961, 1965, 1971, 1985



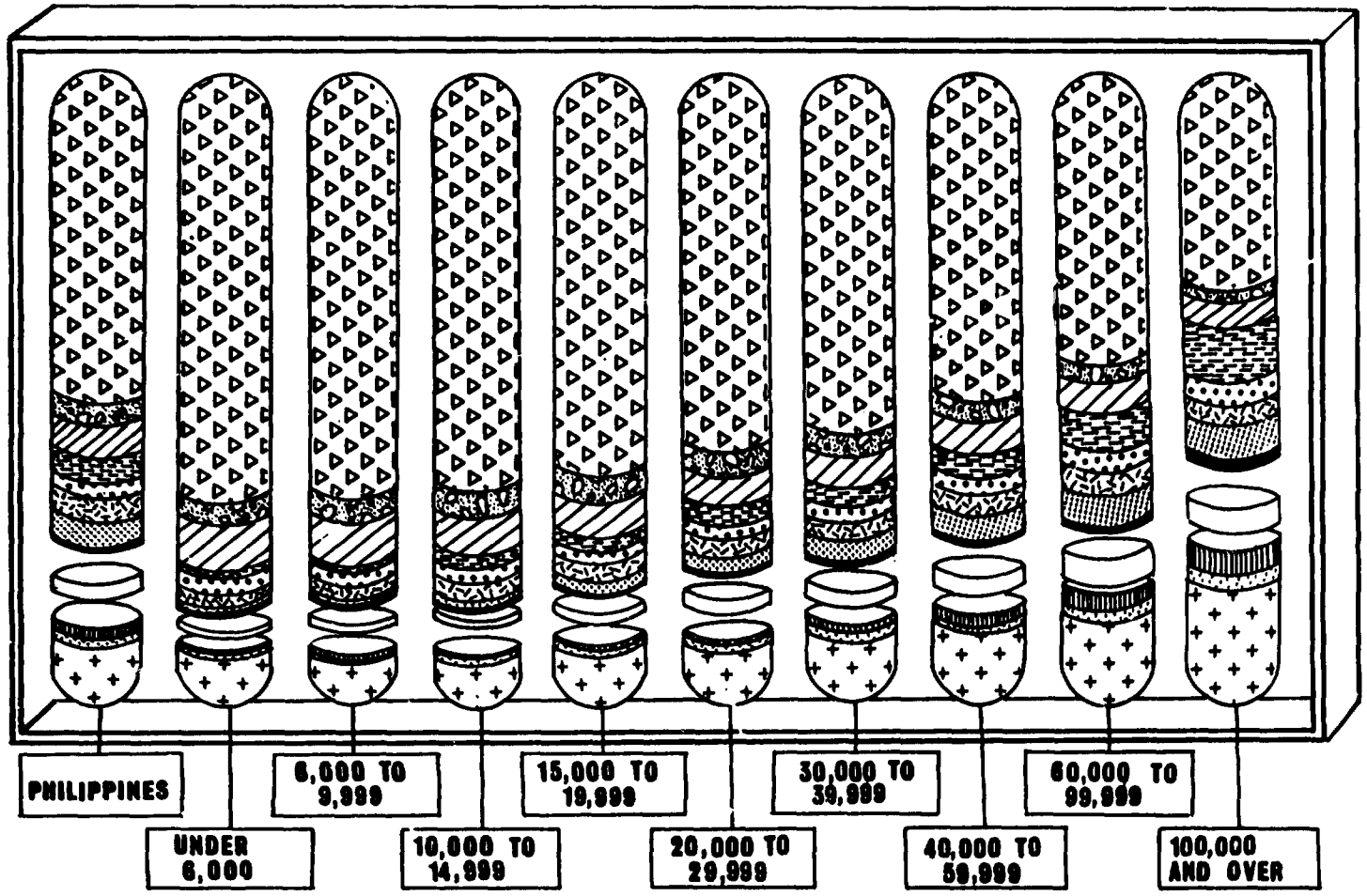
LEGEND:

1 FOOD
2 ALCOHOLIC BEVERAGES
3 TOBACCO
4 HOUSING
5 FUEL, LIGHT, WATER
6 HOUSEHOLD FURNISHINGS AND EQUIPMENT
7 HOUSEHOLD OPERATIONS
8 CLOTHING, FOOTWEAR AND OTHER WEAR
9 PERSONAL CARE AND EFFECTS
10 MEDICAL CARE
11 TRANSPORTATION AND COMMUNICATIONS
12 RECREATION
13 EDUCATION
14 GIFTS AND CONTRIBUTIONS
15 TAXES
16 SPECIAL OCCASIONS
17 OTHER EXPENDITURES

SOURCE: NATIONAL CENSUS AND STATISTICS OFFICE

FIGURE A4

TOTAL FAMILY EXPENDITURE BY INCOME CLASS AND EXPENDITURE GROUP, 1985



SOURCE: INTEGRATED SURVEY OF HOUSEHOLD MEB, 1985.

4.2.1.8 The Effect of Population Levels and the Prevailing Disease Pattern On Drug Consumption: Actual Drug Demand - Drug Requirement Gap

The domestic sales as of 1987 of about P9.8 Billion represents a measly 19% of the country's drug requirement of P51.9 Billion for that year. Simply put, this means that given the country's level of population and disease incidence coupled with the existing drug prices for that year, the country's drugs spending falls short of what was expected.

The country's drug requirement, defined as the sum total of all drug and pharmaceutical preparations needed for the prevention, treatment or management of all drug requiring human disease, symptoms or conditions occurring in the country for a given year, was estimated by Dr. Quintin Kintanar of the Department of Science and Technology. The country's drug requirement in 1987 compared with the estimated drug consumption for the year by therapeutic class is given in the Table 107.

Note the disparities in the country's consumption profile vis-a-vis the estimated requirement. In particular, the country appears to be spending more than necessary in drugs for alimentary tract and metabolism, dermatologicals, genito-urinary and sex hormones and in sensory organs. In contrast it sorely needs more consumption of drugs for the respiratory system, central nervous system, cardiovascular diseases, blood and blood forming organs, musculo-skeletal systems, systemic hormones and parasites.

Figure 45 highlights the gap between drug consumption and drug requirement by therapeutic class.

Table 107
DRUG DEMAND - DRUG REQUIREMENT GAP, 1987
(in million pesos)

THERAPEUTIC CLASS	Consumption (C)	Requirement (R)	C/R(%)
Systemic Anti-Infectives	2278	2278	100.0
Respiratory System	1448	2236	64.8
Alimentary Tract & Metabolism	1531	678	225.8
Central Nervous System	706	5233	13.5
Cardiovascular System	643	13557	4.7
Dermatologicals	458	103	444.7
Blood & Blood Forming Organs	605	17557	3.5
Genito-Urinary & Sex Hormones	240	77	311.7
Musculo-skeletal System	327	388	84.3
Systemic Hormones	168	2837	5.9
Sensory Organs	125	11	1136.4
Parasitology	107	5557	1.9
Cytostatics	18	-	-
Others	640	1367	46.8
Total	9324	51879	18.0

Source: Q. Kintanar, Department of Science and Technology, 1988

FIGURE 45

THE PHILIPPINE DRUG SITUATION

(IN MILLION PESOS)

THERAPEUTIC CLASS	CONSUMPTION	REQUIREMENT	C/R (%)	UNFILLED GAP	OVER CONSUMPTION
SYSTEMIC ANTI-INFECTIVE	2,278	2,278	100.0	—	.014
RESPIRATORY SYSTEM	1,448	2,236	64.8	787.942	—
ALIMENTARY TRACT AND METABOLISM	1,531	678	225.8	—	852.736
CENTRAL NERVOUS SYSTEM	706	5233	13.5	527.160	—
CARDIOVASCULAR SYSTEM	643	13,557	4.7	12,913.906	—
DERMATOLOGICALS	458	103	444.7	—	355.349
BLOOD, BLOOD FORMING ORGANS	605	17557	3.5	16,951.937	—
GENITO-URINARY AND SEX HORMONES	240	77	311.7	—	190.920
MUSCULO-SKELETAL SYSTEM	327	388	84.3	61.455	—
SYSTEMIC HORMONES	168	2,837	5.9	2,668.217	—
SENSORY ORGANS	125	11	1136.4	—	113.409
PARASITOLOGY	107	5,557	1.9	5,449.285	—
CYTOSTATICS	18	—	—	—	17.817
OTHERS	640	1,367	46.8	726.803	—
TOTAL	9,324	51,879	18.0	44,086.740	1,532.740

SOURCE: UNIDO RP PHARMACEUTICAL DEVELOPMENT STUDY, Q. KINTANAR

4.2.1.9 Government Health Care Expenditures & Expenditures for Drugs

Government health expenditures reached P5 Billion in 1988. This figure represents an average annual increase of 16.8% over the period 1978 to 1988.

Despite increases in shares of the Department of Health's allocation to total government allocations, it was only in 1988 when the country reached the 10% mark. As a percentage of the Gross National Product, allocations for health did not reach 1%.

Table 108 shows the government health expenditures picture from 1978 to 1988.

As discussed earlier, the government allocated a portion of its budget to purchase drugs and medicine. Table 92 shows the allocation from 1986 to 1989.

Table 108
Government Health Expenditure As a Percentage of National Government Expenditures and Social Development Expenditures (1978 - 1988)

Year	Gov't Health Expenditures (million Pesos)	Percent Change	As a percentage of		
			GNP	Nat'l Gov't Expenditure	Social Development
1978	1,114	6.70	0.6	4.0	18.2
1979	1,237	11.04	0.6	3.8	16.7
1980	1,364	10.27	0.5	3.5	16.8
1981	2,341	71.63	0.8	4.4	19.5
1982	2,383	1.79	0.7	4.0	14.7
1983	2,462	3.31	0.7	4.9	23.5
1984	2,822	14.62	0.5	4.8	18.8
1985	3,411	20.87	0.6	5.1	19.7
1986	3,651	7.03	0.6	4.0	16.6
1987	3,720	1.88	0.5	9.0	16.1
1988	5,040	35.40	-	10.3	17.8

Source: Medium-Term Development Plan, 1986 - 1992
Philippine Development Review, 1987

Table 109
Estimated Total DOH Budget/Appropriation for Purchase of Drugs and Medicines, 1986-1989
(in million Pesos)

	1986	1987	1988	1989
Total	838.6	831.1	1045.6	1429.6
A.For Regional Distribution Purchase of Drugs & Medicines	300.0	287.1	300.0	500.0
-Central Office	-	-	100.0	100.0
-NCR	-	-	6.0	6.6
-Region I	23.0	20.1	13.9	12.1
-CAR	-	-	-	5.7
-Region II	14.0	15.3	10.1	8.7
-Region III	32.0	29.8	20.1	22.1
-Region IV	52.0	48.8	33.9	37.3
-Region V	20.0	19.8	13.1	14.4
-Region VI	32.0	31.0	20.9	23.0
-Region VII	20.0	19.3	12.9	14.2
-Region VIII	19.0	18.1	12.1	13.3
-Region IX	21.0	20.4	13.7	15.1
-Region X	20.0	19.3	12.9	14.2
-Region XI	27.0	26.0	17.5	19.3
-Region XII	20.0	19.3	12.9	14.2
B. DOH Health Programs	203.6	161.1	184.8	186.0
TB Drugs/Medicines	200.0	150.0	150.0	150.0
Malaria Drugs/Medicines	-	7.9	26.9	26.6
Schisto Drugs/Medicines	-	-	1.5	1.5
Family Planning Drugs/Medicines	3.6	3.2	3.5	4.2
Non-communicable Diseases Drugs	-	-	2.9	3.7
C.Hospital Purchases from Their MOOE Budget	335.0	382.8	560.9	743.6
Special Hospitals	29.1	40.7	62.8	191.1
-Jose Reyes Memorial Med Center	0.9	1.9	3.4	16.8
-Rizal Medical Center	2.5	3.7	6.1	13.2
-East Ave. Med. Center	0.7	1.6	1.0	10.3
-Quirino Mem. General Hospital	1.5	0.6	1.5	6.8
-Tondo Medical Center	0.7	1.1	2.1	7.4
-Jose Fabella Mem. Hospital	2.6	4.7	4.8	20.9
-Nat'l Children's Hospital	1.1	2.0	3.0	8.9
-National Center for Mental Hosp.	7.6	9.4	18.7	61.8
-Nat'l Orthopedic Hosp & Rehabilitation Med. Center	2.1	1.9	3.3	22.3
-San Lazaro Hospital	8.8	13.0	17.6	21.7
-Research Center for Tropical Med	0.8	0.9	1.3	0.9

Extension of Medical & Health Services for Regional Hospital, Medical Center & Sanitaria	112.4	131.8	183.1	200.5
-NCR	-	-	-	-
-Region I	13.5	16.1	22.3	12.4
-CAR	-	-	-	12.1
-Region II	5.6	6.5	10.2	11.3
-Region III	13.5	15.9	19.4	19.9
-Region IV	14.9	17.5	24.6	27.2
-Region V	10.3	12.1	16.8	18.5
-Region VI	14.6	17.1	23.6	26.0
-Region VII	11.8	13.8	19.2	21.2
-Region VIII	4.2	4.8	7.1	7.8
-Region IX	4.9	5.6	8.1	8.9
-Region X	3.6	4.2	6.2	6.9
-Region XI	11.3	13.4	18.6	20.6
-Region XII	4.2	4.8	7.0	7.7
Extension of Medical & Health Services for Prov'l Health Offices & District Hospitals	193.6	210.2	314.9	352.1
-NCR	-	-	2.5	11.7
-Region I	20.3	21.9	32.6	25.2
-CAR	-	-	-	7.9
-Region II	15.9	17.4	25.9	20.6
-Region III	19.6	21.2	32.5	42.9
-Region IV	33.2	37.4	55.0	61.9
-Region V	14.0	14.7	23.6	25.2
-Region VI	15.3	18.1	24.5	29.4
-Region VII	12.1	13.0	20.8	22.3
-Region VIII	16.6	16.5	24.5	27.3
-Region IX	10.8	11.5	16.4	17.5
-Region X	17.1	18.5	25.6	27.5
-Region XI	10.6	11.2	17.7	18.6
-Region XII	8.1	8.8	13.4	14.2

Source: Estimates furnished by Norma D. Baldago, Budget Officer II, Department of Health, August 31, 1988

4.2.1.10 Other Factors Affecting Drug Consumption

1. Health Status of the Population

The most comprehensive estimate linking drug consumption and the health status of the population was done by Dr. Quintin Kintanar. The result of these estimates is discussed in Section 4.4 of this paper.

2. Health Care Financing

The only public insurance scheme in the country is that of Medicare. This health care financing is available to all Social Security System (SSS) and Government Service Insurance System (GSIS) members.

As of 1987, Medicare covers an estimated 55% of the total population according to records of the National Economic and Development Authority.

Medicare benefits include hospitalization, surgery and special services covering laboratory examinations, drugs, x-rays and use of the operating room. The contributuion structure has basically remained the same since 1972, with minor adjustments in income ceilings mandated in 1978 and 1986.

The Medicare System is a significant component of the Philippine Health Care System. The program's receipts accounts for a fifth of all expenditures on hospital and physician services and about 6.5% of all health-related expenditures ion the Philippines.

4.2.2 Supply

4.2.2.1 Product Description and Uses

The products of the industry comprise all drugs, medicines and pharmaceutical specialties. These are substances or mixture of substances manufactured for use in the diagnoses, treatment, mitigation or prevention of diseases, abnormal physical state or the symptoms thereof; and, restoring, correcting, or modifying organic functions in man or animals.

These products may be grouped according to:

- o classes of related therapeutic action: The Philippine Pharmaceutical Index classifies drugs into 14 major therapeutic classes; 87 second level therapeutic classes, and about 213 third level therapeutic classes.

- o method of dispensing: Based on the mode of dispensing, drug products may be classified into **prescription** or **proprietary**. Prescription or regulated ethical drugs are those which are promoted only to medical professionals and can be bought by the public only with physician's prescription; proprietary drugs are those which are dispensed freely (over the counter) to the public and advertised in the mass media.

- o dosage form: According to dosage form, drugs come in syrups, injectibles, ointments, capsules, pills, tablets, powders, lozenges (pastilles, troches), solutions, suspensions, mixtures, tinctures, elixirs, extracts (liquid), emulsions, lotions, sprays, aerosols, and suppositories.

- o source of basic raw material: According to source of basic raw materials, drugs are classified into **synthetic** (coal and petrochemical derivatives); **plant-derived drugs** (caffeine, atropine, quinine, morphine); **animal-derived drugs** (adrenaline, liver extracts, pepsin, and vitamin A concentrates among others); **vaccine and sera** (e.g. prophylactic vaccines, antitoxins, anti-venoms); and, **antibiotic and fermented products** (bacitracin, chloramphenicol, erythrocin, gentamicin, neomycin, penicillin, streptomycin, and tetracyclines).

Variations exists among drug products belonging to the same sub-group. They vary in mode or speed of action, duration of therapeutic activity, tolerability, side-effects and other important aspects. This is necessary on account of differences in a patient's physical condition, because of allergy or because of other treatments the patient is receiving.

4.2.2.2 Firms in the Industry

The Philippine drug industry comprises:

- firms that compound and pack active substances, process simple galenical medicines and excipients into final drug form, and dilute concentrated extracts to marketable strengths;
- establishments that pack imported bulk drugs into dosage forms, and those that import finished form as well as raw materials;
- enterprises that distribute and trade in drug products.

Records from the Regulation Divison I of the Bureau of Food and Drugs show that as of June 30, 1988 there are 246 drug manufacturers in the country, 266 drug producers(traders), 8,051 retail drugstores, 486 wholesale drugstores, 980 hospital pharmacies and 70 Chinese drugstores. As Table 110 shows, most of these drug establishments are concentrated in the Metro Manila Area.

Table 110
Regional Distribution of Drug Firms, 1988

	1	2	3	4	5	6
Metro Manila	1,895	108	142	60	214	259
Ilocos Region	397	21	66	-	1	0
Cagayan Valley	297	7	52	-	0	0
Central Luzon	702	46	104	-	6	5
Southern Tagalog	990	78	139	-	11	1
Bicol Region	300	10	47	1	1	0
Western Visayas	640	32	80	3	3	0
Central Visayas	561	52	89	2	7	1
Eastern Visayas	250	26	46	-	0	0
Western Mindanao	257	21	33	-	1	0
Northern Mindanao	997	34	64	-	1	0
Southern Mindanao	467	27	73	1	1	0
Central Mindanao	298	24	45	3	0	0
Total	8,051	486	980	70	246	266

Legend: 1 - Retailers
2 - General Wholesalers
3 - Hospital Pharmacies
4 - Chinese Drugstores
5 - Manufacturers
6 - Producers(Traders)

Source: Bureau of Food and Drugs, Regulation Division I, 06/30/88

Of the registered drug firms in the country, only a few however, can be considered as major ones. Moreover, the major firms have their bases in Metro Manila and it is from this region where drug manufacturing, trading, and main offices are located. Table 111 shows a listing of major drug companies in the country and their main areas of concern.

Table 111
Pharmaceutical Companies By Type Of Activity

	Manufacturer					
	w/o plant	w/ plant	Importer	Distributor	Retailer	Regional Office
Abbot	x	x	x			
AH Robins	x					
Alcon	x		x			
Astra	x	x(*)				
Ayerst	x		x	x		
Bayer	x		x			
Berlimed	x		x			
Boehringer Ingelheim	x					
Boie		x	x			
Boots	x					
Ciba Geigy		x	x			
Cyanamid	x		x			
Drugmakers		x	x			
Kali-Duphar	x		x			
ER Squibb	x					
Eli Lilly	x		x			
Farmitalia Carlo Erba	x		x			
GD Searle	x		x			
Glaxo	x					
Hizon		x				
Hoechst		x				
International Pharmaceuticals		x	x			
Interphil		x				
Janssen	x		x			
Marsman & Co.		x	x	x		
Marsman Laboratories	x					
Mead Johnson	x	x	x			
Merck	x		x			
Merrel Dow	x		x			
Natterman	x		x			
Nicholas Kiwi	x	x				
Organon	x		x			
Otalco	x	x	x	x		
Pascual	x	x	x	x		
Pfizer		x	x			
Pediatrica				x		
Rhone Phoulenc	x					
Procter & Gamble (Richardson Vicks)		x				
Riker/3M			x			
Rorer	x		x			
Sandoz	x		x			
Schering	x		x			
Sanofi	x		x			

Taole 111
Pharmaceutical Companies By Type Of Activity cont'd...

	Manufacturer					
	w/o plant	w/ plant	Importer	Distributor	Retailer	Regional Office
Smith Kline & French		x	x			
Sterling	x	x	x	x		
United		x				
Upjohn				x		
Warner Lambert		x				
Wellcome	x		x			
Wyeth Suaco		x				
YSS	x	x	x	x		
Asia Health Systems		x		x		
BASF			x			
Beecham	x		x	x		
Boie Takeda	x		x			
Cu Unjieng			x	x		
Dispersa			x			
Hi-Eisai			x			
Inphilco			x	x		
Institut Merieux			x			
Med-Asia			x			
Metro Drug				x		
Morishita-Seggs			x	x		
Nordia			x	x		
Norwich Eaton			x			
Pacific			x	x		
Pharmafere			x	x		
Stiefel			x			
Syntex						x
Terramedic				x		
Unicor				x		
Zuellig Pharma				x		
Botica De Sta Cruz			x	x	x	
Casanz				x		
Federal Medical			x	x		
Medeccr			x	x		
Philusa	x		x	x		
Farmacia Oro					x	
Farmacia Rubi			x	x	x	
Farmacia Socorro					x	
Mercury Drug					x	
Rose Pharmacy					x	
RP Chem			x	x		
Byk Gulden						x
Leo Pharma						x
Elan						x
Chemfields		x				
Elins		x		x		

Table 111
Pharmaceutical Companies By Type Of Activity cont'd...

	Manufacturer					
	w/o plant	w/ plant	Importer	Distributor	Retailer	Regional Office
Geapsons		x		x		
General Drug		x		x		
Oro Laboratories		x		x		
Phil. Health Foods		x		x		
Socorro Lab		x		x		
Sydenham		x		x		
Asean	x			x		
Biosis	x			x		
Conpharm	x			x		
Pharma Dynamic	x			x		
PMS Commercial				x		
Rodachem	x			x		
Roddensers	x			x		
Terramedic				x		
Tynor				x		
VCP Intermed	x			x		
Eadriex	x			x		
Metro Lab		x				
Global				x		

* Manufacturing plant is under construction

Source: Drug Association of the Philippines, Chamber of Filipino Drug Manufacturers, Securities and Exchange Commission

4.2.2.3 Competition in the Industry

Intense and continuous competition is a striking aspect of the drug industry's activities.

The unique nature and extent of competition in the industry arises in part from the fact that in the marketing sense, it is not a single industry. Its market is divided into a variety of different sub-markets, depending upon the therapeutic uses of the products.

Even if the industry's total market is broken down not by diseases but by broad classes of therapeutic uses of drugs, there are at least several dozen different therapeutic markets. In each of them vigorous competition is to be found because of the possibilities the physician has for substituting one product for another.

The vigor of competition in the Philippine pharmaceutical market is in part indicated by the analysis offered in Table 112. This shows that none of 1985's ten leading products (by sales value) were similarly ranked in 1978. Of the ten leading manufacturers in 1978, only one has the same rank in 1985. The strength of pharmaceutical industry competition is further underlined by the composition of the ten leading products and manufacturers in 1978 and 1985. Six of the top 10 products in 1985 were way below the relative ranking in 1978. Moreover, only one of these six products were in the top 20 list in 1978. The ten leading products in 1985 come from 9 different companies. Likewise, four of the leading manufacturers in 1978 were dislodged from the top 10 list in 1985.

Table 112
Position of Leading Ten Products and Manufacturers in 1978 and 1985

Position of 1985's Leading Product in 1978		Position of 1985's Leading Manufacturer in 1978	
1978	1985	1978	1985
2	1	1	1
1	2	14	2
4	3	6	3
43	4	2	4
24	5	15	5
37	6	11	6
9	7	4	7
66	8	3	8
20	9	5	9
91	10	13	10

Notes : Ranking by sales values
Source: IMS, 1978 & 1985

The largest share of the pharmaceutical market held by any one manufacturer in 1987 was 4.3% of total sales. The leading ten manufacturers together account for only 33.3% of the total market.

In fact, this is one industry where about two hundred corporate groups, comprising more than 500 manufacturers and traders selling more than 3,000 brands, compete in the market. As shown by Table 113, not one manufacturer nor product dominates the market.

Table 113
Concentration in the Drug Industry, 1987

	% share to total sales of the corresponding group of		
	Corporate Group	Manufacturer	Product
Top firm	20.8	4.3	1.3
Top 5	39.0	18.8	5.0
Top 10	53.2	33.3	8.9
Top 20	72.2	53.9	14.9
Top 30	84.7	67.8	19.3
Top 40	92.3	77.2	23.1
Top 50	95.8	84.4	26.5
Top 100	99.4	96.0	39.3
Top 150	99.9	98.6	48.0
Top 200	100.0	99.4	55.0

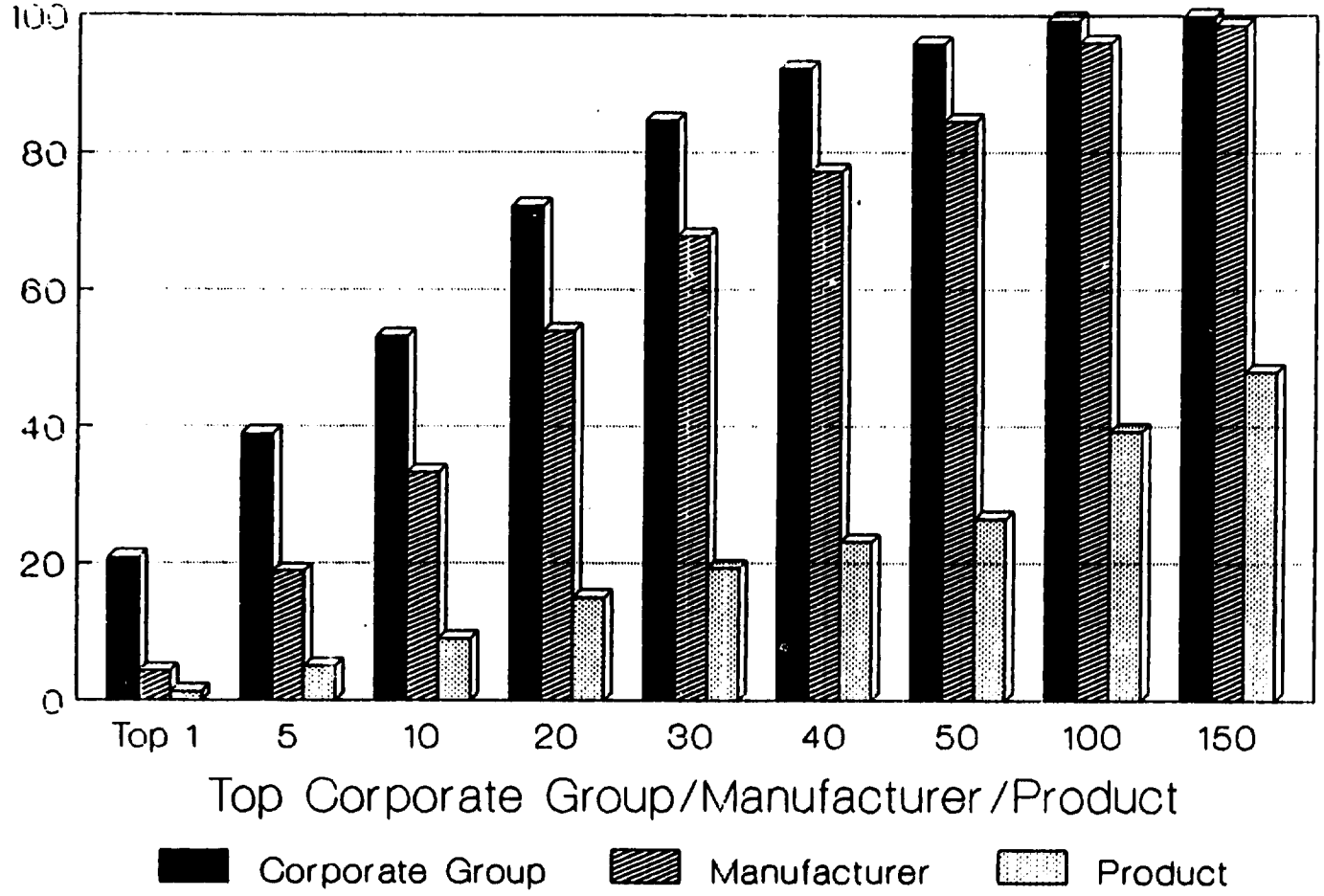
Source: IMS, 1987

Significantly, local drug manufacturing is one where Filipino-owned companies have shown some strength. The UNILAB corporate group, a Filipino-owned company, rakes in about 21.28% of total sales. Individual MNCs in contrast accounts on the average, for less than 1% to 5.4% of total sales, although as a group they rake in approximately 60% of the industry's sales pie.

The concentration in the industry by nationality of ownership is shown in Table 114.

FIGURE 46

CONCENTRATION IN THE DRUG INDUSTRY, 1987
(In % share to total sales of the group)



Source: IMS, 1987

Table 114
Percentage Distribution of Sales through Drugstores, by Nationality of Ownership, 1985

Leading Corporate Group		Market Share 21.28%
Filipino-owned firms		39.86
Foreign-owned firms		60.14
-American	39.35%	
-German	7.95	
-Swiss	5.89	
-British	2.79	
-Swedish	2.38	
-Dutch	0.63	
-French	0.52	
-Italian	0.46	
-Japanese	0.17	

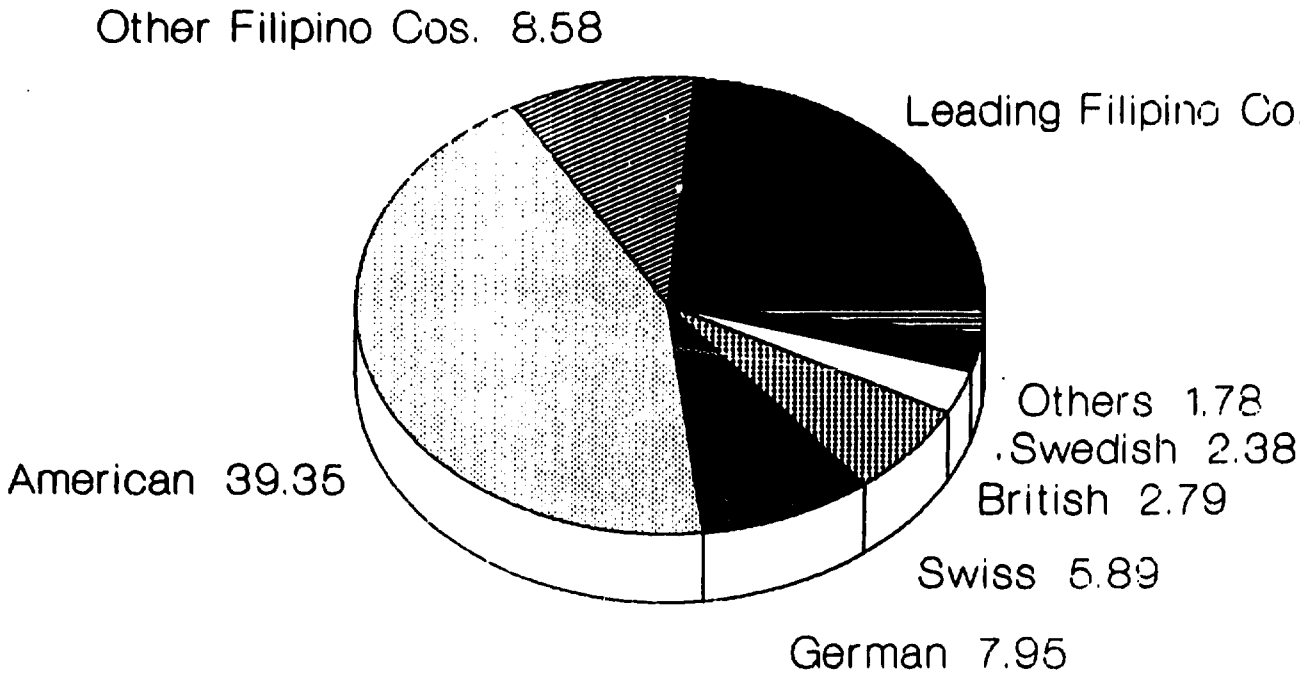
Nationality of the Leading Firm: Filipino

Source: IMS, 1985

Distribution and retailing are likewise dominated by Filipino-owned companies. Drug distribution is about 85% controlled by Filipinos, while existing Philippine laws prohibits foreigners to go into retailing.

FIGURE 47

DISTRIBUTION OF DRUGSTORE SALES BY THE NATIONALITY OF OWNERSHIP OF SELLERS, 1985



Source: IMS, 1985

4.2.2.4 Manufacturing Capacity

Table 115 shows the estimated manufacturing capacity of the drug industry.

Table 115
Estimated Manufacturing Capacity of the Drug Industry, 1985

TYPE	VOLUME CAPACITY
Ampoules and vials	35,000 thousand units
Liquids(suspension)	11,260 thousand liters
Capsules and tablets	4,396 million units
Creams and ointments	754 thousand kilograms
I.V. solutions	7,200 thousand liters
Suppositories	6,000 thousand units

Source: Drug Association of the Philippines. Reference Paper on Pharmaceuticals. a submission to the Department of Health. January 20, 1987. p.49

There are 33 large scale manufacturing laboratories in the country(see Table 116). Of these, Interphil and Drugmakers are exclusively devoted to contract manufacturing for companies classified as manufacturers but which do not have their own manufacturing laboratories. Marsman, Metro, Hizon and Boie accept contract manufacturing in addition to manufacturing their own product lines. Chemfields manufactures ampicillin/amoxycillin substances. The rest, manufacture only their own products.

Table 116
Companies Owning and Operating Drug Manufacturing Laboratories

-Asia Health Systems	-Mead Johnson Philippines
-Abbott Laboratories(Phil.)	-Metro Laboratories
-Boie, Inc.	-Nicholas Kiwi Philippines
-Chemfields, Inc.	-Oro Laboratories
-Ciba-Geigy (Phil.), Inc.	-Otalco Corporation
-Drugmaker's Laboratories	-Pascual Laboratories
-Elin's Pharmaceuticals	-Pfizer, Inc.
-E.R. Squibb & Sons (Phil.) Corp.	-Philippine Health Foods
-Geapson's Laboratories	-Richardson Vicks Corp.
-General Drug	-Smith Kline & French
-Hizon Laboratories	-Sterling Products Int'l
-Hoechst Far East Marketing Corp.	-Socorro Laboratories
-International Pharmaceuticals, Inc.	-Sydenham Laboratories
-Interphil Laboratories	-United Laboratories
-Johnson & Johnson Philippines, Inc.	-Warner Lambert Philippines
-Marsman & Co., Inc.	-Wyeth-Suaco Laboratories
	-YSS Laboratories Co., Inc.

Source: Chamber of Filipino Drug Manufacturers and Distributors, Inc.; Drug Association of the Philippines, 1987

Besides these 33 large manufacturing plants, there are other small manufacturers and traders that have marginal manufacturing facilities solely oriented to serve the purchase order requirements for common generic drugs placed by the Ministry of Health.

The present utilization rates vary on a company to company basis. However, on a consolidated basis, the utilization rates are as follows:

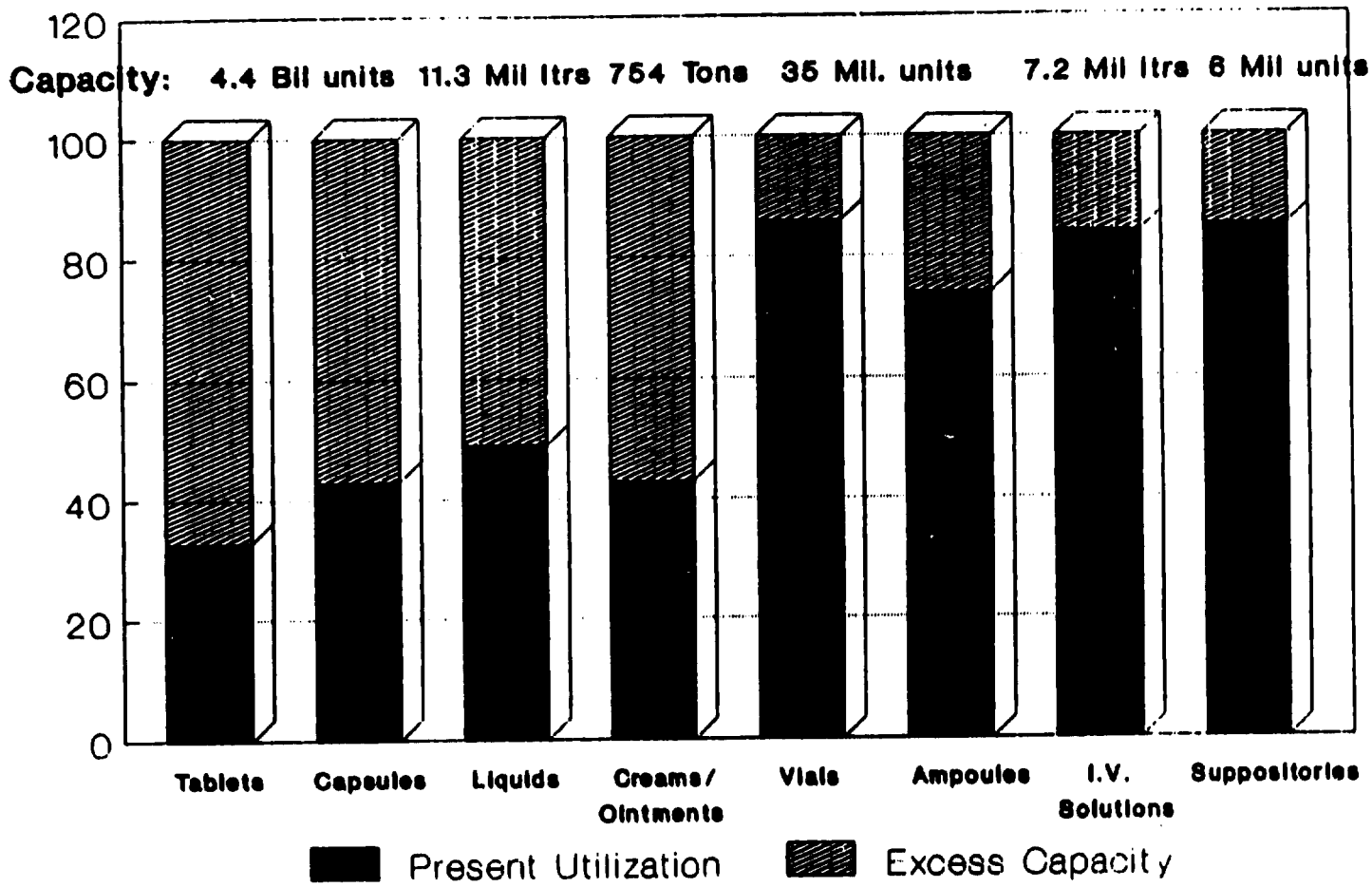
Table 117
Capacity Utilization of the Drug Industry, By Type of Presentation, 1987

	Present Utilization %	Excess Capacity %
Tablets	33	67
Capsules	43	57
Liquids	49	51
Creams/Ointments	43	57
Vials	86	14
Ampoules	74	26
I.V. Solutions	84	16
Suppositories	85	15

Source: Board of Investments, 08/88

FIGURE 48

CAPACITY UTILIZATION OF THE DRUG INDUSTRY, BY TYPE OF PRESENTATION, 1987



Source: Board of Investments, 08/88

4.2.2.5 Sourcing of Raw Raterials

Almost all active substances and excipients are imported with the exception of amoicillin and amoxycillin from Chemfields. Most packaging materials such as glass, bottles, plastic containers, caps, droppers, foils, paper labels, cartons, corrugated shipping cases, blister foils etc. are locally procured, while raw materials such as refined sugar, glycerine, alcohol, and starch are also sourced locally.

Pharmaceutical active substances and some excipients are sourced from the United States, United Kingdom, Germany, Switzerland, France, Italy, Canada, Sweden, Belgium, Holland and Japan. These countries are also the home bases of most multinational drug firms operating in the country.

Neither the country nor the local drug companies have embarked on an effort at substituting local raw materials for imported ones. It does not have the facilities for manufacturing raw materials, particularly the active ingredients.

However, local content of production could have been increased if domestic manufacturers of liquid glucose, sugar, etc., could improve their quality to "pharmaceutical grade". Drug companies have made representations in the past, but these manufacturers are not too interested to invest in improving their facilities.

4.2.2.6 Importation

Total imports in 1987 reached US$104 million coming mostly from the United States, Europe, Japan and Australia. In the same year, exports hit only US$5 million(f.o.b). The main export markets are the countries of Southeast Asia and some South Pacific countries.

Importations are in the form of chemicals, semi-finished products and other raw materials for the manufacture of drugs and medicines. Consequently, the fastest selling types of drugs (i.e., antibiotics and vitamins) chalked up the highest share to total imports (see Table 118).

On an annual basis, imports are characterized by a fluctuating pattern, depending on the existing demand pattern for a given year. From 1978 to 1987, the country's drug import bill averages 1.12% of total imports. In contrast, exports of pharmaceutical products comprise only 0.12% of total exports (see Table 119).

The industry imports medicinal preparations and raw materials from more than 30 countries. The bulk of these imports comes from the world's major pharmaceutical centers like the US, Switzerland. Germany and United Kingdom.

IMPORTS OF EXCIPIENTS, 1984-1987
BY COMMODITY CLASSIFICATION

CLASSIFICATION CODE NUMBER	COMMODITY DESCRIPTION	1984 VOLUME IN NET KG	1984 VALUE FOB US $	1985 VOLUME IN NET KG	1985 VALUE FOB US $	1986 VOLUME IN NET KG	1986 VALUE FOB US $	1987 VOLUME IN NET KG	1987 VALUE FOB US $
061.93-01	Glucose, Commercial, Total	470967	184298	4539479	684399	5407177	939783	7864639	825712
061.93-02	Glucose, Chemically Pure or Dextrose, Total	1162381	753419	3474857	768958	6276507	1481882	7428435	1752452
061.95-01	Lactose, Not Chemically Pure, Total	-	-	-	-	100	49	-	-
061.95-02	Lactose, USP Grade, Total	2381164	1095883	1592845	723523	2398174	1259543	3118752	2894888
061.99-00	Other Sugars and Syrups, N.E.S., Total	1638	3481	7853	18526	22215	9438	2178	3226
091.49-01	Oleo Oil, Emulsified, Mixed or Prepared, Total	74888	72176	-	-	18178	5666	-	-
278.30-01	Industrial Salt--Ground, Screened Rock Salt, etc, with at least 95% NaCl on a dry basis, with BOI & TC prior approval subject to IRR, Total	29166588	521686	52278628	1889187	35174588	512357	58964276	1289428
278.30-02	Industrial Salt--Ground, Screened Rock Salt, etc, with at least 95% NaCl on a dry basis, with BOI & TC joint authorization, Total	36884623	928769	18268487	521864	53497232	1115632	38485286	1168488
278.30-03	Salt, Refined--Purified Vacuum Pan or Grainer Salt of Fine Crystals with not less than 99.5% NaCl on a dry basis, Total	-	-	144888	7896	245736	15616	683494	37219
278.30-09	Other Crude Salt, N.E.S. (Solar or Mined Rock Salt) of Coarse Crystals or Grains with not less than 95% NaCl on a dry basis, Total	4355	6435	1588	536	-	-	3888192	54788
512.19-00	Other Acyclic Alcohols and the Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives of Acyclic Alcohols, Total, in liters	18824258	6183761	8869143	3989497	11912216	6739423	15914996	12265583
512.37-00	Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives of Phenols or Phenol-Alcohols, Total	478641	582388	218874	273224	328218	374818	397187	578838
513.90-01	Acetylsalicylic Acid (Aspirin), Bulk, Total	124478	368882	124489	397816	95368	259894	119776	362584
513.90-02	Citric Acid (Excluding USP or NF), Total	2658	5997	2361	1766	348	871	-	-

513.98-03	Citric Acid, USP or NF, Total	1828879	2570285	953593	1307813	1160529	1588269	1478578	2077585
513.98-04	Tartaric Acid, USP or NF, Total	7238	16818	9428	17573	9947	29357	12071	34122
513.98-05	Cream of Tartar, Total	54891	59883	92888	94889	68598	77981	123828	192136
513.98-09	Other Carboxylic Acids with Alcohol, etc, Oxygen-Function, their Anhydrides, Halides, etc, and their Halogenated, Sulphonated, etc, derivatives, N.E.S., Total	968935	2715385	954431	1892849	1881998	1938687	1365117	2849466
514.82-01	Saccharine Sodium and Saccharine Calcium, USP, Bulk, Total	32188	151284	17555	188177	28759	137488	22882	158568
516.11-88	Ethers, Ether-Alcohols, Ether-Phenols, Ether-Alcohol-Phenols, Alcohol Peroxides, and Ether Peroxides, and their Halogenated, Sulphonated, etc, Derivatives. Total	5882398	4846861	2374681	2515947	6768512	5884455	8791984	7124114
516.39-48	Carbonic Esters and their Salts, and their Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives, Total	4697	526883	-	-	10238	37968	548	265
516.91-88	Enzymes, Total	93394	389552	163283	448587	264968	786651	265988	946858
516.92-81	Maltose or Malt Sugar, Chemically Pure, Total	11858	2236	-	-	953	2788	-	-
516.92-89	Other Sugars, Chemically Pure (Other than Sucrose, Glucose and Lactose), Sugar Ethers and Sugar Esters, and their Salts, N.E.S. Total	39469	114482	18831	49487	6787	36383	11492	69857
523.18-88	Sodium Sulphate (Glauber's Salt), Sodium Hydrogen Sulphate and Sodium Pyrosulphate, Total	11363583	1494887	9519324	1366994	14729983	1831168	14278985	1642953
523.19-89	Other Sulphates (Including Alums), and Persulphates, N.E.S., Total	4481884	1393849	3996841	1273839	9527673	2714295	11714214	2955681
531.22-88	Color Lakes, Total	66622	362619	44836	268642	51964	467915	96679	621268
541.39-89	Other Antibiotics, N.E.S., not put up as medicaments, Total	139471	8186515	38747	6369794	43528	8489383	49688	11322584
541.79-81	Vitamins, Dosage, Total in grams	23196875	1319474	18979755	874848	13656365	1177867	32254492	1585668
541.79-19	Other Medicinal and Pharmaceutical Products, N.E.S., (e.g. Medicinal Teas, Sodium Chlorides, put up as ampoules, tablets or otherwise as medicaments, Total in gross kilos	1782887	18938479	1787557	20426841	2874835	27578857	4075646	39984866
551.38-81	Anise Oil, USP or NF, for the manufacture of medicine, Total	62	995	357	4415	136	1868	78	657

551.38-03	Lime and Lemon Oils for the manufacture of medicine, Total	4682	35427	758	18902	561	15341	2358	26536
551.38-05	Citrus Oil, excluding Lime and Lemon Oils, for the manufacture of medicine, Total	468	48739	89	4439	374	3487	863	7865
551.38-07	Peppermint and Spearmint Oils for the manufacture of medicine, Total	13938	126998	4938	49869	4478	55392	3388	52472
551.38-19	Other Essential Oils for the manufacture of medicine, Total	32875	174472	7623	132556	5938	151872	12836	245825
551.49-00	Synthetic Flavor Materials and Concentrates, Enfleurage Greases, and Mixtures of Alcohol and Essential Oils, used in pharmaceutical, food, etc industries, Total	3128051	13199946	1703837	9848756	2516118	10617384	2733425	12729858
584.19-00	Other Regenerated Cellulose, Total	461979	3724812	126325	1271895	189735	2475755	263847	4177549
592.11-01	Potato Starch, Total	192684	48388	219328	58316	345488	88354	957146	175348
592.11-02	Cassava Starch, Total	-	-	1573888	179698	-	-	-	-
592.11-03	Corn Starch, Total	4988	3888	1885826	484168	512489	246815	3382981	498224
592.11-09	Other Starches, N.E.S., Total	128875	115394	2289512	397833	2465528	599271	664772	369288
592.12-00	Wheat Gluten, whether or not dried, Total	86888	43278	19288	18342	18888	23218	195343	118942
592.21-01	Glue, Casein, Total	64888	93595	61945	84245	-	-	5888	14883
592.21-02	Mucilage, Casein, Total	-	-	35	48	-	-	-	-
592.21-03	Casein Compounds (Bakelite & Galalith), Total	454938	1892589	252874	541388	421283	944652	289594	487772
592.22-01	Glue, Albumin, Total	-	-	-	-	856	2341	1888	3457
592.22-02	Albumin and Derivatives, Total	9165	49382	9956	51882	22469	129662	26348	158583
592.23-01	Gelatin, Edible (Excluding USP or NF Grade), Total	5582	19888	9684	27313	14218	48162	15682	51375
592.23-02	Gelatin, Edible, Medicinal Grade (USP or NF), Total	16718	49835	41187	148679	49497	175611	63141	248312
592.23-03	Animal Glue, Total	152683	239235	227145	218577	228438	178576	226988	226637
592.23-05	Gelatin, Inedible, Adhesive, Total	5239	4948	2595	5124	1648	6867	38681	21883
592.24-01	Peptones and other Protein Substance and their Derivatives, Total	149895	426775	118475	318892	189387	319923	242782	612874

592.24-02	Hide Powder, Total	-	-	-	-	-	-	1000	4690
592.25-01	Dextrine (Excluding Glue), Total	256008	162399	387052	184340	495421	308098	659669	422567
592.25-02	Glue, Starch (Dextrin), Total	151486	140913	125248	136514	124758	107599	70777	60016
592.25-03	Paste, Starch, Inedible, Total	11340	12805	-	-	78237	101422	191630	194313
592.25-09	Starches, not for food, N.E.S., Total	648261	540629	126609	123768	303224	256695	1233231	611219
899.19-41	Empty Gelatin Capsules for Pharmaceutical Products, Total	52118	1151875	53419	1119817	63544	1278877	78718	1776995

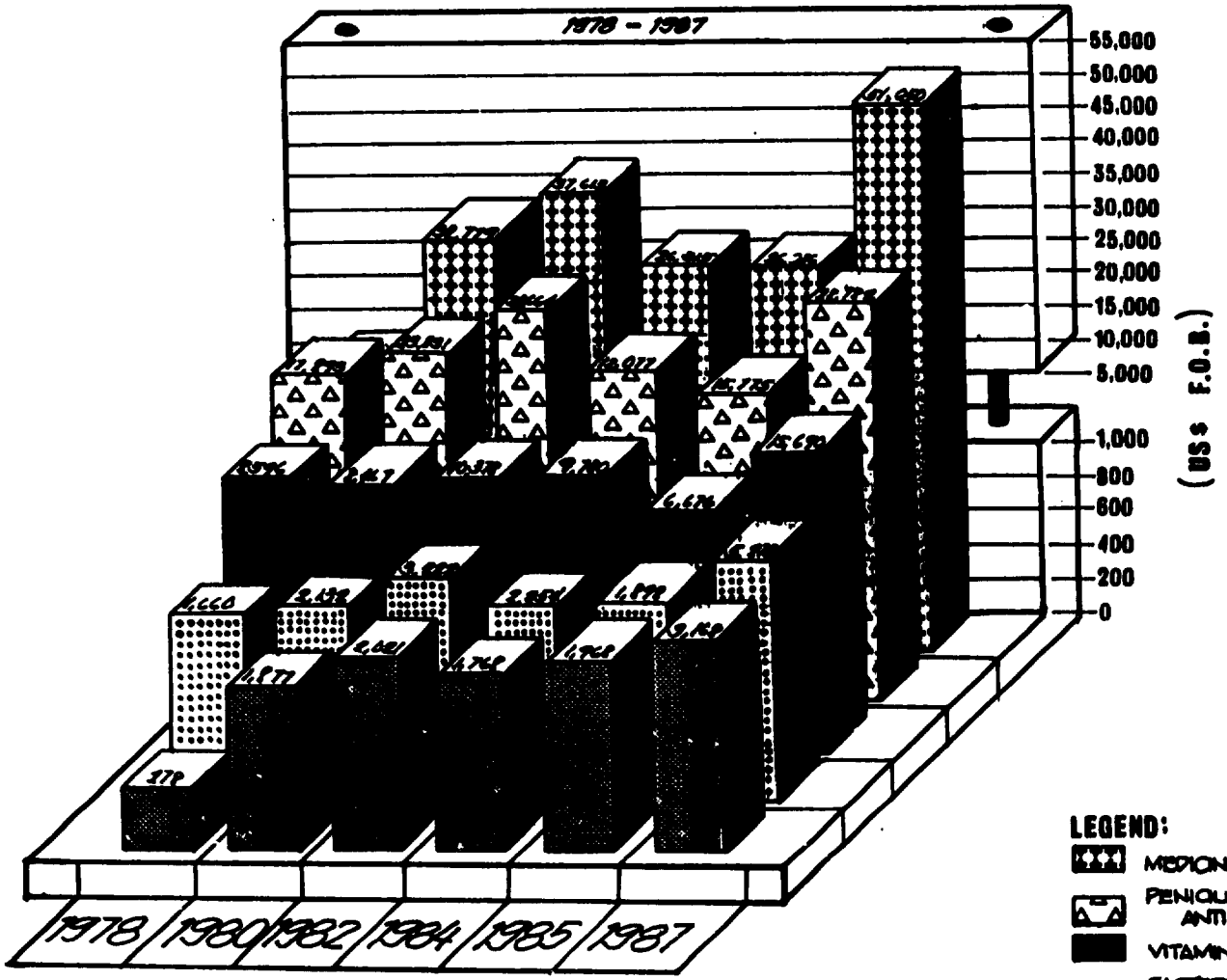
Table 118
Value of Philippine Imports of Medicinal & Pharmaceutical Products by Sub-Groups 1978 - 1987 (US$ '000 F.O.B.)

Product Description	1978	1980	1982	1984	1985	1987
Total .	54,016	69,087	81,898	58,195	52,402	103,967
Vitamins & Vitamin Preparations	8,596	8,467	10,378	9,780	6,676	15,690
Bacteriological products, sera, vaccines	1,660	2,132	3,222	2,254	1,898	5,278
Penicillin, streptomyrin, tyrocidine,antibiotics	17,893	23,831	23,664	18,077	15,775	28,782
Opium alkaloids, cocaine, caffeine, quinine and other alkaloids, salts and derivatives	278	1,877	2,021	1,768	1,968	3,168
Medicinal & pharmaceutical products, N.E.S.	11,205	32,779	37,613	26,315	26,086	51,050

Source: Foreign Trade Statistics of the Philippines, various years

FIGURE 49

VALUE OF PHILIPPINE IMPORTS OF MEDICINAL & PHARMACEUTICAL PRODUCTS BY SUB-GROUPS



SOURCE: FOREIGN TRADE STATISTICS OF THE PHILIPPINES, VARIOUS YEARS

Table 119
Drug Imports and Exports, Percent Annual Change,
Share in Total Imports and Exports, 1978 - 1987

Year	Drug Imports ('000 US$)	Percent change	Percent to total Imports	Drug Exports ('000 US$)	Percent change	Percent to total Exports
1978	56,021	29.5	1.18	3,507	15.0	0.10
1979	60,949	8.8	0.99	4,799	36.8	0.10
1980	69,087	13.4	0.89	6,233	29.9	0.11
1981	71,967	4.2	1.02	6,483	4.0	0.11
1982	81,898	(13.8)	1.07	7,138	10.1	0.14
1983	75,913	(7.3)	1.01	6,742	(5.5)	0.13
1984	58,195	(23.3)	0.96	5,874	(12.9)	0.11
1985	52,403	(10.0)	1.03	6,728	14.5	0.15
1986	70,857	35.2	1.40	5,919	(12.0)	0.12
1987	103,967	46.7	1.50	5,251	(11.3)	0.09
Average annual Growth		8.3			6.9	
Average Share			1.12			0.12

Source: Foreign Trade Statistics of the Philippines, various years

4.2.2.7 Research and Development

Table 120 emphasize the fact that the Philippine market alone cannot support a full range of drug R&D. With the R&D expenses of any company listed in Table 120 , a research-based drug company has to sell in big markets of the world and has to establish worldwide operations.

Table 120
R&D Expenses of Multinationals with Philippine Affiliate Operations, 1985

COMPANY	R&D EXPENSES (in million US$)	AS % OF SALES (%)
Hoechst	486	14
Ciba-Geigy	400	10
Boehringer Ingelheim	315	16
Smith Kline	310	10
Pfizer	287	7
Bristol	262	14
Abbot	240	8
Elli Lilly	217	9
Wyeth(Am. Prod.)	217	7
Warner Lambert	208	6
Rhone-Poulenc	200	15
Wellcome	190	13
Schering	175	9
ER Squibb	166	8
Berlimed	150	15
Astra	110	20
AH Robins	52	7
Beecham	50	7
Boots	38	6
TOTAL	US$4,073	

Source: Various company reports

Because of R & D's enormous economies of scale, local drug companies minimize R & D in the country. Very often, these are confined to clinical trials to assess biological activities or side effects of particular compounds.

For Filipino-owned companies, R & D is devoted to facilitating the access to and rapid retrieval, control and dissemination of volume of scientific and technical journals from all over the world. In general, local drug companies gain access to the new drug development and new products either through their mother companies abroad or through licensing agreements with the technology owner.

The pharmaceutical industry is heavily dependent on research and development of both basic and applied science. The research work carried out by pharmaceutical companies have different levels: basic research for the development of new drugs which have a strong dependence on pure-science studies in such areas as chemistry, biology, pharmacology and physiology; and applied research for the development of the industrial technologies for the production of new drugs or drugs already commercially available. Such work requires the availability of highly skilled manpower and large financial resources.

In terms of the cash spent by pharmaceutical companies on research and development, the United States industry is the clear leader, spending $4.7 billion in this area in 1986, compared with $2 billion in Japan, $1.6 billion in the Federal Republic of Germany and $1.2 billion in Switzerland. Individual companies' spending on research and development in a year is often counted in terms of hundreds of millions of dollars. In 1986, for example, Merck Sharp and Donme of the United States spent $300 million on research and development, Hoechst of the Federal Republic of Germany spent $290 million.*

In the drugs industry, the research and development process is a lengthy series of steps which are sub-divided into several key parts. Generally speaking it can take 10 years to bring a drug from the discovery in the laboratory of a new chemical to the time when the product is marketed. The process of bringing a product to the stage where it can be sold costs on average (taking into account the research being done on other drugs that do not come to the market) about $100 million, according to industry estimates. That explains why even the very biggest drug companies with large research and development budgets seldom launch on the market place more than two or three completely new medication each year.

---

* Industry and Development, global Report 1988/89 UNIDO, 1988

4.2.3 Marketing Practices

4.2.3.1. Pricing

There are two possible sources of the movement in prices of drugs. The first one, is the Pollard Index as monitored by the IMS. This reflects pharmacy purchase prices, i.e., the prices paid by pharmacist to drug companies. Price computations are based on the whole array of drug products carried by drugstores, and not by samples.

The other source is the average wholesale and the retail prices of drugs and pharmaceuticals as monitored by the National Statistics Office. It is based on a sample composed of antacids, anti-spasmodic, antiseptic, expectorants, vitamins, adhesive plaster, cotton, feeding bottles and eyeglasses.

For this section we will be using the price indices monitored by the IMS. The main reason here is that the Pollard Index is based on virtually the whole items traded rather than a small sample and therefore captures best the movement in the drugs in the market.

In situations where the indices used will be the ones published by NSO, the reader's attention will be called.

1.1. Movement of Drug Prices

Drug prices grew at an average of 15.8% per year over the period 1980 to 1987. Growth rates in prices was highest in 1984 when the country was in the midst of a recession and both inflation and foreign exchange rates jumped by 50%.

Consumer prices have outpaced pharmaceutical prices in the 1980s, except in 1983, 1986, and 1987 (see Table 121). 1983 was a peculiar year: The economy suffered a capital hemorrhage, and restrictions were clamped on imports to arrest the seepage. The peso skidded by 30% against the dollar, thereby bloating the production costs of pharmaceutical firms. In 1986 and 1987, the country began to get back on its feet. Inflation was less than 1% in 1986, and a very manageable 4% in 1987. The exchange rate settled at P20.52/US$1 to P20.81/US$20.81. Yet, in spite of these favorable developments, drug prices surprisingly rose faster than consumer prices did.

Table 121
The Growth in Drugs Prices vs. Inflation from 1980 - 1987 (in percent)

	Total Pharmaceuticals	Ethicals	Proprietary	Inflation
1980	11.6	11.4	12.6	18.2
1981	8.4	8.0	9.6	13.1
1982	7.6	7.8	6.6	10.2
1983	29.0	30.8	20.0	9.9
1984	39.2	37.6	48.7	50.3
1985	9.0	8.3	12.5	23.0
1986	13.2	13.7	11.2	0.9
1987	8.2	8.3	7.8	3.8
Average annual growth rate(%)	15.8	15.7	16.1	16.2

Source: IMS(198) for Drug Prices, NSO(1988) for Inflation

1.2. Drug Prices and Prices of Other Basic Commodities

As mentioned earlier, drug prices grew by an average of 15.8% from 1980 to 1987. This average rate of growth is slower than that posted by the consumer prices which was 16.2% over the same period. It was also lower than the average growth rates posted by other basic commodities such as clothing, fuel, light & water, services and other miscellaneous consumer products. On the other hand, its rate of growth is about the same as that of housing and repairs and higher than food, beverages and tobacco.

For the period 1980 to 1987, the growth rates in drug prices were lower than those of other commodities for the period 1980 to 1982, and 1984. Growth rates were higher for the years 1983, 1985 - 1987. Apparently, there was a shift in the pricing strategy of the drug companies after 1985: from one of growing below consumer prices before 1985 to that of outpacing consumer prices starting in 1985. Table 122 shows the comparative growth rates of drug prices and those of other basic commodities.

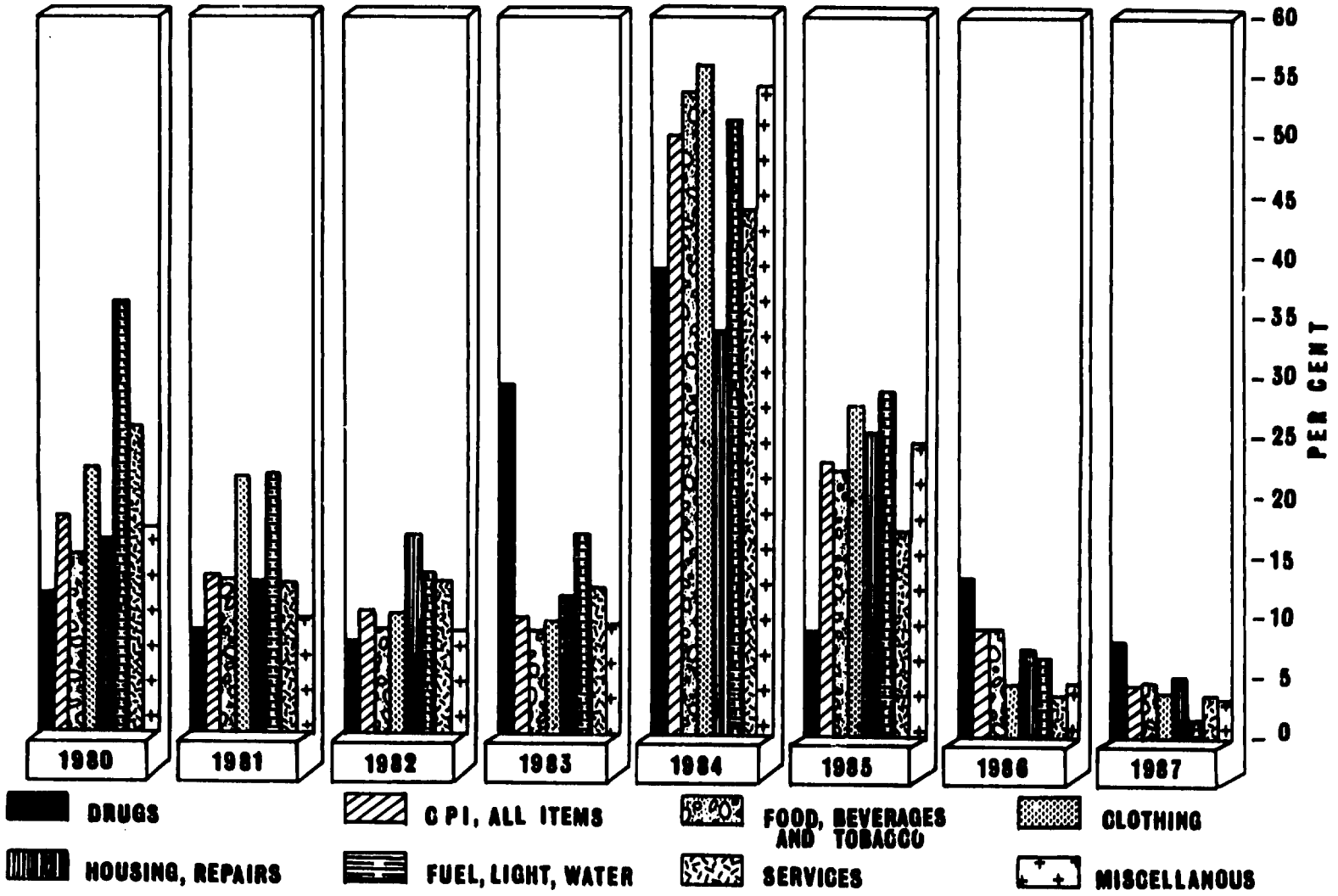
Table 122
Growth Rates in Drug Prices vs. Growth Rates in Prices of Other Basic Commodities, 1980 - 1987
(in percent)

	1980	1981	1982	1983	1984	1985	1986	1987	1980-87 Ave.
Drugs	11.6	8.4	7.6	29.0	39.2	9.0	13.2	8.2	15.8
CPI, All Items	18.2	13.1	10.2	9.9	50.3	23.0	0.9	3.8	16.2
Food, Beverage & Tobacco	15.0	12.7	8.5	8.6	53.8	22.3	(0.9)	4.2	15.5
Clothing	22.3	12.3	10.0	9.1	56.1	27.5	4.4	3.0	18.1
Housing & Repairs	16.1	12.6	16.7	11.0	33.1	25.4	7.4	5.0	15.9
Fuel, Light & H20	36.2	21.7	13.5	17.3	51.6	28.5	(6.8)	1.8	20.5
Services	25.6	12.6	12.7	12.4	43.9	17.3	3.0	3.2	16.3
Miscellanous	17.4	9.7	8.2	8.9	53.9	24.3	4.3	3.0	16.2

Source: IMS; Prices Division, National Statistic: Office, 1988

FIGURE 50

GROWTH RATE IN DRUG PRICES VS. GROWTH RATES IN PRICES OF OTHER BASIC COMMODITIES 1980-1987



SOURCE: IMF, PRICES DIVISION, NATIONAL STATISTICS OFFICE, 1988

1.3 Drug Prices and Prices of Other Manufacturing Products

The growth rates in drug prices are likewise lower than most manufacturing industries. Of the 20 major industry groups in the economy growth rates in drug prices outpaced the growth rates of 8 industry groups. The comparative growth rates are shown in Table 123

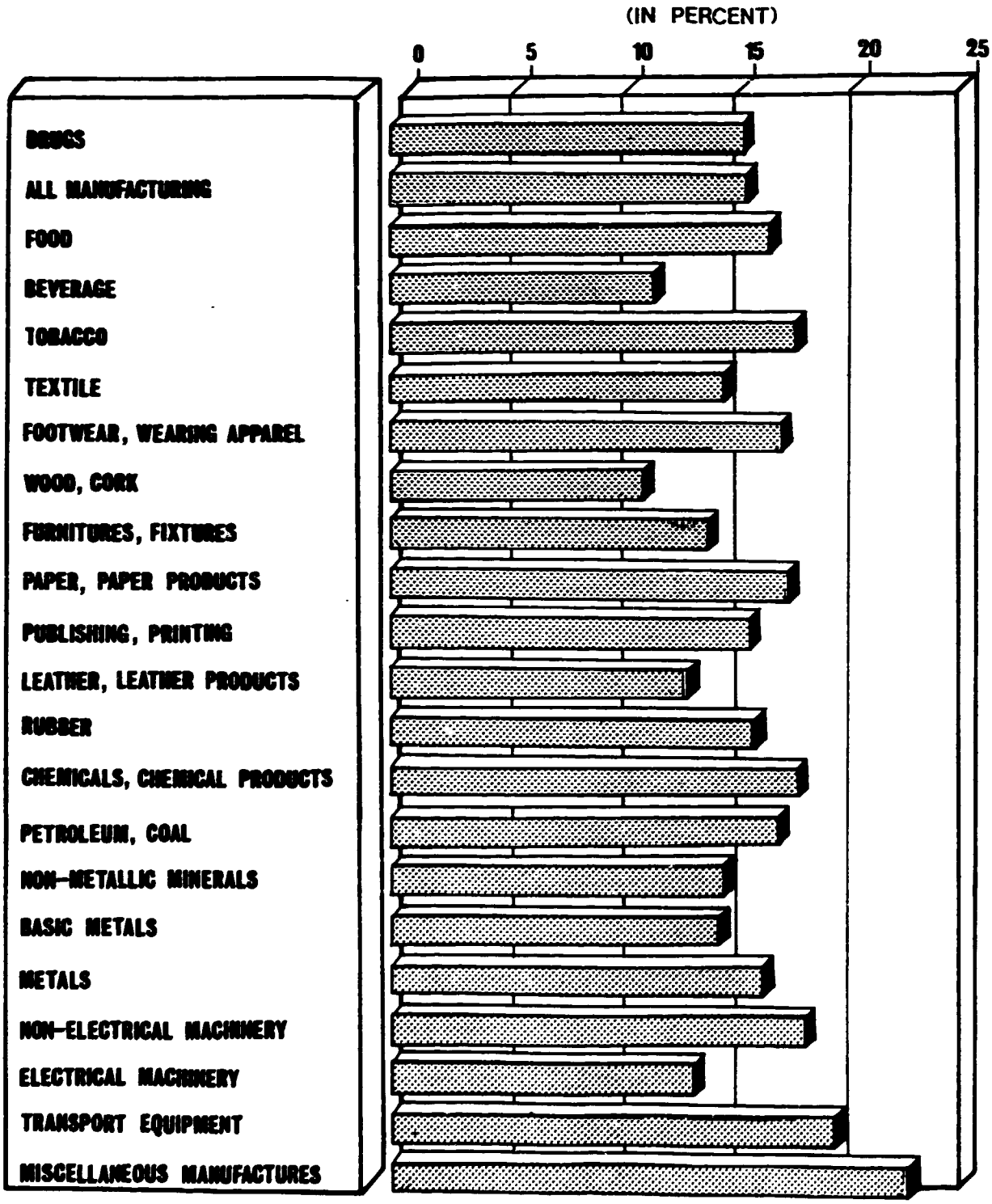
Table 123
Growth Rates in Drug Prices vs. Growth Rates in Other Manufacturing Industries, 1980 - 1987
(in percent)

	1980	1981	1982	1983	1984	1985	1986	1987	1980-87 Ave.
Drugs	11.6	8.4	7.6	29.0	39.2	9.0	13.2	8.2	15.8
All Manufacturing	17.1	10.1	8.0	11.9	55.3	18.3	2.3	5.0	16.0
Food	15.0	13.2	11.0	13.6	56.8	21.8	0.3	4.1	17.0
Beverage	14.5	5.3	6.9	10.2	24.1	16.9	5.4	11.8	11.9
Tobacco	10.6	4.2	4.6	9.9	68.3	23.0	11.4	12.9	18.1
Textile	10.6	7.0	6.0	10.4	44.9	28.7	7.8	4.4	15.0
Footwear & Wearing Apparel	24.8	7.0	6.0	15.3	42.3	17.1	14.0	13.4	17.5
Wood & Cork	(2.3)	11.7	6.0	10.9	39.2	14.0	6.1	5.8	11.4
Furniture & Fixtures	12.1	8.9	7.0	6.1	37.7	31.8	5.1	4.4	14.1
Paper & Paper Products	24.0	6.9	4.1	6.2	80.1	15.1	3.5	2.9	17.9
Publishing & Printing	9.3	11.3	6.1	10.4	59.9	19.2	7.4	4.3	16.0
Leather & Leather Products	4.8	7.9	3.7	11.3	69.2	(3.3)	4.9	8.2	13.3
Rubber	17.2	12.0	9.7	12.1	48.5	17.5	5.5	8.1	16.3
Chemicals & Chemical Prods.	9.0	3.2	4.0	16.2	84.2	6.4	11.7	10.4	18.1
Petroleum & Coal	56.5	19.2	6.9	8.8	58.3	4.2	(13.0)	(2.2)	17.3
Non-metallic Minerals	20.0	15.0	9.8	6.1	44.0	15.8	4.6	3.9	14.9
Basic Metals	9.5	6.9	9.0	8.1	37.0	33.5	3.0	10.0	14.6
Metals	14.9	8.0	9.0	11.5	54.7	30.4	4.0	0.0	16.6
Non-electrical Machinery	12.1	11.1	10.0	10.6	69.1	31.6	4.7	(0.9)	18.5
Electrical Machinery	15.3	16.7	13.0	13.5	25.2	16.9	3.8	4.1	13.6
Transport Equipment	12.3	11.7	8.0	7.8	65.8	27.7	11.6	14.5	19.9
Miscellaneous Manufactures	38.6	10.9	10.5	10.7	73.4	33.4	8.1	3.7	23.7

Source: IMS; Prices Division, National Statistics Office, 1988

FIGURE 51

AVERAGE ANNUAL GROWTH RATES IN DRUG PRICES VS. GROWTH RATES IN OTHER MANUFACTURING INDUSTRIES, 1980–1987



SOURCE: IMF; PRICES DIVISION, NATIONAL STATISTICS OFFICE, 1988.

1.4 Price Determinants

The pricing policies of drug companies are generally based on three main considerations: (a) competitive conditions; (b) market or customer response: and, (c) costs. Below is a brief discussion on each of these factors as they affect pricing policies of drug companies.

1.Competitive Conditions

Every brand sold by a drug company in the market usually has a host of other competitors and near competitors. Competition comes from other brands in the same therapeutic class or from those belonging to other classes.

Each company, therefore, has to look at the effective cost (to the patient) of the daily dosage of its products' competitors. It then sets prices, depending on how it assesses its own products -- i.e. whether they are better than, at par with, or inferior to those of competition. In finally deciding on its product(s)'s prices, the firm is aware that if it sets prices at levels very much less than those of competition, it may invite a ruinous price war. But if it sets prices at levels very much higher than competition's, its sales volumes may shrink.

2.Market or Customer Response

Whether the price of a specific pharmaceutical product or brand is raised or lowered, however, the action surely affects buyers, competitors, distributors, suppliers, and often even the government itself. The success (or failure) of any price change depends a lot on how these different parties, particularly buyers and competitors, respond.

In cases of price increases, for example, consumers may respond in any of these ways:
(a) cut back on buying
(b) stop buying the product altogether
(c) economize on usage
(d) find a cheaper substitute
(e) keep their normal level of usage of the product; or
(f) increase their purchase volume (especially if they want to hedge against future price increases

Except for the last two, all these responses to price increase lead to a lower sales volume for the product. This is why economists often talk of a downward sloping demand curve - i.e.,as the price of a product goes up, the demand for that product declines.

The decline in sales volume may, of course be made up for by increasing the product's price. However, as the price increases become more severe, the additional revenues per unit gained through higher prices may be offset by bigger declines in volume. Firms thus make sure they do not increase prices beyond what the market can bear.

Besides having to cope with a probable drop in total sales, firms planning to raise their prices, may also have to contend with the reaction - emotional or otherwise - of consumers and the government.

3.Cost Considerations

Drug companies consider product costs and intended profit margins when setting drug prices. The estimated breakdown of costs is given in Table 124 below. Note that costs here is defined as the sum of all expenses incurred by the drug company from procurement of raw materials to the point of sales and break down as follows:

(a) manufacturing costs
(b) costs of finished goods
(c) inventory costs
(d) operating and selling expenses

Table 124
Estimates of the Drug Industry Cost Structure

		as % of Total Sales
COST OF GOODS MANUFACTURED & SOLD		50.0 - 60.0
Manufacturing Cost		35.0 - 45.0
Direct Materials	30.0- 34.0	
Direct Labor	1.0- 2.5	
Overhead	4.5- 10.5	
Cost of Finished Goods		15.0 - 19.0
Inventory Cost		0.5 - 1.5
OPERATING & SELLING EXPENSES		31.5 - 36.5
General Management Costs		4.3 - 12.4
Selling Costs		15.0 - 18.5
Promotion & Advertising		4.5 - 9.2
R & D and Royalties		0.5 - 2.5
Interest & Bank Charges		0.3 - 6.0
RETURNS		8.0 - 13.0

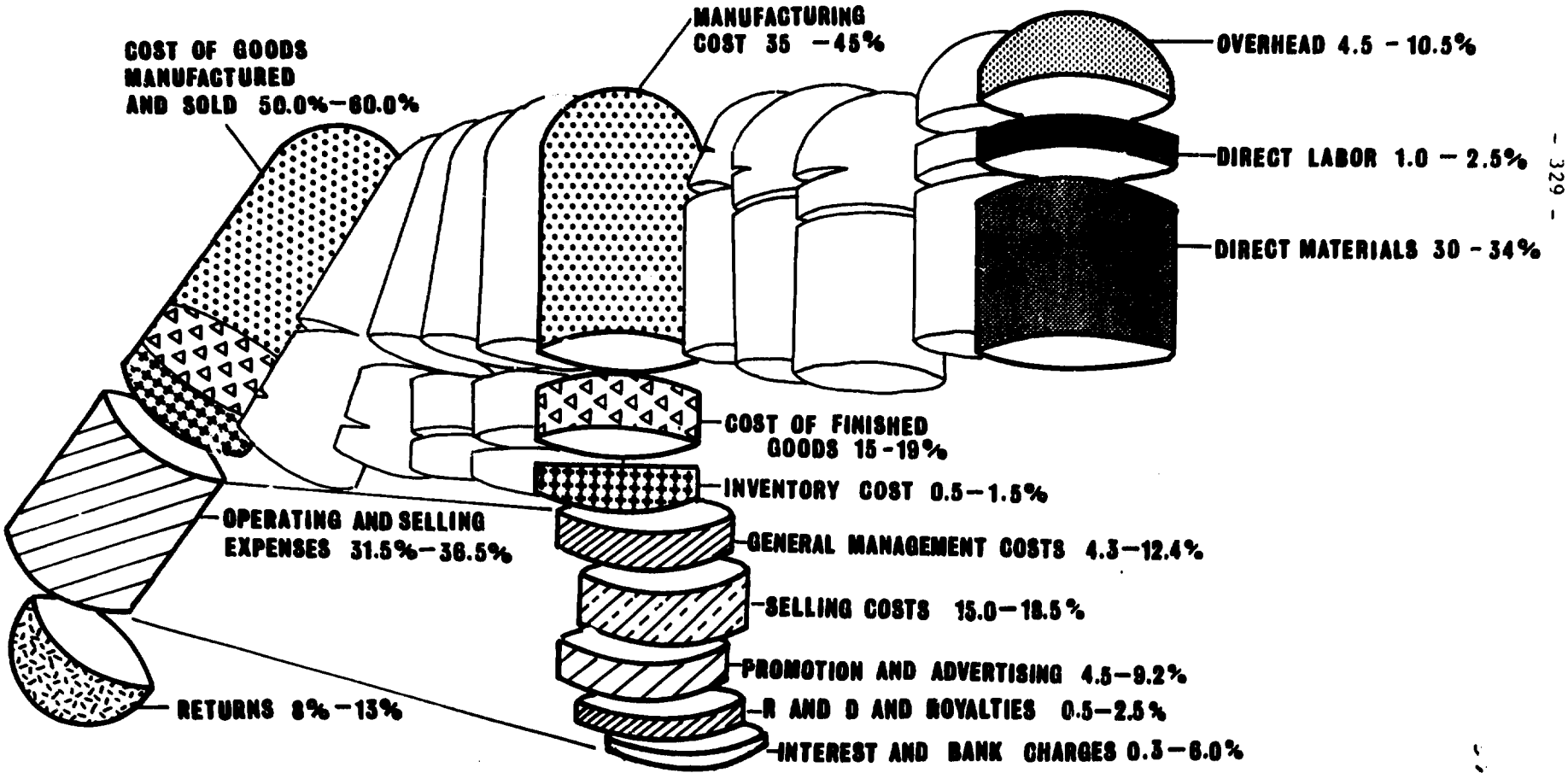
Notes :Estimates are based on a sample of companies with manufacturing facilities. Figures represent range across different companies.

Source:Nicanor Gabunada Jr. "Drug Prices: Are They Reasonable?". Staff Memos 13. Center for Research and Communication. July 1985.

FIGURE 42

ESTIMATES OF THE DRUG INDUSTRY COST STRUCTURE

AS PER CENT OF TOTAL SALES



SOURCE: NICANOR GABUNADA JR. "DRUG PRICES: ARE THEY REASONABLE?" STAFF MEMOS 15. CENTER FOR RESEARCH AND COMMUNICATION. JULY 1969.

The total manufacturing costs consists of direct costs (those that can be directly attributed to the product), indirect costs (those that cannot be attributed to specific products and which are more or less allocated among all the items produced), the distributed portion of overhead and the depreciation allowance for production-related assets and facilities.

An estimate of the breakdown of the manufacturing costs by type of presentation is given in Table 125 below:

Table 125
Estimate of Manufacturing Cost By Type of Presentation

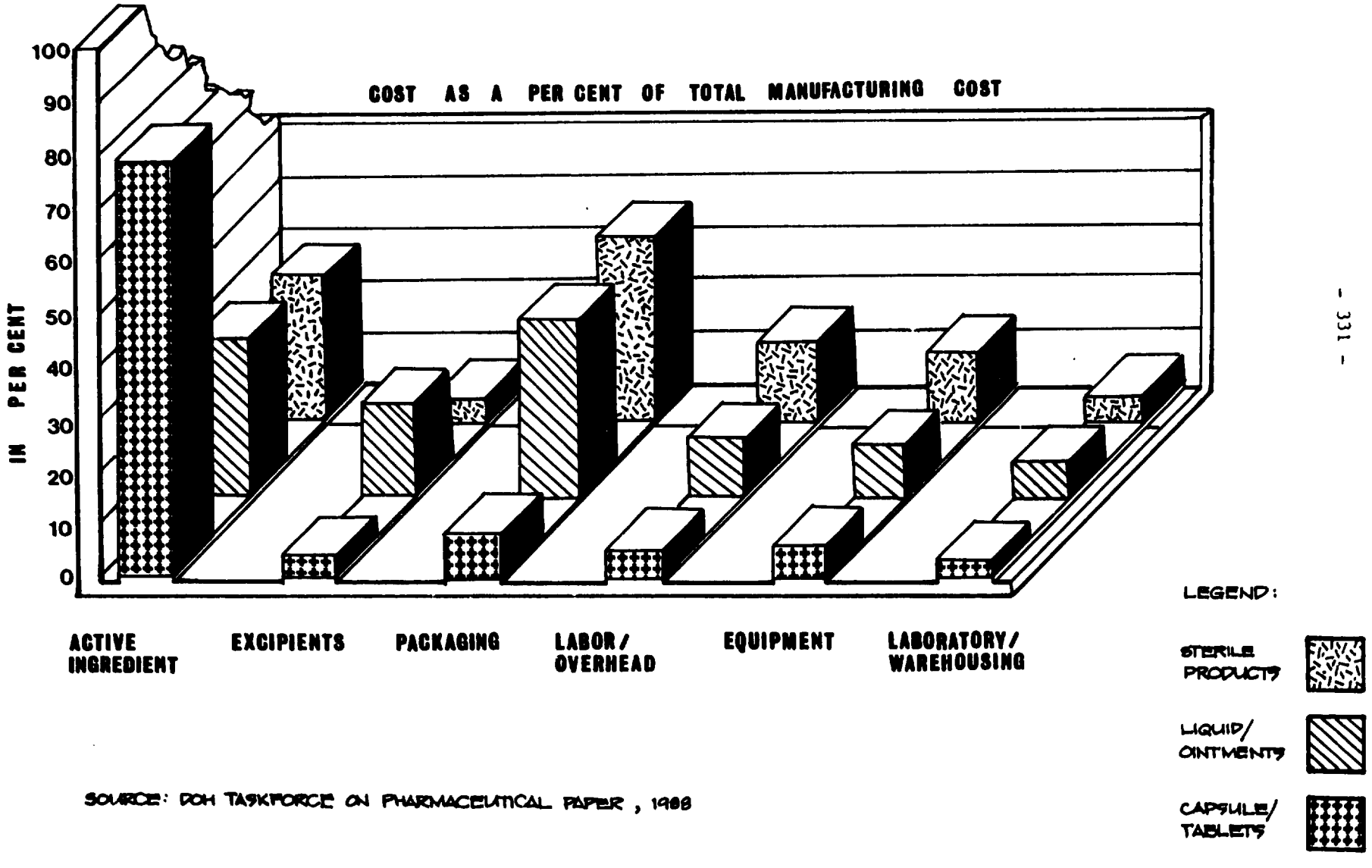
	Costs As a % of Total Manufacturing Costs		
	Capsule/ Tablets	Liquid/ Ointments	Sterile Products
Active Ingredient	77	32	31
Excipients	3	14	4
Packaging	7	32	33
Labor/Overhead	5	11	17
Equipment	6	7	12
Laboratory/Warehousing	2	4	3

Source: DOH Task Force on Pharmaceuticals Paper, 1987

Note that the cost of the active ingredient is generally similar regardless of the final dosage form presentation, hence, the above suggests that capsules are the cheapest dosage form while injecttables are the most expensive -- all due mainly to the relatively high cost of packaging for the liquids, ointments, and sterile or injectable drugs. This differences in product cost affect the product price directly, as shown in Table 126.

FIGURE #3

ESTIMATE OF MANUFACTURING COST BY TYPE OF PRESENTATION



SOURCE: DOH TASKFORCE ON PHARMACEUTICAL PAPER, 1988

Table 126
Illustration of Price Differences by Type of Presentation

Brand Name : Amoxil
Generic Name: Amoxycillin
As of : November 1986

Dosage Forms:

	Dosage Form	Unit Retail Price	Price/Mg	Index
Capsule	250 mg.	P 3.8642/cap	P 0.01530	100
Syrup	125 mg/ml	22.43/30ml	0.02991	195
Vial	250 mg.	30.55/vial	0.1222	799

Source: DOH Task Force on Pharmaceuticals Paper, 1987

Thus, the active ingredient and dosage form presentation are the two major elements of the manufacturing costs.

The cost of finished goods represents the cost of importation of finished goods.

Inventory costs include the cost of net inventories of goods in process and finished goods.

The operating and selling expenses include general management costs(accounting costs, taxes, etc.), selling costs(salaries, wages, commisssions of sales personnel and distribution costs), promotional and advertising expenses, R&D and royalties, and interest/bank charges.

4. Major Cost Determinants

The major components of drug costs are in turn heavily influenced by three main factors, namely: (1) the foreign exchange rate, (2) prevailing world prices of raw materials(imported inflation), and (3) domestic inflation. Prices are also influenced, although less significantly, by other factors such as the tax rates, the cost of utilities, interest rates, and the wage rates.

Table 127 shows the movement of the major factors affecting drug prices since 1980. Also following is a discussion of each of these main cost determinants.

1. Foreign Exchange Rate and Imported Inflation

The impact of these factors on drug pricing can be easily understood considering that the drug industry is import-dependent for its raw materials. Multinational companies used foreign exchange to pay royalties and dividends, to remit profits, and to pay other foreign dues and fees. Import prices and the availability of foreign exchange vitally affect the operations of local drug firms, especially the Filipino-owned companies.

2. Domestic Inflation

As inflation rises, costs like manufacturing overhead, selling and administration expenses, and promotion and advertsising costs, also increase. Interest and bank charges will also increase since bankers usually set these rates higher than the prevailing inflation rates. High inflation also triggers a clamor for higher wages among workers, if not orders for wage increases coming from the government.

3. Historically therefore, the drug price index has moved with changes in the foreign exchange rate, imported inflation and domestic inflation. In particular, a 1% increase in the peso-dollar rate lead to a 0.44% rise in the drug price index, assuming all other things remain constant. On the other hand, every 1% increase in imported inflation and domestic inflation would raise the drug price index by 0.15% and 0.52% respectively.

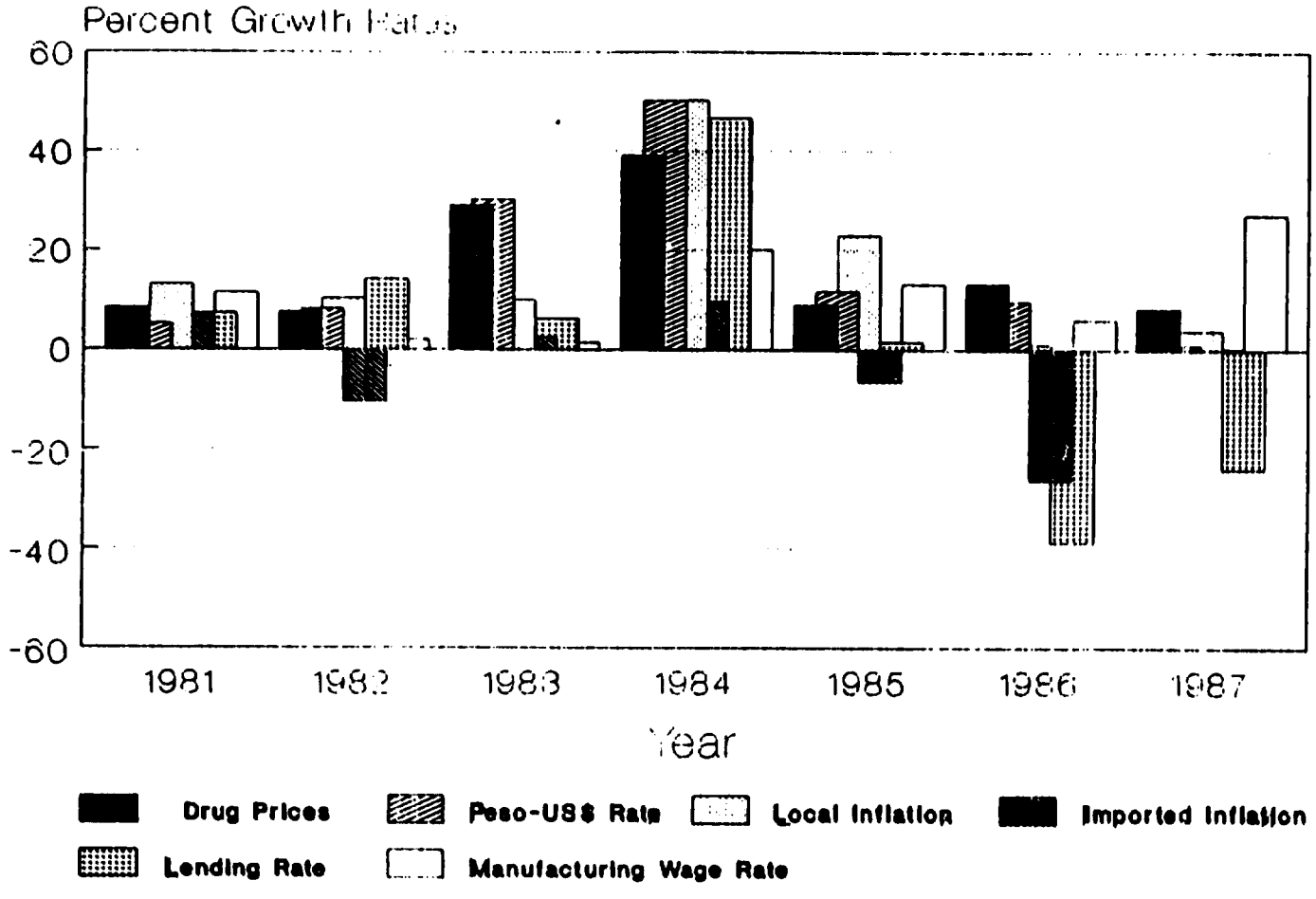
Table 127
Comparative Movements of Cost Determinants and Drug Prices, 1981 - 1987
(annual growth rates, in percent)

	1981	1982	1983	1984	1985	1986	1987
Drugs	8.4	7.6	29.0	39.2	9.0	13.2	8.2
Foreign Exchange Rate	5.2	8.1	30.1	50.1	11.6	9.6	0.8
Local Inflation	13.1	10.2	9.9	50.3	23.0	0.9	3.8
Imported Inflation	6.7	(10.2)	2.5	9.7	(6.3)	(26.0)	0.2
Weighted Average Interest Rate	7.3	14.2	6.2	46.6	1.5	(38.7)	(23.9)
Wage Rate (Manufacturing)	11.4	1.9	1.3	20.1	13.0	5.8	27.0

Source: IMS; Prices Division, National Statistics Office, 1988

FIGURE 54

GROWTH RATES OF COST DETERMINANTS AND DRUG PRICES (in %, 1981-87)



Source: IMS; NSO

5. Other Factors Affecting Price

1. Profit Margin of Distributors and Other Resellers

Trade margins has a bearing on the final cost of drugs to consumers as shown below:

Table 128
Profit Margins at Each Stage of the Distribution Chain (in index points)

Manufacturer's Selling Price	100
Distributor's Selling Price	100 - 115
Wholesaler's Selling Price	115 - 120
Retailer's Selling Price	125 - 130

Source: DOH Task Force on Pharmaceuticals Paper, 1987

2. Taxes and Duties

Taxes and duties levied on the drug industry has a substantial impact on drug pricing. To illustrate this point, we reproduce below a breakdown of taxes paid by an American multinational company supplying the drug and medicinal requirements of the Department of Health per peso of sales:

Table 129
Taxes and Duties Paid By a Typical Company

	Government Sales		Corporate Sales	
	Amount	%	Amount	%
Gross Sales	4718	100.0	10809	100.0
Sales Taxes	573	11.6	1254	11.6
Duties	94	2.0	216	2.0
Corporate Income Tax	330	7.0	757	7.0
Witholding Tax on Royalties	57	1.2	130	1.2
Individual Income Tax	80	1.7	184	1.7
Realty & Municipal Tax	9	0.2	22	0.2
Shipping Charges	377	8.0	33	0.3

Source: American Chamber of Commerce in the Philippines, 1987

The above example was made prior to the implementation of the the value added tax. This illustrates that P0.317 is paid for evry P1.00 of sale, leaving only P0.683 for the cost of producing raw materials, the production and the packaging process, as well as operating and advertising/promotional expenses. Note also that an additional 8% for shipping charges is deducted from income when sales are made to the government.

Aside from the above taxes, the following are also the taxes levied on imports of packaging materials:

Material	Custom Duties
Bottle Caps	40% ad valorem
Plastics	30% ad valorem
Cartons (raw materials)	50% ad valorem
Boxes (finished products)	40% ad valorem
Aluminum Tubes	20% ad valorem
Aluminum Foils	20% ad valorem
Vials for Injectibles	20% ad valorem

The BIR advance sales tax for importing any of the above packaging materials is 10 - 20 percent ad valorem.

4.2.3.2 Use of Brand Names

The use of brand names, as distinguished from generic names, is a significant marketing tool used by the industry. The industry defends their use of brand names as the company's guarantee of quality, safety and efficay of the product they are selling. Branding, however, actually facilitates the advertising and promotion of their product lines, so that even though a product is protected by a patent, virtually all patented drugs in the country are sold under brand names.

Moreover, the use of brand names can also be particularly valuable to a drug firm marketing a drug that either cannot be patented or, if patented, has been freely licensed so as to minimize the competitive barrier of the patent itself.

As of end-1987, drug products are sold under in at least 3,228 brand names presented in about 11,000 forms. Table 130 shows the number of brands in major therapeutic classes in 1987, classified as to whether they are ethical or proprietary. Table 132 on the other hand shows the breakdowns by sub-therapeutic classes.

TABLE 130
Number of Brands in Major Therapeutic Classes, 1987

Therapeutic Class	Total	Ethicals	Proprietary
Alimentary Tract Metabolism	718	585	133
Blood & Blood Forming Organs	167	155	12
Cardiovascular Systems	182	180	2
Dermatologicals	357	185	172
G.U. Systems & Sex Hormones	113	107	6
Systemic Hormones	59	59	0
Systemic Anti-infectives	626	625	1
Cytostatics	35	35	0
Musculo-Skeletal Systems	116	85	31
Central Nervous System	273	250	23
Parasitology	61	54	7
Respiratory Systems	521	455	66

Source: Board of Investments, 08/88

On the average, a manufacturer carries 9 different brands. However, the number of brands carried by the industry's leading corporate groups exceeds the average by a large degree (see Table 131).

TABLE 131
Number of Brands of the Top 20 Corporate Groups, 1987

A. Top Ten Corporations		Next 10 Corporations	
Company	No. of Brands	Company	No. of Brands
UNILAB	292	Astra	27
Abbot	55	Roche	39
Zuellig Pharma	109	Sterling	48
Warner Lambert	46	Squibb	41
Bristol Myers	63	Robins	15
Wyeth-Suaco	28	Rhoune Poulenc	42
Boehringer Ingelheim	29	Sandoz	24
Ciba Geigy	45	Cyanamid	22
Pfizer	27	Merrel	22
Glaxo	24	Schering	39
Totals	718		319

Source: Board of Investments, 08/88

Table 132
Number of Brands in Major Therapeutic Classes
Subdivided into Ethicals and Proprietary

	Ethicals	Proprietary
a) Anti-infectives	625	1
Tetracyclines	70	
Chloramphenicols	54	
BS Penicillins	117	
Cephalosphorins	20	
Trimethoprins	39	
Macrolides	22	
Quinolones	6	
MN Penicillins	69	
Aminoglycosides	17	
Carbenicillins	3	
Rifampicin/Rifamycins	15	
Other Antibiotics	3	
Tuberculostatics	122	1
Antivirals	7	
Sulphonamides	10	
Antifungals	4	
Other Anti-infectives	5	
Sera	22	
Vaccines	20	
b) Respiratory System	455	66
Nasal Decongestants (Top)	13	
Nasal Decongestants (Systemic)	15	1
Pharyngeals	9	6
Bronchodilators (Anti-asthma)	67	
Other Anti-asthmatics	3	
Chest Rubs/Inhalants	2	9
Cold Preparations	47	15
Cough/Cold + Anti-infectives	14	
Expectorants	131	9
Antitussives	124	24
Other Cough/Cold	1	
Antihistamines	27	
Other Respiratory	2	

Table 132
Number of Brands in Major Therapeutic Classes
Subdivided into Ethicals and Proprietary cont'd..

c) Alimentary Tract and Metabolism	585	133
Stomatologicals	12	18
Antacids/Antiflatulents	38	15
Antipeptic Ulcerants	9	
Others	2	11
Antispasmodics	26	
GI Ataratic	1	
GI Analgesic Combinations	11	1
Antiemetics/Antinauseants	22	
Bile Therapy	5	
Hepatic Protectors	14	
Laxatives	11	18
Antidiarrheals/Antibacterials	38	1
Other Antidiarrheals	24	
Electrolyte replacer	9	
Antiobesity	6	1
Digestives	6	
Insulin	13	
Antidiabetics (Oral)	8	
Multi-Vitamins + Minerals	98	20
Multi-Vitamins w/o Minerals	53	8
Vitamins A & D	11	3
Vitamins B1 & B1, B6, B12 (??)	40	1
Vitamin B Complex	41	8
Vitamin B12 Plain	8	
Vitamin C	18	6
Other Plain Vitamins	9	13
Calcium	8	2
Potassium	4	
Other Mineral Supplements	2	
Tonics	15	7
Anabolic Hormones	6	
Appetite Stimulants	17	
d) Central Nervous System	250	23
Anaesthetics General	5	
Anaesthetics Local	15	
Analgesics Narcotics	2	
Analgesics Non-Narcotic	147	23
Anti-Epileptics	7	
Anti-Parkinson	5	
Neuroleptics	19	
Hypnotics & Sedatives	11	
Tranquilizers	18	
Anti-Depressants	3	
Psycho-stimulants	1	
Psycholeptic Anti-depressants	3	
Nootropics	3	
Neurotonics	5	
Other CNS	6	

Table 132
Number of Brands in Major Therapeutic Classes
Subdivided into Ethicals and Proprietary cont'd...

e) Cardiovascular	150	2
Cardiac Glycosides	4	
Antiarrhytmics	14	
Sympathomimetrics	5	
Coronary Therapy	8	
Nitrites/Nitrates	20	
Inotropic	6	
Antihypertensives	15	
Antihypertensives + Diuretics	4	
Rauwolfia	4	
Rauwolfia + Diuretics	9	
Diuretics	21	
Cereb + Periphe Vasotherapy	18	1
Vasoprotectives	8	1
Other Cardiovasculars	2	
Beta Blockers (Plain)	19	
Beta Blockers (Combi)	7	
Calcium Antagonists (Plain)	10	
ACE Inhibitors (Plain)	2	
ACE Inhibitors (Combi)	4	
f) Dermatologicals	185	172
Antifungals	27	38
Emollients	9	8
Wound Healing	3	4
Antiprurities	6	10
Coal-Tar Preparations	8	1
Antibiotics/Sulpho	23	2
Antivirals	2	
Corticosteroids (Plain)	30	
Corticosteroids (Combi)	36	
Antiseptics	12	62
Medicated Dressings	2	4
Anti-Acne	18	19
Other Dermatologicals	9	24
g) Blood and Blood Forming Organs	155	12
Anticoagulants/Platelel Inh	5	
Platelel Agg.	3	
Anti-Fibrinolytics	3	
Vitamin K & Others	21	
Hematinics iron & Combi	73	8
Other Hematinics	1	
Hypolipidemic	16	4
Blood & Related	6	
IV Solutions	25	
Peritoneal Dialytics	1	
Other Hematologicals	1	

Table 132
Number of Brands in Major Therapeutic Classes
Subdivided into Ethicals and Proprietary cont'd...

h) Musculo-Skeletal System	85	31
Antirheumatic Non-steroid	34	
Antirheumatic Steroid	5	
Antirheumatic Topical	9	31
Muscle Relaxants (Inj)	6	
Muscle Relaxants Systemic	17	
Anti Gout	14	
i) Genito Urinary System	107	5
Trichomonacides	2	
Antimycotics	11	
Antibiotics	1	
Antiseptics	4	
Labor Inducers	6	
Contraceptives (Topical)	2	2
Other Gynaecologicals	3	2
Hormo-Contraceptives	13	
Androgens & Combinations	9	
Destrogens & Combinations	3	
Progestogens & Combinations	7	
Androgen & Fem. Hormones	2	
Destrogen + Progestogen	6	
Gonadotrophins	5	
Other Sex Hormones	4	1
Urinary Anti-Infectives & Antiseptics	18	1
Other Urologicals	9	
j) Systemic Hormones	59	
ACTH	1	
Corticosteroids (Plain)	41	
CCMB Corticosteroids	7	
Thyroid Preparations	5	
Anti-Thyroid Preparations	3	
Iodine Preparations	1	
All Other Hormones	1	
k) Parasitology	54	7
Amoebicides	20	
Anthelmintics	15	3
Anti-malarials	12	1
Scabio & Ectoparasitic	7	2
Other Anti-parasitics		1

Table 132
Number of Brands in Major Therapeutic Classes
Subdivided into Ethicals and Proprietary cont'c...

1) Cytostatics	35
Alkylating Agents	9
Anti-metabolites	10
Vinea Alkaloids	3
Cytostatic Antibiotics	4
Cytostatic Hormones	7
Other Cytostatics	2

4.2.3.3 Advertising and Promotion

Advertising and promotion is strong in the drug indsutry primarily because of two reasons:

(a) in the prescription market, there is a complete separation between the buyer (the buyer or whatever agency pays for the patient) and the decision maker (the doctor/physician) eliminating any direct pressure on the latter to "economize" in the normal sense of the word; and,

(b) in the proprietary market, product awareness on the part of both the sellers (i.e. the drugstores) and buyers is crucial in the movement of the manufacturer's lines.

It is in this context that we see the rationale behind supporting product lines with a barrage of high powered promotions. The success of these efforts depends on how they convince doctors, pharmacists, and consumers regarding the virtues (in terms of their therapeutic superiority or better quality) of particular brand names.

1.Advertising and Promotion in the Proprietary Market

Advertising in the usual media (radio,tv, print) is not allowed for proprietary products. About the only print advertising done for proprietary drugs is in the Philippine Index of Medical Specialties (PIMS) - a quarterly journal containing a list of medical specialties and in medical journals distributed to doctors.

Drug promotion however, is an ongoing activity. Promotion efforts are directed almost entirely at practising physicians who dictate what drugs and which brands will be purchased by the ultimate consumers. The effort begins when the physician is still a medical student and continues throughout his active career. The key element here is the medical representative or the detailman. His function is to pay doctors regular visits and try to persuade them to prescribe his company's products.

In this connection, the industry has developed strong links with the Philippine Medical Association and other medical groups. Drugs companies support annual conventions of doctors and specialists. In these conventions or conferences, the companies exploit to the hilt their network of detailmen and sales representatives, bringing in speakers(even from outside the country), chauffeuring physicians around and providing them all other amenities.

2.Other Promotional Tools and Mass Media Advertising

Companies also give trade deals and incentives, volume discounts, prompt payment discounts, product samples, useful gift items, sales contests, and occasionally liberal terms of payment.

In all these promotional efforts, drug companies make sure that synergy is gained from their efforts. That is, they would see to it that promotions campaigns ultimately redound to a highly favorable outlook not only on specific product lines but on the company's products and image as a whole. And one of the best ways to do this is through the mass media by way of product and institutional advertising.

3.Cost of Advertising and Promotion

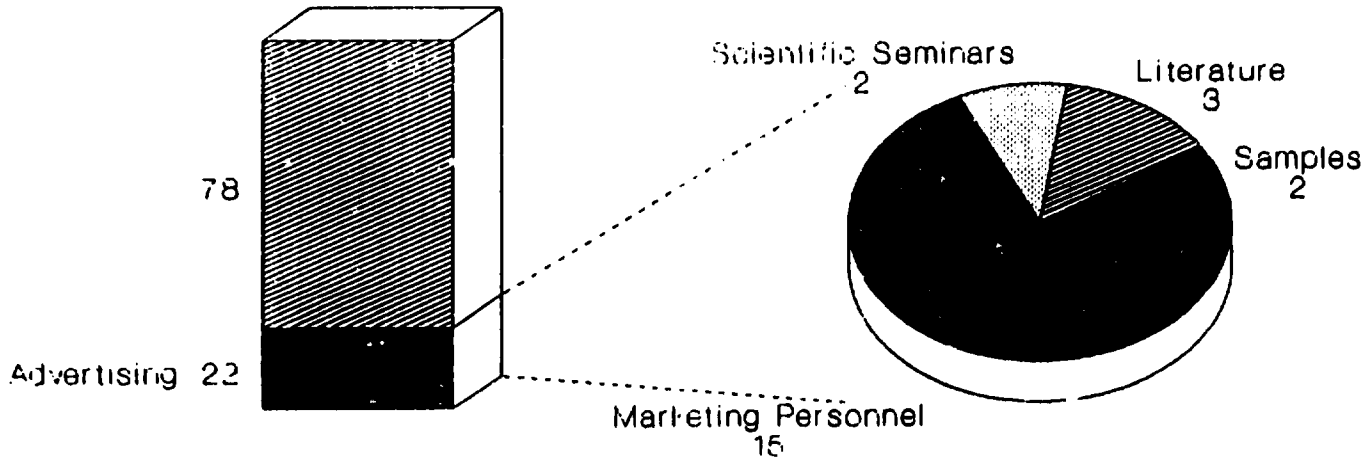
The cost of advertising and promotion varies from company to company and from product to product. The Drug Association of the Philippines estimated the average direct cost of promotion at 22% of sales broken into: 15% for cost of marketing personnel(salaries and travel); and 7% for promotion(literature and documentation, 3%; samples, 2%; and, scientific seminars and other expenses, 2%)*

---

*Source: "A Position Paper on the Pharmaceutical Industry". Drug Association of the Philippines. January 1988

FIGURE 55

BREAKDOWN OF ADVERTISING EXPENSES AS A PERCENTAGE OF TOTAL SALES



Advertising As Percent Of Total Sales

Breakdown of Advertising Expenditures

Source: Drug Association of the Phils ,1988

4.2.7.4 Distribution

The combination of inadequate or lack of transport facilities in the rural areas pose major problems for the distribution system.

The distribution of drugs to the market is through exclusive or non-exclusive distributorships as well as through drugstores with chain retail outlets. It is a common practice of the MNCs however, to distribute their products through distributors, mostly on an exclusive basis. For most drug companies, their products are distributed by the bigger drugstores with chain retail outlets like Mercury Drug Corporation. In the public sector, drugs are distributed through government hospitals, health centers and boticas sa barangay.

Aside from dispensing doctors, and government agencies, any drug company in the country has to contend with a total of 9,871 possible outlets with which their products can reach the final consumer. The regional distribution of these outlets are shown in Table 133 below:

Table 133
Regional Distribution of Drug Outlets, 1988

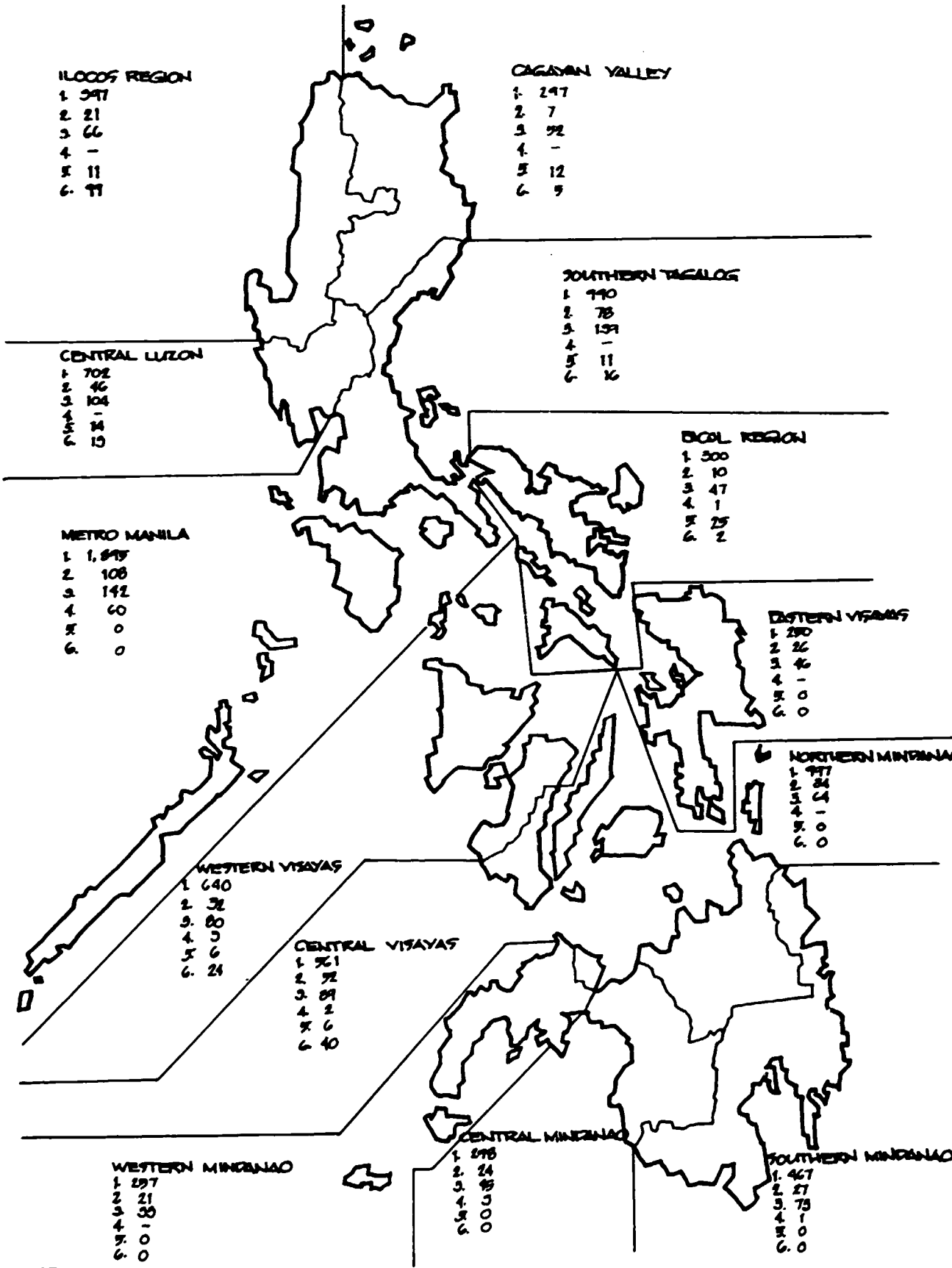
	1	2	3	4	5	6
Metro Manila	1,895	108	142	60	0	0
Ilocos Region	397	21	66	-	11	99
Cagayan Valley	297	7	52	-	12	5
Central Luzon	702	46	104	-	14	13
Southern Tagalog	990	78	139	-	11	16
Bicol Region	300	10	47	1	25	2
Western Visayas	640	32	80	3	6	24
Central Visayas	561	52	89	2	6	40
Eastern Visayas	250	26	46	-	0	0
Western Mindanao	257	21	33	-	0	0
Northern Mindanao	997	34	64	-	0	0
Southern Mindanao	467	27	73	1	0	0
Central Mindanao	298	24	45	3	0	0
Total	8,051	486	980	70	85	199

Legend: 1 - Retailers
2 - General Wholesalers
3 - Hospital Pharmacies
4 - Chinese Drugstores
5 - Household Remedy Stores
6 - Botica sa Barangay

Source: Bureau of Food and Drugs, Regulation Division I, 06/30/88

FIGURE 56

REGIONAL DISTRIBUTION OF DRUG OUTLETS



LEGEND:

1. RETAILERS	3. HOSPITAL PHARMACIES	5. HOUSEHOLD REMEDY STORES
2. GENERAL WHOLESALERS	4. CHINESE DRUGSTORES	6. BOTICA SA BARANGAY

SOURCE: BUREAU OF FOOD AND DRUGS, REGULATION DIVISION I, 06/00/80

The greatest bulk of these outlets, however, are concentrated in Metro Manila. This region houses 23.5% of all retail drugstores, 22.2% of all wholesalers and 14.5% of hospital pharmacies in the country.

1.Drug Distribution Network

Drug manufacturers, producers and importers either undertake their own distribution or course it through nationwide distributors. From there, drugs pass through a variety of channels such as drugstores, private and industrial hospitals, government hospitals, and dispensing physicians. From these trade outlets, drugs eventually gets transferred to the consumers.

Figure 57 on the next page illustrate the distribution flow in the industry.

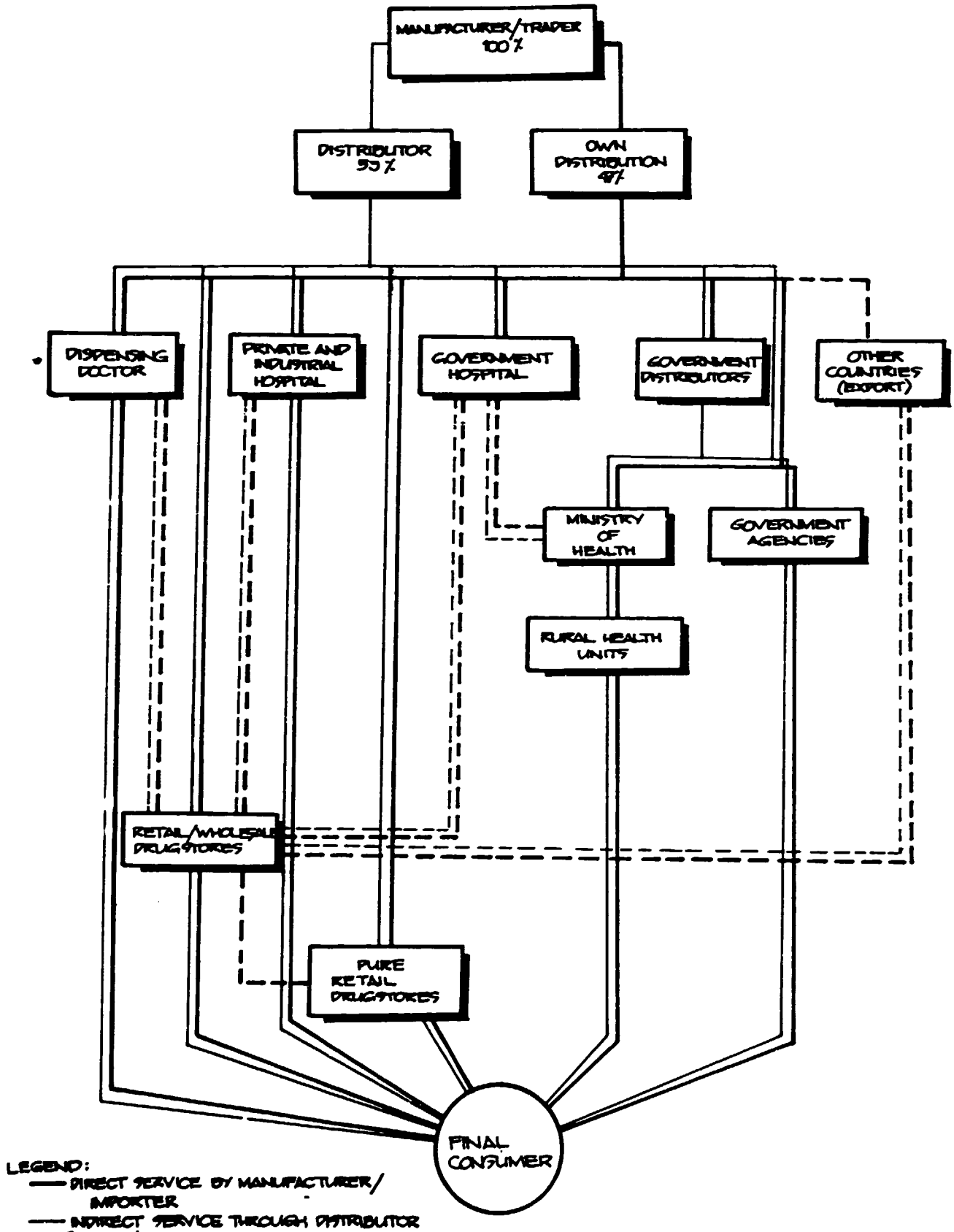
The geography of the Philippines makes it uneconomic and inefficient for some drug companies to handle the distribution of their products. Thus, only few manufacturers have their own distribution network of nationwide coverage (see Table 134).

Other companies make use of the services of Metro Drug, Zuellig Pharma, Marsman, Philusa and others to distribute their products. These distributors have specialized in the field and have already developed a well-entrenched network for sales and collection. Aside from sales and collection personnel, these companies have also invested heavily in bodegas, rolling equipment, and communications. These resources enable them to cover distribution nationwide.

The combined sales forces of the above listed four(4) companies is about 800. Combined vehicles fleet is about 900 cars. The fleet includes cars, delivery panels and trucks. Communication are by telex, telegraph, telephone and the post.

Table 135 shows the location of the branches and warehouses of these major distributors.

FIGURE 57
DISTRIBUTION CHART



SOURCE: IMS

Table 134
Major Drug Companies and their Corresponding Distributors

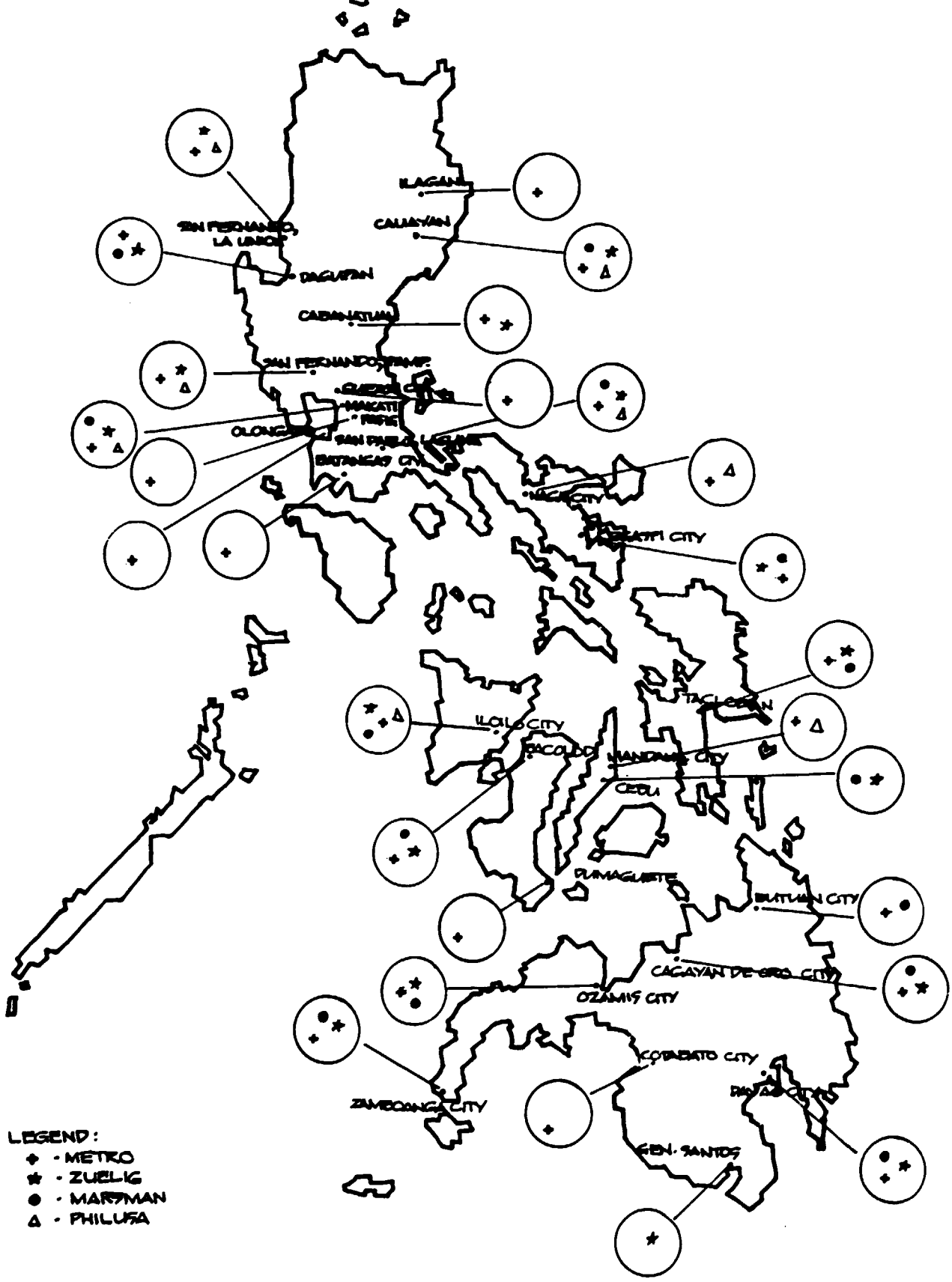
Company	Distributor
United Laboratories	United Laboratories
Bristol Myers	Bristol Myers
Warner Lambert	Warner Lambert
Abbot Laboratories	Metro Drug
Wyeth-Suaco	Marsman(pharmaceuticals only)
Pfizer	Metro Drug
Boenringer Ingelheim	Metro Drug
Richardson Vicks	Richardson Vicks
Astra	Zuellig Pharma Corporation
Robins	Metro Drug
Sterling Products	Sterling Products
Roche	Zuellig Pharma Corporation
Cathay Drug	Cathay Drugs
Glaxo	Zuellig Pharma Corporation
Cyanamid	Metro Drug
Merrel	Marsman
Squibb	Zuellig Pharma Corporation

Source: Drug Companies, Philipoine Index of Medical Specialties

Table 135
COVERAGE OF THE COUNTRY'S MAJOR DISTRIBUTORS

Branches/Warehouses	Metro	Zuellig Pharma	Marsman	Philusa	Total
a)**Luzon**					
Makati	x	x	x	x	4
Quezon City	x				1
Caloocan	x				1
Pasig	x				1
Ilagan	x				1
Cauayan	x	x	x	x	4
San Fernando, La Union	x	x		x	3
Dagupan	x	x	x		3
San Fernando, Pampanga	x	x	x	x	4
Cabanatuan	x	x			2
Olongapo	x				1
San Pablo, Laguna	x	x	x	x	4
Batangas City	x				1
Legaspi City	x	x	x		3
Naga City	x			x	2
b)**Visayas**					
Mandaue City	x			x	2
Cebu City		x	x		2
Bacolod City	x	x	x		3
Iloilo City	x	x	x	x	4
Tacloban City	x	x	x		3
Dumaguete City	x				1
c)**Mindanao**					
Butuan City	x		x		2
Ozamis City	x	x	x		3
Cagayan de Oro City	x	x	x	x	4
Davao City	x	x	x	x	4
General Santos	x	x			2
Cotabato City	x				1
Zamboanga City	x	x	x		3
	27	17	15	10	69

FIGURE 58
COVERAGE OF THE COUNTRY'S MAJOR DISTRIBUTORS



Distributors usually handle the product of several companies which are often times in direct competition with each other. The distribution fees vary depending on the type of the product handled, but the range is anywhere from 12% to 15% of the product sales.

Hiring the services of "professional" distributors gives manufacturers specific cost advantages like not having to worry about collections, warehousing, etc. However, it also has its drawbacks. A distributor may accord low service levels to a company's products if these products yield unsatisfactory turnovers and/or margins.

Distribution does not stop at simply choosing the distributor to handle a company's product line. The chain goes further downstream to wholesalers, drugstore chains, retail drugstores, dispensing doctors, hospitals and the government. As such, the company provides their distributors' salesmen with professional service representatives (also called medical reporesentatives) to aid in the servicing of the downstream outlets where the distributors pass on the products. These medical representatives makes it a point to pay doctors a visit at least twice a month and tries to impart on the doctors the strong points of their products, provide product samples, gifts and other giveaways and/or just make plain courtesy calls to develop goodwill. The detailing frequency of a selected number of companies is shown in Table 136.

Table 136
Detailing Frequency - Number of Calls per Doctor per Month, 1985-86

	Manila	Rest of Luzon	Visayas Mindanao	Nat'l	1983-84 Nat'l
Average	2.7	1.9	2.2	2.3	2.2
Astra	3.2	2.9	3.4	3.2	3.2
United	3.4	2.6	2.8	3.0	2.9
ICI	2.8	2.5	3.2	2.8	3.2
Pediatrica	3.1	2.5	2.8	2.8	3.2
Rhone Poulenc	2.5	1.9	3.3	2.8	2.1
Boehringer	3.0	2.4	2.5	2.7	2.3
Sandoz	2.9	2.3	2.5	2.7	2.7
Bristol	3.1	2.2	2.2	2.6	2.2
Glaxo	3.3	2.1	2.3	2.6	2.5
Hoechst	3.0	2.2	1.4	2.6	2.3
MSD	2.4	1.3	1.4	1.6	1.7

Source: Private Sources

2.Public Distribution System

In the public sector, drugs are distributed through government hospitals, health centers and rural pharmacies. The public distribution system is shown in Figure 59.

The Department of Health get their drugs through tender from local suppliers. Fifteen percent of these drugs are set aside as reserves: 5% for the central office and 10% for the regional offices. The remaining 85% are distributed equally among the 1,991 rural health units (as of 1988) spread across the country.

Provincial health officers are responsible for distributing the medicines and supplies by municipalities. The municipal health officers in turn distribute these medicines to the rural health units (RHUs). Medicines from the RHUs are given to patients without charge.

On planning stage at the DOH is a distribution system based on the size of the population. The DOH is also seriously considering a proposal which calls for one formulary per region rather than having one national formulary. The proposal is meant to make drug puchases more relevant to the health needs in the regions. At present, at the regional levels, there is some discretion in purchases of drugs in excess of regional allotments from the national office.

3.2.3.4 Trade Margins

The pricing structure and mark-ups as we go down the distribution chain is given in Table 137 below:

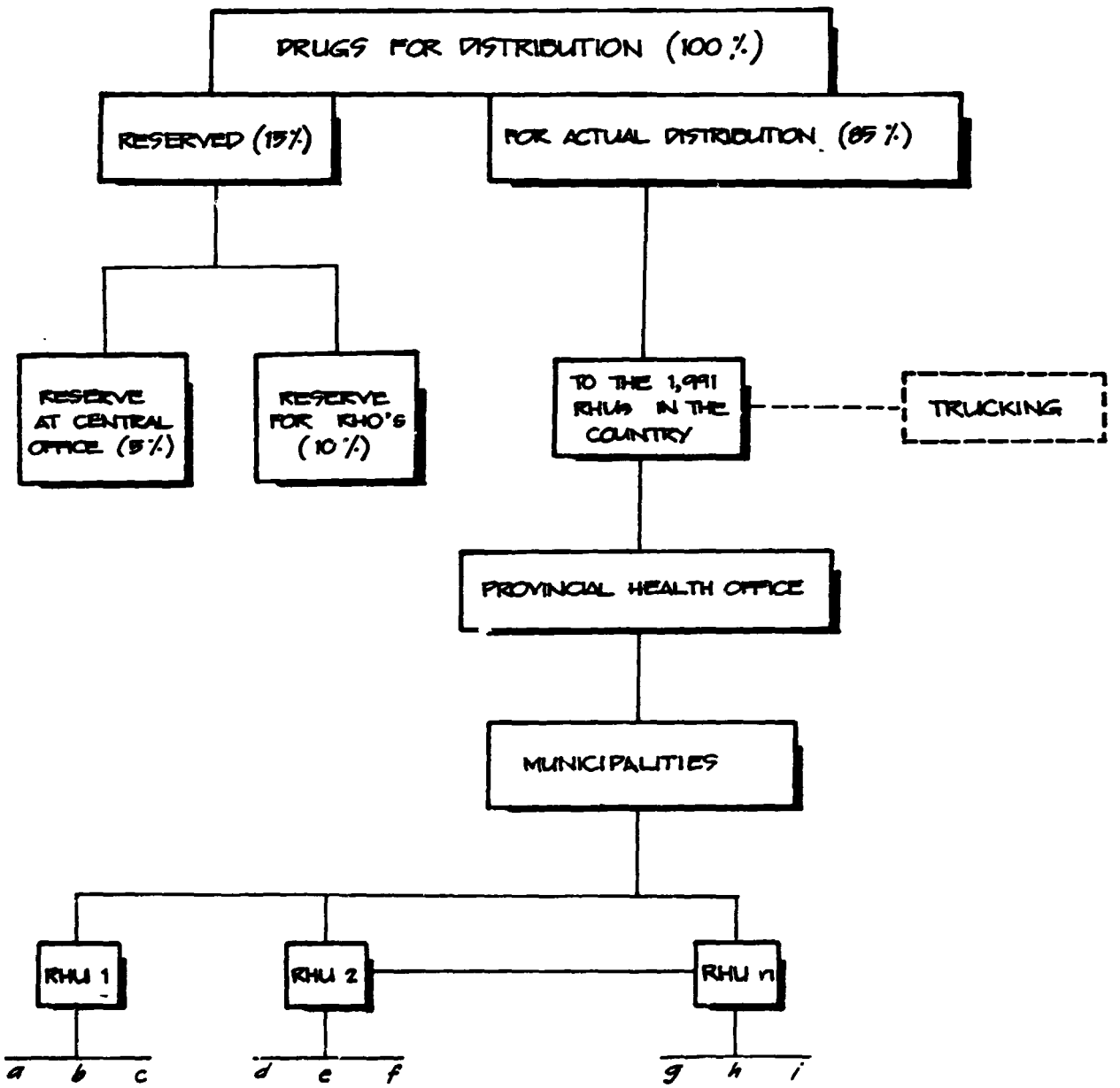
Table 137
Average Price and Mark-ups

	Average Price	Average Mark-ups
Manufacturer to Distributor	100	
Distributor to Wholesaler	118	15%
Wholesaler to Retailer	124	5%
Retailer to Consumer	138	10%

Source: DOH Task Force on Pharmaceuticals Paper, 1987

FIGURE 59

DISTRIBUTION OF DRUGS IN THE PUBLIC SECTOR



SOURCES:

HOW TO SELL TO THE GOVERNMENT AND U.S. BASES, 1987 ED.
MRS. ROSITA ALISASIS, SENIOR PHARMACIST, DOH, DISTRIBUTION DIVISION.

From the manufacturer to the consumer, there is a 38% increase in price. When the pharmaceutical firm sell goods to a distributor, distributors receive 15%. Distributors handle promotional activities for the branded products. When pharmaceeutical companies deal with large retail drugstore (usually acting as wholesalers) as subdistributors, a 5% service fee is generally given. Retail price to consumers is 10% higher or maybe less, depending on the degree of competition among retailers and the operating costs of the estbalishment. Drugstores which perform strictly retail functions follow a manufacturer's list price and simply enjoy volume discounts as incentives.

Where the manufacturers do not employ distributors but instead sell directly to the drugstores, the manufacturers' selling price include the theoretical distributors' mark-up, except that this is taken up as either part of the product cost or part of distribution expenses. When a wholesaler sells to the general public, it generally passes on part of the theoretical retailers' margin. The structure described above does not include any additional discounts given by companies and/or distributors to the trade. These discounts are usually given in consideration of volume purchases and/or early collection of receivables. These discounts do not normally affect the price structure. Their impact lies in the profitability of the trader/business.

4.2.3.5 Profitability

Throughout 1978 to 1986, the industry's profitability based on records submitted by the major pharmaceutical companies to the Securities and Exchange Commission showed a marked increase and are always higher than the average for all manufacturing industries (see Table 138).

Table 138
Profitability of the Drug Industry Compared to Total Manufacturing, 1978-1986

	Drug Industry			Total Manufacturing		
	Sales	Return on Equity	Assets	Sales	Return on Equity	Assets
1978	6.23	20.36	8.87	2.27	8.16	2.58
1979	6.82	22.12	9.84	2.62	9.49	2.89
1980	6.47	18.77	9.22	1.51	5.61	1.60
1981	6.00	17.43	8.40	1.12	3.87	1.22
1982	6.68	20.14	10.28	-0.11	-0.39	-0.13
1983	8.34	23.12	11.59	0.56	2.16	0.63
1984	7.92	22.10	11.08	1.46	7.22	1.90
1985	8.70	25.00	13.45	1.45	6.69	1.83
1986	9.62	24.55	14.59	2.87	10.66	3.31
1978-86 Average	7.42	21.51	10.81	1.53	5.94	1.76

Source: Businessday's Top 1000 Corporations, 1978 to 1986; Philippine Best 1000 Corporations, 1997

4.3 Long Term Prospects of the Drug Industry

4.3.1. The Methodology

The drug market is modelled and forecasted in terms of both price driven growth and real volume (constant prices) growth. A price and a demand model is estimated using the following process:

Step 1) The sales in constant prices and the price index series are independently analyzed with respect to major macroeconomic variables, by the technique of multiple regression.

Step 2) The models which results are then simulated, and the derived pharmaceutical sales estimates are compared to actual historical sales data to determine the quality of fit and performance of the models.

Step 3) Once satisfactorily tested, the resultant models are projected using the NEDA generated forecasts to obtain baseline extrapolations of the sales at constant prices. These are combined with price growth projections to produce baseline forecasts at actual prices.

Step 4) These baseline forecasts are modified to take into account the expected environmental and legislative developments during the next five years which are not reflected in the historical data or the economic forecasts.

Step 4) The forecasts produced are consolidated at actual prices to account for market sectors not included in the sales series used, thus providing for national market forecasts at actual prices.

The plot of the actual and the fitted price and sales in constant prices resulting from the multiple regressions are shown in Figures 60 and 61.

Figure 6(

PLOT OF DRUG SALES IN 1972 PRICES

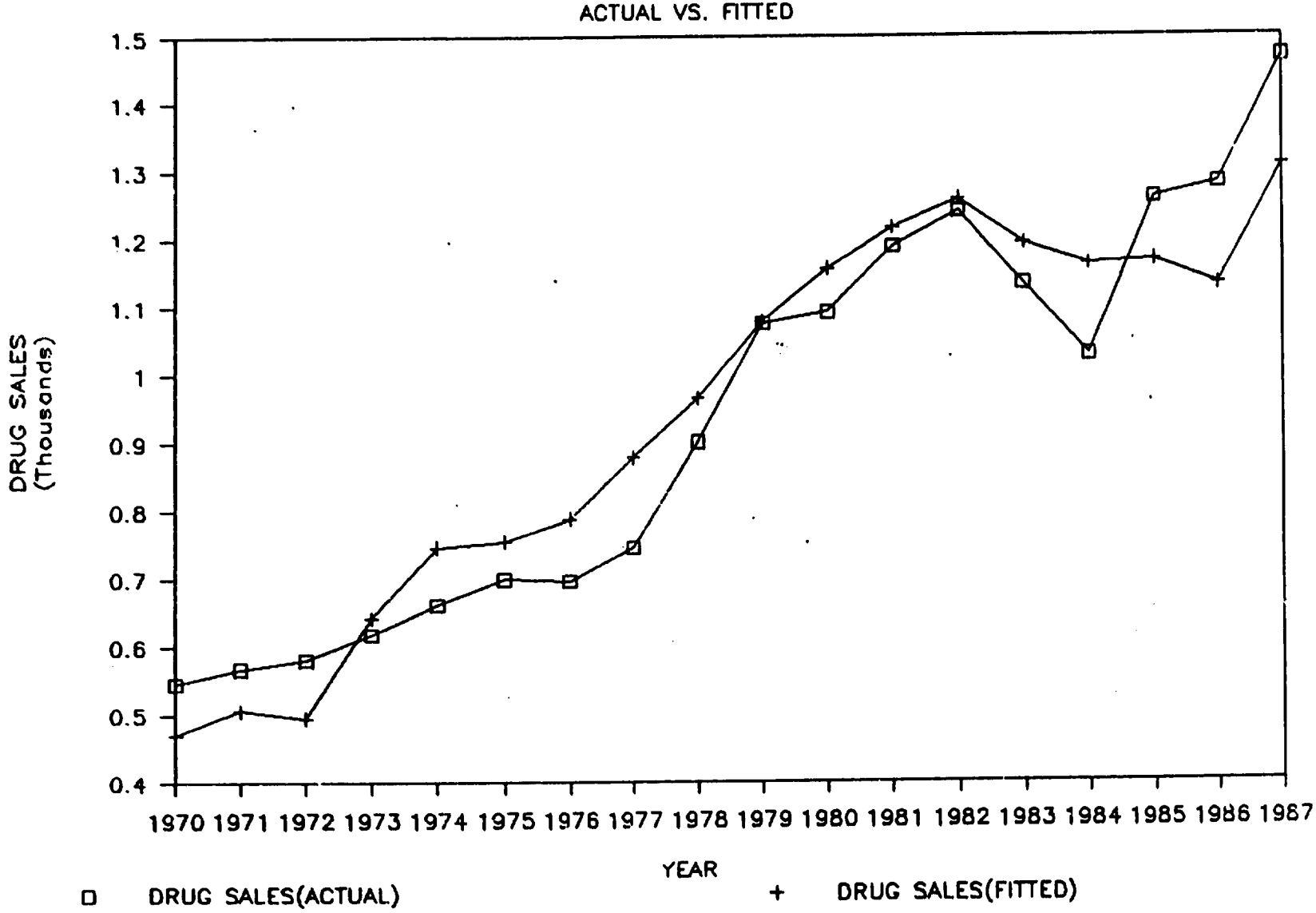
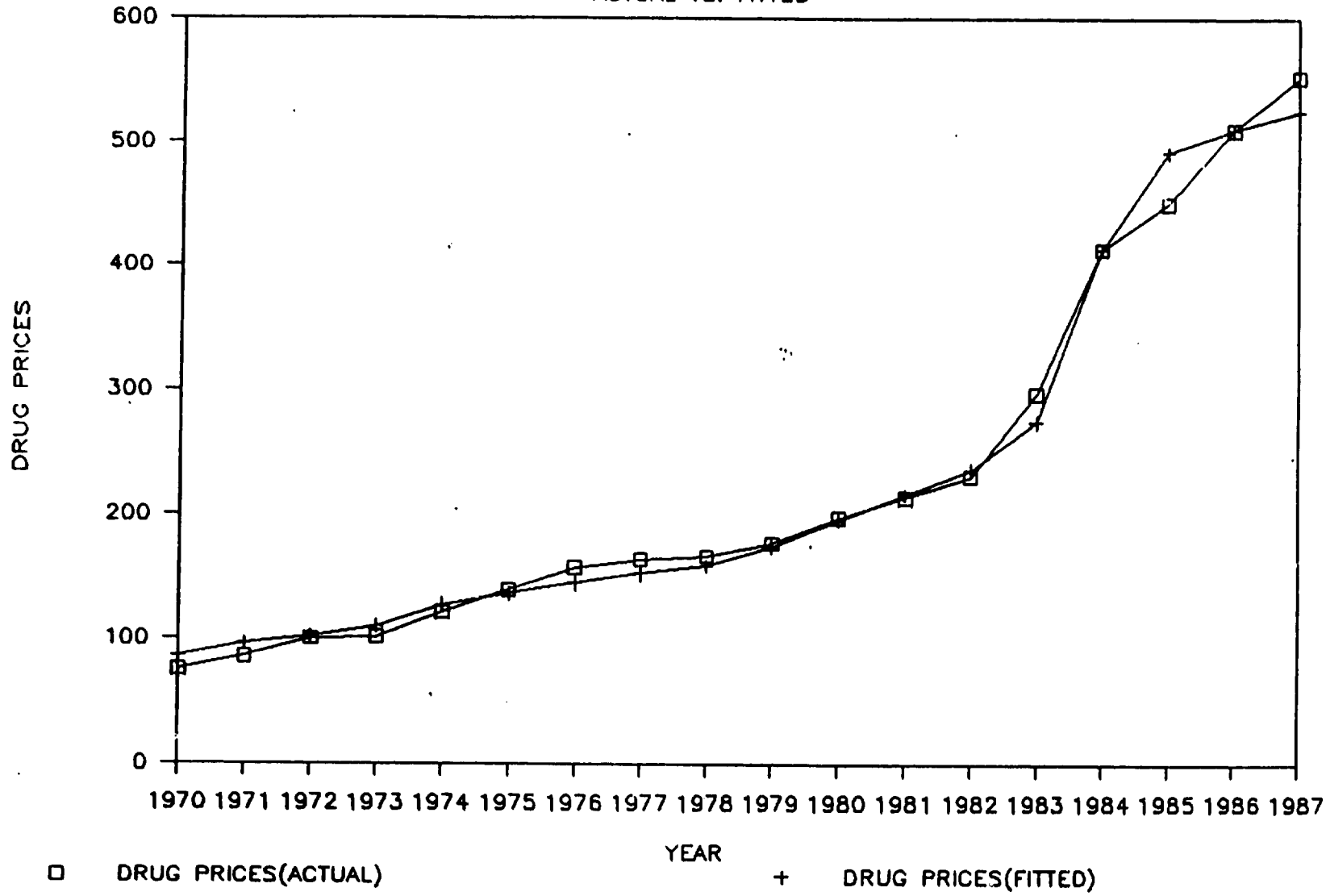


FIGURE 61

PLOT OF DRUG PRICE INDEX

ACTUAL VS. FITTED



4.3.2 The Environment in the Next 5 Years: Basis for the Forecasts

The economy will continue to grow strongly in the forecast period (1988-92). Demand led growth will slowly turn investment led towards the second half of 1988. Economic growth therefore will be sustained by industrial expansion and domestic demand, which is dependent on further increases in government and consumer spending, public and private investments and exports of manufactured products. Growth of real GDP should be 6.5% per annum in the next five years.

The cost of doing business meanwhile will start to go up as increasing needs for imported inputs and repayments of loans shall put a pressure on the peso. Interest rates will likewise go up largely because of increasing competition which shall be pose the government on the funds from the banking sector. Inflation will also hit double digit figures as a result.

The economic scenario from 1988 to 1992 is given in Table 139.

Table 139
Forecasts of Selected Macroeconomic Variables in the Next Five Years, 1988 to 1992

Year	GDP Growth Percent	Inflation Percent	Peso-Dollar Rate Peso: US$1
1988	6.2	7.7	21.50
1989	6.5	7.0	22.30
1990	6.5	7.1	23.00
1991	6.3	6.9	23.14
1992	6.5	7.1	23.60
Average	6.4	7.2	-

Source: NEDA Updated Development Plan for GDP and Inflation; Center for Research and Communication for Peso-Dollar Rate

The political environment on the other hand, will see the current administration surviving up until the end of its terms despite the ongoing threats of disruptive military elements. Violence and corruption however, will continue and will slowly erode the popularity of the current administration. In the meantime, forces with close affinity to the current administration will further consolidate its hold on the lower house; all in preparation for drafting a presidential candidate strong enough to withstand the onslaught of an envirogated opposition by 1992. Any law that needs to be passed will have to be acceptable to this consolidated group.

While the current administration exhibited a high priority in the improvement of health care, economic difficulties will prevent any real reform of the system. Entrenched political and bureaucratic difficulties will deter the spread of basic and routine health care at the rural level. The multinational lobby against the program of the current Department of Health will exhaust all efforts aimed at cutting the tooth of the program. All sorts of dilatory tactics will be tried in order to prolong the status quo. Any new program or law on health after the National Drug Policy will meet stiff resistance in Congress as a result of this powerful lobby.

The newly enacted National Drug Policy however, shall open the way for an increased consumer awareness of the merits of being price conscious and slowly destroy the myths surrounding some expensive brand names built through years of advertising and promotion. The same policy shall serve to moderate price increases. However, it will also work against any governemnt program to attain self sufficiency in some types of drugs since such efforts will initially mean slightly higher prices than the ones offered by existing companies.

The growth in markets notwithstanding, there will be no drastic changes in the structure of demand both at the therapeutic class and at the regional levels. No major overhaul will be made on the area of the disease pattern of the country as well as in the income distribution across classes and regions. Thus, the 1986-87 shares by therapeutic class and by region will largely be the same throughout the forecast period.

The drug market in the next five years is shown in Table 140.

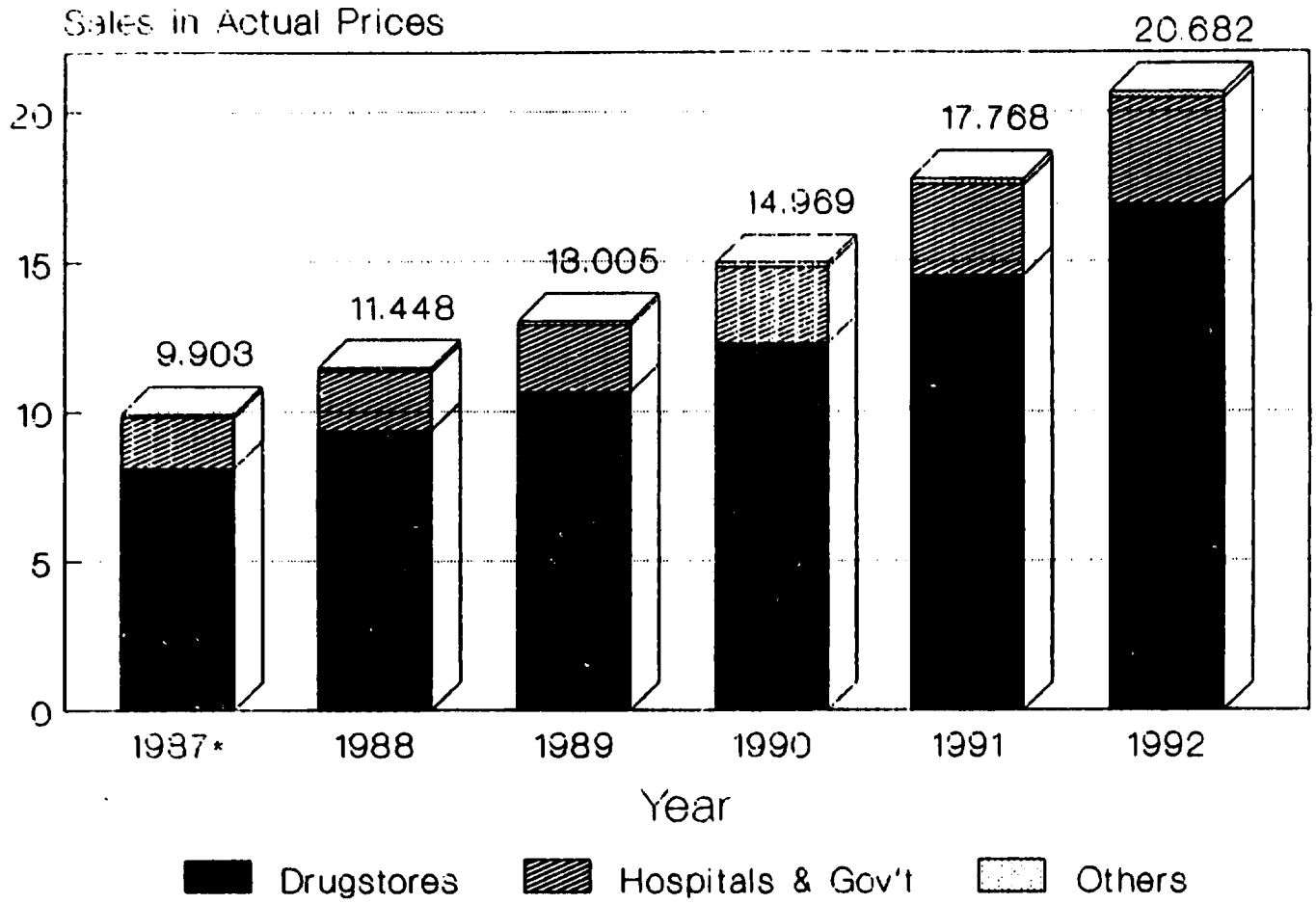
Table 140
The Drug Market from 1987 - 1992

	Actual Values	Forecasted Values				
	1987	1988	1989	1990	1991	1992
Prices growth rate (percent)	8.2	6.6	6.7	8.1	11.5	9.3
Sales Volume growth rate (percent)	14.6	8.4	6.5	6.5	6.5	6.5
Sales Value growth rate (percent)	21.6	15.6	13.6	15.1	18.7	16.4
Values (Pesos Million)						
Total Sales	9903.3	11448.2	13005.2	14969.0	17768.1	20682.1
Drugstores Sales	8108.5	9376.1	10651.3	12259.6	14552.1	16938.6
Hospitals & Gov't Sales	1686.8	1946.2	2210.9	2544.7	3020.6	3516.0
Others	108.0	125.9	143.1	164.7	195.4	227.5
Drugstores & Private Hospital Sales Of:						
Antibiotics Systemic	1774.9	2051.4	2330.4	2682.3	3183.9	3706.0
Tuberculostatics Incl. Strepto	304.8	352.3	400.2	460.6	546.7	636.4

FIGURE 62

FORECASTS OF THE DRUG MARKET:1987 - 92

(By Type of Market, in Billion Pesos)



*Note: 1987 are actual figures

V HUMAN RESOURCES DEVELOPMENT

For its implementation, the Philippine Pharmaceutical Development Plan requires manpower of given qualifications in roughly two stages: at the start of the priority projects and further into the future as the projects expand and develop.

This section, therefore, considers the following points:

1) The trained manpower available at levels and qualifications specified for each project
2) The training program needed to bring the skilled personnel to desired levels of capability
3) The ability of the educational system to produce the trained manpower in the future

5.1 Technical Human Resources Required and Available

5.1.1 Qualifications

The production of pharmaceutical chemicals by fermentation, chemical synthesis or other processes call for technical personnel in the form of chemists, biochemists, microbiologists and engineers, particularly in production and quality control.

At the start, any R & D function needed may be subcontracted to existing research institutes. In time, however, R & D will probably have to be done in-house with the concomittant need for a high level scientific staff.

The general qualification for chemists, engineers and biological scientists is a good master's or even a doctorate degree. Specialization and appropriate experience are additional qualifications that may be imposed.

Where appropriate manpower at the M.S. or Ph.D. level is not available, B.S. degree holders will have to be hired and trained to the appropriate level. Almost invariably, however, some form of re-training would be needed. This training is needed to impart new skills as well as give new orientation.

5.1.2 Manpower Training Requirements

5.1.2.1 Assumptions in costing manpower requirements and suggestions for improving training programs

1) BS graduates in Biology, Chemistry and Chemical Engineering are generally available.

2) Technicians (electrical/mechanical) of the level required are readily available and/or may be trained locally.

3) Available degree programs:
(UP = University of the Philippines at Diliman)
(UPLB = University of the Philippines at Los Banos)
(ADMU = Ateneo de Manila University)
(DLSU = De La Salle University)
(UST = University of Santo Tomas)

Ph.D. Biology (Microbiology option)	UP
	UPLB
Ph.D. Molecular Biology & Biotechnology	UP
M.S. Biology (Microbiology option)	UP
	UPLB
M.S. Molecular Biology & Biotechnology	UP
M.S. Chemistry	UP
	UPLB
	ADMU
	DLSU UST
M.S. Chemical Engineering (Biochemical Engineering option)	UP

The degree program need to be strengthened especially in terms of research equipment and research funds. Presently, although the number of enrolees is sufficient, the rate of graduation is very slow due to lack of resources for the thesis. This is especially true for synthetic chemistry and chemical engineering.To strengthen the micr biology/biotechnology programs a consortium arrangement should be started among the following institutions: UP College of Science, UPLB-Institute of Biology (UPLB-IB), BIOTECH at UPLB, ITDI & UP Manila. Additional institutional support might also be necessary especially in terms of research funds.

4) The government should actively seek foreign assistance for the training programs abroad. Such assistance should include experts, funds and placement in industrial facilities abroad.

5) The local training program consists of four components:

a) Training in an analytical laboratory:
This is readily available at the Philippine Institute of Pure and Applied Chemistry (PIPAC), BIOTECH and UP Natural Sciences Research Institute (UPNSRI).

b) Training in a pilot plant: ITDI has a Citric Acid Pilot Plant which is not yet operational. Support in terms of foreign experts and operational funds will be necessary to start up the plant. Arrangements have to be made with ITDI for this purpose.

c) Training in a local pharmaceutical company - This will require agreement by the company to take in some trainees.

d) In-plant training: This will be taken cared of by foreign & local experts to be hired on a part-time basis.

6) The training cost per student includes only the stipend and the training fee but does not include the overhead cost for local experts.

7) Fellowship and Scholarship

a) Bachelor of Science

Stipend	₱ 24,000 pa
Schoolfees	16,000 pa
Book allowance	2,000 pa
Transportation	1,000 pa
Total	₱ 43,000 pa

Total for a 4-year program (Chemistry, Biology) = ₱ 172,000

Total for a 5-year program (Engineering) = ₱ 215,000

b) Master of Science

Stipend	₱ 30,000 pa
School fees	16,000 pa
Book allowance	4,000 pa
Transportation	2,000 pa
Sub-total	52,000 x 2 years
=	₱ 104,000

Research allowance	₱ 30,000
Thesis allowance	5,000
Total	₱ 179,000

c) Doctor of Philosophy

This may require a 6-month to 12-month stint abroad to be funded by a foreign funding agency, such as JSPS, DAAD, etc.

Stipend	36,000	pa
School fees	16,000	pa
Book allowance	4,000	pa
Transportation	2,000	pa
Sub-total	₱ 58,000	pa x 4 yrs
	₱ 232,000	
Research allowance	100,000	for 2 yrs
Thesis	5,000	
Total	₱337,000	

A B.S. graduate may take a straight Ph.D program and the fellowship could run up to 5 years' cost of ₱ 395,000.

d) Training Abroad

1 year	:	$ 49,450	₱ 1,063,200
6 months	:	$ 25,790	₱ 554,500
4 months	:	$ 17,860	₱ 384,000
3 months	:	$ 13,830	₱ 297 350
2 months	:	$ 9,800	₱ 210,700
1 month	:	$ 5,900	₱ 126,850

Note: i) Stipend of $ 130 pd
ii) Travel allowance of $ 2,000
iii) $ 1 = ₱ 21.50
iv) Cost of training to be borne by foreign funding agency.

e) Pilot-Plant Training

Components:

i) foreign expert at $ 9 500 a month and per diem of $ 88
ii) pilot plant rental - (cost not considered)
iii) materials for the pilot plant (chemicals, etc.) - (cost not considered)
iv) training materials - (cost not considered)
v) stipend of trainees - ₱ 4 000 a month

Assumption: DOST will allow the use of its Citric Acid pilot plant for the training program. The foreign expert will help start up the plant and conduct the training program.

f) Analytical Laboratory Training

Components:

i) local expert at P 30,000 per man-month (not included in costing per trainee)
ii) training cost at P 20,000 per person per month
iii) stipend of trainee at P 4,000 a month.

g) Local Training - Pharmaceutical Company

Components:
i) local expert at P 30,000 per man-month (not included in costing per trainee)
ii) training cost at P 20,000 per person per month
iii) stipend of trainee at P 4,000 a month. This assumes that a private company will agree to train people.

5.1.2.2 Manpower training requirements for the Microbiology Laboratory

1) Team leader (Ph.D. Biology with 2 years experience)

	Ph.D. Fellowship	Training Abroad 1 year	Total Cost (P)
B.S. Recruit	395,000	1,063,200	1,458,200
M.S. Recruit	337,000	1,063,200	1,400.200
Ph.D. Recruit		1,063,200	1,063,200

2) Two senior microbiologists (M.S. degree with experience)

	M.S. Fellowship	Training Abroad 6 months	Total Cost (P)
B.S. Recruits	134,000	354,500	688,500
M.S. Recruits		554,500	554,500

Cost for two

B.S. Recruit	1,377,000
M.S. Recruit	1,109,000

3) Two microbiologists (B.S.)

4) Three workers (high school diploma)

5) Part-time involvement of analysts and chemists

TABLE 141

ESTIMATED TRAINING COSTS
MANPOWER TRAINING REQUIREMENT FOR MICROBIOLOGY LABORATORY

Qualification	No.	No. of months for Special Training		Financial Requirements	
		Local	Abroad	Minimum	Maximum
Ph.D. Microbiology	1	-	12	P1,063,200	P1,458,200
M.S. Microbiology	2	-	12	1,109,000	1,377,000
B.S. Microbiology	2	-	-	0	0
Total	5	-	24	P2,172,200	P2,835,200

5.1.2.3 Manpower training requirements for the Pilot Plant

1) One Team leader (M.S. in Chemistry or Biology with experience in fermentation, instrumentation)

	M.S. Fellowship	Training Abroad 6 months	Total Cost (P)
B.S. Recruit	134,000	554,500	688,500
M.S. Recruit		554,500	554,500

2) Two Senior Microbiologists (M.S. Microbiology with 3 months pilot plant experience)

	M.S. Fellowship	Training Abroad 3 months	Total Cost (P)
B.S. Recruit	134,000	297,350	431,350
M.S. Recruit		297,350	

Cost for two	Total Cost (P)
B.S. Recruits	862,700
M.S. Recruits	594,700

3) Three microbiologists or chemists (B.S. with no additional training required)

4) Five workers (high school diploma)

5) One chemical Engineer (M.S. Chemical Engineering with biochemical engineering experience)

	M.S. fellowship	Total Cost (P)
B.S. Recruit	134,000	134,000

The local training could be done at the Citric Acid Pilot Plant of ITDI.

The UP College of Engineering offers an M.S. degree, Biochemical Engineering option).

TABLE 142

ESTIMATED TRAINING COSTS
MANPOWER REQUIREMENT FOR PILOT PLANT

Qualification	No.	No. of months for Special Training		Financial Requirements	
		Local	Abroad	Minimum	Maximum
M.S. Chemistry or Biology	1	-	6	P554,500	P688,500
M.S. Microbiology	2	-	6	594,700	862,700
M.S. Chem. Eng.	1	-	-	0	134,000
B.S. Chemistry	3	-	-	0	0
Total	7	-	12	P1,149,200	P1,685,200

5.1.2.4 Manpower training requirements for Penicillin Fermentation Plant

1) Eight Supervisory Position (B.S. degree in Chemistry, Biology or Chemical Engineering). Three (heads of fermentation, extraction and injectable penicillin units) will need additional training abroad.

	Training Abroad	Total Cost(P) for three
B.S. Recruits	384,000	1,152,000

2) Head of Laboratory (Ph.D. microbiology with experience)

	Ph.D. Fellowhip	Training Abroad	Total Cost (P)
B.S. Recruits	395,000	1,063,200	1,458,200
M.S. Recruits	337,000	1,063,200	1,400,200
Ph.D. Recruits		1,065,200	1,063,200

3) Two Senior Microbiologists (M.S. Microbiology with training abroad)

	M.S. Fellowship	Training Abroad 4 months	Total Cost (P)
B.S. Recruits	134,000	384,000	518,000
M.S. Recruits		384,000	384,000

Cost for Two	Total Cost (P)
B.S.	1,036,000
M.S.	768,000

4) Two biologists (B.S. Biology with training abroad)

	Training Abroad 4 months	Total Cost (P)
B.S. Recruit	384,000	384,000
Cost for two		768,000

5) Two chemists (B.S. Chemistry with local training in modern analytical instrumentation)

	Local Training	Total Cost (P)
B.S. Recruits	72,000	72,000
Cost for two		144,000*

* overhead cost for trainer should be included

6) Operators and first level supervisors (high school diploma)

7) Technical personnel, e.g., mechanical and electrical maintenance workers - (experience in domestic fermentation industries)

8) Workers (able to read and write properly)

9) Foreign Experts (two years)

a) Plant and Production Manager
b) Quality Control Manager
c) Engineering and Maintenance Manager

		Total Cost for 3 managers for 2 years
Salary	$ 114,000 pa	$ 684,000
		$ 684,000
		or P 14,706,000

The foreign experts will also conduct in-plant training for certain personnel.

Note : $1.00 = $21.50

TABLE 143

ESTIMATED TRAINING COSTS
MANPOWER TRAINING REQUIREMENT
FOR PENICILLIN FERMENTATION PLANT

Qualification	No.	No. of months for Special Training		Financial Requirements*	
		Local	Abroad	Minimum	Maximum
Ph.D. Microbiology	1	-	12	P1,063,200	P1,458,200
M.S. Microbiology	2	-	8	768,000	1,036,000
B.S. Chem., Biology Chem. Eng.	5	-	-	0	0
B.S. Chem., Biology Chem. Eng.	3	-	12	1,152,000	1,152,000
B.S. Biology	2	-	8	768,000	768,000
B.S. Chemistry	2	6	-	144,000	144,000
Sub-Total	15	6	40	3,895,200	4,558,200
Experts					
Foreign Expert	3	-	-	14,706,000	14,706,000
Total	18	6	40	P18,601,200	P19,264,200

5.1.2.5 Manpower training requirements for Multi-purpose Fermentation Plant

1) Supervisory Positions (B.S. degree in Chemistry, Biology or Chemical Engineering). Two (heads of fermentation and extraction units) will need additional training abroad.

	Training Abroad 4 months	Total Cost (P) for two
B.S. Recruits	384,000	768,000

2) Head of Laboratory (Ph.D. Microbiology with experience)

	Ph.D. Fellowship	Training Abroad	Total Cost (P)
B.S. Recruits	395,000	1,063,200	1,458,200
M.S. Recruits	337,000	1,065,200	1,400,200
Ph.D. Recruits		1,063,200	1,063,200

3) Two Senior Microbiologists (M.S. Microbiology with training abroad)

	M.S. Fellowship	Training Abroad 4 months	Total Cost (P)
B.S. Recruits	134,000	384,000	518,000
M.S. Recruits		384,000	384,000

Cost for Two	Total Cost (P)
B.S.	1,036,000
M.S.	768,000

4) Two biologists (B.S. Biology with training abroad)

	Training Abroad 4 months	Total Cost (P)
B.S. Recruits	384,000	384,000
Cost for two		768,000

5) Two chemists (B.S. Chemistry with local training in modern analytical instrumentation)

	Local Training 3 months	Total Cost (P)
B.S. Recruit	72,000	72,000
Cost for two		144,000*

* overhead cost for trainer should be included

6) Operators and first level supervisors (high school diploma)

7) Technical personnel, e.g., mechanical and electrical maintenance workers - (experience in domestic fermentation industries

8) Workers (able to read and write properly)

9) Foreign Experts (two years)

a) Plant and Production Manager
b) Quality Control Manager
c) Engineering and Maintenance Manager

		Total Cost for 3 managers for 2 years
Salary	$ 114,000 pa	$ 684,000
		$ 684,000 or P 14,706,000

The foreign experts will also conduct in plant training for certain personnel.

TABLE 144

ESTIMATED TRAINING COSTS
MANPOWER TRAINING REQUIREMENT
FOR MULTI-PURPOSE FERMENTATION PLANT

Qualification	No.	No. of months for Special Training Local	Abroad	Financial Requirements Minimum	Maximum
Ph.D. Microbiology	1	-	12	P1,063,200	P1,458,200
M.S. Microbiology	2	-	8	768,000	1,036,000
B.S. Chemistry, Biology Chem. Eng.	6	-	-	0	0
B.S. Chemistry, Biology Chem. Eng.	2	-	8	768,000	768,000
B.S. Biology	2	-	8	768,000	768,000
B.S. Chemistry	2	6	-	144,000	144,000
Subtotal	15	6	36	3,511,200	4,174,200
Experts					
Foreign Experts	3	-	-	14,706,000	14,706,000
Total	18	6	36	P18,217,200	P18,880,200

5.1.2.6 Manpower training requirements for semi-synthetic Penicillin Production Plant

1) Plant Manager (M.S. Chemistry, with experience in plant management)

	M.S. Fellowship 1 year	Training Abroad	Total Cost (P)
B.S. Recruits	134,000	1,063,200	1,197,200
M.S. Recruits		1,063,200	1,063,200

2) Four Supervisor (M.S. Chemistry with experience)

	M.S. Fellowship	Training Abroad 6 months	Total Cost (P)
B.S.Recruits	134,000	554,500	688,500
M.S. Recruits		554,500	554,500

Cost for four	Total cost (P)
B.S. Recruits	2,754,000
M.S. Recruits	2,218,000

3) Eight Senior Production Technicians (B.S. Chemistry, with experience)

	Training Abroad 4 months	Total Cost (P)
B.S. Recruits	384,000	384,000
Cost for eight		3,072,000

4) Twelve Production Technicians (B.S. Chemistry; may gain in-plant experience locally)

5) Six Production Aides (no previous experience required)

6) One Senior Laboratory Technician (M.S. Chemistry with specialization in Analytical Chemistry and experience in use of modern instrumentation)

	M.S. Fellowship 3 months	Training* Local	Total Cost
B.S. Recruit	134,000	72,000	206,000
M.S. Recruit		72,000	72,000

* Cost for trainer should be included

7) One Quality Control Inspector (M.S. Chemistry with experience)

	M.S. Fellowship	Training Local	Training Abroad	Total Cost (P)
B.S. Recruit	134,000	144,000	554,000	688,500
M.S. Recruit		144,000	554,000	554,500

* Training in a local pharmaceutical company or training abroad.

8) Two Laboratory Technicians (B.S. Chemistry with experience which might be gained at Chemfield laboratory)

9) One Utilities Operator (knowledge of use and regulation of utilities, available locally)

10) Two Mechanics/Electricians (available locally)

11) Other personnel (available locally)

TABLE 145

ESTIMATED TRAINING COSTS
MANPOWER TRAINING REQUIREMENT
FOR SEMI-SYNTHETIC PENICILLIN PRODUCTION PLANT

Qualification	No.	No. of months for Special Training		Financial Requirements	
		Local	Abroad	Minimum	Maximum
M.S. Chemistry	1	-	12	P1,063,000	P1,197,000
M.S. Chemistry	4	-	24	2,218,000	2,754,000
M.S. Chemistry	1	3	-	72,000	206,000
M.S. Chemistry	1	-	6	554,500	688,500
B.S. Chemistry	8	-	32	3,072,000	3,072,000
B.S. Chemistry	14	-	-	0	0
Total	29	3	74	6,979,700	7,917,700

5.1.2.7 Manpower training requirements for Rifampicin and Erythromycin Production Plant

1) Plant Manager (M.S. Chemistry, with experience in plant management)

	M.S. Fellowship	Training Abroad 1 year	Total Cost (P)
B.S.Recruits	134,000	1,063,200	1,197,200
M.S. Recruits		1,063,200	1,063,200

2) Four Supervisor (M.S. Chemistry with experience)

	M.S. Fellowship	Training Abroad 6 months	Total Cost (P)
B.S. Recruits	134,000	554,500	686,500
M.S. Recruits		554,500	554,500

Cost for four	Total cost
B.S. Recruits	2,754,000
M.S. Recruits	2,218,000

3) Four Senior Production Technicians (B.S. Chemistry with experience)

	Training Abroad 4 months	Total Cost (P)
B.S. Recruits	384,000	384,000
Cost for four		1,536,000

4) Four Production Technicians (B.S. Chemistry; may gain experience locally)

5) Four Production Aides (no previous experience required)

6) One Senior Laboratory Technician (M.S. Chemistry with specialization in Analytical Chemistry and experience in use of modern instrumentation)

	M.S. Fellowship	Training* Local 3 months	Total Cost (P)
B.S. Recruit	134,000	72,000	206,000
M.S. Recruit		72,000	72,000

* Cost for trainer should be included

7) One Quality Control Inspector (M.S. Chemistry with experience)

	M.S. Fellowship	Training Local 6 months	Training Abroad 6 months	Total Cost (P)
B.S. Recruit	134,000	144,000	554,000	278,000/688,500
M.S. Recruit		144,000	554,000	144,000/554,500

Training in a local pharmaceutical company or training abroad

8) Two Laboratory Technicians (B.S. Chemistry with experience which might be gained at Chemfield laboratory)

9) One Utilities Operator (knowledge of use and regulation of utilities, available locally)

10) Two Mechanics/Electricians (available locally)

11) Other personnel (available locally)

12) Foreign Expert (one year, to assist Plant Manager)

Total Cost for 1 year

Salary $ 114,000 pa

or

₱ 2,451,000

TABLE 166

ESTIMATED TRAINING COSTS
MANPOWER TRAINING REQUIREMENT
FOR RIFAMYCIN AND ERYTHROMYCIN PRODUCTION PLANT

Qualification	No.	No. of months for Special Training		Financial Requirements	
		Local	Abroad	Minimum	Maximum
M.S. Chemistry	1	-	12	P1,063,200	P1,197,200
M.S. Chemistry	4	-	24	2,218,000	2,754,000
M.S. Chemistry	1	3	-	72,000	206,000
M.S. Chemistry	1	-	6	554,500	688,500
B.S. Chemistry	4	-	16	1,536,000	1,536,000
B.S. Chemistry	6	-	-	0	0
Subtotal	17	3	58	5,433,700	6,381,700
Experts					
Foreign Expert	1	-	-	2,451,000	2,451,000
TOTAL	18	3	58	P7,884,700	P8,832,700

5.1.2.8 Manpower training requirements for Tetracycline HCl, Oxytetracycline Production Plant

1) Four Supervisors (M.S. Chemistry with experience)

	M.S. Fellowship	Training Abroad 6 months	Total Cost (P)
B.S. Recruits	134,000	554,500	688,500
M.S. Recruits		554,500	554,500

Cost for four	Total cost (P)
B.S. Recruits	2,754,000
M.S. Recruits	2,218,000

2) Four Senior Production Technicians (B.S. Chemistry with experience)

	Training Abroad 4 months	Total Cost (P)
B.S. Recruits	384,000	384,000
Cost for four		1.536,000

3) Four Production Technicians (B.S. Chemistry; may gain experience locally)

4) Four Production Aides (no previous experience required)

5) One Analyst (M.S. Chemistry with specialization in Analytical Chemistry and experience in use of modern instrumentation)

	M.S. Fellowship	Local Training	Total Cost (P)
B.S. Recruit	134,000	72,000	206,000
M.S. Recruit		72,000	72,000

6) One Laboratory Technician (B.S. Chemistry with experience which might be gained at Chemfield laboratory)

7) Other personnel (available locally)

ASSUMPTION: the manpower requirements will be in addition to those in the Tetracycline Fermentation Plant.

Considering the qualifications enumerated above the question to be answered is: Is the needed scientific and engineering manpower for the top-level functions available now?

TABLE 147

ESTIMATED TRAINING COSTS
MANPOWER TRAINING REQUIREMENT
FOR TETRACYLINE HCl, OXYTETRACYLINE PLANT

Qualification	No.	No. of months for Special Training		Financial Requirements	
		Local	Abroad	Minimum	Maximum
M.S. Chemistry	4		24	P2,218,000	P2,754,200
M.S. Chemistry	1	3	-	72,000	206,000
B.S. Chemistry	4	-	16	1,536,000	1,536,000
B.S. Chemistry	5	-	-	0	0
TOTAL	14	3	40	P3,826,000	P4,496,000

Table 148

MANPOWER REQUIREMENTS FOR THE DRUG PRODUCTION PROGRAM

Position	Qualifications	M.L.	P.P.	P.F.	M.F.	S.P.	R.E.	T.H.
Team Leader	PhD Microbiology	1	-	-	-	-	-	-
Senior Microbiologist	MS Microbiology	2	2	2	2	-	-	-
Microbiologist	BS Microbiology	2	3	-	-	-	-	-
Team Leader	MS Chem or Bio	-	1	-	-	-	-	-
Chemical Engineer	MS Chem. Eng.	-	1	-	-	-	-	-
Department Head	BS Chem/Bio/Chem. Eng.	-	-	8	8	-	-	-
Head of Laboratory	PhD Microbiology	-	-	1	1	-	-	-
Biologists	BS Biology	-	-	2	2	-	-	-
Chemists	BS Chemistry	-	-	2	2	-	-	-
Plant Manager	MS Chemistry	-	-	-	-	1	1	-
Supervisor	MS Chemistry	-	-	-	-	4	4	4
Senior Production Technician	BS Chemistry	-	-	-	-	8	4	4
Production Technician	BS Chemistry	-	-	-	-	12	4	4
Senior Laboratory Technician	MS Chemistry	-	-	-	-	1	1	1
Quality Control Inspector	MS Chemistry	-	-	-	-	1	1	-
Laboratory Technicians	BS Chemistry	-	-	-	-	2	2	1
Foreign Experts	-	-	-	3	3	-	1	-
Total		5	7	18	18	29	18	14

Legend

M.L. = Microbiology Laboratory
P.P. = Pilot Plant
P.F. = Penicillin Fermentation
T.H. = Tetracycline HCl
M.F. = Multipurpose Fermentation
S.P. = Semi-synthetic Penicillin
R.F. = Rifamoicin Erythromycin

TABLE 149

ESTIMATED TRAINING COSTS
MANPOWER REQUIREMENT FOR THE DRUG PRODUCTION PROGRAM

Qualification	No.	No. of months for Special Training: Local	Abroad	Financial Requirements * Minimum	Maximum
Ph.D. Microbiology	3	-	36	P3,189,600	P4,373,600
M.S. Microbiology	8	-	32	3,239,200	4,311,700
M.S. Chemistry	14	-	96	8,780,400	1,965,400
M.S. Chemistry	2	-	12**	1,109,000	1,377,000
M.S. Chemistry	3	9	-	216,000	618,000
M.S. Chemical Eng.	1	-	-	0	134,000
M.S. Chemistry or Bio.	1	-	6	554,500	688,500
B.S. Chem, Bio., or Chem. Eng.	11	-	-	0	0
B.S. Chemistry, Bio., Chem. Eng.	5	-	20	1,920,000	1,920,000
B.S. Biology	4	-	16	1,536,000	1,536,000
B.S. Chemistry	16	-	64	6,144,000	6,144,000
B.S. Chemistry	4	12	-	288,000	288,000
B.S. Chemistry	28	-	-	0	0
B.S. Microbiology	2	-	-	0	0
Sub-total	102	21	284	26,977,200	32,048,200
Experts					
Foreign Expert	7 ***	-	-	31,863,000	31,863,000
Local Trainers	2	-	-	360,000	360,000
Total	112	21	284	P58,840,200	P63,911,200

---

* The maximum financial requirement assumes hiring at B.S. level and includes fellowship beyond the B.S. level and special training only.

** Alternatively, the training may be done locally.

*** The total number of man/months is estimated at 156 (72 for the Penicillin manufacture, 72 for the Multipurpose fermentation plant and 12 for the Erythromycin and Rifamoicin fermentation)

5.1.3 Inventory of Available Technical Human Resources

The trained manpower needed by the priority projects can be met by tapping the existing pool of trained technical people in the country.

A significant segment of this pool is made up of chemists, biologists, microbiologists, and engineers among the research and teaching staff of universities.

From existing listings and other sources of information, a directory of chemists, biologists, microbiologists, and engineers with Ph.D. and M.S. degrees has been compiled and indexed by name and discipline. In the case of engineers, a directory including B.S. degree holders was prepared.

For microbiology, the biochemical engineering program and the M.S. Microbiology, both of UP Diliman, will produce graduates who can be tapped as microbiologists needed by the projects.

The directory of members of the Philippine Microbiological Society provides a list of people in Microbiology.

While the listings are incomplete, they give an idea of the size of this pool of trained manpower.

The number of chemists (including biochemists) and biologists in the universities with Ph.D. and M.S. degrees, is small. It is, however, sufficiently large to enable the selection of the few individuals who will be needed initially.

5.1.4 Upgrading of Scientists from the Academe

As a whole, chemists and biologists are, from their training and experience, oriented to pure science and to the pursuit of research to push the frontiers of knowledge in their areas rather than being concerned with the practical application of that knowledge.

To be able to function effectively in industry, scientists from the academe have to be given "re-tooling" or bridging courses. The possible nature of these courses is described in a later section. This is in addition to specialized exposures to actual plant or laboratory operation.

Alternatively, short term on the job training in appropriate industries abroad may be arranged. There are country and UN programs that can be availed of to support this type of training.

Some of these funding groups are:

Carl-Duisberg Gesellschaft (Germany)
Japan Society for the Promotion of Science
UNDP
The British Council

5.1.5 Other Manpower Sources

5.1.5.1 Research institutes

While these may not fall directly under the notion of human resources required by the Development Plan, nevertheless, it is important to keep in sight the fact that solid technical support can be provided the projects of the Development Plan by a number of established research institutes. The support can take various forms, depending on the capability of the respective institutes.

The Philippine Institute of Pure and Applied Chemistry (PIPAC), an independent chemistry-oriented research institute, for instance, offers the following services:

synthesis know-how
R & D
chemical analytical services
process trouble-shooting
development of analytical
procedures
manpower training
general consultancy

As example of how industry and research institutes may work hand-in-hand, the young indigenous pharmaceutical industry of India may be cited.

The start of the Indian pharmaceutical industry can be traced to industry-sponsored research projects in chemistry departments of Indian universities. This helped the industry to generate knowDhow for the manufacture of several important drugs. Processes were developed for several steroid hormones: norethisterone, norgestrol, methandrinone, mestranol, oestrone and others. Processes were also worked out for the extraction of hecogenin from Agave spp. and solasodine from Solanum spp.

5.1.5.2 PHASE : Scientists and Engineers in the U.S.

PHASE is an association of Filipino scientists and engineers based in the U.S. who have banded together to make themselves available for short-term or longer term involvement in the Philippines. These U.S.-based Filipino scientists and engineers may be tapped for consultancy on training opportunities for local technical staff, information on Filipinos and other experts who may be available for positions which cannot be satisfactorily filled locally.

The association has published a directory of its members.

5.2 The Educational System: producer of technical human resources

In the Philippines, universities and colleges are the main producers of the diverse skills that are needed for the planning and implementation of industrial development projects. For industrial projects to develop and grow, appropriately skilled manpower must be produced in sufficient numbers by the universities. This requires the educational system to provide the starting student today, for example, with the necessary skills and knowledge for a job that he will not fill until 5 - 10 years from now.

In this connection, it should be recognized that in a developing country like the Philippines, industrial development mainly means technology transfer. However, technology transfer can be as demanding on the quality of skilled manpower need as technology development. Technologies from developed countries often have to be adapted to local resources, economics and social realities. Choosing the technology to transfer, therefore, requires skills beyond the purely technical.

The educational system must be of high quality in order to produce these skills.

5.2.1 Philippine Educational System

Overview

The educational system in the Philippines is essentially a Y-track system, under the supervision of the Department of Education, Culture and Sports (DECS). See Figure 63. One branch is comprised of public schools and the other, of private schools. In addition to these two main streams and falling outside DECS supervision are those schools having their own charters, such as the University of the Philippines system, Philippine Normal University and their subsidiary grade schools and high schools.

Public schools:	Elementary Schools (under DECS) High Schools (under DECS) Colleges and Universities (not under DECS)
Private schools:	Elementary Schools (under DECS) High Schools (under DECS) Colleges and Universities (under DECS)

There is a common perception that World War II is a significant milestone in the Philippine educational system, especially concerning the elementary and high school levels. The public school system was regarded highly for its academic standards before WWII. After WWII, there has been a steady deterioration of the public school system. The situation is such that today it is the private school system that is generally associated with academic excellence in pre-university education.

It must be noted here that the private school system is NOT one system. It is a forked system: one branch has for its members the private schools organized as stock corporations and run for profit; the other is made up of non-profit institutions. The high regard for private schools today are largely limited to schools of this second category.

The classification of educational institutions above gives some indication of the resources available to them. The public school system, including state universities and colleges derive their budgets from the Government. Government funding of pre-university schools is very inadequate. Tuition in public schools is minimal, facilities are poor, textbooks are unavailable.

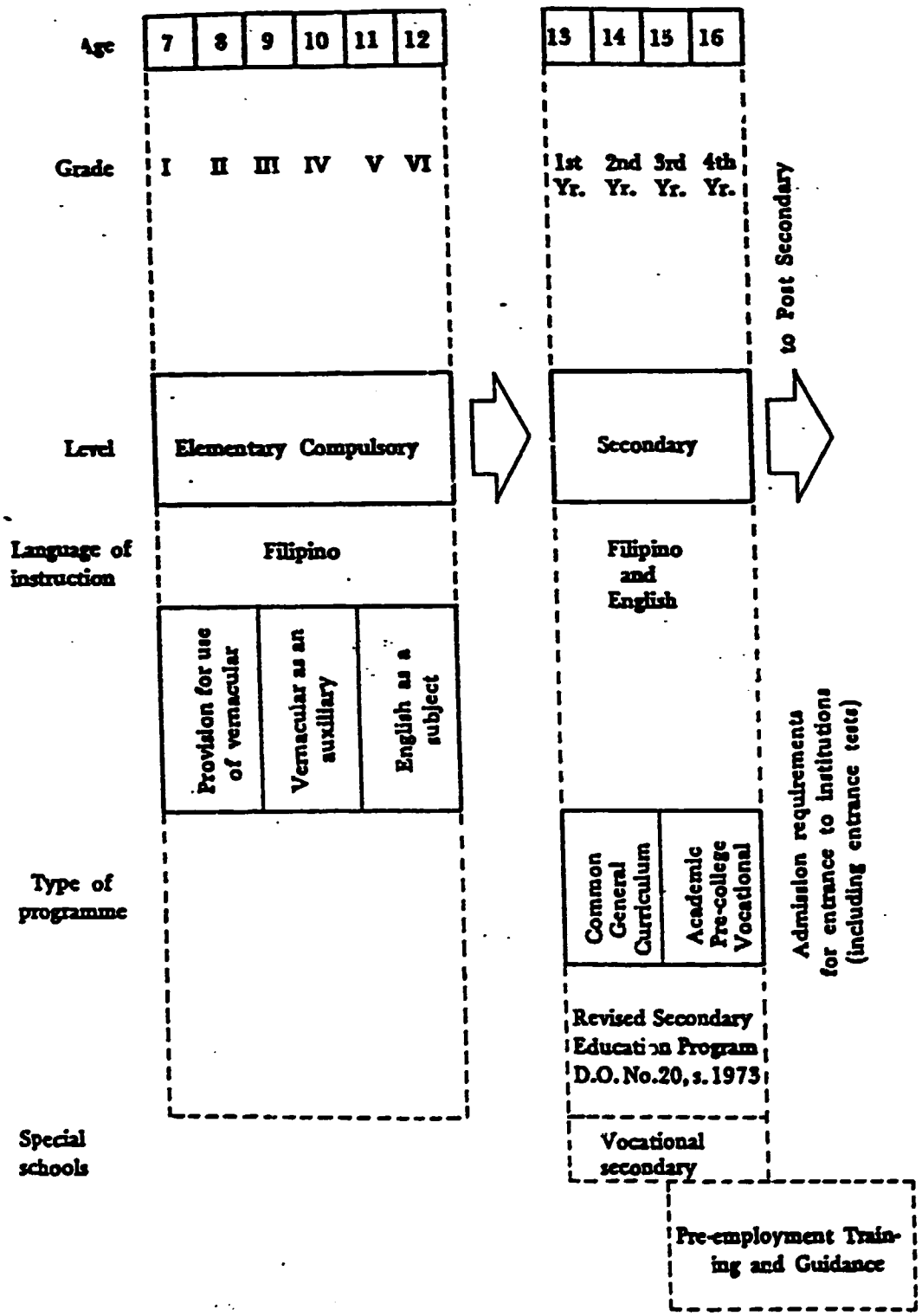
The private institutions rely on tuition to cover costs of operation and improvement. Parents pay extra fees for library and laboratory use. How much of the tuition and other fees is re-invested in the school depends on the primary motivation for having a school in the first place: either to make profit and declare dividends to stockholders or to run an ever-improving educational institution.

In this situation of uneven funding, it is not surprising to find schools of very uneven quality of education. There are obvious indications of this: poorly stocked libraries, inadequately equipped laboratories, overly large classes and, ultimately, the formation of graduates that are not employable.

Formal education consists of three levels: elementary (6 years), secondary (4 years), and tertiary. Figure 63 shows the structure of school education in the Philippines from primary to pre-university stage. Certification is required for the learner to progress through the grades or move to higher levels.

Figure 63

The structure of school education in the Philippines from primary to pre-university stage



Source: Adapted from: Secondary Education Program in the Philippines from primary to pre-university stage.

To be admitted into the tertiary (college or university) level, students have to pass the National College Intrance Examination (NCEE), which has been established to upDgrade academic standards. Those who do not pass the NCEE are supposed to take up vocational/technical courses. Over the last thirteen years during which the NCEE has been given, of 7.5 millions who took the test, 4.3 million students (57%) passed. The percentage of successful examinees is greatest in the national capital region (Greater Manila). In 1986 - 1987, this was 70%. This reflects the generally better quality of education in the national capital region (NCR).

5.2.1.1 Government and private educational institutions

In schoolyear 1984-1985, a total of 13.2 million students were enrolled in government and private schools in all levels. See Table 150. The figures show that government schools accounted for 94% of all enrolees in the elementary level, but only 16% in the tertiary level. College and university education, in terms of numbers, is therefore run by private institutions where 84% of tertiary level students are enrolled.

During the schoolyear 1983 - 1984, the Department of Education, Culture and Sports counted the number of schools in the country, both government and private. Out of a total of 39,041 schools, 35 596 (91%) are government-run. Of this number of government schools, 753 are in the Greater Manila area while the rest are, more or less, evenly distributed among the twelve regions of the country.

5.2.1.2 Enrolment in tertiary schools

In schoolyear 1984 -1985, a total of about 1.1 million students out of a national population of 55 millions were enrolled in colleges and universities. As noted above, 84% of these were enrolled in privated institutions. The distri-bution of students in the various fields of study is open to different interpretations. Table 151 shows this distribution by major field of study. Four hundred ten thousand (37%) students took up Commerce and Business Administration, 200 000 (18%), engineering programs, 6 500 or 0.5% took up natural science, and 29 299 or 2.6%, law.

5.2.1.3 Public colleges and universities

There are three classes of public colleges and universities:

chartered state universities and colleges

non-chartered colleges

community colleges

Chartered state universities and colleges enjoy autonomy under a governing board. All other tertiary institutions are under the supervision of the Department of Education, Culture, and Sports (DECS). Community colleges developed from the barangay high schools. Most of these community colleges offer a general one-year post high school course or a two-year liberal arts education.

5.2.1.4 Private colleges and universities

As mentioned earlier, 84% of tertiary education is done by private colleges and universities. There is a wide spectrum in quality among these private schools. While all are corporations run by boards of directors or trustees, some are non-stock, non-profit institutions, while the rest are stock corporations and mostly family-controlled.

A system of accreditation of private higher educational institutions (PAASCU) has been established and is in operation. This has the objective of lifting standards of member schools, by offering as incentives fiscal autonomy and progressive deregulation.

Among the better schools are the sectarian schools, which are all non-stock not-for-profit institutions, operated by Roman Catholic and Protestant religious orders. The Catholic schools have formed themselves into the Catholic Educational Association of the Philippines (CEAP). The Protestant schools have the corresponding Association of Christian Colleges and Universities (ACCU).

5.2.1.5 Weaknesses of the tertiary educational system

Among the apparent weaknesses which have often been pointed out in the educational system at the tertiary level are:

i) The preponderance of low-cost degree courses, e.g. commerce, business administration. This is the case especially with colleges and universities operating as stock corporations. This has led to a large surplus of graduates in disciplines where jobs are not available and to the neglect of needed disciplines.

Table 150 Enrolment in Government and Private Schools by Level of Education: SY 1954-55 to CY 1985-86

School Year	Grand Total	ELEMENTARY			SECONDARY			TERTIARY
		Total	Government	Private	Total	Government	Private	Govt. & Private
1954-55	4,004,285	3,444,417	3,305,103	139,314	559,868	187,373	372,495	n.a.
1959-60	4,762,287	4,150,743	3,970,750	179,993	611,544	200,164	411,380	n.a.
1964-65	6,539,460	5,577,901	5,330,334	247,567	961,559	318,498	643,061	n.a.
1969-70	8,446,857	6,855,501	6,521,143	334,358	1,591,356	675,840	915,516	n.a.
1970-71	8,688,364	6,968,978	6,627,734	341,244	1,719,386	762,984	956,402	n.a.
1971-72	8,802,654	7,001,970	6,659,544	342,426	1,800,684	812,260	988,424	n.a.
1972-73	8,897,721	7,022,709	6,667,644	355,065	1,875,012	863,326	1,011,686	n.a.
1973-74	9,167,087	7,209,039	6,845,138	363,901	1,958,048	913,342	1,044,706	n.a.
1974-75	9,541,425	7,429,249	7,043,522	385,727	2,112,176	975,356	1,136,820	n.a.
1975-76	9,888,986	7,597,279	7,197,878	399,401	2,291,707	1,061,731	1,229,976	n.a.
1976-77	11,204,077	7,808,158	7,387,178	420,980	2,508,519	1,205,434	1,303,085	887,400
1977-78	11,538,471	7,861,641	7,424,254	437,387	2,696,460	1,319,898	1,376,562	980,370
1978-79	12,005,538	8,056,013	7,601,115	454,898	2,820,469	1,370,127	1,450,342	1,129,056
1980-81	12,585,032	8,290,448	7,931,168	359,280	3,018,568	1,614,554	1,404,014	1,276,016
1981-82	12,789,904	8,518,283	8,073,290	444,993	2,935,732	1,591,510	1,344,222	1,335,889
1982-83	13,077,001	8,591,267	8,164,061	427,206	3,074,219	1,721,159	1,353,060	1,411,615
1983-84	13,498,520	8,717,469	8,228,554	488,915	3,204,551	1,844,174	1,360,377	1,576,500
1984-85	13,244,804	8,793,773	8,269,825	523,948	3,323,063	1,957,444	1,365,619	1,127,968[a]
1985-86	12,166,354	8,896,920	8,392,103	504,817	3,269,434	1,949,542	1,319,892	n.a

[a]Seventy six percent (76%) complete

Source: Department of Education Culture and Sports

Table 151 Enrolment in Government and Private Tertiary Institutions by Major Field of Study by Region: SY 1984-85

Program/Major field of study	Grand Total			NCR		
	Total	Govt.	Private	Total	Govt.	Private
Total	1,110,460	137,724	972,736	381,319	14,279	367,040
General	79,724	6,184	73,540	24,051	-	24,051
Teacher Training and Educ.	132,752	39,335	93,417	12,335	988	11,347
Humanities	3,785	482	3,303	2,154	85	2,069
Fine Arts	5,742	169	5,573	1,474	-	1,474
Religion and Theology	1,173	-	1,173	685	-	685
Social and Behavioral	13,526	2,134	11,392	8,336	391	7,945
Commercial and Business Adm.	409,798	15,151	394,647	153,205	3,338	149,867
Law and Jurisprudence	29,299	1,613	27,686	13,082	-	13,082
Natural Science	6,541	2,119	4,422	1,466	101	1,018
Math and Comp. Science	10,865	784	10,081	5,475	336	5,139
Medical and Health Related Program	62,755	4,179	58,576	24,178	309	23,869
Trade Craft Ind'l. Prog.	66,229	24,317	41,912	24,180	7,150	17,030
Engineering Programs	196,538	15,322	181,216	88,208	1,328	86,880
Architectural and Town Planning	13,351	753	12,598	7,642	-	7,642
Agricultural Forestry and Fishing Program	29,205	20,214	8,991	1,485	-	1,485
Home Economics (Domestic)	6,133	2,866	3,267	951	52	899
Transportation and Comm. Program	39,202	1,580	37,622	10,818	-	10,818
Service Trade Program	1,285	212	1,073	95	-	695
Mass Comm. and Docum.	2,538	291	2,247	880	182	698
Other Programs of Educ.	19	19	-	19	19	-

2) Inadequate quality of instruction due to heavy teachers' load, poor teachers' pay, inadequate textbooks and laboratory facilities.

3) Centralized mode of curriculum development through the Department of Education, Culture, and Sports (DECS) has made it difficult to improve curriculum. For instance, the DECS specifies sixty (60) units of chemistry for a B.S. degree in Chemistry. Many professors of Chemistry here and elsewhere consider forty to forty-five (40 - 45) units, taught in greater depth, to be more appropriate.

While no easy solutions to these and other problems have been proposed, still great progress in improving the quality of education can be expected from a loosening of the tight bureaucratic control exercised by the government (DECS) over private colleges and universities. The tight supervision, after all, has not produced high standards. More often than not the bureaucratic control has served to stifle curricular innovation.

5.2.1.6 Accreditation

The question how to cut down on bureaucratic control and maintain and raise standards looms large. The answer is to let schools supervise themselves by banding together in accrediting associations, setting up standards and applying a system of inspection. This has worked with the Philippine Association of Accredited Schools, Colleges, and Universities (PAASCU).

The system has several advantages. It would give back academic freedom to the institutions to decide on curriculum. Panels of experts from the same institutions carry out inspections at prescribed intervals and issue assessments and recommendations. In this way weaknesses of given institutions are pinpointed and suggestions for improvement are made.

5.2.2 Philippine Universities

There are some 46 universities of various sizes in the Philippines. The largest one has some 46,000 students. Most of these universities offer at least a bachelor's degree in chemistry and biology. Fewer offer some form of engineering degree.

Some of these universities are stock corporations, while others are non-profit. As might be expected, quality and standard of education vary very strongly.

5.2.2.1 University programs producing engineers and chemists

Engineering

The discussion of technical programs in the universities will be limited to engineering and chemistry for the reason that the biology programs have traditionally attracted a good share of incoming science students. At the Ateneo de Manila University, for example, the typical ratio of chemistry to biology majors is 5:15. The directory of scientific manpower in the universities also shows that in the main universities, the number of biologists with M.S. and Ph.D. degrees is twice that of chemists. It is to be noted that the B.S. biology degree often serves as entry point into medical school.

As far as engineering is concerned, Figures 64 to 68 show a 5-year profile (1983-1987) of those taking (and passing) the national board examinations in chemical, mechanical, electrical and civil engineering. With the exception of chemical engineering, where numbers are going down, the numbers of those taking the board examinations per year are stable.

On the average, the numbers of those taking the board examinations each year are as follows:

Chemical Engineering	2,000
Mechanical Engineering	4,500
Electrical Engineering	160
Civil Engineering	11,000

When these numbers are compared with those for chemistry Figure 68 we get the results shown in Figure 69. This figure shows that, in terms of those passing the board examinations and entering the professions, chemistry seems to be in terminal decline.

Chemistry

The Bachelor of Science degree in Chemistry is offered by some 35 universities and colleges in the Philippines. These schools have very similar 5-year chemistry curricula in terms of prescribed courses. This is not surprising as the curriculum is imposed uniformly by the Department of Education, Culture and Sports (DECS) on all schools except the state schools, which have their own charters and are therefore outside DECS jurisdiction.

FIGURE 64

CHEMICAL ENGINEERING
BOARD EXAM TREND

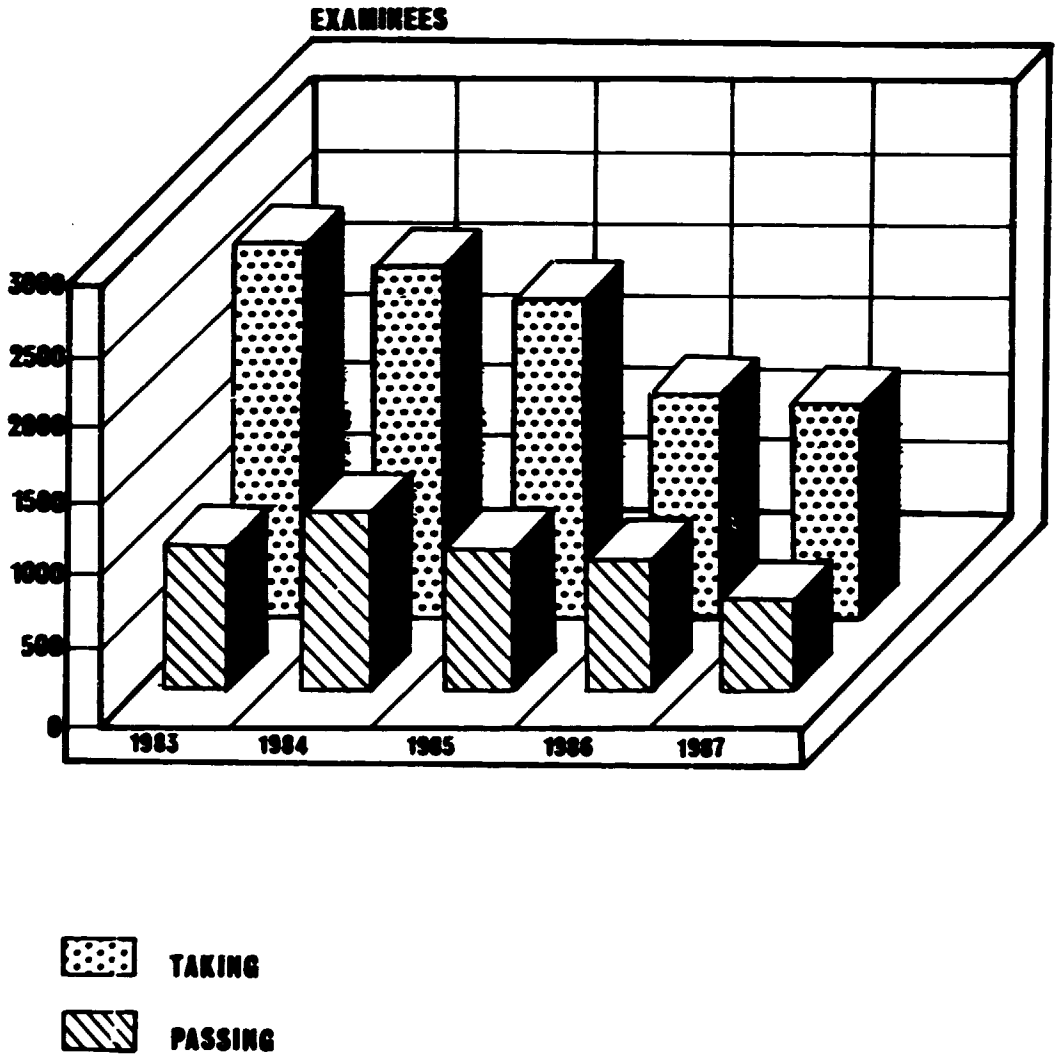


FIGURE 65

MECHANICAL ENGINEERING

BOARD EXAM TREND

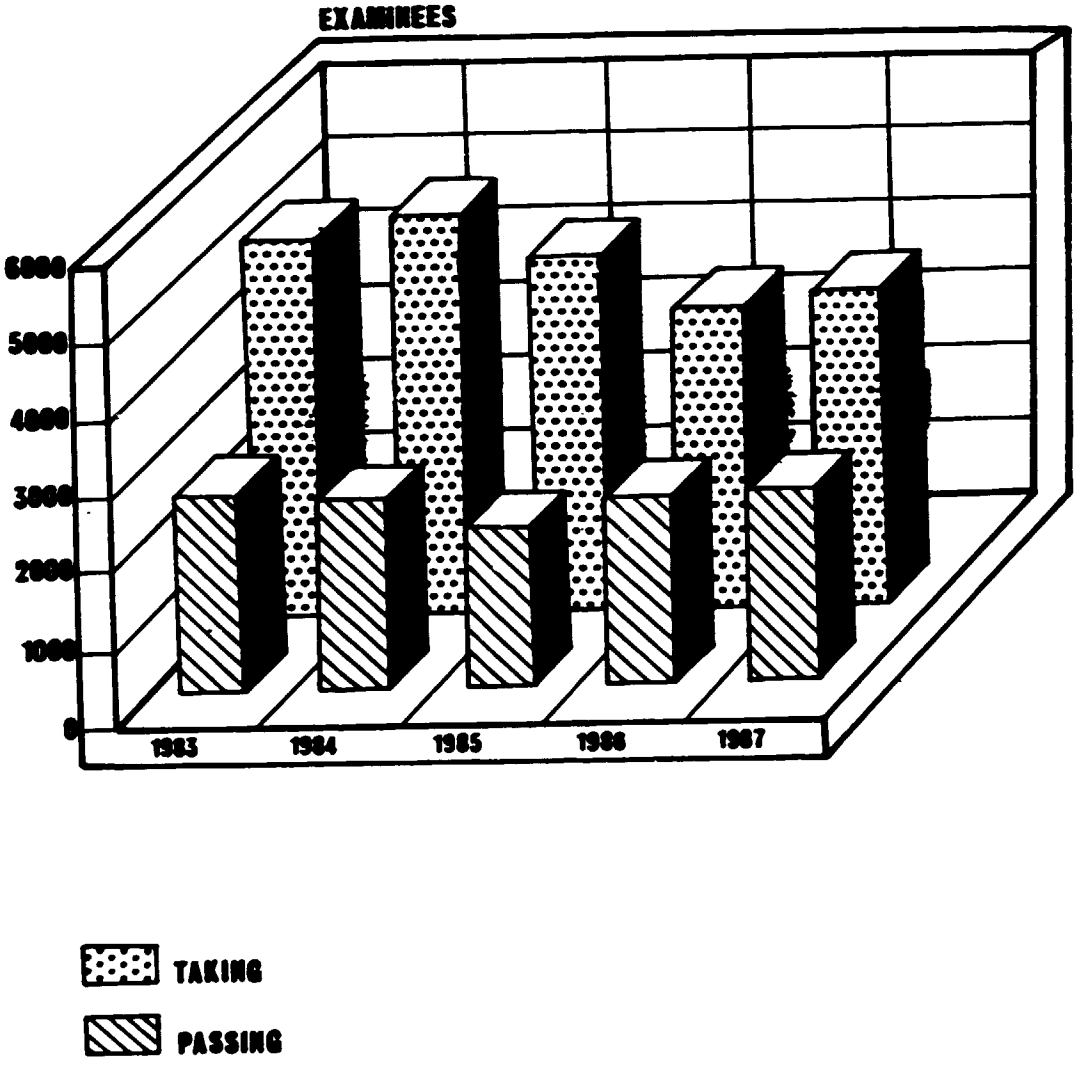


FIGURE 66

ELECTRICAL ENGINEERING

BOARD EXAM TREND

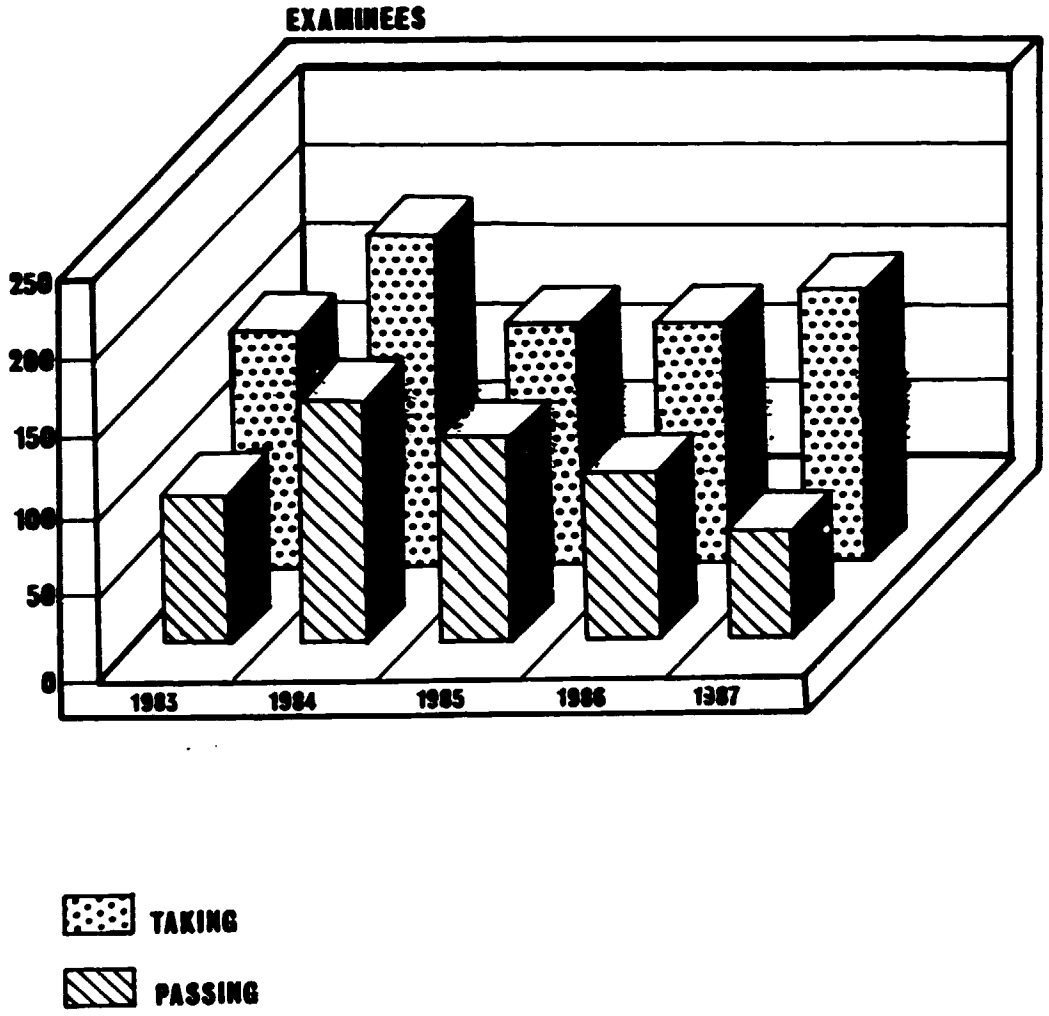


FIGURE 67

CIVIL ENGINEERING
BOARD EXAM TREND

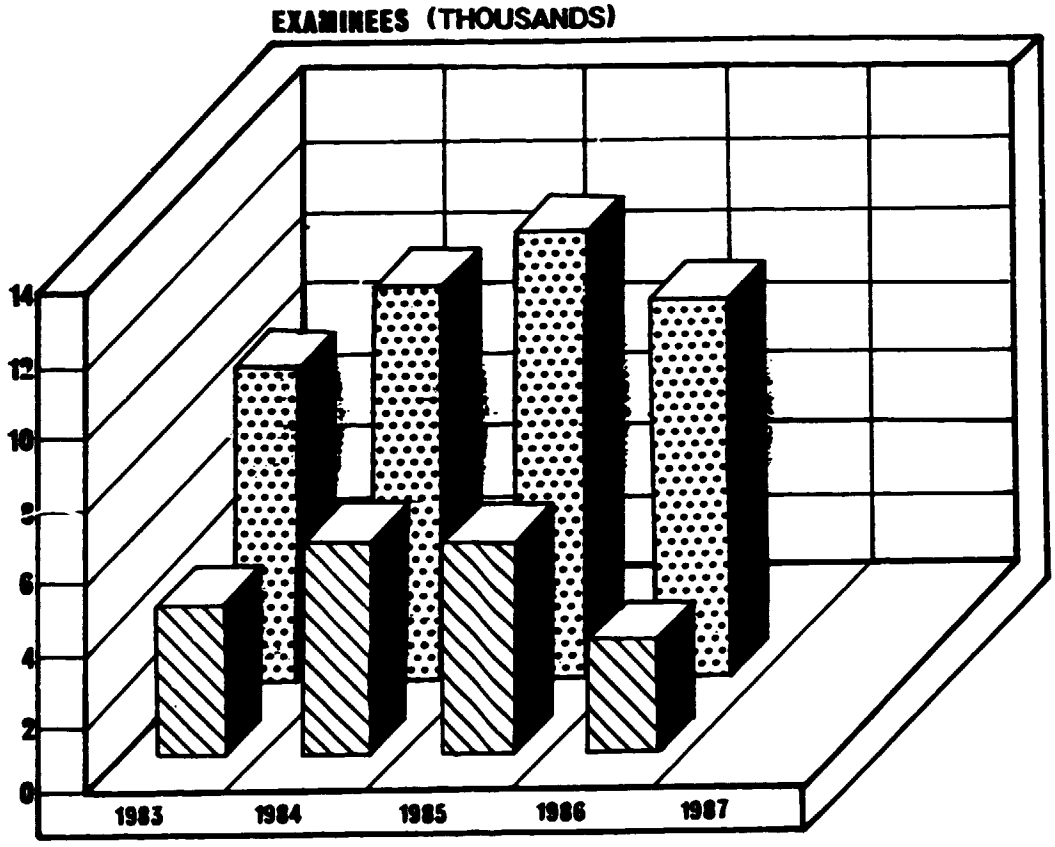


FIGURE 68

CHEMISTRY

BOARD EXAM TREND

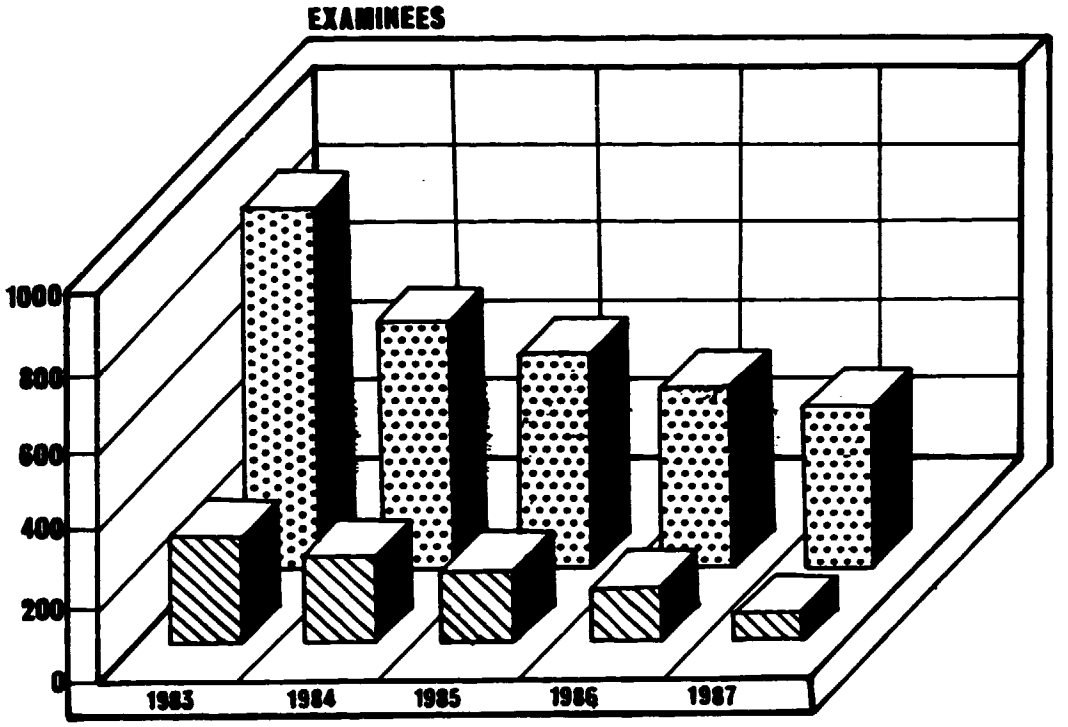
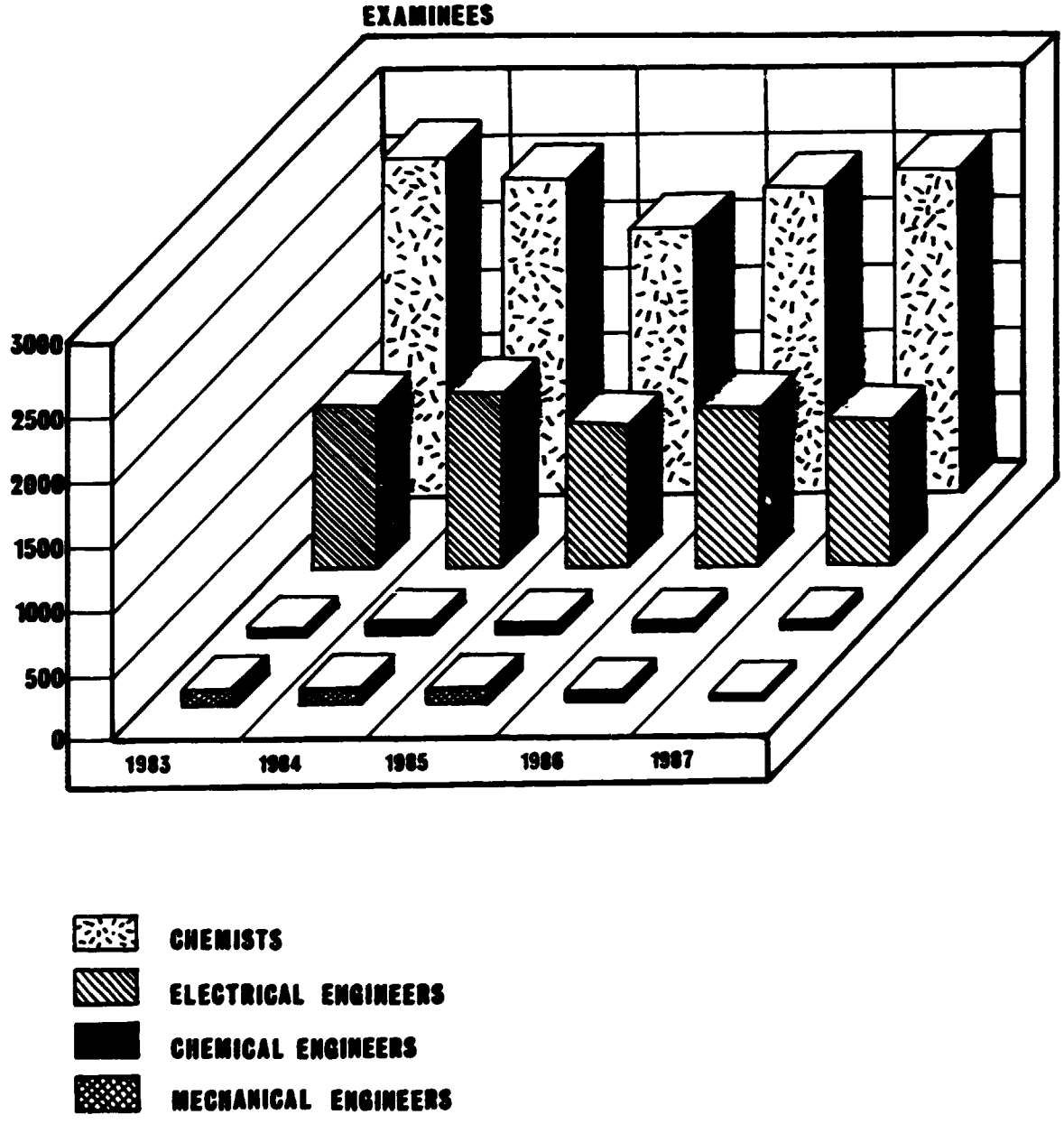


FIGURE 69

CHEMISTS AND ENGINEERS
PASSING THE BOARD EXAMS



But despite having essentially the same formal curricula, the schools produce chemistry graduates of widely varying qualifications. This fact is traceable not only to such factors as academic qualifications of faculty but also to school policies on teaching load, compensation, expenditure for physical plant (especially laboratories and library) improvements and equipment, among others.

That there is a problem in the quality of chemistry graduates is generally recognized. The problem is underlined by the results of the 1987 national board examination in chemistry. Out of 399 graduates who took the examination, only 44 (11%) passed.

This dismal result should not, however, obscure the fact that there are a few schools with really good undergraduate and graduate programs in chemistry. Among these schools are the Ateneo de Manila University and the University of the Philippines at Diliman and Los Banos.

For the foreseeable future, it is from these schools that the better trained chemists for chemistry-based industries in the Philippines will be expected to come. It is also with the help of these schools that the general level of chemistry teaching in the other schools may be improved through a system of accredi-tation mentioned above.

The last five years have shown a steady, continuous drop in the number of chemists taking the board examinations (see Figure 66). From a high of 931 in 1983, the number went to a low of 399 in 1987. In terms of those passing the examinations, the numbers are even lower - 263 (28%) in 1983 and 44 (11%) last year. From all indications, no change in the trends is to be expected in the foreseeable future.

The decline in the number of students enrolled in chemistry programs was shown also in a recent survey of 21 schools offering B.S. Chemistry programs. The respondees indicated a snarp drop in enrolment in chemistry programs. If this trend continues, a shakeout will take place with a few schools phasing out their chemistry programs. This, in itself, may lead to an improvement in the quality, if not in number, of graduating chemists.

PhD Consortium in Chemistry

The Ph.D. Consortium in Chemistry is composed of the UP, Ateneo de Manila University and De La Salle University.

The Consortium offers a four-year full-time program leading to a doctorate degree in Chemistry. The program is supported by the Department of Science and Technology.

The first two years are spent in advanced coursework and the last two, in dissertation research. A part of the last two years is spent working in the laboratory of one of selected universities abroad.

The Consortium, which began in 1982, is an effort of the three better universities to pool their scientific resources in order to offer a high-quality doctoral degree in chemistry.

The Consortium is actively supported by the

Japan Society for the Promotion of Science (JSPS)
International Development Program of Australia (IDP)
German Academic Exchange Service (DAAD) British Council.

The students accepted into the program receive full stipends that cover all expenses, including books. To date the Consortium has graduated 5 students.

5.3 Assessment of Human Resources Available Today And In The Near Future

From all indications, there is a sufficient pool of technically trained manpower to meet the manpower needs of the priority projects. However, the weaknesses of the present educational system put to question the ability to maintain a continuing source of qualified technical manpower as the Development Plan progresses.

The unfavorable outlook for chemistry education, for instance, may be taken to be a reflection of the general slow growth of science and technology in the Philippines. This may be attributed to the failure to set up science and technology goals and a serious national plan to achieve these goals.

This becomes obvious when comparisons are made with the situation in our ASEAN neighbors where the development of science and technology has led to industrial development. Thailand serves as a good reference because Thailand and the Philippines were at about the same (low) level scientifically about twenty years ago. As recently as the early 70's, Thailand did not have much to speak of by way of chemistry research.

Today, however, chemistry in Thailand is moving forward vigorously. The Chemistry departments of the ten major Thai universities have about 160 faculty members with PhD degrees. This is the result of long-range planning in Thailand.

5.4 Recommendations for Remedying Outlook for Science and Technology.

5.4.1 Development Program for Science and Technology

It is recognized that there is at present inadequate national capability to apply science and technology for development. Traditionally, science and technology have been taught separately, without regard to their complementary roles in development. Pure science is taught without consideration of its application to technology, and technology is taught without adequate consideration of its scientific basis.

Science programs must be developed that will produce chemists, biologists, physicists, and engineers, who not only understand their science but can apply it.

To do this, the universities must:

develop faculty in the sciences, who are adequately trained in their fields and who embody the ideals of being able to operate under Philippine conditions and address Philippine problems in their areas.

establish a clear policy of enabling faculty in the sciences to remain active in their fields by promoting research work, providing adequate materials and supplies and count extension work and work done in development as academic load .

establish and strengthen the policy of cooperation with other universities and colleges in such areas as faculty sharing and exchange.

promote vigorous linkages with government, industry and service-oriented organizations in areas of common interest.

5.4.2 Bridging Courses to Prepare Biology, Chemistry, and Microbiology Graduates for Careers in Industry

There are advantages in employing chemists as technical personnel in fine chemicals manu-facturing. In England and in West Germany, tech-nical personnel in such operations have their basic training in pure chemistry.

Chemists are taken as example here but what is said applies as well to biologists and micro-biologists, mutans mutandum.

The traditional chemistry graduate, however, is one who has gone through a degree program focussed on pure science. He does not get the skills and knowledge needed for activities such as plant operation, production management, process design and development. He has no background in such topics as unit operations and process economics.

From his academic training, he pursues chemistry as a pure discipline. His orientation is likely to be the traditional one of extending the frontiers of knowledge. As a chemist in industry, however, he has to be able to cope with much more diverse and practical demands. His concern is centered on applying chemistry. Successful application of chemistry requires both knowledge of the science and a grasp of the system to which the science is applied.

Herein lies the advantage of the chemist entering industry: he is a specialist in his science. He needs only a bridging course to prepare him to be a generalist in understanding industrial chemical processes and the factors affecting processes in an industrial context.

Such a bridging course needs to be designed. It can be considered to be a remedial course whose operational objective will be to bring a chemist to a state where he can successfully apply his science to the attainment of the technical, economic and social goals of the company.

The bridging course can be a short term, intensive certificate program or it may be designed as a two-year degree program not unlike current M.S. programs in Chemistry. It could be operated by an existing institution, such as a university, or by a management school as the Asian Institute of Management.

The course is, by its very nature, an interdisciplinary program, with economists, chemical engineers, accountants, etc. as lecturers. It is important that the teaching faculty have industry experience.

Possible Content of Bridging Course.

Some topics that should be part of the syllabus:

Basics of unit operations Industrial Chemical processes Basic Accounting and Financial Control Process Scale Up Basic Economics Computers Selected Case Studies

The course work should be supplemented with plant visits and seminars by people from industry.

5.4.3 A Possible Way to Improve Chemistry, Science, Engineering Education

Identify lead schools to form a core of accredited schools in the various fields of science. For example, in the field of chemistry, the grouping of universities can be as follows:

1) St Louis University (Baguio)

2) University of the Philippines in Diliman (UP)
Ateneo de Manila University (ADMU)
University of Santo Tomas (UST)
De La Salle University (DLSU)
University of the Philippines at Los Banos (UPLB)

3) San Carlos University (Cebu, SCU)
Silliman University (SU)

4) Xavier University (XU)
Iligan Institute of Technology/
Mindanao State University (IIT/MSU)

A program of institutional development could be undertaken.

5.5 Conclusion

There is a pool of trained microbiologists, chemists and engineers from which the staffing requirements of the priority projects can be met. Some of these skilled people are active in university research or teaching.

In most cases, additional training is needed, either here or abroad, in universities or industrial plants. In this way these individuals are prepared to fulfill their functions. For local training where no suitably qualified Filipino trainors are available, foreign experts should be engaged to handle the training.

An up-grading of universities and colleges is urgently needed particularly in the sciences and engineering. The general deficiency of the system even among the better universities is in the training of the students in the practical aspects of the sciences and engineering.

A system of accreditation in which colleges and universities of a given region associate and group around lead universities would be one way to accelerate the up-grading.

BIBLIOGRAPHY

1. Proposed Policies and Standards for the Basic Sciences (Biology, Chemistry, Mathematics, Physics) and the Science Components of Teacher Education Volume I Bureau of Higher Education of the Ministry of Education, Culture and Sports and the Science Promotion Institute (NSTA)

2. NSDB Policies on the Implementation of the Program on Graduate Scientific Manpower Development Program (NSDB-UP Project 6201 Ed.) 1982

3. The World of Learning
1984-1985
(Section on Philippine Universities)
Europa Publications Limited
London

4. Higher Education: Its relevance to National Development. Preliminary Report, National Research Team, Higher Education Research Council (1971)

5. The Problems of Philippine Education, unpublished paper by Fr. Francisco Araneta, S.J.

6. Philippine Yearbook
1987
National Census and Statistics Office
Manila, Philippine

7. Philippine Statistical Yearbook
1986
National Economic and Development Authority
Manila, Philippines

8. Bulletin of the UNESCO Regional Office for Education in Asia and the Pacific, No. 24 (1983) 54-59.

9. Bulletin of the UNESCO Regional Office for Education in Asia and the Pacific, No. 25 (1984) 250-270

10. Report of the Presidential Study Committee on State Higher Education, 1976.

11. Data on Government examinations for engineers and chemists was obtained from the Professional Regulations Commission (PRC)

VI THE STATE OF THE SCIENCE AND TECHNOLOGY IN THE PHILIPPINES

Any effort to establish a pharmaceutical industry in the Philippines must take into consideration the science and technology (S and T) milieu within which the industry is to grow and develop. An appreciation of the scientific and technological capability which will provide support for the pharmaceutical industry and the constraints which will limit its growth are extremely necessary components in the conceptualization of a realistic and implementable work plan. To ignore the present characteristics of S and T in the Philippines would be a disaster for a national development effort which involves a significant amount of technological input like the one under consideration.

6.1 Structure of Science and Technology

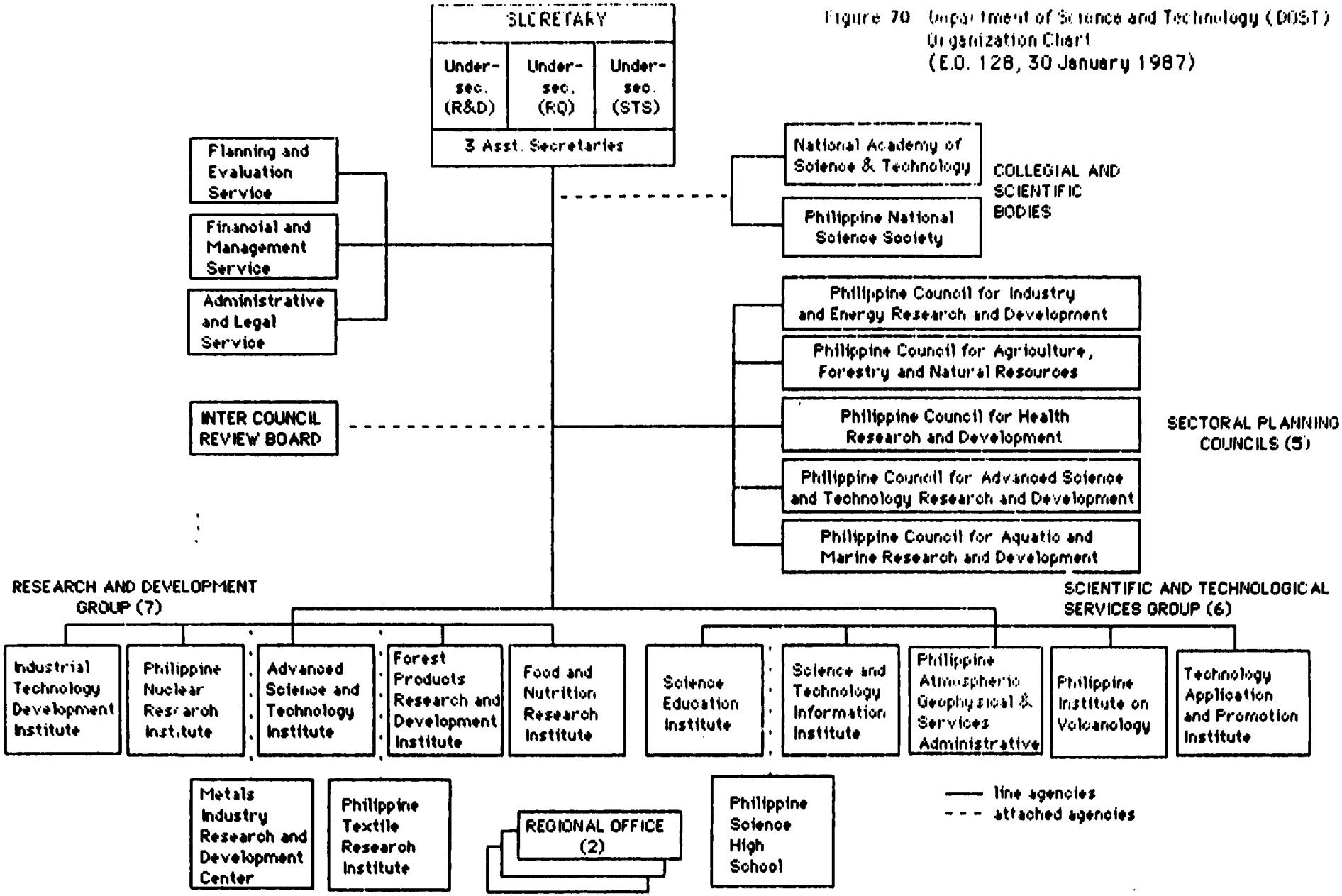
Organized under Executive Order No.128 dated 20 January 1987, the Department of Science and Technology (DOST) is a government office of cabinet rank which is responsible for the development of science and technology in the Philippines. The organizational structure of the DOST is reflected in Figure 70.

The DOST maintains regional offices all over the country and is headed by a Secretary with a full cabinet rank. There are five groups of institutions/offices which constitute the DOST, namely:

- DOST Staff Services Group
- Collegial and Scientific Bodies
- Sectoral Planning Councils
- Research and Development Group
- Scientific and Technological Services Group.

The DOST Staff Services Group is the bureaucracy which handles the day-to-day affairs. The Collegial and Scientific Bodies include the National Academy of Science and Technology and the Philippine National Science Society (formerly the National Research Council of the Philippines, NRCP). Both serve advisory and research funding functions. The Sectoral Planning Councils are probably the most powerful group composed of the following:

Figure 70 Department of Science and Technology (DOST) Organization Chart (E.O. 128, 30 January 1987)



- Philippine Council for Industry and Energy Research and Development (PCIERD)
- Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD)
- Philippine Council for Health Research and Development (PCHRD)
- Philippine Council for Aquatic and Marine Research and Development (PCAMRD)
- Philippine Council for Advanced Science and Technology Research and Development (PCASTRD)

These sectoral councils prepare the master plan for the S and T component of the sector especially with regard to research and development (R and D).

The DOST also administers five institutes under the Research and Development Group including two attached units, the Metals Industry Research and Development Center, which is also a part of the Ministry of Trade and Industry, and the Philippine Textile Research Institute. Under the Scientific and Technological Services Groups, there are five institutes with the Philippine Science High School as an attached agency.

In 1983, the DOST also organized four science communities, namely:

- Los Banos Science Community (Agriculture)
- Bicutan Science Community (Industry)
- Ermita Science Community (Health)
- Diliman Science Community (Basic Sciences)

These science communities are a loose cluster of science-related institutions which are contiguous and interact with each other.

According to the 1986 Annual Report of DOST (then called the National Science and Technology Authority), a total of 4,795 personnel were employed by the DOST, 60.5% of whom had BS/AB degrees, 7.0% with MS/MA degree, and 1.8% with Ph.D. degrees. the rest (30.7%) being those who are not college graduates.

For the year 1988, the government appropriation for the DOST amounts to a total of P538,556,000 with P495,612,000 allotted for the core operations and the rest for international commitments. This appropriation is 0.62% of the total 1988 budget.

Aside from the DOST, there are other government institutions which have functions directly involving R and D but deriving financial support from other appropriations in the budget. These are:

- State Universities and Colleges
- Other Departments, e.g., Agriculture, Natural Resources, Health, etc.

Although the above agencies may have their own budgets for R and D, many of them still apply for grants from the sectoral councils of the DOST.

In addition to government institutions, there are some private industries which maintain a research and development unit, the biggest being in San Miguel Corporation and United Laboratories, Inc. The big multinational agribusiness corporations also maintain R and D operations like Philippine Packing Corporation and Dole Philippines.

In summary, then, the S and T community in the Philippines is composed of:

- DOST
- Other Departments
- State Universities and Colleges
- Private Industries

6.2 Selected S and T Indicators

The status of S and T is usually gauged by selected indicators which show the resources that one country has committed to this effort. Historical data on selected S and T indicators covering the period from 1981-1987 are presented in Table 1. This table was prepared by the Planning and Evaluation Service of the DOST and, as such, is the official source of information on this particular subject matter. The information covering the period from 1981-1985 are actual figures and those covering 1986 and 1987 are estimates.

6.2.1 Expenditures for S and T Activities

This particular indicator shows the total amount of national resources, private and public, committed to S and T activities, including direct expenses for R and D. Except for a slight decrease in 1984, the total expenditures have been on an increasing trend since 1981 to the present. Of the total, 90% is estimated to be the government share. Actual expenditure for 1981-1985 amounted to a total of P8.482 B or an average of P1.696 B per year. For 1984 to 1986, government share increased dramatically by 28% per year but only to drop to a mere 2.0% increase estimated for 1987.

6.2.2 R and D Expenditures

For the period covered in Table 135, the total R and D expenditures averaged P593 M per year. An erratic trend in expenditures is observed from 1981 to 1985 but an increase was noted in 1986 and in 1987. An analysis of figures on the R and D expenditures by source of funds indicates that except for the year 1984 where there was a significant increase in local funding (own fund plus government fund) for R and D, a significant portion of the funds accounting for the increase in R and D expenditures came from foreign sources in the form of grants-in-aid or technical assistance. It is noted that the proportion of total R and D funds coming from foreign sources has been increasing from 5.9% in 1981 to 19.2% in 1987, almost a 3-fold increase in 7 years time. In fact, the funds from foreign sources exceeded government funds by 84% in 1987. This situation makes one wonder how effective government influence will be on the directions for R and D and how much influence foreign-funding agencies will have on the R and D agenda.

A total of P2.9 B was spent for R and D for the period from 1981 to 1985 and P633.6 M was estimated to have been spent in 1987. The information also indicates an average of 0.13% of GNP spent for R and D, with the levels decreasing from 0.12% in 1984 to 0.10% in 1985, and 0.09% in 1987. For the years 1985 to 1987, the figures cited for the % of GNP spent for R and D are corrected from the official government figures as reflected in Table 152. These corrections were made due to the inconsistencies noted in the same table. The figures are still below the UNESCO norm of at least 1% of GNP to be committed to R and D. Of the

Table 152.
Historical data on selected S & T indicators, 1981-1987.

	1981	1982	1983	1984	1985	1986[E]	1987[E]
1. GNP (in billion P)	303.6	335.4	378.7	526.3	595.1	626.2	715.8
2. STI Expenditures (in billion P):							
2.1 Total	1.219	1.527	1.767	1.738	2.231	2.862	3.920
2.2 Gov't. share	1.097	1.374	1.590	1.564	2.008	2.576	2.628
3. R&D Expenditures as % of GNP[E]	0.17	0.19	0.14	0.12	0.10	0.10	0.09
4. R&D Expenditures by Sector (in billion P)							
- Government	332.47	418.33	338.49	419.23	422.24	446.28	458.33
- Private Industry	104.80	104.37	103.89	118.89	118.43	122.61	126.79
- Higher Education	37.86	55.24	42.11	38.07	40.20	38.95	37.70
- Non-Profit Institutions	53.21	56.52	30.10	37.22	25.66	18.23	10.78
T O T A L	528.34	634.46	514.59	613.41	606.53	620.07	633.60
5. R&D Expenditures by source of Funds (in billion P)							
- Own Fund	443.74	524.64	384.70	467.76	438.24	431.45	424.66
- Government Fund	42.39	59.77	60.87	50.39	59.63	62.14	64.65
- Foreign Fund	31.80	41.44	52.92	79.74	90.30	105.83	121.36
- Other Fund	10.41	8.61	16.10	15.52	18.36	20.65	22.93
T O T A L	528.34	634.46	514.59	613.41	606.53	620.07	633.60
6. R&D Manpower by Sector							
- Government	11,048	11,631	6,449	6,678	5,885	5,180	4,565
- Private Industry	2,368	2,416	1,244	1,148	941	788	646
- Higher Education	2,733	2,829	1,568	1,618	1,414	1,234	1,079
- Non-Profit Institutions	1,034	1,116	688	741	685	632	585
T O T A L	17,183	17,992	9,949	10,185	8,925	7,834	6,875

Table 152. (continued)

	1981	1982	1983	1984	1985	1986[e]	1987[e]
7. R&D Manpower by Category							
- Scientists and Engineers	7,482	7,884	4,394	4,830	4,363	3,944	3,561
- Technicians	3,306	3,500	1,867	1,855	1,599	1,379	1,188
- Support Personnel	6,395	6,608	3,688	3,500	2,963	2,511	2,126
T O T A L	17,183	17,992	9,949	10,185	8,925	7,834	6,875

[e] Estimate

* Official government figures for 1985, 1986, and 1987 are 0.22, 0.23, and 0.22, respectively.

SOURCES: NSTA Surveys on R & D Expenditures and Manpower, 1981-1982 and 1983-1984
EPRS, NEDA projections on GNP (August 1986)
National Accounting Office, DBM

NOTE: Assumption for item 2: Government Share is 90%

Prepared by STRAED, Planning and Evaluation Service
Department of Science and Technology
10 June 1988

Table 153.
Total R & D expenditures by type of research and by sector, 1984 (in million pesos).

Type of Research	Total	Government	Private Industry	Higher Educ'n	Non-Profit Inst'n
T O T A L	613.50	419.33	118.89	38.07	37.22
Basic Research	88.96	73.41	0.58	11.58	3.38
Applied Research	322.87	232.38	45.19	23.83	21.47
Experimental Dev't.	201.02	113.54	73.12	2.66	11.70
Unspecified	0.66	-	-	-	0.66

SOURCE: NSTA Survey on R&D Expenditures and Manpower, 1983-1984
Prepared by: STRAED, PES, Department of Science and Technology

P633.6 M spent in 1987, 72.3% was attributed to the government, 20.0% to private industry, 6.0% to higher education and 1.7% to non-profit institutions. This indicates that the bulk of resources which supported R and D work in 1987, and for that matter since 1981, were government expenditures. It is interesting to note that while a major portion of scientific and technological capabilities were in institutions of higher learning, only 6.0% of the resources were attributed to this sector. The private industry share was 20%.

A study was made in 1984 on the R and D expenditures by type of research and by sector. The results presented in Table 153 show that of the total funds amounting to P613.5M, 14.5% was alloted basic research, 52.6% for applied research, 32.7% for experimental development and 0.1% for unspecified purposes. In all instances, the bulk of the funds were in the government sector. Private industry committed very little money to basic research and more funds to applied research and experimental development. The non-profit institution and higher education sectors also spent much f their funds for applied research.

6.2.3 R and D Manpower

Table 152 also shows that from a total number of 17,183 R and D personnel in 1981, only 6,875 people were estimated to be employed in this category in 1987. Scientists and engineers comprise the major portion of R and D personnel but the number is decreasing at a rate of 9.7% per year. A drastic decrease in R and D personnel was observed in 1983 leaving 9,949 people from a level of 17,992 in 1982. This may be due to a change in the definition of who can be considered R and D personnel. Since 1984, R and D manpower decreased by 12% every year. If this trend continues, there will be very few R and D personnel left. The decreasing trend of R and D personnel is quite alarming and may be accounted by the transfer of skilled people to the Middle East and migration to other countries. By all means, this trend has to be arrested.

Of the estimated 6,875 R and D personnel in 1987, 66.4% of the manpower was in the government sector, 9.4% in private industry and 15.7% in higher education. The total number for that year gives a ratio of 1.2 per 10000 people comprising the R and D manpower which is low by UNESCO standards.

6.2.4 Comparative Country Data in S and T

A reinforcement on the bleak picture of the state of S and T in the Philippine c[illegible]be obtained from the 1987 UNESCO Statistical Yearbook.

The developed countries like USA, Japan, West Germany and the United Kingdom spend 2.2% or greater of their GNP for R and D. The newly industrialized countries like South Korea, Brazil, Mexico and Singapore have R and D expenditures of 0.5%-1.1% of GNP. Pakistan, Indonesia, and Thailand spend 0.3% of the GNP. Egypt and Panama spend 0.2% of GNP while the Philippines spend an average of 0.13% of GNP.

The UNESCO data also showed that in 1982, there were 117 scientists and engineers per million people which was greater than that of Pakistan, but less than that of Egypt, Cuba, South Korea, Malaysia, Singapore, or Vietnam.

6.3 The NEDA Medium Term Plan, 1987-1992

The presentation of the Science and Technology chapter in the Medium Term Plan (MTP) reflects the current views on the role of S and T in national development. Indeed, S and T is treated as a separate sector in a separate chapter, seemingly divorced from its role as a partner in the development and progress of other sectors such as agriculture, industry, health, transportation, communication and others. Yet, we know fully well that these sectors cannot move without synchronizing political and economic programs with S and T. This weak synchronization, or the lack of it, has retarded the progress in these sectors and has also marginalized the role of S and T in their development efforts. New development programs which involved technology have been assisted, in a very large part, by foreign consultants who have transferred technology without thorough consultation with the Philippine S and T community. This has resulted in the entry of technologies which have been "overspecified", oversized, and too vulnerable to obsolescence and underutilization.

However, the current economic crises confronting the nation now has made it too expensive to import expertise and technology. Thus there is now a slow but gradually increasing trend towards tapping local expertise in research and development.

6.3.1 Review of Accomplishments

The S and T chapter of the MTP gives a very general but rather misleading assessment of the accomplishment in the 1981-1986 plan period (NEDA, 1987). The following were cited as major accomplishments:

- increased productivity and improved quality of life.
- policy and institutional reforms featuring the strengthening of the sectoral councils and adoption of the "demand-pull" approach.
- building of "a relatively strong technological base in agriculture"
- initiation of the "establishment of the basic elements of a modern industrial sector"

The statements of accomplishments in R and D, commercialization of technologies, S and T services, and manpower development and institution building are a litany of results with a very cursory statement of their impact. In a number of cases, the statements were framed as if the discoveries had been made for the first time and thus merited their inclusion in the S and T chapter of such a vital document. A more discriminating selection of accomplishments would have made a more credible presentation. For example, in the Agriculture and Agrarian Reform chapter of the Philippine Development Report for 1987, it was noted that there was negative growth rate in that year for the major agricultural crops such as palay, coconut, sugarcane, banana, coffee and abaca. However, the S and T chapter merely presented an enumeration of accomplishments and did not at all reflect the problem. This is typical of the lack of synchronization between the needs of the sectors and the activities of the S and T sector. In the same light, the dramatic turnaround registered by the industry sector was attributed to "renewed business confidence in the economy which was bouyed by vastly improved consumer spending and the perceived ability of the government to overcome political and economic uncertainties." It is noted here that no mention was made of the use of superior technology. However, in the chapter covering the health, nutrition and family planning sector, there is mention of the role of technology in the implementation of the national drug policy.

There is deliberate effort to synchronize the S and T goals with the needs of other sectors but this is going to take more than just additional money because some ongoing projects may not fit into the urgent need to modernize and increase productivity.

6.3.2 Targets

The following targets have been set in the MTP:

- increase expenditures on S and T activities to 1.5% of GNP by the end of plan period
- develop low cost-low input technologies
- self-reliance and mastery of production technology
- increase the number of S and T personnel engaged in R and D by 32%
- increase private sector participation in R and D
- establish new R and D institutions.

With the reduction in the 1987 and 1988 budget of DOST which, according to estimates, accounts for 90% of the S and T activities expenditures, the attainment of the target by the end of the plan period has become more and more remote. The other targets may be moving towards the goal but many perceive the progress as being on a slow pace. Besides, the erratic performance of agricultural production reflects the lack of mastery of some of the production technologies for the major crops.

6.3.3 Specific Policies, Strategies and Thrusts

Although neatly presented in the MTP, the specific policies, strategies and thrusts must really be made part of the other sectoral chapters. Otherwise, the disjunction becomes more emphasized as the perceived priorities of the S and T sector, led by the DOST, may not coincide with the priorities of each sector. It is noted, however, that there is an attempt to be more focussed and specific with regard to the policies, strategies, and thrusts of the MTP although the general impression one gets is still diffuse.

6.4 Government Spending for S and T Activities

An examination of the specific items of the 1988 Appropriations Act, Republic Act No. 6642, was undertaken and the items related to science and technology activities, including research and development, were listed. Due to a rather subjective appreciation of what items are to be included or not, the figures reflected herein are limitted by the perceptions of the evaluator and are at best an estimate.

The total new appropriations for 1988 as approved by the Congress of the Philippines is P87,538,862,000 or P88 B, rounded-off. Using a liberal interpretation of S and T activities, the items selected amounted to a total of P2 B or 2.32% of the total new appropriations (Table 154). These activities covered all budgeted items in the different executive offices and the judiciary. The budget items of Congress was not detailed enough to be able to select those items of relevance to this chapter. Around P108 M (5.31%) of the P2 B was alloted for social science related activities and P1.9B (94.68%) alloted to the natural science-related activities. These figures do not reflect private sector expenditure.

Including counterparts for international commitments, the DOST received a budget of P538.5 M or 0.62% of the total new appropriations. This is still the biggest single appropriation for S and T activities. The Department of Agriculture ranks second with appropriations of P394 M for S and T activities. The Department of Health received appropriations of P198 M for S and T activities. It is noteworthy that the state colleges and universities received P222 M for R and D.

How these funds may be channeled to provide technical support for the establishment of a pharmaceutical industry is still not clear. However, it seems that there is enough money to start an R and D program that will lead to the eventual production of drugs in the Philippines considering that P2 B has been appropriated for S and T activities for 1988. However, other considerations will not make such reapportionment easy and straightforward.

Table 154.
Estimated appropriations in science and technology activities in the 1988 National Budget (Republic Act No. 6642).

Department/ Office*	Amount
	(in thousand pesos)
Natural Science	
Agriculture	394,403.3
DECS	20,528.0
DENR	128,103.0
Foreign Affairs (UNESCO)	190.0
Gov't Corp (Naphire, PhilRice)	23,000.0
Health	198,027.0
Int'l Commitments	158,451.0
NCC	25,634.0
NSCB	17,818.0
NSO	154,537.0
Office of Energy Affairs	13,038.0
Phil. Racing Commission	132.0
DPWH	15,899.0
DOST	538,556.0
SUC	222,007.0
DTI	9,653.0
Sub Total (94.66%)	1,919,976.3
Social Science	
Agrarian Reform	24.0
Autonomous Regions	4,000.0
Commission on Human Rights	1,725.0
Constitutional Offices	1,968.0
DECS	10,487.0
Finance	14,153.0
Judiciary	807.0
DOLE	7,545.0
DND	1,411.0
NEDA	11,203.0
Ofice of the President	43,781.0
Office of the Special Prosecutor	3,082.0
Other Executive Offices	2,549.0
Transportation & Communications	516.0
Tourism	2,929.0
DTI	2,107.0
Sub Total (5.34%)	108,287.0
Grand Total	2,028,263.3

*Abbreviations: See Appendix

6.5 Suggested Future Course of Action

Realizing that underinvestment and underutilization of S and T have continued to hamper national development, several selections and strategies, some of them already mentioned, have been proposed. If it is no longer a matter of argument that S and T is one of the major determinants of national progress, then all efforts must be executed to undertake a program of modernization of the production capabilities by the proper and sustained application of S and T.

In general terms, it is imperative that S and T influence the direction of the development plans by providing technological alternatives. This will need money, trained people and institutions.

6.5.1 Objectives Must Specify Goods and Services

As stated earlier, S and T plan must be synchronized with the needs of other sectors. This can be accomplished more effectively by avoiding "motherhood" statements and focussing on specific goods and services needed to fulfill the plan. For example, it may no longer suffice to merely state that a pharmaceutical industry must be developed. The specific drug or groups of drugs must be stated. After all, the implementation of the plan would ultimately result into the manufacture of certain goods after due consideration of the technology that is economical and appropriate. Of course, it is realized that there may be situations where specification of goods and services may not be possible especially in cases where there is not enough information.

6.5.2 Project-Based Capability Building

Having a knowledge of the set of goods and services needed for a development plan will enable the identification of technology projects which can then be the focal point for capability building. The project becomes a theme for development with all sectors mobilized to realize the objective of the project.

Highlighted here is the example of the subject of this chapter which is to develop the pharmaceutical industry in the Philippines. This objective maybe translated into the specific drug, say, the antibiotic penicillin. The technology to produce this drug shall then be disaggregated in order to identify raw material requirements, energy requirements, hardware, manpower capabilities, waste management and other social, political and economic factors. The participation of other sectors shall then be defined by these needs, i.e., agriculture to supply biomass-

based raw materials, industry for the hardware requirements, and education for manpower capabilities, just to name a few. It is assumed that the other sectors will have other concerns and may be the lead sectors for certain projects but the role of these sectors in each project will be more defined. The primary constraint for the number of projects to be implemented will be the financial resources available. Local skills development shall be enhanced, initially to serve the time-bound purposes of the project and to eventually form a corps of highly trained people with enough experience to face new tasks.

6.5.3 Strengthening Infrastructure

Science and technology can only progress if the support services necessary to keep these activities productive are maintained. These include the adequate and reliable supply of power and utilities; the availability of chemicals, reagents, scientific instruments; and the presence of auxiliary services like repair and maintenance. The strengthening of these activities can only result from increased investment in superior technology.

6.5.4 Technology Surveillance and Monitoring System

Economic growth in many countries has been traced to the improvement of workers skills, support of R and D, and encouraging investment in capital that applies technological innovations (Landau, 1988). A major determinant is the advance of technological knowledge. For nations which are resource-rich but capital-poor, care must be exercised in the use of technology. This can be done by setting-up a technology surveillance and monitoring system in selected countries. This system entails the designation of listening posts that will serve as an advance technology alert system (ATAS) to forewarn countries, especially of the developing world, of the emergence of these superior technology systems. This surveillance system must be manned by qualified and perceptive individuals who are familiar with the country's needs. The information generated by this system will be the basis for assessing and selecting technological options.

6.5.5 Strengthening and Consolidating Gains

Whatever gains have been achieved in the past, be they in the form of effectively-transferred technology, established R and D institutions, or highly skilled S and T manpower, they must be strengthened and consolidated. This means putting up a set of policies and procedures that will sustain the momentum of growth of these factors and make them effective instruments in national development. It is necessary that these factors be recognized as strategic resources and remain under the control of the Filipinos.

Indiscriminate establisment of institutions will certainly raise the failure of consolidating the gains. Therefore, any new initiative must be premised on the fact that such will not weaken existing institutions. Likewise, institutions that have not progressed or improved shall be phased out.

6.6 Conclusion

Undertaking a technological initiative in a developing country where the appreciation of S and T is at a very low level requires a modest but sure start hoping that the effort will develop into other future initiatives.

It is almost a certainty that not enough is being spent for anything in a developing country, anyway. Therefore, any resources to be allocated for a major technological initiative such as a pharmaceutical industry needs to be carefully justified in order not to unduly jeopardize the needs of other essential public services. This is a difficult task to perform. However, the work can be made less difficult by embarking on well selected projects to provide the central themes for development so that all sectors can contribute their share to provide the proper environment for national development.

References

NEDA. 1986. Medium Term Philippine Development Plan, 1987-1992.

_____. 1987. Philippine Development Report.

LANDAU, R. 1988.U.S. Economic growth. Scientific American 258. 44-54

DOST. 1987. Annual Report 1986.

UNESCO. 1988. Statistical Yearbook 1987.

Philippine Government General Appropriations Act. Republic Act No. 6642 1988.

Appendix

List of abbreviations

DECS	Department of Education, Culture, and Sports
DENR	Department of Environment and Natural Resources
DND	Department of National Defense
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
NCC	National Computer Center
NEDA	National Economic and Development Authority
NSCB	National Statistics Coordination Board
NSO	National Statistics Office
SUC	State Universities and Colleges
UNESCO	United Nations Educational, Scientific and Cultural Oraganization

VII INCENTIVE SCHEMES FOR SCIENTISTS

Introduction

Science and technology has always played a pivotal role in the development of nations. To a large extent, the pace of technological progress is determined by the productivity of the scientific community. Thus, the ability of a country to harness its S & T resources will determine its economic development.

In science and technology, there is no other resource more critical than manpower. Without a core of trained and qualified scientific manpower, even the most developed research infrastructure becomes meaningless. It is for this reason that the Philippine government has implemented several programs aimed at attracting and retaining Filipino scientists. Among these programs include:

1. The Balik-Scientist Program
2. Scientific Career System
3. Creation of the National Academy of Science & Technology

7.1 The Balik - Scientist Program

While there was a dire need for qualified scientific personnel to man the country's research programs, these was, in the sixties and early seventies, an unabated exodus of well-trained Filipino scientists to developing countries. Realizing the country's loss of one of its most important resources, the government. through Presidential Decree 819, created the Balik-Scientist Program (BSP). The Program ran for a period of five years, beginning July 1975 and ending October 24, 1980. Pursuant to Letter of Instruction No. 1044, the Program was extended for another five years ending October, 1986. It was a joint venture of the Ministry of Tourism (now the Department of Tourism) and the National Science and Technology Authority (now the Department of Science & Technology).

7.1.1 Objectives of the Balik - Scientist Program

The objectives of the BSP as derived from the provision of Presidential Decree 819 are as follows:

7.1.1.1 To augment the research capability of private and public institutions and agencies engaged in research and development by attracting highly trained overseas Filipinos to return and work in the Philippines, and

7.1.1.2 To boost and strengthen the scientific and technological manpower of private and public institutions and agencies, including the academic staff of educational institutions directly or indirectly engaged in the production of goods and services.

7.1.2 Components of the Balik-Scientist Program

The Balik Scientist Program allows any foreign-based scientist, technician or professional, or any person with special skill or expertise who is a Filipino or of Filipino origin or descent to practice his/her profession or expertise while staying in the Philippines on a temporary or permanent basis.

The Program has two components, namely:

7.1.2.1 Under Phase One, a participant stays in the country for two weeks to familiarize himself about local conditions. The visit is likewise intended to enable the participant to see for himself the opportunities to contribute one's talents, expertise, and skill to the national development program of the country.

7.1.2.2 Participants under Phase Two are those who have decided to return and work in the Philippines on a permanent basis in which case arrangements were made for job placements in the field of expertise of the participants. From 1980, until the completion of the Program, partial grant privileges were also awarded to applicants who were holders of student visas and were in need of funding to return to the Philippines after completion of their advance studies abroad.

7.1.3 Incentives for the grantees

Grantees of the Balik-Scientist Program availed of the following incentives:

7.1.3.1 Phase One grantees

1. Personal allowance of ₱250.00 daily to cover cost of living & daily transportation from two to four weeks depending on an approved program of consultancy/ lectureship

2. Reimbursable allowance for internal travel in connection with approved program of consultancy/lectureship

3. Round trip air fare by the most direct route from place of temporary residence in the Philippines.

7.1.3.2 Phase Two grantees

1. Free one-way air passage fare including spouse & two direct dependents by the most direct route

2. Reimbursement for freight expense for the shipment of personal and household effects, not to exceed ₱ 10,000 per family

3. Relocation allowance in the Philippines not to exceed ₱ 4,000.00 per family

4. Duty-free and tax entry of one used motor vehicle which the returnee owns and has registered in his name at the time of the approval of his application

5. License to practice his/her profession, expertise or skill in the Philippines; provided the awardee has been licensed to practice his/her profession expertise, or skill in his/her host country; provided further that an awardee whose profession, skill or expertise falls under medical & para-medical fields shall first be approved by the Ministry of Health (now the Department of Health)

6. Support for research projects approved by the NSTA or the Philippine Council for Agricultural Resources Research and Development

7. Tax credit for foreign income tax paid, provided that the corresponding income is declared in the Philippines

8. Exemption from payment of immigration and alien registration fees if awardee is a foreign citizen

9. Travel grant to attend an international scientific conference (applicable only to those who had stayed in the Philippines at least two years after his/her return under the Program)

10. Assistance to obtain a housing loan from GSIS, SSS and the Development Bank of the Philippines

7.1.4 Term of Award

In return for the benefits of the Program, Phase One grantees were expected to render service in a priority project through consultancy or lectureship. On the other hand, Phase Two grantees were expected to take up permanent residence in the Philippines and engage in gainful occupation relevant to priority scientific projects of the government, for at least two years from their date of arrival.

7.1.5 Program Accomplishments

As of September 30, 1986, a total of two hundred fifty five (255) scientists and technologists returned to the Philippines through the Balik-Scientist Program. Of this number, 160 opted to take permanent residence in the Philippines.

Table 155

Distribution of Awardees of the Balik-Scientist Program

by Field of Science

Field of Study	Phase One No.	Phase Two No.	Total No.	Total Percent
Agricultural & Life Sciences	6	68	74	29
Engineering Sciences	25	19	44	17
Health Sciences	13	16	29	12
Humanities & Social Sciences	25	27	52	20
Mathematical Science	5	11	16	6
Physical Sciences	21	19	40	16
T O T A L	95	160	255	100

Source:
Science Education Institute, Department of Science & Technology

In terms of field of study, the Program was able to attract more scientists in the agricultural and life sciences (Table 155). There was also a sizeable number of social scientists who availed of the Program.

Table 156

Place of Employment of Phase Two Awardees

Place of Employment	No.	Percent
Educational institution	96	60
Government institution	25	16
Industry	39	24
T O T A L	160	100

Source:

Science Education Institute, Department of Science & Technology

Among the Phase Two awardees who found employment in the Philippines, majority (60%) were absorbed by educational institutions (Table 156) Of the 96 who became affiliated with academic institutions, 78 went to public universities while 18 opted to stay with private universities.

The Balik-Scientist awardees assumed multi-responsibilities in their respective places of employment. Majority were assuming three functions, namely research, teaching, and administration (Table 157).

Table 157
Involvement of Phase Two Awardees

Type of involvement	No.	Percent
Research	5	4
Teaching	11	9
Teaching/Research	30	24
Administration	35	29
Teaching/Administration	12	10
Research/Administration	16	13
Research/Teaching Administration	15	11
T O T A L	124[1/]	100

Source:

Science Education Institute, Department of Science and Technology

1/ Twenty-six (26) grantees did not respond to the survey questionnaire, while ten(10) had already left for abroad permanently.

7.2. Scientific Career System

7.2.1 Purpose of the Scientific Career System

The Scientific Career System (SCS), promulgated through Executive Order No. 901, is a system of recruitment, career progression, recognition, and reward of scientists in the public service as a means of developing a pool of highly qualified and productive scientific personnel. The system provides career paths that allow scientists to develop within their respective areas of expertise without leaving their status as scientists.

7.2.2 Scope of the Scientific Career System

The SCS applies only to scientific personnel with masteral or doctoral degrees in the sciences who are directly involved in research and development. In its initial years of implementation, the SCS is applicable only to the scientific personnel of the Department of Science and Technology.

7.2.3 Appointment to the System

In accordance with Executive Order 904, a Scientific Career Council has been established the purpose of which is to screen candidates for appointment to the system. Its membership include the Chairman of the Civil Service Commission, the Secretary of the Department of Science and Technology, the Chairman of the National Research Council of the Philippines (now the Philippine National Science Society), the President of the National Academy of Science and Technology & the President of the University of the Philippines System.

Appointment in the System is based on a set of criteria which include the following: 1) education, 2) productivity, 3) training of young scientists, and 4) professional standing. Once admitted to the System, scientists are given the ranks of Scientist I-IV to the extent that they meet the qualification requirements for each ranks.

7.2.4 Fields Covered by the System

The fields of study to be covered by the scientific career system includes the following:

1. Natural Science

    a. Agronomy
    b. Chemistry
    c. Physics
    d. Mathematics
    e. Statistics
    f. Geology
    g. Oceanography
    h. Meteorology
    i. Botany
    j. Zoology
    k. Microbiology
    l. Nutrition
    m. Computer Science

2. Engineering and Technology

    a. Agricultural engineering
    b. Chemical engineering
    c. Civil engineering
    d. Electrical & electronics engineering
    e. Mining engineering
    f. Metallurgical engineering
    g. Nuclear engineering
    h. Food engineering

3. Medical Sciences

    a. Basic medical sciences

        1. Anatomy
        2. Physiology
        3. Pathology
        4. Pharmacology
        5. Medical microbiology
        6. Biochemistry

    b. Clinical sciences

        1. Medical (including pediatrics and subspecialties of internal medicine)

        2. Surgical (including obstetrics, gynecology, ENT, ophthalmology)

c. Paramedical sciences

1. Dentistry
2. Nursing
3. Pharmacy

4. Agricultural Sciences

1. Agronomy
2. Animal husbandry
3. Fisheries
4. Forestry & Forest Products
5. Horticulture
6. Veterinary Medicine
7. Plant Phathology
8. Entomology
9. Rural Science
10. Food processing (nutrition & food technology)
11. Soil Science

5. Others

1. Library & archival science
2. Scientific & technical documentation

7.2.5 Salary Scheme

Under the Scientific Career System, the following compensation plan is adopted:[1/]

	First step	Second step	Third step	Fourth step	Fifth step
Scientist I	41,292	43,932	45,600	47,928	50,376
Scientist II	45,600	47,298	50,376	52,344	55,644
Scientist III	55,644	58,476	61,464	64,596	67,896
Scientist IV	61,464	64,596	67,896	71,364	75,000
Scientist V	67,896	71,364	75,000	78,828	82,848

1/ A proposal to upgrade the compensation plan in the Scientific Career System projects the following salary scale:
Scientist I, ₱144,00; Scientist II, ₱156,000; Scientist III, ₱168,000; Scientist IV, ₱192,000; and Scientist V, ₱ 216,000.

7.3 Creation of the National Academy of Science & Technology

7.3.1 Objectives of the Academy

The National Academy of Science and Technology was created by virtue of Presidential Decree 1003-A on December 17, 1976. Its objectives are as follows:

1. Implement the constitutional mandate to promote scientific research and invention as a priority in national development.

2. Provide meaningful incentives to those engaged in scientific and technological research

3. Recommend to the President outstanding achievements in the sciences and technology for due recognition.

4. Help professionalize government scientific & technological research services.

The National Academy of Science and Technology, or the Academy, was designated as the nominating body which shall choose the scientists to be accorded by the President the rank and title of "National Scientist" the highest award conferred by the government on a scientist.

In July 1982, the Academy, through Executive Order 818, was formally appointed as an advisory body to the President and the Cabinet. This further emphasized the stature and importance of the Academy.

7.3.2 Membership in the Academy

The Academy is composed of outstanding members of the scientific community of the Philippines. Members are Filipino scientists with doctoral degree in any field of science from an accredited university who have demonstrated and earned distinction in independent research or significant innovative achievements in the basic and applied sciences. The doctoral degree requirement is waived in highly meritorious or exceptional cases. The sciences include agriculture, engineering, medical sciences, mathematics, biological and social sciences. The prospective member is screened on the basis of his researches and published works in recognized scientific and technical journals.

The total membership is limited to 50 at any given time. Members to the Academy are nominated by at least three existing members and are approved by a majority of the full membership.

7.3.3 Privileges of Academy Members

Membership in the Academy carries with it the title of "Academician" and various benefits and privileges, such as monthly pension, medical benefits, free publication of scientific and technical units, travel support for attendance and participation in international conferences, and other incentives to promote scientific and technological achievement.

To date, there are 40 living Academicians, although a total of 52 eminent scientists had been conferred the title.

7.3.4 Rank and Title of National Scientists

Conferment of the rank and title of National Scientist by the President of the Philippines is the highest hoonor given to a Filipino scientist.

Each year, the Academy may recommend not more than 10 scientists for distinguished individual or collaborative achievement in science and technology who shall be accorded the rank and title of "National Scientist" Selection of those recommended for the rank of of National Scientist requires 60% vote of the full membership of the Academy.

A National Scientist has the following benefits and privelages which are implemented under the auspices of the Academy:

1. A cash award of ₱ 10,000 upon conferment and decoration of National Scientist.
2. A life pension which is payable monthly.
3. Medical and hospitalization benefits.
4. A place of honor in state functions, national commemoration ceremonies and all scientific gathering.
5. A state funeral, the arrangement for and the expenses of which shall be borne by the government upon the death of the National Scientist.

Since 1978, 19 scientists, eleven of whom are living, have been accorded the rank and title of National Scientist.

References:

1. Amorcsio, Adoracion. The Balik Scientist Program: A Paper Prepared For a Study Commissioned by the International Labor Organization. Science Promotion Intitute. 1984.

2. Executive Order No. 901 "Prescribing Rules and Regulations Implementing the Scientific Career System Initially in the National Science and Technology Authority". Office of the President, Malacañang, July 19, 1983.

3. NAST: The First Decade. National Academy of Science and Technology, Republic of the Philippines, 1985.

4. Philippine HRD Yearbook 1985. National Manpower & Youth Council, Bicutan, Taguig, Metro Manila, 1985.

5. Progress Report of the Balik Scientist Program as of October 10, 1986, Science Promotion Institute, 1986.

6. Science and Technology Manpower Development: Outlook and Strategies: Policy Forum No. 4. National Science and Technology Authority, 1985.

VIII ASSESSMENT OF RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY AND BIOCHEMISTRY IN RELATION TO THE DEVELOPMENT OF THE PHARMACEUTICAL INDUSTRY IN THE PHILIPPINES

The role that new biotechnology and biochemistry will play in the development of new products and technologies to improve health care has been amply shown by the increased investments in biotechnological R & D in the developed countries. Increasing levels of understanding of various cellular processes, especially the genetic processes, have improved man's ability to control these processes to produce useful products. Likewise, the advent of new techniques of cellular manipulation has allowed the production of biological substances in quantities which will enable commercial exploitation of their properties.

As before, the new biotechnology is based on the study of the exploitation of cellular products - hormones, enzymes, antibodies, and secondary metabolites (drugs, antibiotics, fine chemicals). However, the levels of knowledge about many economically important cellular processes are much deeper now that precision in the control of these biotechnological processes is gaining headway. Thus, the new biotechnology has been characterized as a precision technology.

The assessment of local capability as manifested by research and development activities relevant to the production of drugs and other health care products will be undertaken in this chapter.

Fairtlough (1986) gives a summary of the main biotechnological processes as follows:

a. The cell as protein factory
b. The cell as a chemical plant
c. The production of extracellular proteins

The new developments in molecular genetics now allow us to specify large number of proteins for cells to make and to make cells overproduce these proteins in quantities sufficient to make their production economical. These proteins may be secreted by cells like some enzymes and antibodies or they may be extracted from cells which have been grown on appropriate medium like some hormones and other enzymes. On the other hand, the cell may be considered a chemical factory producing low molecular weight compounds which have use as fine chemicals or drugs like antibiotics. Again, genetic manipulation using recombinant DNA technology can improve existing fermentation processes to achieve better yields using cheaper substrates.

In this light, Fairtlough suggests that the areas in human health care most likely to be affected by recombinant DNA technology or genetic engineering are:

a. hormones
b. immune potentiators - interferon, vaccines, antibodies, and enzymes
c. monoclonal antibodies in diagnostic tests and therapeutic use
d. treatment of genetic diseases

Already, the dramatic improvements in the yields of antibiotic producing organisms have demonstrated the potential impacts of applied genetics in the enhancement of productivity.

All these developments have, of course, been made possible by an increasingly detailed understanding of many cellular processes brought about by tremendous increase in the number of available techniques to study how the cell works. These techniques have been generated and are still being generated in biochemistry laboratories. Biotechnology has been considered a science-based technology and would not have developed were it not for the infrastructure provided by basic research in chemistry, biology, physics, and mathematics.

It is also in the same light that other aspects of drug production be considered. This relates to the matter of synthesis and derivatization of drugs, the latter being applied to drugs isolated from natural sources. This area requires very strong support from organic chemists who have the skill and knowledge to make new compounds and to isolate and purify them to levels suitable for human use. In addition to this, strong analytical chemistry laboratories are essential in the maintenance of standards in the drug industry, not only in the matter of the active ingredients but in the excipients as well.

To summarize, therefore, this chapter will be undertaken to determine existence and extent of Philippine capability in biotechnology and biochemistry especially in the following areas:

a. organic synthesis
b. organic analysis
c. protein and enzyme chemistry
d. immunology and monoclonal antibodies production
e. plant/animal cell and tissue culture
f. fermentation engineering including separation and purification of products
g. Microbiology - isolation, screening, identification, and storage of microorganisms

8.1 Sources of Information

Gathering local information on research and development as they relate to biotechnology and biochemistry in drug development has not been easy. This effort has been limited by the fact that research management in many institutions are at various levels of maturity. The main sources of information are annual reports for the year 1987. In some institutions where

these are not available, the 1986 annual reports were the sources of information. Some reports did not have complete information especially on budget and research leaders. In some cases, they were total figures for the institution with no amounts indicated for research or for each research activity undertaken. In other instances, the listing of research projects was not even available.

Another major limitation is the classification of research activities according to the national research system under the Department of Science and Technology (DOST). In this scheme, research activities are classified as a program or a project or a study. There is very little indication of such classification in the reports examined. Thus, each reported activity will be counted as one. A very important source of information has been the Inventory of Health Researches (1985-1987) published by the Philippine Council for Health Research and Development (PCHRD) of the DOST which contains 381 entries of completed research (1985-1986), ongoing research (1987) and published research (1985-1986).

8.2 The PCHRD Profile of Health Researches

The National Health Research and Development Plan for the period 1985-1989 identifies three major research thrusts as follows:

-BIOTECHNICAL RESEARCH AND DEVELOPMENT
-PHARMACEUTICAL RESEARCH AND DEVELOPMENT
-HEALTH SERVICES RESEARCH AND DEVELOPMENT

The specific program areas which will interphase with the major thrusts are:

-Communicable diseases
-Degenerative, metabolic and mental disorders
-Malnutrition
-Maternal and child health
-Environmental health, safety and rehabilitation

A detailed examination of the matrix as presented in Appendix 1 shows the many specific areas where biotechnology research and development may play a major role. Thus, there is no doubt that the health care community in the Philippines has realized that its research and development capability can be further enhanced by the application of the new technologies in biotechnology. The plan of action for R and D in specific diseases considered in the 1985-1989 National Health Research and Development Plan also reflects several areas of biotechnological intervention especially in immunology and microbiology.

According to the PCHRD plan, Biotechnical R & D "covers studies which will generate standards, parameters and procedures needed in the early detection of health problems and in the follow up of intervention program against parasitic and other communicable diseases, malnutrition, cardiovascular diseases, malignancies, and environmental hazards. Studies in vector and animal host of schistosomiasis, malaria, etc. will be investigated." This category includes R & D in immunology, diagnostics, indigenous medical supplies and materials, and nutritional intervention.

Pharmaceutical research and development, according to the same document, involves the "development of pharmaceutical products from local materials ... to ensure a ready stock of inexpensive drugs and other medical supplies as substitutes for imported preparations at all levels of health care." Local production of drugs involving "low level technologies" and "high level technologies" is envisioned. Studies on the effectivity of drug products and drug resistance will be conducted. The development of medical preparations for fertility control is included.

The R & D category for Health Services will emphasize "the improvement of health care delivery to the people, the delivery system being the main structure through which disease prevention management and control are effected." Health policy research will also be included.

8.3 Ongoing Research Activities Related to Biotechnology and Biochemistry

Using the information available from various publications of institutions with significant activity in health research, the research activities were further screened to suit the purpose of this chapter. The basis for further selection was the perceived high content of biotechnology and/or biochemistry as some of the research activities involved mainly clinical studies.

From the available records, a total of 219 research activities were selected on the basis of the following 21 categories:

- _bioactive substances
- _biochemistry
- _biocontrol
- _chemical synthesis
- _cytogenetics
- _enzymes
- _essential oils
- _fats and oils
- _fine chemicals
- _genetic engineering
- _host/vector
- _histology
- _immunology
- _industrial biotchnology/fermentation
- _medicinal plants
- _microbiology

_molecular biology
_nutrition
_plant cell/tissue culture
_toxicology
_ultrastructure

The information available from the sources regarding financial support for all research activities included in this chapter has been of mixed type. The PCHRD information provides the total project cost for the duration of the project, while the other reports reflect figures which cover the budgetary requirements for one year only. It will take much great effort and time to gather accurate and comparable information. Therefore, the total budget for direct expenses of the ongoing research activities cannot be given in this chapter.

A total of 19 separate institutions are involved in biotechnology/ biochemistry-related research activities as shown in Table 161. The various institutes and units under the UP System have also been shown separately. If they are counted separately, a total of 31 separate institutions could be listed. A major portion (59.84%) of these activities are, of course, being implemented in the UP units, the bulk of the trained manpower being in the UP System. It is to be noted also that there are some good laboratories located in private industries like United Laboratories and San Miguel Corporation. However, the nature of their work is restricted information although it is general knowledge that United Laboratories has been doing good work in bioanalytical chemistry. There are private universities engaged in various research activities covered by this chapter but the extent of their involvement is quite limited. A private company, the Philippine Institute of Pure and Applied Chemistry (PIPAC), also accepts contract research and has played a role in process development for the local semi-synthetic antibiotics plant.

As mentioned earlier, 59.84% of the research activities covered in this chapter are being implemented at the UP Sytem; 26.95% are being implemented in government institutes, while 5.51% are being done in laboratories attached to hospitals. The other state universities and colleges (excluding UP) account for 0.92% of the research activities. The private universities account for 6.86% of the research activities.

An examination of the type of ongoing research in the institutions listed in Table 160 shows the breadth of expertise in the UP System. This is to be expected of institutions of higher learning. The other institutions have more or less narrow ranges of research interest especially related to their area of specializations.

8.4 Types of Research

Twenty-one specific types of biotechnology/biochemistry-related research were drawn up for purposes of this chapter. These types were chosen due to their relevance to the topic under consideration and to give more precise profiles of local capabilities. The distinction among the types of research may not be well defined but at least the type indicates the main direction of the work.

The profile of activities in each type of research and the institutions/units involved in each are shown in Tables 160 & 161.

8.4.1 Bioactive Substances

Research on bioactive substances involves the search and identification of biologically-active compounds especially those produced by organisms excluding the medicinal plants. The research activities covered by this chapter involve four units, all in the UP System, and covering work on antibiotic sensitivity discs and the isolation and identification of bioactive substances from marine organisms, plants and invertebrates. These studies are all at the initial stages and will have to be tested further for biological activity.

8.4.2 Biochemistry

Biochemical research involves also three units in the UP System, RITM, and USTRC dealing with studies on genotoxicity, thiamine nutrition, coconut lipids and the production of some coenzymes. According to a review made by Mendoza (1987), biochemical research in the Philippines is done mostly in the universities. About 13 institutions are listed by Mendoza (1987) but not all are undertaking work related to drug development. A major portion of the work is in the agricultural sciences, followed by the medical sciences (Mendoza, 1987). There are probably around 18 Ph.D. graduates doing biochemistry research in the Philippines (Mendoza, 1987).

8.4.3 Biocontrol

Biocontrol involves the regulation of the population of pests by the use of biological agents in order to control the spread of diseases by reducing the population of hosts and vectors. The five research activities in biocontrol are being conducted at three units of the UP System (Table 161). The work includes the use of Bacillus thuringensis to control malaria by killing the larvae. Also an interesting approach is the use of bacterial molluscicides to control the snail host of Schistosoma japonicum. Another study deals with the biocontrol of seed-borne bacterial pathogens. Considering the importance of biocontrol, these studies indicate the low level of activity.

8.4.4 Chemical Synthesis

The field of chemical synthesis needs no further explanation. Research in this field is being conducted mainly in the two strong chemistry institutes at the University of the Philippines. Various compounds are being studied, many of them derivatives of coconut fatty acids. Enzymes are also being used to catalyze interesterification while novel approaches to the synthesis of thionucleosides and heteroaromatic compounds are being worked out. A reevaluation of sorbitol and mannitol production from sucrose in being undertaken. There are very few synthetic organic chemists in the Philippines, maybe five, all in Ateneo de Manila University and the University of the Philippines (Diliman and Los Baños). However, there are enough trained organic chemists who may be able to follow synthetic procedures. What seems to be a critical deficiency is the lack of analytical instruments, high resolution nuclear magnetic resonance spectrometers and high resolution mass spectrometers, that could accelerate the work especially in a multi-step synthesis. There are enough infrared and ultraviolet spectrophotometers around. One more serious limitation is the availability of reagents which, if available, are sold at high price.

8.4.5 Cytogenetics

Human cytogenetics work is being done at the Institute of Biology in UP Diliman involving chromosome analysis of clinically-diagnosed abnormalities in children. More advanced techniques using DNA probes are now available for cytogenetic studies. However, in the case of of human cytogenetics, the problem of sampling is always a limitation in the experimental design. There is a strong group in plant cytogenetics at UPLB-IBS.

8.4.6 Enzymes

Enzymes are becoming important in our daily lives. They can now be used in several products including diagnostic kits. The studies reflected in this chapter are being conducted in three units of the UP System. They involve screening studies from fungus, using enzymes as genetic markers of certain diseases, and using lipases to make tailored fats. There are now many techniques used in the isolation and fractionation of proteins. Protein engineering leads to the modification of certain proteins to give desirable properties like thermotolerance. However, it seems that the sophisticated instruments such as the amino acid sequencer used in the study of proteins are not available in the country. There are some amino acid analyzers around but not sequencers. Enzyme characterization is an important activity and it seems that only the group in UPLB-BIOTECH is engaged in this work.

8.4.7 Essential Oils

The study of essential oils is usually lumped with medicinal plants. However, it was deemed proper to separate it in view of its other non-medicinal uses. Although the lack of analytical facilities has retarded the growth of knowledge in essential oils from the Philippines, work on non-medicinal essential oils is being undertaken at ITDI. A gas chromatography-mass spectrometry (GC-MS) instrument is needed for this type of research.

8.4.8 Fats and oils

Fats and oils research is important to the Philippines because of the big coconut industry. One activity was noted involving the fats and oils not of coconuts but of other indigenous plants. The role of medium-chain triglycerides (MCT's) in nutrition is also being evaluated at UPCM. Work on the chemistry and utilization of coconut lipids is concentrated in UPLB.

8.4.9 Fine Chemicals

The production of fine chemicals from indigenous materials includes eight activities in ITDI, UPLB, and USTRC. Again, fine chemicals research and development may be difficult to separate from chemical synthesis so that specialty chemicals production from coconut by chemical synthesis are included in this chapter. However, other fine chemicals extracted from plants and the local production of dextrose and USP grade sodium chloride need to be encouraged. Modification of certain drugs can be undertaken by chemical synthesis but the more complex compounds of secondary metabolism may be difficult to synthezise. Thus, other sources such as those that give good yields of these substances can be tapped. Fine chemicals are usually low-volume but high-value commodities. Like the other work involving organic compounds, the development of the fine chemicals industry is limited by the availability of organic analytical instruments and equipment for separation and purification.

8.4.10 Genetic Engineering

Genetic engineering is the hallmark of the new biotechnology. Hands-on experience in this new technology is necessary to assess the developments in genetic manipulation. Work in this direction is being undertaken at a very early stage in UP Diliman and UPLB with experiments involving cyanobacteria, Cellulomonas, and Azospirillum .

8.4.11 Histology

Histology is now used widely as a diagnostic tool. The work described here involve breast smears compared to frozen sections. There is also a hispathology section at RITM involved in surgical pathology.

8.4.12 Host/Vector

Corollary to the effort on biocontrol is the understanding of the biology of hosts and vectors. Thus, the listing provided herein (Table 161) shows work in RITM due to their interest in the entomological aspects of malaria. There seems to be ample local capability for host/vector studies but few studies are being undertaken due to the lack of containment facilities to prevent accidental escape of harmful organisms.

8.4.13 Immunology

Immunology, which is the study of antigen-antibody reactions, is also one of the hallmarks in the new biotechnology. Around 15.52% of the total number of research activities involve immunology. Ten units and/or institutions have work in immunology with at least 3-4 engaged in the production of monoclonal antibodes. UPLB-BIOTECH has succeeded in producing monoclonal antibodies for some plant viruses for diagnostic purposes. Good laboratories may be found at UPLB-BIOTECH, RITM and NKI. Vaccine production is also an ongoing work and is crucial to the immunization program especially for hepatitis B. Likewise, the immunology of schistosomiasis needs to be well understood if the proper control measures are to be instituted. Some good work in this regard is being undertaken at RITM.

8.4.14 Industrial Biotechnology

Industrial biotechnology accounts for 16.89% of the total number of research activities under review. This grouping includes fermentation, enzyme technology and studies oriented towards production of biomass or economically-important substances. ITDI and four units of the UP System are involved in research activities in this area and they cover a wide range of substances produced by fermentation such as antibiotics, vitamins, and gums like dextran. Likewise, an area of intense activity is the bioconversion of lignocellulose which is still the most abundant raw material for fermentation. Local capability in industrial biotechnology is satisfactory with the weakness being on the engineering side. A modestly equipped fermentation pilot plant with one each of 30-, 100-, 130-, 200-, and 1000-liter fermenters has been installed at UPLB-BIOTECH from grant-aid funds of USA and Japan. ITDI and NSRI also have 10- and 20-liter fermenters while PIPAC has a 50-liter fermenter.

An analysis of the research activities catalogued in the PCHRD Inventory of Health Researches (1985-1987) shows a total of 290 ongoing activities in the three R & D categories (Table 158). A major portion, 63%, of these research activities were Biotechnical R & D; 26% and 11% were Operation and Policy R & D and Pharmaceutical/Pharmacological R & D, respectively.

Table 158
Ongoing PCHRD catalogued research by R & D category.

Area	Number	% of total ongoing
Biotechnical R & D	208	63
Operations and Policy R & D	75	26
Pharmmaceutical/Pharmacological R & D	31	11
T O T A L	290	

8.4.15 Medicinal Plants

Accounting for the largest group of research activities, medicinal plants research covers 26.48% of the total and involves 21 groups scattered all over the Philippines. An evaluation of this research is contained in a separate chapter. One fact still remains, that the active compounds of any of the plants are still not known. Thus, there are 24 research activities involving phytochemical studies with the work on *Vitex negundo* and *Mentha cordifolia* being the most advanced. However, final identification of the active compounds is limited by the availability of the proper bioassay procedure.

8.4.16 Microbiology

Research in microbiology involves the identification of the microorganisms and understanding of their physiology so that they can be fully exploited. Work on the medical aspects of microbiology is oriented towards developing fast and reliable diagnostic tests for the presence of the pathogen. Another interesting area of concern is resistance to antibiotics and the role of microorganisms in environmental management. A cheap

antibiotic sensitivity disc that is of lower cost compared to imported ones was developed at UP-PGH. There are two local culture collection units registered with the World Federation of Culture Collections (WFCC): UPD-NSRI and UPLB-BIOTECH. Facilities for ordinary microbiology work are adequate but laboratories that have high-containment rooms may have to be built in order to study pathogenic organisms and prevent accidental escape.

8.4.17 Molecular Biology

Molecular biology work is quite limited and the list contains only one that is medically-oriented. This work involves monoclonal antibodies against hepatitis B. Facilities for this kind of work are very limited due to the need for laminar flow hoods, carbon dioxide incubators, and liquid nitrogen containers. A special strain of mice is also needed but the most important drawback is the high cost of fetal calf serum.

8.4.18 Nutrition

Nutritional studies with biotechnological slant are few. Only two have been classified in this category and they involve MCT's as energy sources. Capability to do nutritional studies is not lacking but operating experses especially for animal studies are inadequate.

8.4.19 Plant Cell and Tissue Culture

Plant cell culture is predicted to be potential source of drugs. In fact, this has been demonstrated by the production of shikonin through cell culture by Mitsui Petrochemicals. Shikonin is used in the treatment of burns. Work in this direction is being undertaken at UPLB-BIOTECH. Due to the equipment requirements for this work, UPLB-BIOTECH may be the only facility in the Philippines that has trained people and equipment to do the work. The plant cell and tissue culture laboratory was established with DOST assistance.

8.4.20 Toxicology

Toxicology is a very important area of concern as more and more substances are released to the environment. ITDI and UPLB-IC have capability in undertaking these studies for a limited number of toxicants.

8.4.21 Ultrastructure

Lastly, ultrastructural studies are still important but this needs powerful electron microscopes. RITM, UPLB-BIOTECH and UPLB-IBS have electron microscopes for both scanning and transmission modes. RITM has directed some of its ultrastructure studies towards schistosomiasis.

8.5 Research Gaps

A perusal of the listing of the areas to which R & D activities have been initiated will give the general impression that in relation to the effort to apply biotechnology and biochemistry to drug production, the level of accomplishment could be assessed as being in the initial stages. It seems that the only organized effort is in the medicinal plants area although there is still a lot of work that has to be done to be able to identify the active components. As mentioned earlier, this will be limited by the facilities available for phytochemical work and biological testing.

Work on immunology appears to have gotten to a good start but seems to lack the depth of approach. This may be limited by the availability of reagents and facilities. Work on monoclonal antibodies seems off to a good start but the application of the work has to be worked out.

Of particular concern is the low level of activity in protein chemistry. While this effort may be focussed on enzymes, there is need to consider other important protein products like hormones. Any strong initial effort in this area is not known.

Another area where there seems to be a very low level of activity is animal cell culture. The production of animal products like lymphokines by way of this technique is becoming more important. Furthermore, a depository of cell lines for research use is crucial.

Research involving recombinant DNA techniques is only at a rudimentary stage. Ongoing research projects have little direct medical application.

One notes with concern the seeming lack of vigorous interest towards work on the production of antibiotics. One project has been noted in this area where the technology for rifampicin production is being studied. Another project is the production of tylosin, an antibiotic presently used only for animal feed. USTRC also conducts research on antifungal antibiotics.

The need to improve facilities is highlighted. It seems that the general practice is to establish the laboratories and not provide them with maintenance funds to upgrade or even keep their facilities in good shape. The work on pathogenic organisms especially in understanding their mechanisms for infectivity will need upgraded containment facilities that can satisfy biosafety guidelines.

8.6 Institutional Infrastructure

Having perused over the list of ongoing research activities and their strengths and weaknesses, the question to consider now is whether there exists the framework that can sustain the initiatives and/or initiate the improvements. Therefore, a brief review of the resources that can be harnessed is in order.

8.6.1 University of the Philippines, Manila

This semi-autonomous campus of the UP System is mandated to lead in health sciences research and development. U.P. Manila administers the following units:

- College of Arts and Sciences
- College of Dentistry
- College of Pharmacy
- College of Public Health
- College of Nursing
- College of Medicine
- Institute of Health Sciences
- Institute of Ophthalmology
- National Teachers Training Center
- School of Allied Medical Professions
- Anesthesiology Center Western Pacific

Although UP Manila has a College of Arts and Sciences, this unit is interested mainly in research in urban poor, criminality, housing, and pollution, with very strong social science orientation. Thus, the concerns of health research would be focussed on the other units. According to the UP Manila 1986-87 annual report, there are 2,965 personnel in UP Manila, 527 of which are faculty, 115 are research and professional staff (REPS) and the rest are administrative staff. There are 32 faculty members and 12 REPS with Ph.D. degrees leading to a combined total of 44 Ph.D. degree holders. There are 410 faculty members and 8 REPS with MS degrees. A total of 317 research activities in all units were implemented in 1986-1987 with approximately P11 M in research funds, the bulk of which were at the College of Public Health and the Biochemistry Laboratory of the College of Medicine. There is continuous facilities upgrading with assistance from the Japanese government. However, in-house capability in biotechnology and biochemistry cannot be improved unless there is a coordinated research plan in the application of biotechnology in medicine for UP Manila. This plan has to be synchronized with the National Health Research and Development Plan for 1985-1989. There is now a proposal to establish the National Institutes of Health at the Ermita Health Science Community. This proposal will certainly be an excellent vehicle for upgrading facilities and manpower development.

The operations of the Philippine General Hospital (UP-PGH) are closely linked with the College of Medicine. The annual report of 1986-1987 did not have indications on the research activities at the PGH except for a statement on the cooperation between the Microbiology Laboratory of the College of Medicine and the Department of Laboratories, PGH in the production of antibiotic sensitivity discs (UPM Annual Report CY 1986-87). Expansion of the hospital facilities has included laboratories although it is assumed that these laboratories are designed for service purposes and not for research. It is, therefore, assumed that UP College of Medicine will still play a greater role in medical research compared to PGH.

8.6.2 University of the Philippines, Diliman (UPD)

Four units at UPD have been participating in health-related research. UPD is the flagship campus of the UP System and the three units involved are:

- Natural Sciences Research Institute (NSRI)
- College of Science
  - Institute of Chemistry (IC)
  - Institute of Biology (IB)
- Molecular Biology and Biotechnology Program
- College of Engineering

The Natural Sciences Research Institute, a center of excellence created in 1983 by Executive Order 889, is an attached unit to the College of Science. It provides grants to IC and IB staff and conducts in-house research. According to the NSRI 1987 Research Report, there were 40 NSRI-funded and 30 NSRI-assisted projects. For the latter, NSRI support is given only in terms of laboratory space and facilities. There were three externally-funded projects. These projects were conducted by faculty members of the College of Science and reflected as projects in their own departments except for two in-house projects conducted by NSRI researchers. NSRI supports projects in biology, chemistry, physics, earth sciences, and mathematics.

As of 1986, the Institute of Chemistry had 58 faculty members, 16% of whom hold Ph.D. degrees, 47% have MS degrees and the rest with baccalaureate degrees. The institute has good synthetic organic chemists and an active interest in natural products derived from marine sources. Its also has areas of research related to health particularly in environmental mutagenesis, genotoxicity, drinking water studies and synthetic organic and inorganic chemistry. The institute has some good major equipment for analytical chemistry except a nuclear magnetic resonance spectrometer and a mass spectrometer. In 1987, it received P1.21 M in research funds (UPD-IC Research Bulletin, 1988).

The Institute of Biology is a merger of the Departments of Zoology and Botany. It has a total of 40 faculty but only 22 are active, of which, 68% are with Ph.D. degrees and 32% are with MS degrees. Most of the research activities of this institute are NSRI-funded.

The Molecular Biology and Biotechnology Program was established in 1986 to provide training leading to a Bachelor of Science, Master of Science, or Doctor of Philosophy degree. However, a research program needs to be put in place to back up the teaching activities.

Only the Chemical Engineering Department of the College of Engineering is involved in biotechnology-related research. The department has one staff member with a doctoral degree in bioreactor design.

8.6.3 University of the Philippines, Los Baños (UPLB)

This is the country's premiere institution of research in agriculture. The UPLB units involved in health-related research are:

- College of Agriculture (CA)
  - Department of Horticulture
  - Department of Entomology
- College of Arts and Sciences (CAS)
  - Institute of Chemistry (IC)
  - Institute of Biological Sciences (IBS)
- National Institutes of Biotechnology and Applied Microbiology (BIOTECH)

The College of Agriculture has good facilities to conduct crop production and crop protection research. It has experimental fields and support facilities. Cultivation of medicinal plants has been a subject of study by Department of Horticulture and Department of Entomology. These research activities are included in a separate chapter on medicinal plants.

The Institute of Chemistry at the CAS is one of the centers of excellence created in 1983 under Executive Order 889. It existed as the Department of Agricultural Chemistry and then as the Department of Chemistry. At present, it has 54 teaching staff, 12 of whom are Ph.D. degree holders and 17 with MS degrees. It also employs 26 full-time research staff to implement projects in organic chemistry, biochemistry, environmental chemistry, toxicology, and chemical education. In 1987, there were 54 ongoing research projects and a total budget of P4.3 M for instruction and research (Institute of Chemistry, Annual Report CY 1987). It has basic equipment for analytical chemistry including a functioning 60 MHz NMR spectrometer, infrared and ultraviolet spectrophotometers and an amino acid analyzer. Its strength lies in chemistry-related agriculture research.

The Institute of Biological Sciences (IBS) is a merger of the Departments of Life Sciences, Botany, and Zoology by virture of Executive Order 889 in 1983. IBS is also a center of excellence. It has strong research and instruction programs in microbiology, plant physiology and genetics. IBS has an ecology program linked with the Institute of Environmental Science and Management. It has 67 teaching staff and 52 research staff. Of the teaching staff, 21 have Ph.D. degrees and 36 have MS degrees.

The National Institutes of Biotechnology and Applied Microbiology (BIOTECH) is also a center of excellence established in 1979. Its research programs are strongly oriented towards agriculture and has well-equipped laboratories capable of doing advanced work in molecular biology and genetic engineering. It also has a pilot plant facility which has a series of five fermentors from 30 liters to 1000 liters. It has 109 regular full-time research staff, 6 of whom have Ph.D degrees and 39 have MS degrees. It is supported by a budget of P7M a year from the Philippine government and derives additional

funding from external sources. Its strength lies in fermentation technology and has a modern molecular biology laboratory and electron microscopes.

8.6.4 Industrial Technology and Development Institute (ITDI)

As one of the institutes under the Department of Science and Technology, ITDI. formerly known as the National Institute of Science and Technology, has been involved in many health-related research projects. According to its annual report for 1986, it had 492 employees but only five of whom have Ph. D. degrees. Aside from undertaking research, ITDI also renders technical services to industry. Several laboratories are maintained by ITDI but its level of instrumentation is probably most advanced in the chemistry department which handles the bulk of its technical services. A new citric acid pilot plant was inaugurated last 01 July 1988 to help establish local capability in citric acid production.

8.6.5 Department of Health-Related Institutions

There are three important DOH-related institutions which are expected to play a prominent role in health research, namely:

Research Institute for Tropical Medicine (RITM)
National Kidney Institute (NKI)
Philippine Heart Center (PHC)

Although all three maintain strong clinical operations, there are indications of a strong research and development initiatives in their relatively well-equipped laboratories.

Established with assistance from the Japanese government,RITM is probably the most research-oriented and best equipped of the three institutions. In 1986, it had 59 personnel (only one is with Ph.D. degree) engaged in research with an internal operating budget of P14.7M, NSTA grants totalling P0.75M and external grants amounting to US$2.7M. It had a total of 17 projects in important tropical diseases, especially on parasitic diseases like schistosomiasis. Technical assistance from Japan has enabled the staff to obtain training and avail of experts in various fields related to their projects. Their facilities are being upgraded to enable them to conduct training courses.

The National Kidney Institute, in addition to its mandated goal for excellence in the care of patients with kidney diseases (NKI Annual Report, 1987), has also initiated some research activities mainly in immunology. The Immunology Department started a project in testing placental blood from PGH in order to produce its own tissue typing trays which are expensive (NKI Annual Report, 1987). A joint venture research project has been worked out between the Molecular Biology and Biotechnology Program of the College of Science, UP Diliman and the NKI. With well equipped laboratories, all NKI needs now are a well-planned

research agenda and funds to conduct research. The total budget of NKI for 1987 was P54.8M with a government subsidy of P15.5M. It has a total of 120 medical and scientific staff.

The Philippine Heart Center is another well-equipped facility. Established in 1975, the PHC is also mandated to conduct research on heart diseases especially those peculiar to the region (PHC Annual Report, 1987). In 1987, it had 27 ongoing research projects involving 33 staff members. The 1987 total budget of PHC was P95.9M including expenses for its hospital operations. However, government subsidy was only P20.7M.

8.6.6 Philippine Institute of Pure and Applied Chemistry (PIPAC)

Established in 1972, PIPAC is a private, non-stock, non-profit corporation which provides essential chemical services needed by the public. PIPAC pursues chemical research in selected areas and offers services which include chemical analyses, personnel training and development of methods for quality control and pollution monitoring and control. The institute is an independent entity but operates in close association with the Department of Chemistry of the Ateneo de Manila University (ADMU). It has 6 senior technical staff all with Ph.D. degrees seconded from the Department of Chemistry of ADMU. A new building was donated by the Japanese government for its operations and it has an excellent set of equipment for analytical purposes except a mass spectrumeter. The laboratory facilities are also excellent and there is space for contract research to be done. PIPAC was instrumental in the development of processes for the semi-synthetic penicillin production now being used commercially in the Philippines.

8.7 Summary

While this chapter did not cover all the institutions involved in health research, the abovementioned institutions will probably be the lead organizations because of their resources - manpower and facilities. However, the workload is really wide enough to allow for the participation of other capable organizations.

8.8 Conclusions

Ongoing local research and development in biotechnology and biochemistry cover a wide area of interests related to the development of drugs. The data gathered have mostly been from 1986 or 1987 annual reports of different institutions. Gathering of information had been difficult due to unorganized reports so that this chapter may seem inadequate in some respects. Thus, the need for a well-organized and systematic monitoring system cannot be over-emphasized. In general, however, many initiatives are at the early stage of development.

The production of drugs through fermentation is still a valid strategy to initiate local production of drugs. It would

seem critical for a country without fine chemicals industry to seriously consider the production of drugs by fermentation, especially those processes which use locally available substrates. Drug development work must start with one or two drugs and gradually expand as capability and experience increase. For the first phase of work, the development of production facilities of penicillin G and V may be an effort large enough for the small community of scientists and engineers who can assist. Penicillin seems to be the drug of strategic value at the moment as established in another chapter regarding the study on the development of Philippine pharmaceutical industry. This is further reinforced by the presence of a semi-synthetic penicillin plant, Chemfields, which can handle downstream production of penicillin derivatives.

A wide range of manpower capability may be locally present but their numbers are limited. The institutions covered in this chapter have a combined number of only 120 Ph.D. degree holders.

In some institutions, upgrading in terms of manpower skills is required. Furthermore, support facilities such as laboratories and equipment are limited and need upgrading. These include the establishment of radioisotope laboratories and containment facilities. Although there is good capability in industrial fermentation, augmentation of facilities especially for separation and purification purposes is needed.

Thus, certain institutions may be selected as part of the network for the applications of biotechnology in drug development as follows:

U.P. Manila

College of Medicine
College of Pharmacy
Institute of Public Health

U.P. Diliman

Institute of Chemistry
Institute of Biology
Natural Science Research Institute
Molecular Biology and Biotechnology Program

U.P. Los Baños

Institute of Biological Sciences
Institute of Chemistry
National Institutes of Biotechnology and Applied Microbiology
College of Agriculture
Industrial Technology and Development Institute
Research Institute for Tropical Medicine
National Kidney Institute
Philippine Heart Center
Philippine Institute of Pure and Applied Chemistry

The current projects in immunology must be coordinated in order to share expertise and facilities and accelerate progress especially in the development of vaccines and diagnostics for the major tropical diseases.

The research program on medicinal plants needs to be reviewed and reoriented so that acceptable quality standards for the priority plants can be defined. It is crucial that the nature of the active ingredients be known.

The identified research gaps must be given serious consideration as soon as resources will permit. However, for purposes of drug development, the following areas of concern must be addressed in terms of manpower and facilities:

For antibiotics

microbiology
identification, separation and purification
fermentation technology

For medicinal plants

quality assessment and control
phytochemistry
chronic toxicity

The production of drugs by chemical synthesis may be difficult to consider at this point because the support facilities and services needed for such an effort are not yet in place.

Be that as it may, serious effort must start now. Both the political will and popular support must be harnessed to make the effort a success.

REFERENCES:

Canadian Minister of Supply and Services. 1981. Biotechnology: A development plan for Canada. as cited by Fairtlough, G.H. 1986. Genetic engineering-problems and opportunities in the biotechnological challenge. Ed. by Jacobsson, S., A. Jamison and H. Rothman. Cambridge Press: Cambridge p.34

Fairtlough, G.H. 1986. Genetic engineering - Problems and oppurtunities in the biotechnological challenge. Ed. by Jacobsson, S., A. Jamison, and H. Rothman. Cambridge Press: Cambridge

Mendoza, E.M.T. 1987. Biochemistry in the Philippines: status and directions. Paper presented during the Philippine Biochemical Society 1987 Annual Convention, 24 October 1987, U.P. College of Medicine.

NIST. 1987. 1986 Annual Report.

NKI. 1988. Annual Report 1987.

NSRI. 1988. NSRI Research Report 1987.

PCHRD-DOST. 1987. Inventory of health researches in the Philippines (1985-1987).

PCHRD-DOST. 1988. Annual Report 1987.

PCHRD-DOST. 1988. National health reserch and development plan 1985-1989.

PCHRD-DOST. 1988. PCHRD Operational plan 1988.

PCIERD. 1988. Annual Report 1987.

PHC. 1988. 1987 Annual Report.

RITM. 1987. Annual Report 1986.

UP. 1988. 1986-87 Annual Report.

UPD-CS. 1987. Chemistry at the University of the Philippines. Paper produced by the UP Dept. of Chemistry, Diliman, Q.C.

UPD-IC. 1988. Institute of Chemistry research bulletin (1980-1987).

UPLB-IBS. 1988. Annual Report 1987.

UPLB-IC. 1988. Institute of Chemistry Annual Report CY 1987.

UPM. 1987. University of the Philippines-Manila Annual Report CY 1986.

Table 159
Ongoing PCHRD catalogued research by R & D category.

Program area	Number	% of total ongoing
Degenerative, matabolic, and mental disorders	67	24
Dental health	3	1
Environmental and occupational health, safety and rehabilitation	10	3
Health services	18	6
Immunology	10	3
Infectious diseases	33	11
Maternal and child health	30	10
Medicinal plants	32	11
Nutrition	87	30
T O T A L	290	

Table 160 - Research activities and institutions in biotechnology/biochemistry-related health research and development.

Type	Institution & No. of Research Activities*	No. of Research Activities	%
Bioactive		8	3.65
	UPCM - 1 UPD-IB - 2 UPLB-IBS - 2 UPLB-IC - 1 UP-PGH - 1 USTRC - 1		
Biochemistry		17	7.76
	RITM - 1 UPCM - 8 UPD-IC - 5 UPLB-IC - 2 USTRC - 1		
Biocontrol		5	2.28
	UP-IPH - 1 UPLB-Biotech - 3 UPLB-IBS - 1		
Chemical Synthesis		9	4.11
	UPD-IC - 7 UPLB-IC - 1 USTRC - 1		
Cytogenetics (human)		1	0.46
	UPD-IB		
Enzymes		3	1.37
	UPD-IB - 1 UPLB-IBS - 1 UPLB-IC - 1		
Essential Oils		2	0.91
	ITDI		
Fats and Oils		1	0.46
	UPLB-IC		

Table 160 (continued)

Type	Institution & No. of Research Activities*	No. of Research Activities	%
Fine Chemicals		8	3.65
	ITDI - 5		
	UPLB-IC - 1		
	UPLB-IFST - 1		
	USTRC - 1		
Genetic Engineering		3	1.37
	UPD-IB - 1		
	UPD-NSRI - 1		
	UPLB-Biotech - 1		
Histology		1	0.46
	JRRMMC		
Host/vector		1	0.46
	RITM		
Immunology		34	15.52
	LnKCH - 1		
	NKI - 1		
	PCMC - 3		
	RITM - 11		
	UP-IPH - 3		
	UP-PGH - 2		
	UPCM - 9		
	UPD-IB - 1		
	UPLB-Biotech - 2		
	YMMC - 1		
Industrial Biotechnology		37	16.89
	ITDI - 12		
	UPD-CENG - 1		
	UPLB-Biotech - 11		
	UPLB-IBS - 3		
	UPLB-IC - 10		

Table 160 .(continued)

Type	Institution & No. of Research Activities*	No. of Research Activities	%
Medicinal Plants		58	26.48
	ADMU - 1		
	CEU - 1		
	CMSU - 1		
	DA-BPI - 3		
	DMC - 1		
	DMSF - 1		
	DOH - 1		
	ITDI - 13		
	RITM - 1		
	UP-IPH - 1		
	UP-PGH - 1		
	UPCD - 1		
	UPCM - 6		
	UPCP - 7		
	UPD-IB - 1		
	UPD-IC - 4		
	UPLB-IBS - 4		
	UPLB-IC - 3		
	USTRC - 6		
	WVSC - 1		
Microbiology		19	8.68
	FEU-NRMFH - 1		
	ITDI - 2		
	LnKCH - 1		
	PCMC - 1		
	PHC - 1		
	RITM - 3		
	UP-IPH - 2		
	UP-PGH - 2		
	UPCM - 1		
	UPLB-Biotech - 1		
	UPLB-IBS - 2		
	USTRC - 1		
	VMMC - 1		
Molecular Biology		1	0.46
	UPCM		
Nutrition		3	1.37
	UPCM - 2		
	UPLB-IC - 1		

Table 160 (continued)

Type	Institution & No. of Research Activities*	No. of Research Activities	%
Plant Cell Culture		1	0.46
	UPLB-Biotech		
Toxicology		4	1.83
	ITDI - 2		
	UPLB-IC - 2		
Ultrastructure		3	1.37
	RITM - 2		
	UPCM - 1		
	TOTAL	219	

*Legend: See Appendix 2

	Research Type and No.	Total	%
Private Universities		15	6.86
ADMU		1	0.46
	medicinal plants		
CEU		1	0.46
	medicinal plants		
DMC		1	0.46
	medicinal plants		
DMSF		1	0.46
	medicinal plants		
USTRC		11	5.02
	bioactive - 1		
	biochemistry - 1		
	chemical synthesis - 1		
	fine chemicals - 1		
	medicinal plants - 6		
	microbiology - 1		

*Legend: See Appendix 2

Table 161 Institutions, type and number of biotechnology/ biochemistry- related research activities.*

	Research Type and No	Total	%
Government Institutes/ Bureaus		59	26.95
DA-BPI	medicinal plants	3	1.37
DOH	medicinal plants	1	0.46
ITDI	essential oils - 2 fine chemicals - 5 industrial biotechnology - 12 medicinal plants - 13 microbiology - 2 toxicology - 2	36	16.44
RITM	biochemistry - 1 host/vector - 1 immunology - 11 medicinal plants - 1 microbiology - 3 ultrastructure - 2	19	8.63
Hospital Laboratories		12	5.51
FEU-NRMFH	microbiology	1	0.46
JRRMMC	histology	1	0.46
LnKCH	immunology - 1 microbiology - 1	2	0.92
NKI	immunology	1	0.46
PCMC	immunology - 3 microbiology - 1	4	1.86

Table 161 (continued)

	Research Type and No.	Total	%
PHC		1	0.46
	microbiology		
YMMC		2	0.96
	immunology - 1		
	microbiology - 1		
State Universities and Colleges		133	60.73
CMSU		1	0.46
	medicinal plants		
UP		131	59.84
UP-IPH		7	3.20
	biocontrol - 1		
	immunology - 3		
	medicinal plants - 1		
	microbiology - 2		
UP-PGH		6	2.74
	bioactive - 1		
	immunology - 2		
	medicinal plants - 1		
	microbiology - 2		
UPCD		1	0.46
	medicinal plants - 1		
UPCM		29	13.24
	bioactive - 1		
	biochemistry - 6		
	immunology - 9		
	medicinal plants - 6		
	microbiology - 1		
	nutrition - 2		
	ultrastucture - 1		
UPCP		7	3.20
	medicinal plants		
UPD-CENG		1	0.46
	industrial biotechnology		

Table 161 (continued)

	Research Type and No.	Total	%
UPD-IB		7	3.20
	bioactive - 2		
	cytogenetics - 1		
	enzymes - 1		
	genetic engineering - 1		
	immunology - 1		
	medicinal plants - 1		
UPD-IC		16	7.30
	biochemistry - 5		
	chemical synthesis - 7		
	medicinal plants - 4		
UP-NSRI		1	0.46
	genetic engineering		
UPLB-BIOTECH		19	8.68
	biocontrol - 3		
	genetic engineering - 1		
	immunology - 2		
	industrial biotechnology - 11		
	microbiology - 1		
	plant cell/tissue culture - 1		
UPLB-IBS		13	5.94
	bioactive - 2		
	biocontrol - 1		
	enzymes - 1		
	industrial biotechnology - 3		
	medicinal plants - 4		
	microbiology - 2		
UPLB-IC		23	10.50
	bioactive - 1		
	biochemistry - 2		
	chemical synthesis - 1		
	enzymes - 1		
	fats and oils - 1		
	fine chemicals - 1		
	industrial biotechnology - 10		
	medicinal plants - 3		
	nutrition - 1		
	toxicology - 2		
UPLB-IFST		1	0.46
WVSC		1	0.46

Appendix I
Health Research and Development Priorities

Research Thrusts \ Program Areas	Communicable Diseases	Degenerative, Metabolic and Mental Disorder	Malnutrition	Maternal and Child Health	Environmental Health Safety and Rehabilitation	Other Areas
Biotechnical Research and Development	*Researches on -epidemiology -etiology - pathophisiology *Diagnosis/disease management *Immunologic studies including vaccine development *Vector/animal host studies	*Studies on - epidemiology - etiology - pathophysiology *Diagnosis/disease management *Immunologic studies *Local standards *Bioengineering studies	*Local standards *Nutritional assessment requirement *Deficiency diseases *Disease interrelationships *Nutritional Food processing *Food quality/bioavailability/toxicity	*Local standards *Growth/devt. problems *Infectious/ diseases/ disorders *Appropriate technology *Family planning	*Epidemiology *Local standards/level *Screening tests/procedures *Appropriate technology *Occupational hazards *Environmental pollutants	*Materials development from indigenous sources *Bioengineering studies
Pharmaceutical Research and Development	*Drug formulation from indigenous sources *In-depth studies (phytochemical, pharmacologic, etc.) *Drug effectivity/resistance *Other pharmaceutical products	*Drug formulation from indigenous sources *Adjuvant treatment *Drug effectivity	*Drug formulation from indigenous sources	*Drug formulation from indigenous sources *Fertility control *Other pharmaceutical products		*Drug formulation from indigenous sources *Other pharmaceutical products
Health Services Research and Development	*Delivery system *Sociological/behavioral studies *Health economics *IEC *Surveillance *Manpower development	*Delivery system *Sociological/behavioral studies *IEC *Manpower development	*Delivery system *Sociological/behavioral studies *Food Economics *IEC *Policy research *Surveillance *Manpower development	*Delivery system *Sociological/behavioral studies *IEC *Policy research *Manpower development	*Delivery system *Sociological/behavioral studies *Health Economics *Surveillance *Manpower development	*Delivery system *Sociological/ behavioral studies *Health Economics *IEC *Manpower development

APPENDIX 2

Legend for abbreviations

ADMU	Ateneo de Manila University
CEU	Centro Escolar University
CMSU	Central Mindanao State University
DA-BPI	DA-Bureau of Plant Industry
DMC	Davao Medical Center
DMSF	Davao Medical School Foundation
DOH	Department of Health
FEU-NRMFH	Far Eastern University-Nicanor Reyes Memorial Foundation Hospital
ITDI	Industrial Technology and Development Institute
JRRMMC	Jose R. Reyes Memorial Medical Center
LnKCH	Lungsod ng Kabataan Children's Hospital
NKI	National Kidney Institute
PCMC	Philippine Children's Medical Center
PHC	Philippine Heart Center
RITM	Research Institute for Tropical Medicine
UP-IPH	UP-Institute of Public Health
UP-PGH	UP-Philippine General Hospital
UPCD	UP College of Dentistry
UPCM	UP College of Medicine
UPCP	UP College of Pharmacy
UPCS	UP College of Science
UPCENG	UP College of Enginering
UPD-IB	UP Diliman-Institute of Biology
UPD-IC	UP Diliman-Institute of Chemistry
UPD-NSRI	UP Diliman-Natural Science Research Institute
UPLB	UP Los Baños
UPLB-BIOTECH	UPLB-National Institutes of Biotechnology and Applied Microbiology
UPLB-CF	UPLB-College of Forestry
UPLB-IBS	UPLB-Institute of Biological Sciences
UPLB-IC	UPLB-Institute of Chemistry
UPLB-IFST	UPLB-Institute of Food Science and Technology
USTRC	University of Santo Tomas Research Center
VMMC	Veterans Memorial Medical Center
WVSC	Western Visayas State College

IX ASSESSMENT OF THE AGRICULTURAL RAW MATERIALS FOR DRUG PRODUCTION IN THE PHILIPPINES

Two important considerations in any production process are the availability and the cost of inputs, especially the raw materials. There exists today two important sources of raw materials in the manufacture of chemicals - petroleum oil and agricultural by-products. Petroleum oil is fractionated and utilized in combination with other agents towards the synthesis of a compound. Agricultural by-products may be used directly as in combustion and pyrolysis or converted by biological agents into useful compounds.

The absence of a significant quantity of local production of crude oil is a major limiting factor in the growth of a petroleum-based industry. Although importation of raw materials from neighboring countries like Indonesia has been proposed, this arrangement would, of course, be subject to political considerations. However, the absence of a petrochemical industry in the Philippines should not be a drawback towards the establishment of a fine chemicals industry for drug production. Abundant agricultural raw materials can serve as feedstocks for biologically- mediated transformations producing useful substances for the manufacture of drugs. Until a petrochemicals industry is established, petrochemically-based raw materials which can serve as intermediates may be imported. The experience of other countries bear out the feasibility of this initial arrangements. Drug production can then develop further from that point.

Thus, a more logical starting point would be to look at the agricultural resources of the Philippines and assess which of these could be used as raw materials for direct or biologically-mediated transformations. This chapter will focus on the raw materials that may be used for biological transformations as this route seems to be the more feasible step to take towards the eventual production of drugs. There are technologies available to "refine" biomass into useful chemicals but the present technology yields only a very limited number of compounds. In the case of biologically-mediated biomass conversions, a very large number of compounds with wide variety of structures can be synthesized either by the mediation of a microbial cell, plant cell, animal cell, or enzyme. It is thus quite clear that one of the major avenues for development would be biotechnologically-based processes which in turn depends to a large extent on agricultural by-products as raw materials.

9.1 Land Use Patterns

The information about land use patterns in the Philippines is not updated. The Philippine Statistical Yearbook (NEDA, 1987) reflects the land use patterns for farms as of the year 1980. Although the Bureau of Forestry Development has data of the status of land use in the Philippines as of the year 1984, the information covers not only the farms but the whole Philippine land area. Changes in land use patterns is expected when an updated census of agriculture shall have been conducted. A foreseen major shift in land use patterns is the shrinkage in farm areas which are being converted to urban residential areas or industrial sites. Because this chapter is concerned mainly with agricultural crops as sources of raw materials, the land use patterns of farms as of 1980 shall be referred here.

Out of a total land area of 30,000,000 hectares, 9,034,354 hectares (30%) were classified as farms in 1980 (Table 162). Of this farm area, 86.23% is arable land and plantations with a total of 7,800,733 hectares. The rest are permanent meadows (610,125 hectares) and covered with forest growth or used for other farming purposes (623,496 hectares).

Table 162
Area of farms by land use, 1980.

Land use	Area (hectares)	Percent
T o t a l	9,034,354	100.00
Arable land	4,487,697	49.56
Planted to permanent crops	3,313,054	36.67
Under permanent meadows and pastures	610,125	6.75
Covered with forest growth	623,496	7.02
All other lands		

Source: National Census and Statistics Office,
1980 Census of Agriculture.

Table 163 . Area of farms by land use and by region, 1980.

Region	Total farm area (ha)	Arable land (ha)	Land under permanent Crops (ha)	Land under permanent meadows & pastures (ha)	All other lands (ha)
Philippines	9,034,354.01	4,487,678.82	3,313,053.96	610,124.18	623,476.35
Metropolitan Manila Area	71,186.94	38,463.51	21,186.65	6,539.09	4,997.69
Region I	373,601.66	286,776.88	13,616.82	38,110.04	35,097.92
Region II	568,345.64	409,834.02	34,729.37	67,898.66	55,883.59
Region III	468,552.70	418,568.52	20,350.24	20,017.64	9,616.30
Region IV	1,126,140.53	363,347.00	578,901.62	76,209.80	107,661.42
Region V	945,534.19	282,983.19	542,112.09	75,721.13	44,717.78
Region VI	745,856.90	513,388.70	130,347.72	49,203.29	52,917.19
Region VII	529,711.54	296,825.60	159,559.61	31,229.09	42,097.24
Region VIII	645,711.14	202,076.46	387,531.09	18,250.33	37,853.26
Region IX	769,827.16	297,904.60	367,218.49	49,803.87	54,900.20
Region X	892,326.83	422,369.52	328,590.47	64,132.04	77,234.80
Region XI	1,086,214.03	440,414.53	528,357.64	63,497.73	53,944.12
Region XII	811,344.75	514,726.29	200,552.15	49,511.47	46,554.84

Source: NCSO, 1980 Census of Agriculture

Looking at the distribution of the farm lands, the biggest total farm area is Region IV which comprises 1,126,140.53 hectares or 12.5% of the total farm area. However, the province of Zamboanga del Sur, which is in Region IX, has the largest farm land, measuring 340,270.54 hectares, among all the 65 provinces.

With regard to arable land, Region XII is the largest with 514,726.29 hectares. But Negros Occidental, which is in Region VI, has an arable land of 221,113.36 hectares, the largest arable land area among all the provinces in the Philippines.

Again, it is Region IV that has the biggest plantation farm area with a total of 578,901.62 hectares. Quezon province, also in Region IV, tops the list of provinces with permanent crops registering a total land area of 232,599.19 hectares.

Region IV also has the largest of lands under permanent meadows and pastures (76,209.80 hectares) but Masbate, which is in Region V, leads among the provinces with an area of 49,298.83 hectares.

There is a large portion of farm land with forest growth and related areas in Region IV (107,661.42 hectares) with Palawan having the largest of this type of farm area at 70,671.93 hectares among all provinces.

Due to population pressure, a significant part of the uplands are now under shifting cultivation. The productivity of the lowlands may decline unless the conversion of the farm lands to industrial and residential sites is regulated.

Thus, 26% of the 30M hectares comprising the Philippine archipelago is considered arable and plantation type farm land and should be the basic constraint for a productivity program. There is also concern that only the marginal lands are available for new farming activities.

9.2 Profiles of Crops - Land Area, Quantity, Mean Yield, and Value

A profile of the crops cultivated in arable and plantation type of land is necessary to have an idea of the quantity of agricultural by-products that would be of any consequence in drug manufacture. The basic information that will be analyzed and discussed covers the year 1986 and is mainly derived from the Philippine Statistical Yearbook (NEDA, 1987). The data are presented in Table 164.

In 1986, a total of 28,567,400 mt of crops was harvested from 12,238,100 hectares of land. It must be noted that this hectarage represents area harvested rather than just physical land area, thus the discrepancy between Table 162 and Table 164. It is possible that areas were counted twice if two crops had been planted in the same piece of land. Furthermore, even if only one crop were planted but two harvests had been made, physical land area is counted twice. Table 165 contains information of the physical area of the farms as of 1971 expressed as percentage distibution according to the major crops. This is being presented for comparative purposes.

The total value of the produce in 1986 amounted to P78,095,000. The income per hectare varies from crop to crop this is also true for the average yield.

Although the Philippines Statistical Yearbook (NEDA, 1987) distinguishes food crops from commercial crops, not much emphasis is placed on this classification because this chapter assesses the potential of products and by-products as raw materials regardless of whether they come from a commercial crop or food crop.

Table 164 Agriculture area harvested, quantity, mean yield, and value by kind of crop in 1986.

Crop	Harvested Area (x1000 ha)	Quantity (x1000 mt)	Mean yield (mt/ha)	Value (PM)
Food crops				
Palay (rough rice)	3,402.6	9,097.0	2.673	27,983.1
Corn (shelled)	3,544.7	3,922.0	1.106	9,842.1
Banana	330.1	3,820.2	11.574	4,855.3
Mango	48.7	296.3	6.079	2,994.8
Pineapple	59.5	1,601.9	26.909	3,423.9
Other fruits and nuts	68.2	311.9	4.573	1,000.9
Citrus	26.4	132.2	5.007	619.4
Root crops	423.7	2,706.1	6.386	4,148.6
Vegetable including onions and potatoes	66.8	487.3	7.294	2,888.5
Beans and peas	49.6	37.7	0.760	406.8
Coffee	147.8	136.5	0.923	3,882.4
Cacao	15.3	6.2	0.405	189.4
Peanuts (unshelled)	49.9	43.9	0.879	430.9
Other food crops	81.7	359.7	4.402	1,277.2
SUB-TOTAL (67.9%)	8,315.0	22,959.0		63,943.1
Commercial crops				
Coconut	3,261.5	3,162.4	0.969	4,496.1
Sugar cane	355.9	2,135.3	5.999	7,662.9
Abaca	161.5	82.7	0.512	440.6
Native tobacco	22.4	19.2	0.857	298.2
Virginia tobacco	34.4	36.8	1.069	464.3
Ramie	3.4	8.1	2.382	243.0
Rubber	75.3	154.0	2.045	499.1
Maguey	3.2	3.4	1.062	10.1
Other commercial crops	5.5	6.4	1.163	37.4
SUB-TOTAL (32.1%)	3,923.1	5,608.4	-	14,151.8
GRAND TOTAL	12,238.1	28,567.4	-	78,095.0

Sources: NEDA, 1987
CRC, 1988

Table 165 . Percentage distribution of physical ares of farms.

Type of farm	% of total physical farm ares
All types	100.0
Palay	36.5
Corn	20.3
Coconut	29.2
Tobacco	0.1
Sugar cane	3.2
Citrus	0.2
Vegeteble	0.5
Tuber, root and bulb crops	1.3
Banana	0.8
Pineaple	0.2
Coffee	1.2
Mango	0.1
Fiber crops	0.6
Other permanent crops	0.9
Other temporary crops	0.5
Cattle	1.3
Hog	0.2
Other livestock	0.2
Chicken	0.1
Other poultry	n.s.
Other not elsewhere classified	0.3

Source: NCSO, 1980 Census of Agriculture.

9.2.1 Land Area

The 1986 data show that the first six crops with the largest harvested area are:

Crop	Harvested area (x1000 hectares)	% of total harvested area
Corn	3544.7	28.96
Palay (rough rice)	3402.6	27.80
Coconut	3261.5	27.65
Root crops	423.7	3.46
Sugar cane	355.9	2.91
Banana	330.1	2.70

These crops are planted in 92.5% of the harvested area. Pineapple, another potential source of raw materials, occupies 59,500 hectares of harvested area which is 0.5% of the total.

The figures available for the kinds of root crops planted cover the year 1986 with cassava and sweet potato registering a harvested area of 218,100 hectares and 164,770 hectares, respectively, in a total harvested area for root crops of 423,730 hectares (Villamayor, 1987).

9.2.2 Quantity

Although corn occupies the largest harvested area, it is rice that produces the largest quantity harvested. The top six crops harvested are as follows:

Crop	quantity harvested (x1000 mt.)	Total % of total quantity harvested
Palay (rough rice)	9097	31.84
Corn	3922	13.74
Banana	3820	13.37
Coconut	3162	11.07
Root crops	2706	9.47
Sugar cane	2135	7.47

The above-mentioned crops account for 86.96% of the harvested quantity. Pineapple showed a total harvested quantity of 1,601,900 mt or 5.61% of the total.

The 1986 figures show that the major root crops planted are cassava, which yielded a total of 1,726,587 mt, and sweet potato, which yielded 800,614 mt (Villamayor, 1987).

It is to be noted that while coconut occupies a large area both physical and harvested, it accounts for only 11% of the quantity harvested, surpassed by banana which occupied an area roughly one-tenth of that occupied by coconut. This may be construed as an indication of low productivity.

9.2.3 Mean Yield

The first six crops with highest mean yields are the following:

Crop	Mean yield (mt/hectare)
Pineapple	26.907
Banana	11.574
Vegetables	7.294
Root crops	6.386
Mango	6.079
Sugar cane	5.999

The highest biomass yield per unit area is obtained from pineapple with 26.907 mt/hectare. Rice, which is the most abundant crop, showed a yield of 2.673 mt/hectare, while shelled corn yielded 1.106 mt/hectare, and coconut, 0.969 mt/hectare. These three crops have not reached their fullest yield potential and a combination of strategies involving breeding and cultural management technologies will have to be drawn up to ensure higher yields of these essential food crops.

It is to be noted here that while rice, corn, and coconut rank as the first three in terms of harvested area, they are not among the first six in terms of mean yield. The vastness of the area planted to these crops, however, makes them more distributed all over the country and thus fairly available in almost any region.

With regard to the root crops, according to 1986 data, cassava had a mean yield of 7.916 mt/hectare, while sweet potato had a mean yield of 4.859 mt/hectare. Irish potato had a mean yield of 11.23 mt/hectare from a harvested area of 4,320 hectares. These mean yield figures indicate the amount of harvested biomass that could be derived annually from each hectare of land. What remains unaccounted for is the biomass that is produced but is not harvested or just disposed by burning.

9.2.4 Value

The total value of the crops harvested in 1986 was P78,095,000. Among the first six crops that showed the highest value are the following:

Crop	Total annual value (PM)
Palay (rough rice)	P27,983.1
Corn	9,842.1
Sugar cane	7,662:9
Banana	4,855.3
Coconut	4,496.1
Root crops	4,148.6

These six crops account for 75.55% of the total value with rice as the major contributor (35.83%). Although sugar cane and banana account for only 2.91% and 2.70% of the harvested hectarage, respectively, they rank third and fourth in terms of value. The low yields of rice and corn are compensated by the large harvested area and thus rank among the first two crops in terms of value. On the other hand, coconut, although occupying 27.65% of the harvested area, is a poor fifth in value. This may be due to depressed world market prices and low productivity.

Being always at the top of the list among the root crops, cassava and sweet potato have the highest values, P2,073,516 and P1,479,075, respectively.

9.2.5 Other Crops

Aside from the crops mentioned above, the following are also of consequence to the drug industry. In 1986, soybean had a land area of 6,860 hectares and quantity of production of about 6,488 mt (PCARRD, 1988). For the same year, the Philippine Agribusiness Factbook and Directory 1987-1988 indicated a preliminary production volume of 4,372 mt of cotton valued at P28,312 from a land area of 4,250 hectares.

The 1986 preliminary figures given for tugui (Dioscorea esculenta) were an an area of 890 hectares and a yield of 5,311 mt valued at P10,170 (CRC, 1988), while ubi (Dioscorea alata) had a total hectarage of 5,590 and yield of 21,662 mt that cost P74,268 in the same year (Villamayor, 1987). Gabi (Xanthosoma sp.) is another root crop which in 1986 had a total area of 30,060 hectares that yielded 103,404 mt of the crop with a total value of P247,838 (Villamayor, 1987).

Other palms like the nipa palm (Nipa fructicans) are also of consequence to the drug industry. However, there is no accurate picture of the extent of land covered by nipa although plantation areas are believed to be concentrated in Northern Luzon, Central Visayas, and some parts of Mindanao.

9.2.6 The Forest

Wood and wood-based industries, which derive their raw materials from the forests also generate by-products that may be used as substrates for drug manufacture. The extent of forest hectarage in the Philippines as of 1985 is 1M hectares (Revilla, 1985). It is estimated that the wood wastes generated annually by the wood industry is around 3.1M mt (UNIDO, 1983).

9.2.7 Some Important Considerations

Rice, corn, pineapple, banana, and coconut are produced in large and concentrated areas but others, like the root crops, are produced in small scattered farms. For most crops cultivated in large concentrated areas, the production figures may be fairly accurate. Otherwise, the figures have to be checked on the basis of traded and processed volumes.

Due to differences in soil and climate, certain crops are produced in larger quantities in some areas. Palay is grown all over the Philippines but the bulk of produce is found in Central Luzon (Region III) and Western Visayas (Region VI) while corn is found mainly in Southern and Central Mindanao (Regions XI and XII, respectively) (Juliano and Gonzales, 1986). Coconut is another crop of wide hectarage and distribution with the bulk of the produce coming from Eastern Visayas (Region VIII), Mindanao (Regions IX, X, and XII) and Southern Tagalog (Region IV) (Agricultural Policy and Strategy Team, 1987). It is a widely adapted plant and can grow from the beach to elevated hillside. Most of the root crops are produced in Central and Eastern Mindanao (Region XII) (Agricultural Policy and Strategy Team, 1987). More than 50% of the banana production is in the whole Mindanao area especially in Davao and 90% of the pineapple products is in Northern and Southern Mindanao (Regions X and XI, respectively) (Agricultural Policy and Strategy Team, 1987). There is, therefore, no doubt that Mindanao is a fertile area and many agricultural enterprises including livestock and cattle raising have been successfully operated in that area.

International trade conditions also affect the volume of production. This is well illustrated by sugar cane whose hectarage has been decreased in the early 1980's due to the low price of sugar in the world market. At present, the price has again increased but the hectarage could not be adjusted immediately so that domestic supply had to be fulfilled by importation. The bulk of the sugarcane produced is in Western and Central Visayas (Regions VI and VII, respectively) (Agricultural Policy and Strategy Team, 1987).

Another important factor to consider in an assessment such as this is the cost of transporting crops from where they are produced to the place where they will be processed. This factor is especially crucial in the Philippines which consists of many islands. Unfortunately, data on transportation costs are very limited and conflicting. For instance, Unnevehr and Nelson (1985) claim that the cost of domestic transport of corn is small and that regular arrival of stocks can be scheduled. But another claim is that the cost of transporting corn from Mindanao to Manila is twice the cost of transporting it from Bangkok to Manila (Agricultural Policy and Strategy Team, 1987). The high cost of domestic transport in the latter claim was due to reasons like long ship turn around time and outmoded facilities. Thus, the lack of definitive studies supported by hard figures has caused the discussion of this matter to be very minimal.

9.3 The Raw Materials

This assessment of the raw materials for drug manufacture shall be based on the assumption that biotechnological processes shall be used. Thus, the discussion will be focussed on whether these raw materials are appropriate for such purpose. Where appropriate and where information is available, the materials needed for purification and formulation shall also be discussed.

The distinct advantage of biotechnological processes is that it can utilize raw materials which are the products of agriculture and, therefore, renewable. It was mentioned earlier that a wide range of products can be made available using improved traditional methods and new techniques in genetic and cellular manipulation. New products, increased yields, and the modification of existing products can result from improvements on the biological agents - be they plant cells, microbial cells, animal cells, or enzymes.

Hacking (1986) lists the different raw materials for biological processes which are currently being used (Table 149). The materials are mainly saccharine and starchy in composition. Although predicted to be the major substrate of the future, lignocellulosics such as wood wastes, which is the most abundant organic material, have not as yet been utilized as substrate for industrial scale biotechnological processes. The technology or the hydrolysis of these lignocellulosics to simple sugars has not yet been developed to give high yields at reasonable costs.

Table 166. Raw materials for biotechnological processess.

Substrate	Carbon content g-mol C per mol substrate	Carbon content relative to glucose (%)
Corn starch	0.44	100
Glucose	0.4	100
Sucrose-raw	0.42	105
Sucrose-refined	0.42	105
Molasses*	0.2	50
Acetic acid	0.4	100
Methanol	0.375	94
Ethanol	0.52	130
Methane	0.75	188
Corn oil (crude)	0.8	200
Palm oil	0.8	200
n-alkanes	0.87	218

% by weight fermentable sugar.

Source: (Hacking, 1986)

Six of the items in Table 166 are now available in the Philippines: corn starch, glucose, sucrose (raw), sucrose (refined), molasses, and ethanol. The rest are not available in the bulk and quality needed for biotechnological processes. Acetic acid is manufactured locally only for vinegar, but there is no facility of the production of glacial acetic acid. Methanol, corn oil, and palm oil are all imported although limited amounts of methanol may be recovered from certain factories producing polymer fibers. There are no natural gas deposits being commercially exploited although there are reports that these exist in the country. There are a limited number of biomethanation facilities operated by the livestock industry but the methane is utilized in situ.

Missing from the list of Hacking (1986) are some mineral nutrients which may be sources of nitrogen and phosphorous as well as high protein substrates like soybean meal and cottonseed meal that are added to the fermentation medium. Also missing from the list is cassava starch which is readily available in the Philippines. In fact, it has been the source of glucose syrup that is bought from the local market and which the Philippines exports to other countires. For animal cell cultivation, fetal calf serum is an important ingredient.

It is still the saccharine and starchy raw materials derived from cereals, sugar cane, and root crops that seem to have wide utilization as substrates. These saccharine and starchy substrates are not only available in bulk but they serve as a medium for growth of a wide range of organisms. Low price-high volume fermentation products as well as low volume-high value fine chemicals and drugs have been produced from these substrates.

The Philippine crops and the nature of their products and by-products which can be potential substrates for biotechnological processes are shown in Table 167.

9.3.1 Sugarcane Products and By-products

Due to the historical use of some of its products and by-products as fermentation substrate, more information is available on the material balance of the processing operation of sugar cane. As indicated in Table 167, sugar cane yielded a total of 2,135,300 mt or an average of 6 mt/hectare raw sugar in 1986. The local sugar industry is capable of producing 3.0M mt of sugar per year. This rated capacity was reached in 1975-1976 with 32 sugar mills in operation processing 29.315M mt cane harvested from 553,300 hectares of sugar plantation (FSSRI, 1984). Due to the low price of sugar in the world market, the government started to limit its production to 1.5M mt starting in 1985. This curtailment in production resulted into the withdrawal of around 100,000 hectares of sugar cane land and the reduction in the operations of sugar centrals (Sugar Regulator

Table 167 : Agricultural products and by-products which may be used as raw materials for drug manufacture.

Crop	1986 Quantity (x1000 mt)	Nature of products & by-products Saccharine	Starchy	Lignocellulosic
Palay	9097	-	bran broken grains	straw hull
Corn	3992	-	broken grains corn steep liqueur corn bran starch	stalks corn cobs
Banana	3820.1	ripe banana fruit rejects	banana fruit rejects	stalk leaves peelings
Coconut	3162.4	water sap (from inflorescense)	copra meal sapsi	coir dust husk plant parts (petrole, leaves, trunk) shell
Sugar cane	2135.3	molasses sugarcane juice	- -	bagasse
Pineapple	1601.9	juice	pulp core	peelings
Cassava	1726.6*		starch	stalks peelings
Sweet potato	800.6*		starch	
Tugui	5.3**		starch (source of steroidal skeleton)	
Ubi	5.6*		starch (source of steroidal skeleton)	
Sorghum (sweet)	12.3***	juice	grains	stalks

Table 167 .(Continued)

Crop	1986 Quantity (x1000 mt)	Nature of products & by-products Saccharine	Starchy	Lignocellulosic
Cotton	4.4**		cottonseed meal	
Soybean	6.9****		soybean mesl	
Palm	no data	sap		

*Villamayor, 1987
**CRC, 1988 (1986 preliminary figure)
***NSTA, 1984 (1981 value)
****PCARRD, 1988

Administration, 1986). In fact, in 1986, three out of the 42 sugar centrals had to stop operation completely (Sugar Regulatory Administration, 1986). There is, therefore, some indication of the availability of land and processing capability to cultivate sugar cane to provide feedstocks for biotechnological processes.

The following 1987 material balance on a national level data may be useful (Sugar Regulatory Administration, 1987):

1 mt cane produces 287 kg bagasse
98 kg raw sugar
35 kg molasses (88.4 brix)
710 liters cane juice (14.7 brix)

Although it is tempting to derive the quantities of products and by-products from the total production figures, it may be more useful to convert the figures on a per hectare basis using the 1986-1987 average yield of approximately 51 mt cane/hectare. Thus, from one hectare the following may be derived:

14.6 mt bagasse
5.0 mt raw sugar
1.8 mt molasses (88.4 brix)
36.2 mt cane juice (14.7 brix)

Table 168 shows the production data for the seven-year period from 1980-1987. The quantity of by-products produced is shown in Table 169.

Of particular interest is the production of molasses since it is one of the most widely used substrate for fermentation. During the crop year 1983-84, 57.6% of the molasses produced was exported, 14.6% was used by local alcohol distilleries, and 19.8% was used for other purposes like monosodium glutamate production and animal feed manufacture. Philippine molasses is exported mainly to Japan, Taiwan, and South Korea and is said to be of high quality and high sugar content due to inefficiencies in the extraction process. It seems from the figures that a considerable increase in molasses produced would be expected if the sugar industry were to operate at full capacity. However, due to the glut in cane sugar supply, it has been proposed that either sugar cane juice (first expressed) or the A-test molasses (recovered after the first crystallization) be used as fermentation substrate. Various research studies have shown their suitability as substrates but they are not available in commercial quantities. Furthermore, they can get easily spoiled, especially sugar cane juice and thus pose transport problems or face utilization in a facility contiguous to the sugar mill.

Bagasse is a lignocellulosic residue derived from sugar cane, and until the hydrolysis technology is improved, may not be feasible as a fermentation substrate. Besides, most of the bagasse produced is burned as fuel especially in large sugar mills with refinery operations. However, it was estimated in

Table . 168 . Sugar industry production data from 1980-1987.

Crop year	Area harvested (ha)	Cane milled (mt)	Raw sugar production (mt)
1979-80	442,202	22,489,647	2,265,91
1980-81	382,439	23,033,970	2,317,866
1981-82	495,674	25,037,127	2,442,862
1982-83	463,577	24,062,736	2,463,789
1983-84	487,378	25,969,151	2,335,622
1984-85	406,750	18,719,339	1,719,033
1985-86	307,547	16,124,014	1,518,944
1986-87	269,058	13,751,501	1,337,095

Source: Sugar Regulatory Administration, 1988

Table 169 Sugar cane by-products production from 1980-1987.

Crop year	Final molasses (mt)	Bagasse (mt)	Filter cake (mt)
1980-81	827,161	6,457,656	553,021
1981-82	884,332	6,955,217	597,648
1982-83	881,343	6,915,205	564,615
1983-84	912,101	7,214,885	649,134
1984-85	647,680	5,269,813	444,429
1985-86	551,388	4,718,943	382,656
1986-87	475,118	3,949,806	310,909

Source: Sugar Regulatory Administration, 1988

1982 by a UNIDO team (UNIDO, 1983) that after accounting for all the posible uses of bagasse including fuel, around 544,000 dry tons may be the surplus available for other processes.

Therefore, molasses remains the most suitable fermentation substrate derivable from sugar cane. Sucrose, by itself, is subject to many political pressures and its price stability has became a pawn in international politics.

9.3.2 Corn Products and By-products

Perhaps second to sugar cane, corn is another important crop that could be a source of fermentation substrates. As indicated earlier, the Philippines produced a total of 3,922,000 mt of shelled corn in 1986 from a harvested area of 3,544,700 hectares. In 1984-85, the local use of corn was 52% for feed, 41% for food, 2% for seed, and 5% for others (Agricultural Policy and Strategy Team, 1987). According to Jayme (1982), 3% of the total demand for unmilled corn went to corn starch manufacturers. Raw material supplies have, so far, been able to meet the demand of starch producers (Jayme, 1982). Of direct relevance to the utilization of corn as a fermentation substrate is the wet milling process of corn. The material balance for the wet milling process has been estimated by Lyons (1983) with the following product proportions:

Feed (21% protein)	19.4%
Gluten meal (60% protein)	5.7%
Germ (45-55% oil)	7.4%
Starch	66.5%

It is, of course, corn starch which is of wide application as a substrate especially in the production of high fructose corn syrup. However, corn steep liquor, which is generated in the earlier process of wet milling, is also an important ingredient in the fermentation medium. About 700 liters of corn steep liquor containing 5% total solids is obtained from one mt of corn (May, 1987). A local starch manufacturer claims that 500 liters of corn steep liquor with 10% total solids could be produced from one ton of white corn. The concentrate of 45% total solids may be expensive due to evaporation costs (Jackson, 1988).

Jayme (1982) claims there are five corn starch millers in 1982 with an annual rated capacity of 147,810 mt/year but whose average operating levels from 1976-1981 was only 44%. In 1982, the corn starch produced was 68,708 mt and 32% of our total corn starch requirement had to be imported from the United States and the Federal Republic of Germany.

The production capacities of the existing corn starch mills in the Philippines need to be assessed thoroughly in the light of the requirements of corn starch and corn steep liquor for the fermentation industry.

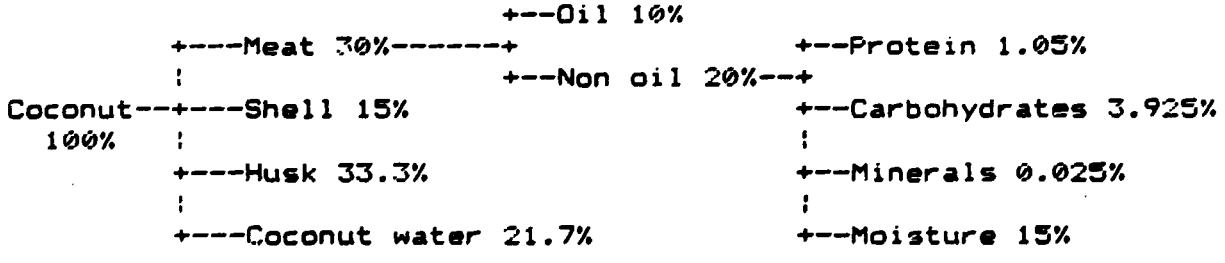
9.3.3 Cassava Products

Next to corn, cassava is the the second most important source of milled starch. In 1986, the aggregated yield of root crops reached 2,706,098 mt covering an area of 423,730 hectares. About 51.5% of this land area was planted to cassava and 63.8% of the total yield is attributable to this crop. The roots of cassava are used for the production of starch. As of 1981, there were 12 cassava flour and starch factories in the Philippines with a total requirement of 950,000 mt of cassava (Villamayor, 1987). According to the same report, these factories operate at 50% capacity with the bulk of the operations in Mindanao. Cassava starch is now used in glucose syrup production in the Philippines. One of the major manufacturer produces 25 mt/day glucose syrup (Philstarch,1988) with a potential annual root requirement of 300,000 mt (Villamayor, 1987). Like corn, postharvest facilities for cassava must be properly installed to prevent deterioration of the product. Thus, chipping and drying facilities have to be in place.

Due to the tolerance of cassava to periods of drought and soils with low fertility, the crop can be planted in marginal lands. Thus the potential for cassava as a source of starch is quite promising for as long as its use as food is not jeopardized.

9.3.4 Coconut Products and By-products

Another crop of vast hectarage and wide distribution is coconut, covering 3,261,500 hectares with a total production of 3,162,400 mt for 1986. The parts of the coconut that may serve as fermentation substrate are the oil, the liquid endosperm (coconut water), and the sap. The relative amounts of an average coconut is as follows (Banzon, 1980), with percentages expressed on the basis of the whole nut:



Coconut oil, which is the most important item of trade, is 10% of the nut which amounts to 0.12 kg on the average. Vegetable oils have been used as a component of some fermentation media. Coconut water, which is a dilute liquid of 4.71% total solids or 2.56% total sugars (Padolina, 1983) has been utilized widely as a fermentation substrate because of the presence of growth hormones. It is assumed, of course, that additional sugar has to

be added to coconut water. On the average, around 0.3 liter of coconut water can be derived from each nut (Padolina, 1983). In fact, it has been estimated that for the total of 471,731,000 nuts processed by dessicated coconut factories in 1981, 141,519,300 liters of coconut water would have been generated for the whole year or around 387,724 liters per day. The biggest use of coconut water today is in vinegar manufacture but the demand is still not enough to absorb the volumes generated each day by the dessicated coconut factories. Coconut water has become a very obnoxious pollutant and must be utilized in better ways. However, as a fermentation substrate, steps must be taken to collect the water hygienically to prevent contamination. And, like sugar cane juice, it can get easily spoiled.

Coconut sap is derived from the excision of the young inflorescence of the tree yielding around one liter of sap per tree per day with 16% sucrose content (Fernandez, 1983). Coconut sap is currently used for the manufacture of local alcoholic beverages like tuba and lambanog. There is no updated information on tuba or toddy manufacture but the Bureau of Census and Statistics reported that in 1971, close to 4M palms were tapped yielding 112M liters of tuba. The only disadvantage in tapping the palm for sap is that the production of nuts is foregone. Thus, a choice has to be made on whether to produce alcohol or produce copra. Some plantations are operated on a combination of both purposes.

Another possible source of raw materials are the fatty acids of coconut oil. Kabara (1979) discussed the toxicological, bacteriological and fungicidal properties of fatty acids and their derivatives and noted that no corrosive effects were exhibited by lauric acid and myristic acid, the two most abundant fatty acids in coconut oil. In the same review, Kabara (1979) also discussed the antimicrobial activity of monolaurin, also known commercially as Lauricidin, especially against gram positive bacteria, yeast, fungi, and molds.

9.3.5 Rice By-products

Although one of the crops that occupies a vast area, rice has traditionally been grown for food. However, as earlier indicated, there are starchy substances such as the broken grains and the bran which may be used for fermentation. The other lignocellulosic residues such as the husk and the straw have been used in handicrafts and other purposes. Rice starch is used in the textile industries and in the manufacture of glucose, dextrin, and adhesive pastes, all in minor quantities in comparison to corn and cassava starch.

Rice bran, which is 10% of the weight of the grain after removal of the husk during milling, has been used as source of rice oil and as feed ingredient. Rice bran is composed of 15.7% dietary fiber including some other minerals and amino acids (Eggum, 1979). The presence of these nutrients has made it possible for rice bran to be added as a component of

fermentation media and in solid substrate fermentation. The volume of rice bran that could be made available after deducting the requirements of the feed industry could be quite substantial to merit consideration as a possible substrate.

9.3.6 Products and By-products of Other Crops

Due to their minor use or lack of use as fermentation substrate, the following crops are going to be discussed cursorily.

From soybean could be obtained soybean meal and soybean oil which are important components of fermentation media. Soybean meal has been added to fermentation media to improve the protein content. It is the residue left after extraction of soybean oil from the bean. Soybean oil is the vegetable oil that is added to some fermentation media. However, the present production of soybean in the Philippines barely supplies the requirements for the food and feed industries. In 1986, the total land area for soybeans was 6,860 hectares (PCARRD, 1988). This has resulted in the importation of a very substantial portion of our soybean requirements especially soybean meal. A processing facility was constructed in Batangas province for soybean but has not been able to operate fully due to shortage in supply of raw materials.

Cotton is another source of raw materials for fermentation. Cottonseed meal, which is about 40% of cottonseed, and the oil, which is17% of cottonseed, are used as components of fermentation media. The meal and oil are used for the same purpose as soybean meal and soybean oil, respectively, in fermentation media.

Sweet potato is a root crop that has been utilized mainly as food. Its processing for starch has been beset with difficulties in handling the relatively high levels of gummy material. The other root crops like tugui and ubi may be evaluated as sources of compounds that could be transformed into steroids but their volumes may be too small for this purpose. Gabi is another root crop whose flour is used as food and has derived special attention due to its low allergenicity.

Banana, especially the Cavendish types, may also be considered as fermentation substrate due to the composition of the fruit pulp. Around 100,000 mt of the Cavendish bananas produced are not of export quality and discarded as rejects (Del Rosario, 1984). According to studies, one kg of banana pulp will yield 0.5-0.7 liters of juice with a pH of 4.9-5.0 and 12% total sugars. The ripe banana pulp is high in carbohydrates. This may merit further investigation.

Pineapple processing residues are also potential sources of substrate. There are unconfirmed claims that around 100,000 mt of pineapple pulp and peelings are generated each year from the processing facilities in Mindanao. The juice is pressed out of this residual pulp and made into vinegar. There is no information available on the analysis of the juice from the processing residues. Another interesting by-product derived from pineapple is the proteolytic enzyme, bromelin. It might be worth mentioning , too, that the proteolytic enzyme papain may be derived from papaya. Proteolytic enzymes are used for many therapeutical and clinical purposes for dissolving blood clots, treatment of inflammations as well as in industrial applications like detergents for the breakdown of protein stains and in the chill-proofing of beer.

The sap of nipa palm may be used as substrate for fermentation. According to reports, it was the major substrate for ethanol production in the early part of the twentieth century (Gibbs, 1911). At present, nipa is used primarily as a source of building material although there is a large industry of vinegar manufacture using nipa sap in the province of Bulacan, north of Manila.

9.4 Availability of Raw Materials for Penicillin Production-A Case Study

The estimated present demand for penicillin is placed at 175 mt/year (NCSO and BSM, 1988) and may be an appropriate basis for assessing the availability of agriculturally-based raw materials for study. Some of the raw materials and their quantities necessary for penicillin production are as follows:

Corn steep liquor (from wet milling of corn)
4 kgs/kg penicillin produced
Glucose solution (70% glucose equivalents)
16 kgs/kg penicillin produced

Around 0.77-0.88 m^3 of corn steep liquor (CSL) is recovered during the wet milling process (May, 1987). This material (CSL) contains 5% total solids thus having around 0.04-0.05 mt solids/mt corn. On the basis of the assumption that 4 kg CSL of 50% total solids is needed in combination with other ingredients to give one kg of penicillin, the recovered CSL which May (1987) considers has to be further concentrated to 50% solids. One then gets an equivalence of 22 kg penicillin that can be manufactured out of one mt of corn. Since the estimated penicillin demand is 175 mt/year, the total amount of corn needed to supply enough CSL for fermentation is 7,954.5 mt/year coming from about 7,192 hectares of land planted to corn.

As for glucose solution requirement, the local source would be glucose syrup produced from cassava starch. Glucose syrup from Philippine sources contains 360 grams glucose obtained from one

kg of tubers and has to be concentrated to about twice its glucose content for penicillin production. Thus, based on the requirement of 16 kg of glucose solution containing 70% reducing sugars to produce one kg of penicillin, 29.8 kg of glucose syrup is necessary. This means an annual requirement of 5,215 mt of glucose syrup or 125,000 mt of cassava tubers from 15,822.8 hectares of land.

In 1986, the Philippines produced 3,922,000 mt of shelled corn from a land area of 3,544,700 hectares (Agricultural Policy and Strategy Team, 1987) and 1,726,587 mt of cassava from 218,000 hectares of land (Villamayor, 1987). To produce the local requirement of 175 mt penicillin/year, 0.20% of the total shelled corn or of the corn land area in 1986 and 7.2% of the total cassava tubers produced or of the cassava area in the same year have to be directed for penicillin production. This analysis clearly indicates that the Philippines is capable of supplying corn steep liquor and glucose solution requirements of the penicillin plant provided that the supply of corn and cassava products to other end-users is not jeopardized.

9.5 Recommendations

1. The major source of saccharine fermentation substrates is still the sugar industry. Thus, any fermentation-based production facility must take serious consideration of the following sugar cane-derived substrates:

blackstrap molasses
A-test molasses
sugar cane juice

Of primary consideration in the choice of the above substrates is the cost and the effect of production process that generates the substrate on the total supply of cane sugar. At present, only blackstrap molasses is available in bulk and is the most stable among the three mentioned above.

2. Another significant source of substrate is the coconut tree, especially coconut water which, when concentrated or fortified with sugar, has proven to be a good fermentation substrate. Hygienic collection techniques must be developed for coconut water.

3. Processes requiring raw materials from the wet milling of corn and the conversion of starch to sugar must take into account the availability and quality of the required products such corn steep liquor and glucose. These raw materials are locally available but pilot testing will be necessary to confirm their suitability for drug production. This includes the use of rice bran for solid substrate fermentation.

4. Substrates like soybean meal and cottonseed meal, which are primarily sources of protein that are added to fermentation media, are produced locally in very limited amounts and may have

to be imported until such time that domestic production has increased. This may apply to other minor components of the fermentation media like the inorganic salts and other organic compounds.

5. Other raw materials which may be needed for drug production by fermentation are pork lard and coconut oil. Pork lard is available in limited amounts and its quality needs to be assessed. Coconut oil may be considered as a substitute for other vegetable oils but needs to be tested for that purpose.

6. The presence of a coco-chemicals industry in the Philippines may be a good starting point for the production of fine chemicals that may be derived from coconut fatty acids. These fine chemicals have long been used in advanced countries by the cosmetic industry, the pharmaceutical industry, and other industries requiring surface-active ingredients. There are also known biologically-active compounds made from coconut fatty acid derivatives which may be manufactured in the Philippines on a limited basis.

7. There are root crops belonging to the genus Dioscorea being cultivated and which may be considered for the semi-synthesis of steroids. However, their suitability must be tested as there are no known studies conducted for this purpose.

9.6 Conclusion

Although not all the raw materials needed as fermentation substrate for the production of drugs may be produced locally, there seems to be a sufficient amount of sugar cane, corn, coconut, and root crops to generate both saccharine and starchy substrates. This may be a sufficient condition to start drug production in the Philippines as the significant part of the substrate requirement may be supplied from indigenous sources that can make production costs competitive enough if given proper incentives at the start.

REFERENCES

AGRICULTURAL POLICY AND STRATEGY TEAM. 1987. Agenda for Action for the Philippine Rural Sector. UPLB-PIDS.

BANZON, J. 1980. The coconut as a renewable energy source. Phil. J Coconut Studies 5(1):31

BUREAU OF CENSUS AND STATISTICS. 1971. Census of the Philippines, Agriculture. Manila, Philippines.

BUSINESS STATISTICS MONITOR. 1988.

CENTER FOR RESEARCH AND COMMUNICATION. 1988. Philippine agribusiness factbook and directory 1987-1988. Manila, Philippines.

DEL ROSARIO, E.J. 1984. Extraction and ethanol fermentation of sugar from size banana fruits. Terminal Report, UPLB-PCARRD Project.

EGGUM, B.O. 1979. Nutritional value of rice in comparison with other cereals. Proceedings of the Workshop on Chemical Aspects of Rice Grain Quality. IRRI, Los Ba_os, Philippines.

FERNANDEZ, W.L. 1983. Alcoholic beverages from coconut sap. Paper read in the Mini WorKshop on Coconut Water and Sap Utilization, PCARRD-PCRDF, 20 September 1983, Manila, Philippines.

FARMING SYSTEMS AND SOIL RESOURCES INSTITUTE. 1984. Philippine Sugar Industry Fact Sheets.

GIBBS, H.D. 1911. The alcohol industry of the Philippine Islands. Phil. J. Sci. 6:99-143.

HACKING, A.J. 1986. Economic aspects of biotechnology. Cambridge University Press, 306 p.

JACKSON, J.A. 1988. Personal Communication.

JAYME, F. 1982. A report on the Philippine Starch Industry. Paper presented during the National Symposium Workshop on Root Crops Research and Development. 21-22 October 1982, VISCA, Baybay, Leyte, Philippines.

JULIANO, B.O. and L.A. GONZALES. 1986. Rice and corn technology and policy in the Philippines. Paper presented during the 8th Annual Scientific Meeting of the National Academy of Science and Technology, July 1986, Manila, Philippines.

KABARA, J.J. 1979. Toxicological, bacteriocidal and fungicidal properties of fatty acids and some derivatives. J. Amer. Oil Chemists Soc. 56, 760A-767A.

LYONS, T.P. 1983. Ethanol production in developed countries. Process Biochem. 18:18-25.

NATIONAL CENSUS AND STATISTICS OFFICE. 1980. Census of Agriculture.

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY. 1987. The Philippine Statistical Yearbook. Manila, Philippines.

NATIONAL STATISTICS OFFICE. 1988.

NATIONAL SCIENCE AND TECHNOLOGY AUTHORITY. 1984. Technical Handbook on Carbohydrate Raw Materials, Philippines.

MAY, J.B. 1987. Wet Milling: process and products. In Corn: chemistry and technology (Watson, SA and PE Ramstad, eds.) Minnesota: American Association of Cereal Chemists, Inc.

PADOLINA, W.G. 1983. Coconut water and coconut sap: suggestions for research and development. Paper presented during the Mini Workshop on Coconut Water and Sap Utilization. PCARR-PCRDF, 20 September 1983. Manila, Philippines.

PHILIPPINE COUNCIL FOR AGRICULTURE AND RESOURCES RESEARCH AND DEVELOPMENT.. 1988. Personal Communication.

PHILSTARCH. 1988. Personal Communication.

REVILLA, A.V., JR. 1985. A 50-year forestry development for the Philippines. Forestry Development Center, UPLB unpublished paper.

SUGAR REGULATORY ADMINISTRATION. 1986. Annual synopsis of Philippine factory performance data. Crop year 1985-1986.

_____. 1987. Annual synopsis of Philippine factory performance data. Crop year 1986-1987.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION. 1983. Final Report Project Contract 82/47 Mk. A Techno-Economic Study on Production of Ethanol from Cellulosic Materials in the Philippines.

UNNEVEHR, L. and G. NELSON. 1985. Structural transformation in Philippine livestock and corn markets. J. Agric. Econ. Dev. 15(1-2):1-31

VILLAMAYOR, F.G., JR. 1987. Genetic resources and development or root crops. Radix 9(2):1-7

X MEDICINAL PLANTS AND ESSENTIAL OILS

Published data on the harvest area, quantity, mean yield, and value of medicinal plants and essential oils are not available due to the low level of development in this sector in the Philippine agricultural enterprise. Therefore, a major part of this chapter shall depend on information from the National Integrated Research Program on Medicinal Plants (NIRPROMP), a program adopting a multidisciplinary approach involving the areas of agriculture, pharmacology, and pharmaceutical chemistry.

Quintana (1983) identified 1,687 plants used by 1,165 traditional healers all over the country. Leaf decoctions were the most popular form of use. Table 169 shows Quintana's (1979) partial survey results covering 10 provinces in Luzon and the distribution of the 28 plants commonly used. The list was revised in 1983 to contain 25 plants which were identified by 50 or more "herb doctors" after a nationwide survey. This survey showed the first ten plants as:

Damong maria	Artemisia vulgaris L.
Banaba	Lagerstroemia speciosa L. (Pers.)
Sambong	Blumea balsamifera L.
Bayabas	Psidium guajava L.
Tubang bakod	Jatropha curcas L.
Cogon	Imperata cylindrica L. (Beav.)
Acapulco	Cassia alata L.
Malunggay	Moringa oleifera Lam.
Yerba buena	Mentha cordifolia Opiz
Luyang dilaw	Curcuma longa L.

In 1984, the list was further trimmed down to five plants, namely:

Lagundi	Vitex negundo
Sambong	Blumea balsamifera
Yerba buena	Mentha cordifolia
Niyog-niyogan	Quisqualis indica
Tsang gubat	Carmona retusa

An updated regional distribution pattern and habitat of the priority medicinal crops is contained in Table 171. It is noted in the same table that only three of the seven plants are of nationwide distribution with the rest being limited in certain regions. Due to this natural trends, it is necessary that regional provenance trials be conducted to ascertain the suitability of certain plants to be propagated in a plantation scale in certain areas where they have not been found to thrive. Furthermore, there are no quantitative indications of the occurence of these plants in these regions. Neither is there information on their yields. Therefore, it may be said that the medicinal plants industry in the Philippines is in a very rudimentary state of development.

Table.170 Plants commonly used by herbolarios in ten provinces of Luzon.

COMMON NAME	P R O V I N C E									
	Abra	Bataan	Benguet	Bontoc	Ifugao	Ilocos Norte	Kalinga Apayao	Nueva Ecija	Tarlac	Zambales
(Ilk.) (Tag.) Aksibal (atsiber)	x	x	x			x	x	x		
Atsuete	x		x					x	x	x
Banaba	x	x	x			x	x	x		x
Bawang	x	x	x		x	x	x	x	x	x
Bayabas (bayabas)	x	x	x	x	x	x	x	x		x
Borburtak			x	x	x	x	x			
Bua (bunga)		x		x	x	x		x	x	x
Busbusilak (pandacaqui)	x	x				x		x	x	x
Comfrey	x	x		x	x	x	x	x		x
Cruz de palo (makabuhay)		x				x	x	x	x	x
Dalineweng (Dita)	x	x			x	x	x	x	x	x
Dangla (lagundi)	x	x			x	x	x	x	x	x
Granada					x	x	x	x		x
Gumamela	x			x		x		x		x
Herbaka (demong-maria)		x	x	x	x		x	x		
Herba-buena		x	x		x	x	x	x	x	x
Laya (luya)		x		x		x			x	x

Table 170(continued)

COMMON NAME	P R O V I N C E									
	Abra	Bataan	Benguet	Bontoc	Ifugao	Ilocos Norte	Kalinga Apayao	Nueva Ecija	Tarlac	Zambales
Lomboy (duhat)	x	x	x		x	x	x	x	x	x
Luyang-dilao	x	x				x		x		x
Mais (corn tassel)		x			x	x		x		x
Manzanilla	x				x	x	x	x		x
Oregano	x	x				x	x	x		x
Paria (ampalaya)	x		x	x		x	x	x		x
Sambong	x	x				x	x	x	x	x
Suma (albutra)		x	x			x	x	x		x
Tangan-tangan	x					x	x	x		x
Tartaraoc (Niog-Niogan)	x	x				x		x	x	
Tawa-tawa (tubang-bakod)	x		x			x	x	x		x

Source: Quintana, 1979

Table 171 Regional distribution and habitat of medicinal crops.

Name	Distribution (Regional)	Habitat
1. Lagundi	I and II	Savannah
2. Hierba buena	all over	Cultivated
3. Niyog-niyogan	I and II, IV B	Riverbanks
4. Sambong	I, II, IV, and VI	Savannah
5. Tsaang gubat	all over	Secondary growth forest
6. Mangosteen	X, XI, XII	Cultivated; wild
7. Akapulko	all over	Moist areas

Source: PCARRD, 1984

There is very little information on the status of the essential oils industry in the Philippines which, according to figures, is on the rise. The 1987 Foreign Trade Statistics of the Philippines indicates a volume of 3,573,088 net kilograms of imported goods classified as essential oils, perfumes and flavor materials worth US$24,183,756. The said volume is divided into the following:

0.6% essential oils and other materials for use in perfumery
4.5% terpenic by-products and mixtures of essential oils, resinoids or synthetic aromatics
8.8% essential oils for medicine
9.6% essential oils for use other than medicine
76.5% essential oils and other materials for use in industries excluding perfumery.

The statistics also shows a volume of 415,588 net kilograms of exported goods worth US$1,898,273 classified under the same category. However, exporting essential oils, perfumes and flavor materials does not necessarily mean that they are produced locally. Imported materials may be processed and the finished products subsequently exported. Since there are many kinds of essential oils, it will be of value to look into how these different essential oils are faring in the Philippine export trade.

An important source of essential oil is citronella grass. Citronella production in the Philippines was started in 1984 by Himmel Industries, a private company. There are now about 20 hectares planted to citronella in Leyte province and some 1000 hectares have been identified in certain towns of the same province. Preliminary results in Leyte showed an average yield of 12 mt citronella leaves per hectare with an oil yield of 0.3-0.6% by weight of leaves. Thus, yield of citronella oil would be 72 kgs per hectare (Department of Agriculture, 1985).

10.1. Research and Development on Medicinal Plants

A formal program on medicinal plants was initiated in 1977 by the National Science Development Board. However, a look at the locally published journals from the early 1900's to 1977 indicates limited but sustained activity in scientific research on medicinal plants involving Dr. Joaquin Maramon, Dr. Alfredo C. Santos, and others.

There are 72 ongoing research projects on medicinal plants but no significant commercial operation is on record. Of these projects, 22% is under the NIRPROMP. The NIRPROMP activities have been divided into two phases: Mission I consists of a research phase and an implementation phase. The research phase involves pharmacological studies and rapid clinical screening in human subjects to verify folklore claims. A plant which is toxic or lacks efficacy is shelved. Only those which pass clinical

Table 172 Completed research activities on medicinal plants as of 1987.*

Research Title	Agency
Estsblishment of pilot production farm of five selected Philippine medicinal plants	CLSU
Intercropping leguminous crops to three medicinal plants (lagundi, sambong and tsaang-gubat)	CLSU
Survey and identification of insect pests commonly associated with five medicinal plant species	CLSU
Study on the use of readily available farm waste as fertilizer source in medicinal plant production	CLSU
Development of post-harvest handling techniques on medicinal plants	CLSU
Evaluation of medicinal plants extracts for insecticidal properties	CLSU
Evaluation of rice straw as mulching materials in hierba buena production	CLSU
Survey of medicinal plants parts sold in the market in Luzon	DA-BPI
Culture of selected medicinal plants	DA-BPI
Cost analysis of maintaining a medicinal plant garden	DA-Region VI
Cultural management of priority medicinal plants	DA-Region VII
Performance of some medicinal plants under varying degrees of shade and fertilizer levels	UPLB-CA
Propagation of medicinal plants	UPLB-CA
Effect of growth regulators on rooting of some medicinal plants	UPLB-CA
Comparative performance of different types of stem cuttings of some medicinal plants	UPLB-CA

Table 172 (continued)

Research Title	Agency
Comparative rooting of terminal stem cuttings of lagundi, niyog-niyogan and isaang-gubat obtained from plants grown in the open and in shade	UPLB-CA
Effect of storage on germination of akapulko seeds	UPLB-CA
Survey, biology and control of diseases and pests of medicinal plants in the Philippines	UPLB-CF

*Legend: See Appendix
Source: PCARRD, 1988

testing were further studied in the agricultural, pharmaceutical, and in-depth clinical aspects. The second phase of Mission I involves the transfer of research output from the program to the health workers in the region, province, municipality and barangay (Cruz, 1985). Mission II is intended to conduct in-depth phytochemical and pharmacological investigation of the pure active principle for commercialization purposes (Cruz, 1985).

With the Philippine Council for Health Research and Development (PCHRD) as coordinator of NIRPROMP, the participating institutions are as follows:

UPLB College of Agriculture
UP College of Science
UP College of Medicine
UP College of Pharmacy
Ateneo de Manila University
Industrial Technology and Development Institute
Philippine National Science Society
Central Luzon State University
Department of Health
Department of Education, Culture and Sports
Department of Agriculture

A large percentage (78%) of the activities on medicinal plants are outside the NIRPROMP and a significant number of NIRPROMP participating institutions are involved in non-NIRPROMP activities. The research projects outside NIRPROMP also cover pharmacological, toxicological and phytochemical research activities as well as agricultural-related ones. However, due to the absence of an effective coordinating mechanism, these activities are rather disorganized with a few duplications.

10.1.1 Agricultural Production Studies

A listing available from PCARRD (Table 172) shows 18 projects completed covering the period from 01 January 1978 to 31 December 1987. They range from the propagation to cultural management of medicinal plants with different institutions implementing the projects. The state of technology development as of 1984 on different aspects of agricultural production of medicinal crops is shown in Tables 173 and 174. It is clear from these tables that Vitex negundo and Mentha cordifolia are in the more advanced state of development. Many of the gaps are now being addressed by the ongoing research activities in agricultural products as shown in Table 175. Most of the projects, though, are scheduled to end in 1988.

The non-NIRPROMP research activities in agricultural production cover also the same topics but implementation and funding may come from different sources (Table 175). Collection, germplasm establishment, intercropping, pest and disease control and other cultural management studies are the types of activities covered by these non-NIRPROMP activities.

Table 173. State of technology development in agricultural production of medicinal crops.*

Activities	Lagundi	Hierba Buena	Niyog-niyogan	Semborg	Tsaang Gubat	Mangos-teen	Akapulko
1. Propagation	TD	TD	TD	TD	TD	TD	TD
2. Distance of Planting	TY	TD	TY	TY	TY	TD	TG
3. Nutrition	TG	TG, TY	TG	TG, TY	TG	TD	TG
4. Water	TG	TG	TG	TG	TG	TD	TG
5. Light	TG, TY	TY	TG	TD	TG, TY	TD	TG
6. Soil	TG	TG	TG	TG	TG	TD	TG
7. Pruning	TG	-	TG, TY	TG	TG	TD	TG
8. Cropping System	TG, TY	TG	TG	TG	TG	TD	TG
9. Crop Protection	TG	TG	TG	TG	TG	TD	TG
10. Age at harvest	TG	TG, TY	TG, TY	TG	TG	TD	TG
11. Season of harvest	TG	TG, TY	-	TG	TG	-	TG
12. Time of harvest	TG	TG, TY	TG	TG	TG	TG	TG
13. Frequency of harvest	TG	TG	-	TG	TG	-	TG
14. Drying methods	TG	TG, TY	TG	TG	TG	TG, TY	TG
15. Physiological maturity	TG, TY	TY	TG	TG	TG	TY	TG

*TG - Technology Generation
TY - Technology Verification
TP - Technology Pilot Testing
TD - Technology Dissemination
Source: PCARRD, 1984

Table 174 Available technology on the propagation methods of medicinal crops.

Plant	Propagation Method(s)	
	Backyard level	Large scale
1. Lagundi	basal cuttings	leafy terminal cuttings under mist - with growth regulator
2. Hierba buena	leafy terminal cuttings	leafy terminal cuttings
3. Niyog-niyogan	basal cuttings	leafy terminal cuttings with growth regulator - under mist
4. Sambong	stolons	stolons
5. Tsaang gubat	basal cuttings	leafy terminal cutting with growth regulator - under mist
6. Mangosteen	seeds	seeds
7. Akapulko	seeds/stem cuttings	seeds/stem cuttings

Source: PCARRD, 1984

Table 175 Ongoing agricultural-related medicinal plants activities, 1987-1988.

Research Title	Agency[a]
BRBDP Medicinal plants project	BRBDP
Establishment of a pilot production farm of selected Philippine medicinal plants*	CLSU
Production and cultural management studies*	CLSU
Screening priority medicinal plants for intercrop with coconut under adverse condition	DA-Region I
Survey and identification of diseases attacking medicinal plants	DA-BPI
Propagation and culture of selected medicinal plants	DA-BPI
Germplasm collection and evalustion of indigenous medicinal	DA-Dingras Expt. Sta.
Gene bank collection, exploration and establishment of medicinal plants	DA-Region VII
Intercropping project on medicinal plants (lagundi, sambong, tsaang gubat, hierba buena, and niyog-niyugan)	DOAC
National integrated research program on medicinal plants (Agricultural component)*	UPLB-CA
Establishment and maintenance of a gene bank for potential medicinal plants*	UPLB-CA
Selective harvesting and storage of medicinal plant parts*	UPLB-CA
Diseases of selected medicinal plant in the Philippines*	UPLB-CA
Establishment of a medicinal plant garden and production farm*	UPLB-CA
Pesticide (residue) management in medicinal plant*	UPLB-NCPC

[a]Legend: See Appendix
*HIRPROMP
Sources: PCARRD, 1988
PCHRD, 1988

10.1.2 Pharmacologic and Toxicologic Studies

In addition to these projects on agricultural production, pharmacologic and toxicologic studies (Table 176) were conducted in accordance with the plans of Mission I. These projects involve both preclinical (animal or laboratory) stage and the clinical or human trials stage. The animal studies conducted were (Cruz, 1985):

1. Determination of lethal dose 50
2. Isolated animal tissue experiments
3. Anesthetized cat or dog experiments
4. Animal behavioral experiments
5. Other studies - analgesic, anti-pyretic and anti-inflammatory animals

The clincial pharmacologic studies are aimed at evaluating the drug's safety, efficacy and therapeutic action in man. The Bureau of Food and Drugs requires that animal experiments be completed before clinical trials are made. However, in the NIRPROMP, the workers did not consider it necessary to complete the animal trials before clinical studies were started because of the "test of time" (Cruz, 1985). Cruz (1985) quotes Barbara Griggs as follows:

"It seems reasonable to assume that any plant drug with a centuries long reputation for being perfectly safe as well as effective has probably earned that reputation. "

The research project on clinical screening of medicinal plants adheres to the principles of the Declaration of Helsinki and the internationally accepted protocols of drug evaluation. The following medicinal plants have undergone basic pharmacologic and toxicologic studies and rapid clinical screening (Cruz, 1985):

1. Vitex negundo L. (lagundi)
2. Mentha cordifolia Opiz. (yerba buena)
3. Blumea balsamifera (sambong)
4. Carmona retusa (tsaang gubat)

The status of dosage formulation research is contained in Table 177.

The non-NIRPROMP research activities in pharmacology and toxicology (Table 176) are also quite extensive, some of which are also being conducted by the same institutions participating in NIRPROMP but on different plants. Research activity have focussed on anti-microbial, anti-inflammatory, antifertility, antiasthmatic, mutagenetic and antihelminthic compounds. There seem to be no biological activity of predominant interest in non-NIRPROMP plants. It is also interesting to note a study on the use of medicinal plants for animal health care.

Table 176 Ongoing pharmacological, toxicological, and phytochemical research activities on medicinal plants, 1987-1988.

Research Title	Agency[a]
1. Phytochemistry of *Vitex negundo* L.: Isolation of pharmacologically active principles*	ADMU
2. Histochemical studies of five medicinal plants with reputed antidiabetic properties	CEU
3. Morpho-histochemical studies of commonly used medicinal plants in the province of Bukidnon	CMSU
4 Determination of antibacterial properties of ampalaya	DA-BPI
5 Study on the utilization of onion oil for pharmaceutical preparation	DA-BPI
6. Determination of antifertility characteristics of damong maria (*Artemisia vulgaris* Linn.)	DA-BPI
7. Developmental research in herbal medicine in Region XI	DMC
8. Therapeutic effect of niyog-niyogan against parasites: A comparative study	DMSF
9. An evaluation of antibacterial and antiplaque activities of mouthwashes utilizing local medicinal plants	DOH
10. Joint R&D on the laboratory analyses and formulation on studies of *Oleum melaleuca* (tea tree oil)	ITDI
11. Therapeutically active alkaloids, glycosides and tannins	ITDI
12. Tannin from selected Phil. some toxic plants tree barks	ITDI
13. Bench-scale production of pigment (Bixin) from *Bixa orellana* L. (achuete)	ITDI
14. Production of tannins from *Psidium guajava* L. for anti-diarrheal durgs	ITDI
15. Studies of Phil. plants with anti-TB/antibacterial activity	ITDI
16. Studies on the utilization of some toxic plants	ITDI
17. Studies on three potential antifertility plants, namely: tugui, kamias, and ampalaya	ITDI
18. Preparation of dosage forms for wounds	ITDI
19. Utilization of local pectin in the production of sodium pectate	ITDI
20. Pharmaceutical formulation studies on new plant-derived drug substances	ITDI

Table 176 (continued)

Research Title	Agency[a]
21. Phytochemical screening of some Phil. medicinal plants (Members of Anonaceae family)	ITDI
22. Phytochemical screening of some Philippine medicinal plants	ITDI
23. *Tinospora rumphii* Boerl. (makabuhay) in the treatment of scabies	RITM
24. Chemical analysis of wild tea and its different preparation	UP-IPH
25. The effect of garlic extract on blood pressure and its possible mechanism of action (Preliminary studies)	UP-PGH
26. Antibacterial effects of guava and ginger plants against dental pathogens: In vitro and in vivo	UPCD
27. Comparative study of lagundi and salbutamol among patients with chronic airflow obstructions	UPCM
28. Pharmacologic and toxicologic studies of Philippine medicinal plants*	UPCM
29. Clinical screening of indigenous plant products used in traditional folk medicine in the Philippines*	UPCM
30. Establishment of quality control bioassay procedures for medicinal plants (Bioassay of indigenous plant products used in traditional medicine)*	UPCM
31. Integrated research on indigenous medicinal plants for family planning	UPCM
32. Lagundi for the treatment of asthma	UPCM
33. Studies on the non-volatile constituents of yerba buena (Phytochemistry of yerba buena: Isolation of pharmacologically active principles)*	UPCP
34. Some constituents of Kokoona from the Philippines	UPCP
35. Phytochemical studies on *Acalypha indica* L. (Euphorbiaceae), *Andrographis paniculata* Ness. (Acanthaceae) and *Tectoron grandis* L. (Verbenaceae)	UPCP
36. Isolation and characterization of active constituents of Philippine medicinal plants	UPCP
37. Dosage formulation from Philippine medicinal plants*	UPCP

Table 176 (continued)

Research Title	Agency[a]
38. Pilot plant production of dosage forms from Philippine medicinal plants*	UPCP
39. Phytochemical studies on *Kolowratia elegans* Persl. (Zingiberaceae)	UPCP
40. Gametophyte morphology of Philippine medicinal ferns	UPD-IB
41. Mutagenicity and antimutagenicity poteptial of tablet preparations Philippine medicinal plants produced by NSTA pilot plants*	UPD-IC
42. Isolation and structural elucidation of anti-mutagens from *Momordica charantia* L.	UPD-IC
43. Isolation and structure elucidation of mutagens from roasted seeds of *Moringa oleifera* Lam.	UPD-IC
44. A study on the antihelminthic effect of *Quisqualis indica* L. on inhabitants of the fishing villages of Mayondon, Los Baños and San Antonio, Bay in Laguna province	UPLB-IBS
45. Screening of major constituents in medicinal plants for family planning	UPLB-IBS
46. Medicinal plants in animal health care	UPLB-IBS
47. Integrated research on the use of medicinal plants for family planning	UPLB-IBS
48. Isolation and structure elucidation of minor compounds from *Mikania cordata*	UPLB-IC
49. Isolation and structure elucidation of active constituents of some Philippine medicinal plants	UPLB-IC
50. Isolation and structure elucidation of the minor constituents of *Pseudoelephantopus spicatus* and *Wedelia prostrata*	UPLB-IC
51. Investigations on the anti-inflammatory properties of some Philippine plants	USTRC
52. Studies on the antifungal properties of some Philippine plants	USTRC
53. Chemical and biological investigation of Philippine plants used for tuberculosis	USTRC

Table 176 (continued)

Research Title	Agency[a]
54. Phytochemical studies for alkaloids	USTRC
55. Alkaloid field survey of selected areas in the Philippines	USTRC
56. Isolation and structural elucidation of alkaloids from three Philippine plants	USTRC
57. Antiasthmatic preparation of Katchubong extract and ointment	WVSC

[a]Legend: See Appendix
*NIRPROMP
Sources: ITDI (1986)
PCARRD (1988)
PCHRD (1988)
RITM (1986)
UP-IPH (1988)
UPD-IC (1987)
UPD-IB (1988)
UPLB-IBS (1988)
UPLB-IC (1988)
USTRC (1987)

Table 177 Status of dosage formulation research.

Medicinal Plant/ Ailment	Dosage Forms	Specific Plant Parts	Status of Technology Development *
1. Lagundi - *Vitex negundo* (antipyretic/antitussive)	tablets, 300 mg	leaves	TD
2. Niyog-niyogan - *Quisqualis indica* L. (antihelmintic)	chewable tablets, 500 mg,	seeds	TV
3. Sambong - *Blumea balsamifera* L.			
a. diuretic/antitussive	a. tablets, 250 mg	leaves	TV/TP
b. antitussive	b. suspension, 300 mg/5 ml.	leaves	TP
4. Yerba buena - *Mentha cordifolia* Opiz. antipyretic/analgesic	tablets, 250 mg	leaves	TP
5. Tsaang-gubat - *Carmona retusa* (antidiarrheal)	tablets, 250 mg	leaves	TG, TV
6. Makahiya - *Mimosa pudica* (antipesmodic)	tablets, 250 mg	leaves	TG, TV
7. Mangosteen - *Garcinia mangostana* L. (antidiarrheal)	tablets, 500 mg	fruit pericarp endocarp	
8. Ipil-ipil - *Lucaena leucocephala* (antihelmintic)	suspension, 4 gms/30 ml	seeds	TG, TV

* TG - Technology Generation
TP - Technology Pilot Testing
TV - Technology Verification
TD - Technology Dissemination

Source: PCARRD, 1984

10.1.3 10.1.3 Phytochemical Studies

Of the four plants mentioned above, only Vitex negundo and Mentha cordifolia have been the subject of phytochemical studies in order to finally isolate the active ingredients. However, present efforts have been prevented from further progress due to limited testing facilities. Other phytochemical studies under NIRPROMP have been postponed due to cost considerations.

There are many non-NIRPROMP phytochemical studies in Philippine medicinal plants located at the Institute of Chemistry, UP Diliman; Institute of Chemistry, UPLB; College of Pharmacy, UP Manila; and the UST Research Center.

10.1.4 Research Gaps

During the National Consultative Meeting on Herbal Medicines held on 02 April 1982, the following research gaps were identified:

I. Agricultural Production

1. Effect of water stress on active constituents of the seven priority species.
2. Effect of pH on the active constituents of the seven priority species.
3. Effect of soil texture on the active constituent of the seven priority species.
4. Nutrient uptake of the seven priority species.
5. Postharvest studies on sambong, tsaang gubat, mangosteen, niyog-niyogan, and lagundi.
6. Effect of density fertilizer application on the active constituents of the seven priority species.
7. Developing the agro-technology appropriate for some soil facilities for medicinal plant production.
8. Determining the suitability of some soil families for medicinal plant production.
9. Effect of elevation on the active constituents of the seven priority species.
10. Comparison of active constituents yield of wildings and cultivated species.
11. Rapid propagation of some medicinal plants (tissue culture)
12. Survey of herbal practices of cultural minorities in the Philippines.
13. Survey of the market potential of selected medicinal crops.

II. Pharmaceutical Testing/Phytochemical Testing of Medicinal Plants

1. Evaluation of herbal drugs
2. Standardization of herbal drugs
3. Phytochemical analysis of herbal drugs

III. Dosage Formulation

1. Need for specific assays for active constituents

The non-identification of pharmacologically active constituents of the different plants makes it impossible to comply with all the required quality control tests such as assay for active constituents, content uniformity test, and dissolution rate.

2. Establishment of mini pilot plants in selected regions.
3. Cost analysis of the dosage forms
4. Need to classify which prioritized plants are to be processed into tablets/suspension.

IV. Extension/Socio-Economics

1. Extension

In moving towards greater self-reliance in health care through herbal medicine, there is a need for a strong and viable outreach program to promote herbal medicine use . . . .

2. Socio-Economics

a. Need to study the cost-analysis of the dosage forms of herbal medicines
b. Survey of market potential of selected medicinal plants."

It is noted in this 1982 listing that the identified gaps are quite wide-ranging and the solution to some seems pivotal to the progress of the work. It seems that the scientific basis for the action of the herbal durgs has not been satisfactorily established such that, even now, none of the active compounds in any of the seven plants have been identified. After almost eleven years of work and about P10M spent, the level of understanding of Philippine medicinal plants has not really moved very far because. The major reason is that in-depth studies were not encouraged for the reason that the plants were known to work anyway as shown by testimonial evidence. The clinical studies in a sense confirmed the experience the herb doctors.

What seems quite disturbing is that a significant amount of resources have been devoted to agricultural production experiments and processing into marketable products without knowing the active constituents. Therefore, there is uncertainty as to whether the recommendations made for agricultural production were optimized simply for biomass production without regard to the variations in the active ingredient.

Another consequence of this lack of information on the active ingredient is the extreme difficulty in standardizing the product and improving quality control measures because of the lack of parameters to monitor. It is thus quite distrubing that pilot plants are being established without the necessary information for product standardization. Without this back-up system, it is doubtful whether adequate quality control measures could be instituted in the face of the increased quantity of output.

Attention is called to the paper of Schoental (1972) which reports fatal cases of children using herbals recommended by the herb doctors. Plants make a wide variety of substances some of which may be harmful. Centuries of use of herbals is not necessarily an indicator of safety. For instance, herb doctors do not reveal how many persons have been adversely affected by these herbs. Schoental (1972) again states that "nobody, however, could be aware of the hazards of plants which do not show immediate toxic effects but which act insidiously and can cause chronic disease and eventually death after a long latent period even with a single dose." This warning issued by Schoental makes it imperative to be more careful in the use of herbals.

Therefore, the medicinal plants program has to supprt further research especially on the active constituents.

10.2 esearch and Development on Essential Oils

Unlike the medicinal plants, research and development activity on the production, processing and utilization aspects of essential oils is very minimal. This is quite ironic in view of the fact that there seems to be a significant export trade which is developing. This may be enough indication for the government to initiate support on research and development in essential oils.

10.3 Conclusions

While the use of herbals in drug development and manufacture is a very attractive strategy, the scientific bases for such a program must be firm. The pivot for all these is the identification of the active compound(s). While the plant may be safe, one still faces the question of standardization of the product, quality control, and its implications on dosage formulation. Therefore, research to derive this information must be instituted at the soonest posible time.

The choice of the plants must still be based on the leading causes of morality and morbidity. NIRPROMP must disseminate information of the priority plants, especially those where NIRPROMP involvement is still minimal. This list will guide interested parties on what directions to take on medicinal plants research.

Surveys to establish the profile of the local essential oils industry must be undertaken. This benchmark information can help steer the development of what seems to be a growth industry. Financial support must be extended to encourage research and development activities on the production, processing and utilization of essential oils. Citronella grass production may be an appropriate area to start with.

REFERENCES:

CRUZ, J. 1985. Pharmacological studies of medicinal plants. First Marsman Professional Chair Lecture. University of the Philippines- Philippine General Hospital, 09 April 1985.

DEPARTMENT OF AGRICULTURE. 1985. Investment prospects in agriculture.

NATIONAL STATISTICS OFFICE. 1988. 1987 Foreign trade statistics of the Philippines. NSO, Manila, Philippines.

PCARRD. 1984. Working Papers of the Ornamental and Medicnal Plants National Commodity and Medicinal Plants National Commodity Team Meeting. Los Baños, Laguna.

PCARRD. 1988. Directory of ongoing researches in agriculture and natural resources by commodity, program year 1988, phase B.

QUITANA, E.G. 1979. Survey of folk use of potential medicinal crops. Proceedings of the 29th Annual Convention, PHILAAS. Metro Manila, 16 November 1979.

QUINTANA, E.G. 1983. Medicinal plants; cheap alternatives to costly drugs. McMicking Professorial Chair Lecture in Horticulture. UPLB, 12 September 1983.

SCHOENTAL, R. 1972. Herbal medicines to avoid. Nature 238:106-107.

ZARA, P. 1979. The integrated program on Philippine medicinal plants. Proceeding of the 28th Annual convention of PHILAAS. Metro Manila, 16 November 1979.

APPENDIX

Legend for Abbreviations

ADMU	Ateneo de Manila University
BRBDP	Bicol River Basin Development Project
CEU	Centro Escolar University
CLSU	Central Luzon State University
CMSU	Central Mindanao State University
DA	Department of Agriculture
DA-BPI	DA-Bureau of Plant Industry
DMC	Davao Medical Center
DMSF	Davao Medical School Foundation
DOH	Department of Health
DSAC	Don Severino Agricultural College
ITDI	Industrial Technology and Development Institute
RITM	Research Institute for Tropical Medicine
UP-IPH	UP-Institute of Public Health
UP-PGH	UP-Philippine General Hospital
UPCD	UP College of Dentistry
UPCM	UP College of Medicine
UPCP	UP College of Pharmacy
UPD-IB	UP Diliman-Institute of Biology
UPD-IC	UP Diliman-Institute of Chemistry
UPLB	UP Los Baños
UPLB-CA	UPLB-College of Agriculture
UPLB-CF	UPLB-College of Forestry
UPLB-IBS	UPLB-Institute of Biological Sciences
UPLB-IC	UPLB-Institute of Chemistry
UPLB-NCPC	UPLB-National Crop Protection Center
USTRC	University of Santo Tomas Research Center
WVSC	Western Visayas State College

XI THE LEGAL FRAMEWORK

11.1 Investment Incentives

11.1.1. How Foreigners Perceive the Philippine Investment Climate

Investments incentives in the Philippines is at just about the tail end of their Asian counterparts, in terms of attractiveness to investors, and is by all indications considered by Filipino policy makers to be tolerably generous to foreign capital.

Not so, declared the Philippine press, citing recent interviews with Japanese and Taiwanese sources.2/

The "Business Star" reported that its source (Masao Sawaki, adviser to the presidents respectively of the Japan Chamber of Commerce and Industry and the Tokyo Chamber of Commerce) bewailed the fact that Japanese business groups do not meet as often with their Philippine counterparts as the Japanese do with the Malaysians. In addition, the Malaysians, already the leading purveyor of investments incentives to foreign capital in Asia, continue to update and improve their package even more. The implication is that the Philippines has hardly made a foreward step in the same direction despite the promulgation of the Omnibus Investments Code of 1987 on 17 July 1987.

Taiwanese Ta Jen Liu, representative of the Pacific Economic and Cultural Center of his country, was reported by the "Manila Bulletin" to have aired the concern of the Taiwanese on the militancy of the Philippine labor sector, peace and order, and lack of investment protection guarantees for investments in the country. Mr. Liu was reported to be specially discouraged by Philippine laws which prohibit foreigners from owning land.

"An investor does not mind having to rent an office or a house in the Philippines", he was reported as saying, "but he would surely like to own land for his factory".

"If a person is a resident, he should be allowed to own even a limited area or land for his business if not for his home. Taiwan which is a very small country, allows foreigners to buy lands for factories". This is a big incentive for investors.

2/The "Business Star", 24 August 1988; and the "Manila Bulletin", 16 September 1988.

11.1.2. Asian Investment Incentives Compared

In September 1987, the SGV Group conducted a survey of current investments incentives in nine (9) Asian countries: the Philippines, China, Taiwan, South Korea, Thailand, Indonesia, Malaysia, Singapore and Hongkong. The results of that survey are contained in a publication entitled "1988 Comparative Investment Incentives", portions of which are reproduced in this report with the kind permission of SGV.

The tally shows that the Philippines places itself at the base of the tail of the most generous givers of incentives to foreign investors, garnering a total of 20 incentives offered out of the 39 incentives and guarantees upon which the comparative ranking was based. The following ranking of the Asian countries surveyed, measured by the number of incentives made available out of the perfect score of 39, tells the story more graphically:

Rank	Name of Countries	No. of Incentives Given	% Out of 39
1	Malaysia	31	80
2	Taiwan	28	72
3	South Korea	27	70
	Singapore	27	70
4	Thailand	26	67
	China	26	67
5	Indonesia	22	57
6	Philippines	20	52
7	Hongkong	19	49

It is interesting to know that all of the above mentioned countries, except the Philippines and Indonesia, allow foreigners to own land in their respective territories.

A summary of the incentives offered by the countries surveyed is presented on the following pages.

A list of the nineteen (19) out of the thirty-nine (39) incentives that the Philippines does not offer to foreign investors include:

INCENTIVES NOT OFFERED BY THE PHILIPPINES BUT OFFERED BY OTHER ASIAN COUNTRIES

1. Guarantees against losses due to nationalization
2. Guarantees against losses due to damage caused by war
3. Guarantees against losses due to incovertibility of currency
4. Preference in the granting of government loans
5. Protection against import competition /ooo/
6. Protection against government competition /ooo/
7. Real estate ownership by alien investors /ooo/
8. Exemption from capital gains taxes
9. Exemption from taxes on royalties
10. Exemptions from withholding tax on interest on foreign loans (tax credits)
11. Accelerated depreciation allowance /***/ooo/
12. Carry foreward of capital allowance during the relief period /ooo/
13. Carry foreward of loss /***/ooo/
14. Export allowance or deduction
15. Deduction of organization expenses /***/ooo/
16. Deduction of reinvestment of profits /ooo/
17. Deduction of pre-operating expenses /***/ooo/
18. Investment tax credits /***/ooo/
19. Technical assistance to investors

NOTA BENE:

a) The incentives immediately followed by triple asterisks (***) were included in the original Investments Incentives Act (RA 5186). For some unknown reason, these incentives were deleted from the new Omnibus Investments Code (EO 226).

b) The incentives followed by triple bullets (ooo) are recommended by this report for inclusion in an improved package of incentives for the Philippines. This will upgrade the country's batting average to 30 out of 39, putting it right behind Malaysia in the comparative scale.

c) Two additional incentives, not included in the SGV Group Survey, are recommended for inclusion especially where they apply to the drug industry:

i. Exemption from customs duties and entry taxes for imported scientific equipment and parts for exclusive use in R & D to discover new product lines or improve existing ones; tax credits for locally manufactured scientific equipment.

ii. Drug procurement by the Government shall be sourced from local manufacturers, where available.

11.1.3. Rationalizing Incentives Against a Broad Scan of the Environment

Making an investment is somewhat like letting go of a bird in the hand to bring back two more in the bush.

The Dictionary of Management by French and Saward (Grower Press), in fact defines "investment" as

> "An act, or the activity of, giving up a benefit presently enjoyed (usually, handing cash) in order to gain a benefit in the future. Specifically: (1) purchasing securities; (2) purchasing capital goods or fixed assets. Also the thing acquired (e.g. security or a fixed asset) during the process. Also the value of the benefit given up (e.g. the amount of cash paid for a security or fixed asset)".

The metaphor and the definition, however, do not quite capture the essential nature of the investor and his investment; or more figuratively, of the bird-holder and his feathered possession. Investors and investments are in many ways not quite unlike the falconer and his hunting falcon. They are respectively predator and bird of prey, in a sense; but they also bring supply into the larder, and thus, perform a beneficial economic and social function.

SUMMARY OF COMPARATIVE INVESTMENT INCENTIVES

(Based on a Survey of the SGV Group; with the Permission of SGV)

Countries Surveyed	MAL	TWN	KOR	SNG	THN	CHI	IND	PHI	HKG
Against 39 Considered, Number offered	31	28	27	27	26	26	22	20	19
Basic Rights and Guarantees									
Guarantee Against Expropriation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Guarantee Against Losses due to:									
a) Nationalization	Yes	No	No	Yes	Yes	Yes	Yes	No	No
b) Damage Cause by War	Yes	No	No	No	No	Yes	Yes	No	No
c) Inconvertibility of Currency									
Remittance of Foreign Exchange earning and payments	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Repatriation of Capital	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Protection Schemes and Priotities Given To Investors and Aliens									
Employment of Aliens	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patent Protection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Preference in the Granting of Government Loans	Yes	Yes	No	Yes	Yes	No	No	No	No
Protection Against Unjust Competition									
a) Import Competition	Yes	Yes	Yes	No	Yes	No	Yes	No	No
b) Government Competition	No	No	No	No	Yes	No	No	No	No
c) Local Competition	Yes	No	No	No	Yes	No	Yes	Yes	No
Real Estate Ownership by Alien Investors	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes

LEGEND:

MAL = MALAYSIA
TWN = TAIWAN
KOR = SOUTH KOREA
SNG = SINGAPORE
THN = THAILAND
CHI = CHINA
IND = INDONESIA
PHI = PHILIPPINES
HKG = HONGKONG

	MAL	TWN	KOR	SNG	THN	CHI	IND	PHI	HKG
Exemption from Taxes and Tariff Duties									
Capital Gains Tax	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Corporate Income Tax	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Taxes on Imported Capital Goods	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Taxes on Royalties	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Taxes on Imported Raw Materials	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Withholding Tax on Interest on Foreign Loans (Tax Credot)	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Other Taxes and Fee	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Deductions from Taxable Corporate Income									
Accelerated Depreciation Allowance	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes
Carry forward of Capital Allowance during the Relief Period	Yes	No	No	Yes	No	No	No	No	No
Carry foreward of Loss	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Export Allowance/Deductions	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Deduction of Organization and Pre-Operating Expenses									
a) Organization Expenses	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No
b) Preoperating Expenses	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Reinvested Profits	No	Yes	No	No	Yes	No	No	No	No
Investment Allowance	Yes	No	No	Yes	No	No	No	Yes	No
Tax Credits (Direct Reduction From Corporate Income Taxes)									
Investment Tax Credits	Yes	Yes	Yes	No	No	No	No	No	No
Tax Credit On Domestic Capital Equipment	No	Yes	Yes	No	No	No	No	Yes	No
Other Tax Credits	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
Extension of Incentive Availment Period	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No
Special Incentives									
To Multinational Companies	No	No	No	No	No	No	No	Yes	No
To Exporters	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
To Offshore Banking Units	Yes	Yes	No	Yes	No	No	No	Yes	No
Other Laws Granting Benefitis to Foreign Investor	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Assistance to Investor									
Joint Venture Brokerage	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Technical Assistance	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Processing of Application and Other Requirements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: 1988 Comparative Investment Incentives, Published by the SGV GROUP.

It is the failure by some policy makers to come to realistic terms with the inherently self-serving purposes of the investor and his investment (i.e. return of capital and profits) that sometimes fire the polemics and epithets against multinationals in some developing countries like the Philippines. Add this to the fact that local investors and investments, which invariably are of more modest means and circumstances, tend to be overshadowed by foreign firms, and the brief against multinationals by those who wear their ideological hearts on their sleeves become the stuff upon which ambivalence in foreign investments policy originates.

A country, however, cannot continue to equivocate on foreign investments and proceed to plan its economic development and execute its strategies on the belief that the falconer will bring economic returns into the national larder without helping himself to his fare share of the profits.

The only forthright alternative is to tell the foreign investor to take his investment elsewhere. The Philippines will then have decided to become an island entire unto itself.

This part of the report should end here if the policy of self-isolation is desired. But it continues on the assumption that Filipinos by and large have a clearer focus of the national imperatives.

In fine, the assumption which impels the continuance of this line of discussion is that the Philippines needs permanent and risk-taking foreign capital to fill the bulk of the country's investments requirements to generate an extra-ordinary growth impetus to catch up at least with the moderate economic performers in the ASEAN Region.

11.1.3.1 Tropism and Reaction: Environmental Strengths, Weaknesses, Opportunities and Threats versus Investments Incentives and Guarantees

Investments incentives and guarantees may not be meaningfully formulated in a vacuum. In their pristine state, they should be the educated reactions by the State to the tropism of the economic, political and social environment. In the analytical discipline of "environmental scanning", most often resorted to by investors and corporate planners, prior to an investment decision or corporate long range planning, the tropism includes the opportunities existing in the theater of proposed operation; the strengths and weaknesses of the environment; and the natural, political, and social threats that may tilt off efforts to turn the opportunities to account.

With a view towards suggesting and analytical model for evaluating the adequacy of current Philippine investments incentives and guarantees (and how they may be made more responsive to the environment, if inadequate), a limited quick

scan of the country is submitted below. The limitation of the exercise is the conscious skewing of the results towards addressing the needs and purposes of the National Drug Policy.

Opportunites - (a) Importation of almost all active ingredients and auxiliaries in the drug industry indicates import substitution potentials; (b) 50% of productive capacities in the drug industry is unutilized; and (c) lopsided record of drug sales in Manila and Luzon (accounting 75.4% of national total) indicates unserved demands in Visayas and Mindanao (accounting for only 20.8% of national total).

Drug sales figures were derived from "The Philippine Pharmaceutical Industry Handbook", by Nicanor C. Gabunada, Jr. reporting on Regional Breakdown of Drugstore Sales for the period 1970-1985.

Strengths - (a) Availability of professional and technical manpower in the medical and pharmaceutical sectors; (b) Educated and English-speaking skilled, semi-skilled and unskilled labor force; and (c) strategic location of the country vis-a-vis the Asian mainland, Southeast Asia, Australia and Oceania.

Weaknesses - (a) Inadequate power source and communications facilities outside of Metropolitan Manila and Luzon; (b) inadequacy of bulk cargo transport system exacerbated by the archipelagic configuration of the country's geography; (c) domestic market too small to support economic scale production of pharmaceutical active ingredients and auxiliaries; (d) inherently low indigenous capability for R & D in medicines and physiology; (e) low purchasing power of 70% of the population which is below the poverty line; (f) unchecked population explosion and reluctance of the State to enunciate and carry out a pragmatic population policy; (g) prevalence of inspirational, ultra-nationalistic drift in economic legislation; (h) disqualification of foreigners from land ownership; (i) actual and pre-emptive control and regulation by the Central Bank of the repatriation of investments and outward remittance of profits (i.e. Central Bank Circulars No.s 1028, 1062 and 1088, in relation to Section 74 of the Central Bank Act, RA 265); (j) adding a fourth "C", i.e. "Citizenship", to the traditional "Three C's of Credit" (Capital, Character, and Collateral) in the extension of domestic loans to productive enterprises.

Threats - (a) Political threats (disgruntled elements of the Military, Marcos and his loyalists, ultra-rightest groups, and the National People's Army); (b) Unstable peace and order situation (criminality); (c) restive labor sector; (d) prevailing breakdown of social values, and graft and corruption; (e) ecological threats (pollution, forest denudation, and frequent typhoons in Eastern Visayas and the Isaland of Luzon); (f) Government competition; and (g) competition from imported drug products.

11.1.3.2 A Model for Correlating Guarantees against Threats; and Incentives against Weaknesses

The results of an environmental scan is an excellent take-off point for investments policy formulation. It is easy to see from those results and from the traditional tools of investment policy that

- investment incentives shore up the environmental weaknesses and sort of evens up the odds for the investors, placing them, as it were, in a theater of operation where the wherewithal for success are available, and

- investment guarantees blunt or provide a shield for the investors against the threats.

However, investment policy formulation, even given these correlations, is not an easy matter of picking out the square and round pegs (incentives and guarantees) to fit the corresponding square and round holes (weaknesses and threats) in the environment.

The policy maker must look inwardly at himself and determine whether or not he had done the necessary "homework" to enable him to undertake a circumspect and adequately responsive formulation. According to experts in public administration, the would-be policy maker should find, or not finding should build up, in himself

-- a high perception or knowledge of the cause and effect relationships governing the social or economic phenomenon to be governed by the policy to be formulated, and

-- a firm certainty as to the preferred outcome logically resulting from the enforcement of the policy to be formulated.

Alternative Strategies. - The relative levels of perception of causal relations of social or economic phenomena, and the prevailing certainty as to outcome preferences, determines the alternative strategies for policy making. And the choice of strategies, in turn, impart their peculiar brand of quality or lack of it, in the policy formulated.

Where the perceived knowledge of casual relationships in low, two strategies are pre-ordained:

-- a judgmental approach is adopted where the outcome preferences are certain, and

-- an inspirational approach is the choice where the outcome preferences are undertain.

The perception/knowledge and certainty levels are increased, according to the scholars, if the Government adopts a so-called "Socio-Economic Impact Analysis Statement (SEIAS) Policy" which mandates precisely the undertaking of researches to identify and translate into mathematical or econometric terms the various cause and effect relationships involved in a phenomenon sought to be place under manageable control; and as a consequence, array and prioritize the alternative ascertainable or quantifiable outcomes that ensue from a manipulation and controlling of the causes.

Implementation of a SEIAS Policy for the Philippine could be a function tailor-made for the National Economic and Development Authority (NEDA), a constitutional economic planning body that has a staff correlationship with the Office of the President of the Philippines.

Where a truly functional SEIAS Policy is in place, a high level of perception and certainty is achieved, making the "computational" approach to policy making, legislation, and rule-making highly feasible.

But even where certainty in outcome preferences may be inadequate, as in the case of the NDP, the "compromise" approach to policy making, which has been adopted in the Generics Drugs case, gives more assurance of fairness and rationality in policy than either the inspirational or judgemental approach allows. The chief virtue of the compromise approach in any case, is its involvement of the affected private sector in the formulation process.

Quite obviously, the need for the "computational" approach in the formulation of an adequately responsive investments incentive policy for the pharmaceutical industry is indispensable in view of the rather divergent reading of the sector's environmental opportunities, strengths, weaknesses and threats by the Government and the industry associations, respectively.

In addition, the government quite clearly seems certain about two preferred outcomes that are not necessarily complementary with each other. One preferred outcome, a social objective, is to make drugs available to all the people at affordable cost. And the other, an economic development goal, sufficiency in the local drug industry and to induce and encourage local companies to make basic and intermediate drug ingredients domestically.

This report confesses to the shortcoming that, while sharing the Government's firm certainty as to the preferred outcomes of the proposed reformulation of the drug investments incentive policy, there has not been enough and reliable statistical data and materials to impart to the Team of Experts a high perception of the cause and effect relationships governing the import-oriented and relatively high price producing drug industry in the

Philippines. Neither is the Team sufficiently acquainted with the reasons why productive capacities in the industry is 50% underutilized; and whether, if fully utilized, such capacities will bring the local drug industry to at least a level of "relative self-reliance."

The Team is also persuaded to suggest that perhaps the objective of the Third Pillar of the NDP, "self-sufficiency in the local drug industry," could be more pragmatically restated.

Within the above stated limitations, the model used for correlating the package of investment incentives and guarantees respectively with the perceived weaknesses and threat in the Philippine environment, as these might impact on the objectives of

-- lowering the cost of medicines to a more affordable level by the majority of the Filipino people. and

-- developing a level of relative self-reliance in the local drug industry --

is, at best, merely judgemental, not computational.

Proposed Additional Guarantees. - Against the enumeration of seven (7) different threats in the environmental scan detailed under the Heading 3.3.1., of this report proposes responses only to the last two (2) i.e.

THREATS	RESPONSIVE GUARANTEES
i) Government competition	i) Guarantee against government competition; assurance that the government will give first opportunity to existing drug companies with excess unutilized capacities, to avail of incentives and opportunities to utilize their idle capacities under the NDP; and undertaking by the DOH to source all their drug procurements from local producers in implementation of the drug procurement policy.
ii) Competition from imported drug products	ii) Guarantee against import competition (conceivably implemented by a corresponding incentive: post operative tariff protection).

This report does not propose any response to the threats that arise from natural or ecological causes.

Proposed Additional Incentives. This report proposes the following additional incentives as responses to specific weaknesses in the economic invironment:

WEAKNESSES:	CORRESPONDING INCENTIVES:
i) Inherently low local capacity for R & D	i) Exemption from customs duties and taxes of imported scientific equipment; tax credit for local ones.
ii) Disqualification of foreigners from owning land	ii) Constitutional revision allowing foreigners to own land for their factories and homes with realistic area limitations.
iii) Controls on the repatriations of investments and outward remittance of profits.	iii) Amendments of the Central Bank Act (RA 265) exempting BOI-registered enterprises from the provisions of Sec 74. of said Act.
iv) Use of citizenship as criterion for extension of domestic credit.	iv) New law disauthorizing the Central Bank from making such imposition and declaring that it shall be against national policy to deny credit to any person or entity by reason of nationality.
v) All other weaknesses enumerated in Heading 3.3.1 that aggrevate the cost of doing business.	v) Cost-attenuating incentives e.g. those mentioned in Nos. 11, 13, 15, 16, 17 and 18 in the enumeration of "Incentives not Offered by other Asian Countries."

11.1.4 Issues Relevant to the Understanding of Certain Weaknesses in the Environment

The problem of the unaffordability of medicines to 70% of the population of the Philippines who are poor and most in need of drugs is, at bottom, a basic needs problem. In the Filipino's hierarchy of wants, medical attention is outranked only by his need for food, clothing, and shelter.

The Filipino's need for medicine and medical attention is, in fact, no more nor less than that of the universal man regardless of his race, color, sex or creed. That need has been elevated into a basic human right, "the right to physical and mental health," under the Universal Declaration of Human Rights adopted by the General Assembly of the United Nations on 10 December 1948.

The tragedy, of course, is that, despite the impoverished condition of most of the Third World and the continuing rise in the cost of research and development in the drug industry -- two contrary forces that pull in opposite directions to make the problem of the affordability of drugs a common plight of the untold millions of poor people in such countries as the Philippines, India, Bangladesh and many others -- no human rights measure (like say, the Convention on the Prevention and Punishment of the Crime of Genocide or on the Elimination of All Forms of Racial Discrimination) has been adopted by the United Nations addressing the Right of the Poor to Physical and Mental Health Reconciled with the Right of Discoverers of New Drug Formulations to Their Intellectual Properties.

11.1.4.1 Resolving the Conflict Between the Human Right to Health and the Right to Intellectual Property

Under both international and municipal law, the right to private property is the most widely and intensively expounded and developed human right concept, juristically speaking.

Tracing strong roots both in Roman Law (specifically, the subsequent interpretations and modification of the Twelve Tables of 449 B.C.) and Common Law (offshooting from the concept of the right to contract formulated in the 15th century in the wake of the discovery of the New World), the right to private property had come, in its broadest sense, to contemplate the right to posses, enjoy, dispose of and recover, if wrongfully taken, those things, <u>tangible</u> or <u>intangible</u>, which are beneficial to society.

Precisely at the core of the ideological debate between the extreme right and the extreme left, is how property (i.e. "those things which are beneficial to society") may be more equitably distributed to the intended beneficiaries. The old and archaic systems of distribution, among them the pre-emptive rights of kings and feudalism under English Common Law and the preferrential right of the patricians over the plebians under Roman Law, had increasingly yielded to the redistributive effects of taxation, eminent domain, police power in the pursuit of such people-oriented objectives as public interest, social justice and public welfare.

And, yet, some questions beg to be postulated.

Should not all nations and philantrophic organizations the world over probably subscribed to the building up of an international fund, ideally trusted with the World Health Organization (WHO), to subsidize the R & D costs of the pharmaceutical industry and, in so doing, reduce or obviate the necessity of patenting vital new drug discoveries and passing on the cost of the creative effort on to the impoverished consumers?

Should not WHO probably see some exemplarities in the Prize and Gratuity Awards initiated by Alfred B. Nobel some years ago in the field of Medicine and Physiology, among other areas of human excellence beneficial to the human race?

This study does not presume to have found the right answers to these inordinately complex, albeit naive, question. But in the face of the population explosion and the misery it engenders, there seems to be a call to ask even the naive questions, now.

Quite obviously, to actualize a future international convention spelling out the specifics of the universal human right to physical and mental health, and establishing the institutional mechanism to promote and uphold that right, it is necessary for all nations of the world to recognize -- and, in so recognizing, act in concert to alleviate -- human indignity and suffering caused by the unaffordability of medicines and medical services to the impoverished multitudes of this planet. Only thus will the present laissez faires system of commercializing breakthrough discoveries in medicine and physiology begin to assume the ugly physiognomy of a crime against humanity (as, for instance, has genocide, apartheid, and male chauvinism) and galvanize the community of nations to stigmatize and eliminate that blight as a measure of self-redemption.

On top of this naivete, the final close-to-home question need be posed. What has the Philippines one its own done, and what can it do in the future, about the conditions of irrationality in its pharmaceutical industry, in particular, and in its bid for social reforms and economic recovery and progress, in general?

11.1.4.2 First Imperative: More Use of the Computational, rather than the Inspirational, Approach to the Formulation of National Policy and Legislation.

To study the trend of policy formulation and legislation in the Philippines is to run through a gauntlet ambivalent resolutions of a number of issues vital to social reforms, and the economic development and future progress of the country. This has resulted from the discerned predisposition of public administrators and legislators to use "judgemental, or worse," the "inspirational," rather than the "computational," approach to policy formulation and law-making.

The Gauntlet of Ambivalence. - Before the indictment can be made that the prevailing approach to national policy formulation and law making is largely "judgemental" or "inspirational," therefore defective, it might be useful first of all to sample the gauntlet of ambivalence earlier discussed:

a) A national consensus for the urgent need for a forthright population policy[1/] to arrest the explosion fails to galvanize it self into a reality becuase the State, despite its constitutionally avowed separation from the Church, hesitates to formulate and pursue a birth control policy that would go off tangentially form church-held views.

b) While acknowledging the inadequacy of capital formation in the country to dent the investment requirements for economic recovery and growth, and while the Executive Department of the Government goes out of its way to woo foreign investments, the Philippine Congress continues to churn out polemics and legislative proposal to "nationalize" (actually, the effect is only to "Filipinize") this or that industry sector.

c) While many knowledgeable Filipinos decry the gross underdevelopment of the nation's securities market (a condition of "thinness" being discerned in the stock market, and a fettered process of public offerings in the commerial papers market), the Philippine Martial Law legislature (the defunct "Batasan Pambansa") aggravated the situation by passing Batas Pambansa Bld. 178, the Revised Securities Act, which mandated that the Securities and Exchange Commission should determine the economic soundness commercial paper issuers and their proposed issuances; and then, worse, hamstrung the inherent negotiability of commercial papers by subjecting transactions in these instruments to the circuitous second-layer documentation requirements attaching to the transfer of common bank deposits.

1/ The Manila Bulletin, in its issues dated 30 and 31 August, and 01 September, 1988, in a Special Report written by Ms. Pinky Concha Colmenares, reports that: "A 1987 survey of urban poor women in their prime reproductive years showed that 63 percent of them wanted no more children. Of those interviewed who were pregnant, 41 admitted that the outcome of the pregnancies would be unwanted children."

d) The pursuit of relief from the country's external debt burden is being done basically as an exercise in debt restructuring; whereas, it could be more meaningfully pursued as the quantifiable sine qua non and source of capital input to propel the country out of the hole of negative growth experienced in 1983-1985 and then to power the economy further upwards to positive growth apace at least with that of its newly industrialized neighbors in Southeast Asia.

e) There is currently under implementation a so-called "Import Liberalization Program" in the face of the continued pegging of the value of the Philippine Peso to a so-called "guiding rate" (a parity between the Peso and the U.S. Dollars expressed in pesos) artificially fixed by the Central Bank, a devise blamed by some quarters as not only putting the national currency on a "dirty float," but also one which unduly over-values the peso thereby enabling the Filipinos under the Import Liberalization Program to find cheaper imported apples (₱10.00 a piece) than homegrown papayas (₱20.00 each) in the marketplace.

f) Closer to the concerns of this study, the new tax treatment of science foundations under Executive Order No. 93, promulgated on 10 March 1987, directly undermines the Third Pillar of the National Drug Policy which seeks to "develop self-sufficiency in the local drug industry, induce and encourage companies to make basic and intermediate drug ingrediants domestically."

"<u>90% Inspiration, 10% Computation</u>." - This topical caption is the reverse of the generally accepted formula for success in most creative endeavors, except that the formula to "perspiration" instead of "computation" in their recommended mix for creative success.

Unfortunately, a surfeit of inspiration is equally as unrewarding in both the policy making exercise and the creative arts because the process does not quite put the artist or the policy maker in touch with reality.

Based on the not so few ambivalent national policies in the Philippines today, there is probable cause for the indictment that the policy makers and legislators of the country are more often than not moved and motivated by inspiration than by a systematic and workmanlike evaluation of the social or economic phenomena which they have endeavored to contain and regulated within the frame work of a written national policy.

The need for a SEIAS policy analysis in the drug industry cannot be overemphasized because the unfolding of the NDP is only half complete. The promulgation of EO 175, the new Food, Drugs and Devises, and Cosmetics Act, basically reinforces only the First Pillar of the NDP which seeks to "assure consumers that medicines are safe and effective" by strengthening the capabilities of BFAD for quality control.

The Generic Drugs Act of 1988, on the other hand, supports only the Second Pillar, i.e. fostering the rational use of drugs.

The drive for national self-sufficiency in drugs (Third Pillar) will continue to be embroiled in the ambivalence on foreign investments and in the sudden shift in the tax treatment of science foundations.

Improved government procurement of drugs, finally, remains an administrative in-house program of the Department of Health.

National Self-Sufficiency in Drugs and Foreign Investments. - In the reference paper of the Department of Health summarizing the National Drug Policy, National Self-Sufficiency in Drugs (the Fourth Pillar) is described as "an ambitious undertaking towards which trade and investments policies must be supportive."

How far and consistent this support must go is estimable, or, if you will, inestimable, from the following uncontroverted claim of the Drug Association of the Philippines in its audio-visual presentation of the industry to the government sector in January this year:

> "The manufacture of raw materials -- active substances and auxiliaries -- is highly capital intensive. The huge investment requires large scale drug production and a worldwide market to justify costs. Manufacture for the Philippine market alone would not be economically vaible."

The realization of the Fourth Pillar of the NDP, given the foregoing perspective, could be an interesting first opportunity for a SEIAS policy exercise to probe the adequacy of the existing investments policy of the country as expounded in the Omnibus Incentives Code (Executive Order No. 226) and as circumscribed by the preceived ideological inclination of the Filipino given his ingrained social and cultural values and attitude discussed in the earlier pages to of this report.

Government Drug Procurement, Privatization, and Other Considerations. - Government procurement of drugs at cost or for free distribution to beneficiaries of public health delivery services, has been a fixture of DOH operations for some time now. It is reported that fully half of the budget of the Department is applied towards this purpose.

The Government drug procurement program, as a component of the NDP, has created private sector anxieties that the Government is contemplating to set up its own drug manufacturing facility. Private business protests that such a plan contravenes the declared policy of the State on Privatization.

There may, perhaps, be more shadow than substance causing that anxiety. Nevertheless, the government procurement may have its own built-in disadvantages and inefficiencies.

For instance, the exact volume, mix and timing of drug need and use by the Government's clientele among the public, cannot be easily approximated and dovetailed with procurement schedules, carry of inventory, dispensing and replenishment. And since government accounting hardly reckons with such non-cash costs for carriage of inventory as cost of money, cost of handling, transport and storage, not to mention losses, wastage, and expiry of drug efficacy, other ways of achieving the cost-saving and logistical advantages envisioned by the Fourth Pillar may be considered for feasibility.

One alternative that comes to mind is the issuance by the DOH and affiliated agencies of "Prescription Scrips" or tickets exchangeable with accredited drug stores for the specific drugs prescribed in the scrips. At the end of a specified period, say a month or a forthnight, the drug stores concerned may then submit their summary of "scrip" sales to the DOH for reimbursement.

The Promotion of Private Scientific Research and EO 93. - One of the classic "inspirational" policy shifts of the Government in recent memory has been the removal by Executive Order No. 93 (10 March 1987) of two direct tax incentives to science foundations, granted to these institutions by the Science act of 1958 (RA 2067 as amended by RA 3589), namely:

a) Tax exemption of all income of whatever kind and character which such foundation may derive from any of their properties, real or personal, or from their investments; and
b) Exemption from all taxes and duties or apparatus, instrument, untensils, equipment and materials imported into the Philippines solely for scientific and technological research and development, and not for barter, sale or hire.

As a result of this removal, all income from the operation of science foundations, particularly service fees for scientific consultancy and the earning of their endowment funds and properties are now taxable.

The only income of science foundations that continue to enjoy tax exempt status are those that come in as membership fees or dues from its corporate members.

Alsc continuing to enjoy tax exemptions are donations, gifts and other charitable contributions to science foundations. Not strictly "incomes" from the taxation point of view, these inflows are exempt from the donor's tax (which would otherwise have been payable by the donor) and donee's tax (which would other wise have been payable by the foundation as done).

The removal of the exemption from income tax in effect consigns science foundations to an attitude of mendicancy and removes the essentiality of "endowment funds" whose income, when invested, assures the self-generating capacity, self-reliance and continuing viability of science foundations.

In fact, etymologically, foundations have been so-called because their existence and raison d'etre are largely anchored or "founded" on the steadying "rock" which endowment funds for investments provide. That essentiality has been destroyed by EO 93 on the inspirational consideration that removal of the exemption would bolster tax revenues.

But what is really the preferred outcome of the policy on science foundations; or, for that matter, on the encouragement of the expenditure of private funds for scientific research?

Can that previously preferred outcome be correlated with the pre-identified outcome of the Third Pillar of the NDP (National Self-Sufficiency in Drugs) of inducing and encouraging private enterprise in the pharmaceutical industry (a research-heavy sectory) to manufacture basic and intermediate drug ingredients locally?

11.1.4.3 Second Imperative: Recovery, Reconstruction and Reform

The complete unfolding of the National Drug Policy cannot be taken is isolation of the national development process. It must, above all, be taken in the context of a comprehensive socio-economic blue print for recovery, reconstruction and reform that is attuned to the nuances of the locale of plan formulation and implementation. That locale is the Philippines -- a unique combination of time, place, history, people and odd circumstances.

Noted Mr. Sixto K. Roxas, eminent Filipino economist in a speech early this year before a forum of Provincial Governors:

> "When President Aquino ascended into power in February, 1986, the country was faced with three tasks: recovery, reconstruction and reform.
>
> Recovery to get production and incomes back to capacity. Reconstruction to restore the impaired facilities and the serious damage brought by past management. Reform to remedy the social and economic inefficiencies and inequities in the structure of production and in income and wealth distribution in the country"

[illegible] or no control at all."

Undoubtedly, the NDP is a well thought out and imaginative reform policy concerning a vital sector of the Philippine economy. It had been formulated through the initiative of the DOH which set up a Task Force on Pharmaceuticals for the purpose in June 1986. And its conclusions, precepts and directions have been evolved after a long and circumspect series of consultations with the pharmaceutical industry, professional organizations, academic and consumer groups; local research which, after a situational analysis, enabled the Task Force to identify the basic issues in the industry; and international research which entailed visits to Malaysia, Indonesia and Thailand to gain insights into the experiences of these countries in formulating a national drugs policy.

But since the dimension of development requires that the concern for recovery and reconstruction must be considered hand in hand with the imperative for reform, the NDP might acquire added relevance and dimension if it were:

-- to assist existing drug enterprises increase their utilitzation of available productive capacities reported by the Drug Association of the Philippines to be only about 50% utilized, in pursuit of the imperative for recovery; 1/ and

-- to restore the tax exemption of science foundations, in pursuit of the imperative of reconstruction.

Further, in pursuit of the reform imperative, a special R & D incentive should be inserted in the Omnibus Incentive Code granting research-based drug manufacturing companies, which registers with the Board of Investments under the Code, "exemption from all taxes and duties on apparatus, instruments, utensils, equipment and materials imported into the Philippines solely for scientific and technological research and development in the field of Medicine and Physiology, provided said importations are not for barter, sale or hire." If said 7equiptment are now in operations and the taxes and duties for which has been paid, a tax credit may be given.

This reformative policy proposal supports the Third Pillar of the NDP relating to the search for national self-sufficiency in pharmaceuticals.

1/ Steps in this direction has already been initiated by the Secretary of Health who has invited local drug manufacturers to address their unutilized capacities towards filling he demand of the Government Drug Procurement Program.

Although some what similar to the tax and duty free exemption on imported equipment provided for in Section 39 (e), Title III of Book One of the Omnibus Investment Code, the equipment in the envisioned new exemption relates to R&D, ergo, to support, equipment; in contract to the principal: "on-line" manufacturing equipment spoken of in the code which are "needed and will be used by the registered enterprise in the manufacture of its products".

11.2 Perspectives on the "NATIONAL DRUG POLICY"

On 30 April 1987, during her inaugauration of the new building of the Bureau of Food and Drugs (BFAD) in Alabang, Muntinlupa, Metro Manila, Pres. Corazon C. Aquino enunciated, for the first time, a four-point National Drug Policy (NDP) designed to **"ensure that safe and effective drugs are made available to all Filipinos at any time and place and at a reasonable and affordable cost."**

The components of the Policy, called its "Four Pillars," are:

a) Quality Control. - Assure consumers that medicines are safe and effective by improving quality control.

b) Rational Use. - Foster rational use of drugs by creating an official list of Government-approved essential drugs and by regulating the promotion and advertising of pharmaceuticals.

c) National Self-Sufficiency. - Develop self-sufficiency in the local drug industry and induce and encourage companies to make basic and intermediate drug ingredients domestically.

d) Government Procurement. - Improve the current Government procurement program to provide better drugs at cheaper prices through bulk purchasing and contract manufacturing.

As thus stated, the NDP invites little polemics of controversy, for avowedly the Four Pillars are in effect universal ideals which attract almost every one.

However, reduced to specific and concrete goals and converted into quantifiable targets for strategy and action, the Four Pillar are perceived to transform themselves into weapons of appression aimed at those who feel compelled to defend the status quo. Those who feel themselves in the line of fire, intimates Mr. Nicanor C. Gabunada, Jr. (Associate Director of the Pulse Research Group and author of "The Philippine Pharmaceutical Industry Fact Book"), is the pharmaceutical industry itself which he pictures as being "caught in the middle of certain elements over which it has little, or no control at all."

Writes Mr. Gabunada, in the Foreword to his Fact Book, as to what these elements are:

> "First, are the paradoxes surrounding the nature of the industry's existence. Some of these, like the paradox of saving lives for profit, are more apparent than real. Others, such as the need for regulations governing the safety and efficacy of pharmaceuticals require fine balance between death and suffering that could be caused by the premature release of unsafe products and the needless delay of the approval of safe ones.
>
> "Second, is the insufficient availability of information on the industry." This has resulted in the spread of numerous allegations that, often repeated as propaganda, have developed into myths and legends. More importantly, the complexity of the industry's functions and the highly sensitive issues underlying them can, in all good faith, lead from a single set of facts to diametrically opposed perceptions. For example, the industry considers its profit levels commensurate to the high cost, and high risk undertaken in research and development. Critics, on the other hand, consider the high profitability of the industry a blatant example of exploitation and overcharging.
>
> "Third, is the fact that diseases which are easily treatable and/or preventable continue to prevail in the Philippines where poverty covers 70% of the population. When people do not have enough to eat, they expect the government and society to provide them medicines at a very low cost, if not free. Ironically, the people who need medicines most are those who do not have the means to pay, and neither do their government."

What are the facts? Is the industry truly in the line of fire? If it is, will the fusillade of contemplated reforms under the NDP inflict upon the industry a mortal wound? Or would the spate of reforms be nothing more than the pruning, as it were from a tree, of supernumeracy branches and appurtenances in order to give the industry breathing space and to canalize its growth and development along rational lines calculated to best serve the industry's own interests and those of the society it is supposed to serve? What are the issues? And what are some of the fair solutions?

11.2.1 The Specific Objectives of the NDP

In the wake of the announcement and initial implementation by Government of the NDP, at least three development addressed towards achieving certain specific objectives of the Policy have caused anxieties in certain quarters of the Philippine pharmaceutical industry, These developments include:

a) The proposed delisting of certain drugs and medicines that have been banned, restricted or withdrawn from the market of other countries but are still available in the Philippines;

b) The specter of the Government going into drug manufacturing and distribution (not contemplated under the NDP at the moment) as an extreme alternative to the proposed reorientation of the Government's procurement system to achieve the economies of bulk purchasing; and

c) Senate Bill No. 453, approved by the Philippine Senate on 30 May 1988, and signed into law by President Aquino on 13 September 1988, which seeks to "promote and ensure the production of an adequate supply, distribution and public use and acceptance of drugs and medicines identified by the generic names."

A major development, of course, which seems not to have raised a ripple, is the substantial revision of RA 3720, (the Food, Drug and Cosmetics Act), the NDP on 30 April 1987. The revisions were effected by EO 175 (the new Food, Drugs and Devices, and Cosmetics Act), one of the few major legislative issuances of President Aquino in the exercise of her interim post-revolutionary powers of legislation under the revolutionary Freedom Constitution of 1986.

11.2.1.1 Executive Order No. 175

Suiting action to words, the President incorporated at least two of the "Four Pillars" of the NDP into the new Food, Drugs and Devices, and Cosmetics Act when she promulgated EO 175 on 22 May 1987. This effect is shown more dramatically in the revisions (highlighted by underscoring) wrought by EO 175 on RA 3720, viz:

Title Caption, as revised:

> "AN ACT TO ENSURE THE SAFETY AND PURITY OF FOODS, DRUGS, AND COSMETICS, <u>AND THE PURITY, SAFETY, EFFICACY AND QUALITY OF DRUGS AND DEVICES</u> BEING MADE AVAILABLE TO THE PUBLIC BY <u>VESTING THE BUREAU OF FOOD AND DRUGS WITH AUTHORITY TO</u> ADMINISTER AND ENFORCE THE LAWS PERTAINING THERETO, <u>AND FOR OTHER PURPOSES</u>."

Declaration of Policy, as revised:

CHAPTER II - Declaration of Policy

"SEC. 2. The State policies as embodied in Article II, Section 15 of the 1987 Constitution that: 'The State shall protect and promote the right to health of the people and instill health consciousness among them' and in Section 12, Article XIII of the 1987 Constitution, that: 'The State shall establish and maintain an effective food and drug regulatory system and undertake appropriate health manpower development and research, responsive to the country's health needs and problems' are iterated".

"SEC. 3. In the implementation of the foregoing policies, the Govenment, through the Department of Health, shall, in accordance with the provisions of this Act:"

"(a) Est blish standards and quality measures for foods, drugs and devices and cosmetics."

"(b) Adopt measures to ensure pure and safe supply of foods and cosmetics, and pure, safe, efficacious and good quality drugs and devices in the country." (First Pillar, NDP, re: Quality Control).

"(c) Adopt measures to ensure the rational use of drugs and devises, such as, but not limited to, banning, recalling or withdrawing from the market drugs and devices which are not registered, unsafe, inefficacious, or of doubtful therapeutic value, the adoption of a National Drug Formulary, and the use of generic names in the labelling of drugs. (Second Pillar, NDP, re: Rational Use)."

"(e) Strengthen the Bureau of Food and Drugs."

In addition to the foregoing shift in policy, which emphasizes the adoption of the new standards of "safety, efficacy and good quality" of drugs that may be allowed manufacture, importation, and sale to the public, EO 175 transformed the BFAD from a basically standard-setting and enforcing agency to one which performs registration and licensing functions over enterprises and products in the pharmaceutical industry. In the past, drug enterprises were licensed to operate by local governments, along with all other business entities. And only new drugss "were required to be registered with BFAD".

Under RA 3720, the BFAD had basically little regulatory functions over the pre-productive and/or pre-procurement phase in the drug industry except to

a) Advise the Commissioner of Customs (COC), in the case of imported drugs, that, based on the results of BFAD examination of random samples submitted by C O C from said importation, said imported drugs are or had been either unsanitarily processed or packaged or are forbidden or restricted from sale in the country of origin; or are adulterated, misbranded, or are new drugs that have not passed the prerequisite tests and standards for public distribution and must, therefore, be refused entry into the Philippines; and

b) Impose legally mandated labelling and packing requirements such as: statement of quantity of contents (weight, measure, number, count); cautionary notices such as that the drug is "habit forming," or "may not be dispensed without the prescription of a physician;" safe dosage level and frequency or duration of use; expiry of efficacy period; and that, if the drugs are compounds wholly or in part of any antibiotic, the same are from a batch with the proper "release certificate" and that the efficacy of the batch has not yet expired.

In the case of imported drugs, BFAD's pre-screening examination is often rendered post facto because the C O C is authorized by RA 3720 to deliver the importation to the owner or consignee, pending examination of the sample by the BFAD, upon the owner's or consignee's posting of a bond.

The transformation of the BFAD from a virtually "post-tomb" to a "pre-womb" regulator in the business cycle of pharmaceutical enterprise was effected by:

(aa) The changing of the Headnote "NEW DRUGS" preceding Section 21 of RA 3720 into "LICENSING AND REGISTRATION," by EO 175; and

(bb) The insertion of the following new section by the said Executive Order after Section 21 of the same Act, viz:

"SEC. 21-A. No person shall manufacture, sell, offer for sale, import, export, distribute or transfer any drug or device without first securing a license to operate from the Bureau after due compliance with technical requirements in accordance with the rules and regulations promulgated by the Secretary pursuant to this Act".

"SEC. 21-B. No drug or device shall be manufactured, sold, offered for sale, imported, exported, distributed or transferred, unless registered by the manufacturer, importer or distributor thereof in accordance with rules and regulations promulgated by the Secretary pursuant to this Act. The provisions of Section 21 (b), (d) and (e), to the extent applicable, shall govern the registration of such drugs and devices".

"SEC. 21-C. The Secretary shall promulgate a schedule of fees for the issuance of the certificate of product registration and license to operate provided for under Sections 21, 21-A, and 21-B."

Other salient revisions of EO 175 on RA 3720, include:

(cc) Increase in penalty for violation of the Act:

Type of Penalties:	FROM: (Under RA 3720)	TO: (As Revised)
Imprisonment -		
Minimum	6 months & 1 day	1 Year
Maximum	5 Years	5 Years
F i n e		
Minimum	Not less than ₱1,000	Not less than ₱1,000
Maximum	-	Not more than ₱5,000

NB. Both fine and imprisonment may be imposed at the discretion of the Court.

(dd) Filling a specific gap in the penal provision of RA 3720 (Section 12) which did not specify upon whom (natural person) shall the penalty of the law apply if the violator is a juridical person, through the insertion of the necessary provision, viz: "Should the offense be committed by a juridical person, the Chairman of the Board, the President, general manager, or the partners and/or the persons directly responsible therefore shall be penalized."

(ee) The addition of four (4) additional "Prohibited Acts" to the eight (8) originally enumerated under Section 11 of RA 3720, viz:

"SEC. 11. The following acts and the causing thereof are hereby prohibited:"
" x x x x x x x.

"(j) The manufacture, importation, exportation, sale, offering for sale distribution or transfer of any drug or device which is no registered with the Bureau pursuant to this Act".

"(k) The manufacture, importation, exportation, sale, offering for sale, distribution or transfer of any drug or device by any person without the license from the Bureau required under this Act".

"(l) The sale or offering for sale of any drug or device beyond it exoiration or expiry date".

"(m) The release for sale or distribution of a batch of drugs without batch certificate required under Section twenty-two hereor". "Batch" as used above, is defined as a quantity of any drug or device produced during a given cycle of manufacture.

(ff) The mandate given to the Secretary to issue, with the recommendation of the BFAD Director, rules and regulations that "shall provide for, among others, the banning, recalling or withdrawing from the market drugs and devices which are not registered, unsafe, inefficacious or of doubful therapeutic value, the adoption of a National Drug Formulary, and the use of generic names in the labelling of drugs." (Insertion of EO 175 in Section 26-a of RA 3720. Note that the mandate to adopt a national Drug Formulary and the use of generic names is a reiteration of the strategy for NDP implementation stated in Section 3-c of RA 3720).

11.2.1.2. The "Generic Drugs Act of 1988."

On 30 May 1988, the Senate of the Philippines passed on Second Reading Senate Bill No. 453 which, together with its counterpart version from the House of Representative, has been consolidated into a proposed "Generic Drugs Act of 1988". This Bill has been signed into law by President Aquino on 13 September 1988, and is now entered in our statute books as Republic Act (RA) No. 6675.

The Specter of State Intervention - The act has invited a lot of controversy, not so much on its central theme of promoting the "public use and acceptance of drugs and medicines identified by their generic names," but on the mandatory imposition on private physicians and dentists, in giving out prescription, to "indicate the generic name of the drug" prescribed.

The drug industry association, in a position paper, argue that Government may justifiably impose the prescription and use of generics on government physicians, dentists, and health delivery agencies. But the associations contend, Government would be unduly intervensionistic if the imposition were also to be made on the private sector. The Drug Association of the Philippines (DAP) states that "Brand products should be allowed to compete with generics in a free market in order that consumers may choose freely."

Between Freedom and Captivity of Choice - The industry may well have a point, except for the fact for all practical purposes, the exercise of free choice in the market for ethical drugs may altogether be illusory. In the real world of the day-to-day marketplace, it is really the prescribing dentist veterinarian, or physician who chooses for his patient what brand drug to prescribe for whatever ails the latter. And, in the workings of the selling and promotions game in the drug industy, the prescriber's decision is almost always captive to the relative values of the "useful gift items" in store for him for filling a prescription quota on particular drugs that manufacturers may be hard-selling to the public at the time.

The gift-giving patronage by drug manufacturer on prescribing physicians is legitimate in the promotion and advertising game. And it is the rule rather than the exception among the big manufacturers in the industry. Thus, more likely than not, the choice by a physician of a particular drug brand (given an array of choices) may be his preference for the gift item (say, a choice between a refrigerator and a TV set) attainable from the manufacturer's promotion program at the time.

What this system demonstrates is the seeming irrelevance to the prescribing physician of the differentiation, if any exists, on the relative efficacy and so-call "bio-availability" of the array of brand drugs available; and the relavance, instead, of the subjective value to him of the "gift" the anticipates to receive in the exercise of his Hippocratic privilege of prescription.

The New Law Strikes a Comoromise. - Professional practitioners in the medical field should probably heave a sigh of relief because of the Generic Act appears to have accomodated the DAP position of giving fair opportunity to brand pharmaceuticals to compete with generics by allowing the prescribing professional to include the brand name of the recommended medicine in the prescription slip, if desired.

Under the new law, the State has apparently chosen the "carrot" along with the "stick" in bringing about the objective of legislation: lower costing drugs through the use of their generic terminology in the labelling, advertising, and prescription of medicines.

Significantly, rather than mandate on manufacturers and importers the use of generic names on their products, the new Generic Drugs Act of 1988 seeks to promote " the exclusive use of generic terminology in the manufacture, marketing, and sales of drugs and medicines xxx through a system of incentives as the Board of Investments jointly with the Department of Health and other government agencies xxx shall promulgate in accordance with existing laws."

Existing incentives legalization may however, prove wanting in certain respects. This is the thesis of the preceding Chapter.

"The National Drug Formulary". - The carrot of incentive which the Government hopes to dangle before the Philippine drug industry is pointed towards leading the pattern of supply and use of drugs towards the choiced generic listing of these products in the National Drug Formulary (NDF). The NDF, also known as the "Essential Drug List", is a list of drugs prepared and periodically updated by the DOH on the basis of the health conditions obtaining in the Philippines as well as on internationally accepted criteria. It consist of a core list and a complementary list.

The "Complementary list" is a list of alternative drugs used when there is no response to the core essential drug or when, for one reason or another, the core essential cannot be given.

The carrot approach is, of course, only true in the Generic Drug Act of 1988. It is the view of this report, in fact, that if the carrot does not entice the industry towards the NDF, the DOH may always bring out the big stick hidden in the new insertions of EO 175 to section 11 of RA 3720. These insertions are quoted verbatim at the end of the discussion of heading 4.1.1.

11.2.1.3 Other Proposed Legislation on the Pharmaceutical Industry.

Reflective of President Aquino's concern for uplifting the health condition in the country, Congress started the legislative mill grinding on a number of proposed new laws on the pharmaceutical industry, on top of the recently enacted "Generic Drugs Act of 1988" just discussed. The more important ones include House Bills Nos. 2144, 2187, 2550 and 2804.

House Bill No. 2144. This bill proposes to declare a "National Policy on the Drug Industry" and to regulate "the activities and relations of persons and entities engaged (in said industry) and (to establish) the Drug Industry Commission."

The National Policy sought to be established by the Bill reflects the Four Pillars of President Aquino's NDP, and then some.

For all that, however, House Bill No. 2144 may well be the interesting take-off point for an in-depth study of the drug industry. It dares to tread into what author N. C. Gabunada (see supra) calls the "highly sensitive issues surrounding (the complexity of the industry's functions)" which have led, "in all good faith, from a single set of facts to diametrically opposed perceptions."

The Bill, for instance, has taken the bull by the horns (with the bravado, if not probably with the skill, elan and finesse, of a matador) on such issues as: the reasonableness of drug prices in the Philippines; the ratable shares in the family expenditure for health care of the cost of medicines as against hospitalization expenses and professional fees; the price reduction potentials of generics over branded pharmaceuticals; the "unjustifiable" cost of advertising and promotion which "created an upward push" on the price of drugs at the retail outlest; the "inordinately high" transfer pricing in the industry; the "inordinate profits" of the industry; the "monopoly" of the multinationals in the drug sector; among other issues.

Against its diagnosis of what ails the drug industry because of these symptomatic issues, Hous Bill No. 2144, therefore, unrevels an array of State intervensionist recourses against the free play of market forces, seeking thereby to lower the cost of medicines; reduce the number of supposedly redundant drugs; limit promotional and advertising activities of drug companies; control transfer pricing and therefore curtail excessive profits of drug companies, particularly multinational drug companies; encourage initiatives of local capital and technology; and, in general, improve the deteriorating health condition of the people.

House Bill No. 2187. - This bill essays a two-pronged attack on the present unavailability of medicine to the greater majority of the nation's poor at affordable prices by both managing the quantity and controlling the price of imported pharmaceuticals. Availability and affordability are envisioned to come about from an anticipated achievement of cost economies derived from "bulk" importation which requires a "cross-checking" of the import price at which a particular drug is imported into the Philippines against the exporters asking price of the same drug to five other countries.

The drug associations have faulted this bill for its lack of definition as to what constitutes "bulk importation." Moreover, the associations observe that bulk importation may not always be cost-effective because it may not always dovetail with critical production schedules to assure the continuous supply of drugs to the public. Finally, it is claimed, that in the case of high potency drugs which require a minimum of active substances, bulk importation may in some instances be impractical or uneconomic because the total requirements to fill an annual Philippine demand may just be a few kilos a year.

House Bill No. 2550. - This Bill and House Bill No. 2187, just discussed, are cut from the same cloth, each from either extreme of the fabric.

Both aims to ensure the affordability of safe, effective and good quality drugs for all sectors of the country. Thus, where House Bill No. 2187 seeks to control the "input cost" of materials that determines to a large measure the retail price of the medicine at the corner drug store, House Bill No. 2550 seeks to put the control cap on the price at which the drug is sold at the retail outlets. Section 2 (a) of the latter Bill requires that "the margin of profit" of any single item of drugs and medicines sold in retail shall not exceed 20% based on factory price.

The Bill's solution to the affordability problem is simplistic, to say the least. It makes no definition of the key terminologies used, e.g. "ex factory price," "retail" and "margin of profit." It takes no sensible consideration of factors and practices in business operations where geographic distances, inventory carrying costs (e.g. interest on borrowed funds to support inventory), trade discounts, and value added tax, among others, impacts negatively on so-called margins of profit.

Price control and other modes of managing the free play of market forces has frequently been the inspirational muse of populistic legislation in the Philippines. The conservative core of Philippine society, which contitutes the nation's silent majority, view the exercise of price control as nothing more than a circuitous route to the tiger's stomach by at first riding the tiger's back.

House Bill No. 2804. - This Bill proposes to Filipinize (the provisions, though, uses the stronger term "Nationalize"in the text) the drug industry by proposing that at least 60% of the capital of companies engaged in the sector by owned by Filipino citizens.

Apart from earning nationalistic trophy points for its authors, this bill (and other of its kind that may be presented in the future) are clearly excessing the light of the clear-cut and stable national and foreign investment policies of the country now consolidated and embodied in Executive Order No. 226, otherwise known as the Omnibus Incentives Code of 1987.

In addition, perhaps some of the points raised in Chapter III merits looking into.

If enacted into law, this bill will only serve to resurrect the ugly head of uncertainty in the investment climate of the country so painstakingly put to rest over a period of close to twenty years (1968 to 1987) by the combined effect of Republic Acts Nos. 5186 and 5455 and Executive Order No. 226.

In the scale of values of international investors considering to locate a business in a given country, the stability of the ground rules for playing the investment game has been generally acknowledged to rank higher than the guarantees or incentives offered.

The rule of thumb for the average foreign investor invariably seems to be: "Tell me what the rules of the game are, and assure me that they are stable and permanent, and I will come and play."

11.3 A Short Digest of Laws And Regulations Generally Applicable to Doing Business

Except for the special application such as the new Food, Drugs and Devices, and Cosmetics Act (RA 3720 as amended by EO 175), the Generics Act of 1988 (still unnumbered) the country's broad body of economic laws and procedures apply mutalis mutandi to the pharmaceutical industry as to all other sectors of the economy. These laws and procedures cover such matters as:

a) The modes, forms and manner of establishing business enterprises in the Philippines;

b) The policies and procedures on investments as embodied in the Omibus Investment Code of 1987 and its implementing regulations;

c) The Law on patents

d) Taxation

e) Various business regulations such as those on

-- immigration requirements for foreigners working in the country

-- foreign exchange regulations

-- foreign borrowings and investments

-- repatriation of foreign investments

-- peso borrowings by foreign firms

-- outward remittance of profits and dividends

-- remittance of royalties

-- foreign currency deposits

-- securities transactions

-- export and import procedures

-- labor and labor relations, including social security, and

-- accounting and auditing requirements.

11.3.1 Doing Business

The foregoing are minutiae which investors, both Filipino and foreign, have found to be reasonably fair and commodious. The would-be entrepreneur eager to go through a nodding acquaintance with them may refer to a very informative little publication, "Doing Business in the Philippines," updated annually by the SGV Group and given for free to the publisher's clients and to prospective investors in the Philippines. SGV Group is the country's largest, most prestigious auditing and management consulting firm, and the first truly trans-national Filipino enterprise with successful ongoing joint venture duplicates of itself in practically all of the capital cities in Southeast Asia.

The 1988 edition of "Doing Business in the Philippine" has just gone of the press, and has a must useful component of the bibliographic references of this study.

11.3.1.1. Establishing a Business

There are three forms of business organizations recognized in the Philippines: the corporation, the partnership, and the sole proprietorship. Most enterpreneurs prefer the corporate form of business organization because of the limited liability protection that it affords investors.

Partnerships are preferred by professional service organizations, particularly lawyers, accountants, engineers and the like.

The advantages of the corporate form are as follows:

- suitability of the corporate form for greater and bigger undertakings
- limited shareholder's liability
- continuity of existence
- capacity to act as a legal unit
- transferrability of shares
- contralized management, and
- standardized operating methods and procedures.

A corporation may be distinguished from a partnership, as follows:

CORPORATION	PARTNERSHIP
1. Created by and under general law	1. Created by agreement of the parties.
2. A shareholder may transfer his shares without the consent of his co-shareholders.	2. A partner may not transfer his interest to make assignee as partner without the consent of the other partners.
3. Managed by a board of directors.	3. Managed by all partners except if they appoint a managing partner.
4. Death of a shareholder does not dissolve a corporation.	4. Death of a general partner dissolve a partnership.
5. Shareholder is not liable to corporate creditors with its separate property.	5. A general partner is liable for debts of the partnership beyond his capital investment.
6. May exist for fifty years subject to extension.	6. May exist indefinitely.
7. Governed by the Corporation Code (Batas Pambansa Blg. 68).	7. Governed by the Civil Code.

A sole proprietorship consists of a natural person going into business for himself without the trappings of an artificial business organization.

Corporations and partnerships are registered with the Securities and Exchange Commission (SEC), an office which serves both as a registry for companies and regulator of the securities market.

A sole proprietorship may go into business solely on the strength of a Mayor's permit and may be constrained to register with the Bureau of Commerce only if it uses a tradename and style different from that of the owner or proprietor.

11.3.1.2. Immigration

A foreigner desiring to enter the Philippines may be able to apply for a visa suitable for his purpose and estimated length of stay in the country. A no-visa mode of entry is generally available for visits not exceeding 21 days provided the party concerned does not fall under the category of certain nationalities whose entry are for the meantime restricted.

Tourist or temporary visitor's visas are available for a stay of 59 days, extendible to a year. Aliens whose stay exceeds 59 days are required to registered with the Commissioner for Immigration and Deportation.

Foreign technicians may be admitted into the country with a pre-arranged employment visa if the skills they possess are not available in the country.

An alien who is bringing in an investment of at least US$75,000 into the Philippines may be issued a special investors visa, and he and the immediate members of his family can stay in the country for as long as the investment is maintained.

11.3.1.3. Foreign Exchange Regulations

Since about 18 years ago, the value of the Philippine peso has been pegged to the United States dollar. Foreign exchange is bought and sold in the country, if a third currency other than the dollar is involved, on the cross-conversion equivalent of the peso to the third currency measured by the basic dollar parity.

The system is called the floating rate system, more specifically a "managed" floating rate system because the peso is not allowed to vary by more than a band of 1% above or below a "guiding rate" fixed by the Central Bank from time to time.

Under this system, all foreign exchange receipts are required to be sold to the banking system within three business days after they are received.

The Central Bank also regulates foreign borrowing and registers inward foreign investments. In line with the economic development program, the Central Bank allows foreign financing only for the following:

- Food production and agricultural development projects
- Power and energy exploration and development projects
- Infrastructure projects classified as urgent by the National Economic and Development Authority (NEDA)
- Telecommunications improvement and development projects
- Transportation improvement and development projects, and
- Projects approved by the Investment Coordination Committee of the Central Bank.

In view of the NDP, the foreign financing of pharmaceutical development projects needs to be added to the above enumeration.

11.3.1.4. Outward Remittance of Investments, Dividends and Royalties

The repatriation of foreign investments, upon liquidation, thereof, is guaranteed by Section 38 of the Omnibus Investments Incentives Code. A similar guarantee by the same section covers the outward remittance of earnings and dividends as well as royalties for use of Patents and Copyrights. These outward movements of foreign exchange, however, are specifically mad subject to laws, regulating foreign exchange operations (Central Bank Act, Republic Act 265, as amended) "in the imminence of, or during an exchange crisis, or in time of national emergency".

Repatriation of Foreign Investments - CB Circulars Nos. 1028 and 1088 govern the repatriation of the liquidation of a foreign investments as follows:

- Investments in export-oriented industries certified by the Central Bank may be expatriated in full or in annual installments to the extent of the applicant's share in the net foreign exchange earnings of the firm for the preceeding year.

- Investments in BOI-registered enterprises engaged in the production of import substitutes and/or export items not covered by the preceeding rule may be expatriated in three equal annual installments or to the extent of the total net foreign exchange earnings, whichever is less, starting one year after liquidation of the investment.

- Investments in BOI-registered enterprises not engaged in the production of import substitutes or engaged in industries that do not use domestic credit may be repatriated in three equal annual installments starting one year from the liquidation of the investments.

- Investments in all other industries may be repatriated according to the following schedule:

US$250,000 or less	five equal annual installments after liquidation of the investment
Over US$250,000 to US$500,000	seven equal annual installments after liquidation of the investments
Over US$500,000	nine equal annual installments after the liquidation of the investments.

Outward Remittances of Dividends, Royalties, etc. - Outward remittances of dividends, profits, capital gains, and royalties are not subject to timing constraints as those imposed on the repatriation of investments.

Profits, capital gains and dividends are generally remittable through simple approval by the Foreign Exchange Operations and Investments Department (FEOID) of the Central Bank. Provided earned or accruing after 14 October 1984, such earnings are remittable to the non-resident entitled thereto, net of taxes, at the interbank guiding rate prevailing on the date of actual remittance.

So that royalties may be similarly remittable, the royalty or technical service contracts covering the use of the patent in a manufactured product should be registered with the Central Bank.

11.3.1.5. Labor and Social Legislation

Except for certain minimum terms and conditions of employment and mandatory employment benefits and services, Philippine labor and social legislation allows employers and employees full rein in negotiating for and mutually determining the economic terms and conditions of their contractual relationship.

The areas of concern between employers and employees where the State has set minimum standards or other terms and conditions include:

Hours of Work - The Labor Code provides that the maximum number of hours that an employee may be required to work at his regular rate of pay is eight (8) hours per day cumulated to not more than 48 hours a week. Additional hours of work entails a corresponding premium pay rate of at least 125% of the employees regular rate of pay.

Government employees observe a 40-hour work week. An abberant inspirational legislation had extented the 40-hour work week privelege to workers in private hospitals - a matter which had recently precipitated a nationwide strike by private hospital workers who, in the light of the 48-hour work week requirement of the Labor Code, are being required to render that optimum working time by their respective employees.

The controversy, which was resolved by a return-to-work order by the Secretary of Labor and Employment, is now before the courts where the employers contend that the Labor Code (a more recent legislative enactment) had superseded the law providing for a 40-hour work week standard for private hospital workers.

Service Incentive Leave - Every employee who has rendered at least one year of service is entitled to a yearly service incentive leave of five days with pay.

Minimum Wage - The President of the Philippines has stand-by powers, delegated by the legislature, to determine and fix new minimum wage rates from time to time to keep the purchasing power of the labor sector more or less apace with the eroding effects of inflation.

As at the 14 December 1987, the minimum daily basic wage rate (this one was fixed by statute, RA 6640) stood at (a) P64 for non-agricultural workers; (b) P54 for agricultural plantation workers; and (c) P43.50 for agricultural non-plantation workers.

Disability Benefits - The Labor Code features an Employees Compensation Program requiring the compensation of employees for sickness, injury or death occurring in the course of employment. The Program grants medical, rehabilitation, burial services, and disability and death benefits.

Private and government employees are mandatorily covered by social security insurance respectively under the Social Security System (SSS) and Government Service and Insurance System (GSIS). The premiums are shouldered exclusively by the employer through monthly remittances to the appropriate insurance institution. Premiums per month per employee is computed at 1% of total monthly salary credits, but not exceeding ₱10.00.

Medicare - Medical care plan coverage is compulsory and automatic for all employees covered by the SSS and the GSIS (except members of the Armed Forces). Employers and employees are required to make equal monthly contributions to the medical careplan. The employer withholds the employees' share in the comtributions from the latters' salaries, and handles the remittance of the combined contributions to the Philippine Medical Care Commission, administrator of the program.

Home Development Mutual Fund - This is a provident savings system imposed on private and government employees from the pooling of their contributions to it (and the counterpart contributed by their respective employers) the savers may borrow funds for home construction. Imposed by the Martial Law Regime, both employers and employees felt that the imposition was a surplusage in view of other home assistance financing facilities offered by both the GSIS and the SSS to their members. This constrained President Aquino to convert the plan to a voluntary one beginning 01 January 1987 (Executive Order No. 90, dated 17 December 1986).

11.3.2. Basic Investment Policy

Prior to 30 September 1968, the effective date of RA 5455, the Filipinization of an industry or economic activity was a legislative penchant that may only be best described as ad hoc and inspirational. There was hardly any discernible trend or pattern upon which to anchor a reliable projection of what other business activities would likely be next Filipinized by each incumbent or future Congress that was upon or to come into the scene.

"Ad hoc-king" was, thus, the name of the lawmaking game then. It may, to some extent, be still true today by a few grandstanding "Nationalist Scions". Pure chance and hazard was the incalculable risks that foreign investors has to take in deciding to invest in an area of endeavor which may yet be untouched by Filipinization. And, the ground rules being open-ended, the environment was vulnerable to unforeseeable changes that could prove detrimental to both long and short term business plans.

11.3.2.1. The Road to Stabilization of Policy

The way was paved for RA 5455 (The Business Regulations Act) when RA 5186 (the original Investments Incentives Act) was enacted to put forward the juristic philosophy that the Philippine Government was encouraging, guaranteeing and giving incentives to investments, investors and enterprises (whether Filipino or foreign) provided: the productive activity, to be undertaken as extractive; filled a specified gap between the supply and demand ("measured capacity") for a given product included in the Government's Investments Priorities Plan (IPP): and, as a general rule, that the enterprises proposing to avail of the guarantees and incentives qualify under the regime of "Ordinary Preponderant Control" of the applicant's capital structure by Filipino citizens.

RA 5186 also put forward the novel proposition that envisioned a "pioneering role" for foreign capital in the Philippines. Thus, foreign investors were given guarantees and incentives to come in as 100% owners of so-called "pioneer enterprise," i.e. those engaged at proposing to engaged in the production of goods:

- that have not been or are not being produce in the Philippines on a commercial scale; or

- which uses a design, formula, scheme, method, process or system of production which is new and untried in the Philippines.

After being registered and having enjoyed the guarantees and incentives, the wholly foreign owned pioneer enterprise was required by RA 5186 to attain within 30 years the status of a "Philippine National," an enterprise having Filipino Nationals in Ordinary Preponderant Majority Control of equity base.

Prior to RA 5455, it had always been understood that the incentives, guarnatees and prequalifications specified in RA 5186 applied only to those who chose to avail of those bounties. Foreign investors were free to come in "without incentives" under the then wagering situation that the inspirational penchant for Filipiniation would not radically change the rules of the game for the foreign enterpreneurs concerned.

Back in 1968, a groundswell for a clearer definition of the role of foreign investors and investments in the Philippines impelled the enactment of RA 5455.

It was RA 5455 that clarified the policy of the Philippines in respect of foreign investments that may choose to come into the country without availing themselves of the incentives and guarantees provided by RA 5186 and other applicable laws.

That law (RA 5455) applied the Filipinization of equity control over enterprises more stringently against foreign investments coming into the Philippines without incentives, and in the process introduced the concept of so-called "permitted" and "permissible" investments.

The question of "permissibility" was anchored by the law on whether or not the magnitude of foreign capital contribution (against the Filipino counterpart) undershot or exceeded 30% of total capital base. Foreign investment was "Permitted" (allowed to enter without prior approval) if it constituted 30% or less of subscribed equity; and, "Permissible" (allowed to enter only with prior approval) if such contribution exceeded 30%. This benchmark ratio has since been raised to 40% by the Original Omnibus Investments Code (PD 1789, as amended by BP 391). This liberalization continues under the Omnibus Investments Code of 1987 (Executive Order No. 226, effective 27 February 1987).

In addition to the Nationality of Equity Control Test, as above explained, Permitted and Permissible foreign investments, that choose to come in without incentives are circumscribed within the following areas:

- in economic endeavors or activities not adequately exploited by Filipinos

- in those of such endeavors or activities that are not in conflict with existing constitutional and Filipinization laws

- in those that are not inconsistent with the IPP

- in those that are likely to contribute to the sound economic development of the Philippines, and

- in those that do not promote monopolies or combinations in restraint of trade.

PD 1789 has since been superseded by EO 226 whose salient additions to the ground rules for making investments in the Philippines are discussed below. Also discussed in the subsequent pages are specific Filipinization laws whose enforcement and implementation affect, or are likely to affect, the pharmaceutical industry in the Philippines.

11.3.2.2 The Omnibus Investments Code of 1987.

EO 226, one of the few statutes enacted by President Aquino in the exercise of her interim legislative powers under the Freedom Constitution, formalized, strengthened and consolidated all the laws that in their totality spelled out the foreign investments policy of the Philippines.

The centerpiece of that policy, as declared in Article 2 of the Code, is "economic nationalism." This primordial objective is sought to be achieved by giving Filipinos "first crack" at organizing, capitalizing, and operating a business enterprise in the Philippines, all things being equal. Thus, as a general rule, foreign capital may be allowed to come into the country only if:

- the area of investment proposed to be entered is not adequately exploited by Filipinos, and

- the foreign equity involved in the enterprise does not exceed 40% and capital at least 60% of the governing board are Philippine nationals.

An offshore investment that enters the country under this general rule is called a "permitted" foreign investments and needs no prior approval or registration by the Board of Investments in order to co-venture with Filipino partners of its choice in a Philippine enterprise.

Consistent with the key objective of economic nationalism, the Code cultivated a strong bias in favor of the joint effect of combining the application of the so-called "Control Test" and the "Incorporation Test" in determining the nationality of a corporation. The first determines the nationality of a corporation by the citizenship of its controlling shareholders. The second observes the more internationally practiced rule of considering a private corporation as the citizen of a state or country by or under the laws of which it was created and existed without regard to the citizenship of it shareholders.

Under the combined application of the aforementioned test criteria, the Omnibus Investments Code of 1987 considers a corporation as a "Philippine National" if it is both:

- organized under Philippine laws ("Incorporation Test"), and

- the foreign equity involved in the enterprise does not exceed 40%, and at least 60% of the governing board are Filipino citizens ("Control Test").

If an enterprise fails, then it needs prior approval by the Board of Investmepts even if it chooses to come into the country without benefit of incentives. Such pre-cleared entry is termed by the Code as "Permissible".

A Non-Philippine National is "Welcome" (a non-legal term used in following SGV-inspired diagrams of Philippine investment policy to come in with incentives) if, being qualified to "Permissible" entry, the enterprise will engage in a non-pioneer area of investment listed in the Investment Priorities Plan (IPP); or if the area is not so listed, at least 50% of its production is for export.

Foreign nationals are "Encouraged" (also a non-legal SGV terminology) to enter with incentives in the following areas of investments:

- pioneer areas listed in the IPP
- registered enterprises located in less developed geographic areas of the Philippines
- liberalized non-pioneer areas, the measured capacity of which has not yet been filled up after three years listing in the IPP
- export-oriented enterprises at least 70% of whose production is for export, and
- areas being promoted in the Export Processing Zones and in industrial estates

A foreign national enterprise which comes in as an "Encouraged" investment may be fully (100%) owned by non-Filipinos.

11.3.3 The Philippine Law on Patents

A patent is a governmental grant conferred upon the inventor or discoverer of a **"new and useful machine, manufactured product or substance, process, or (their) improvement,** "(Section 7, RA 165, as amended), securing to the invention or discovery for a designated period of time, in consideration of the patentee's disclosure in his patent application of the details of the patented matter, in accordance with the requirements of law, for the benefit of the public and the promotion of science and the useful arts.

The right to exclude all others from exploiting the patented product operates to invest the patentee with what amounts to a monpolistic franchise to make, use, or sell the patented during the full run of the patent period.

11.3.3.1 Basic Law

The 1987 Philippine Constitution imposes it as a duty on the State to **"protect and secure the exclusive rights of scientists, inventors, artists, and other gifted citizens to their intellectual property and creations, particularly when beneficial to the people, for such period as may be provided by law."** (Section 17, Article XIV, Education, Science and Technology, Arts, Culture and Sports).

The law provides for the creation and operation of the Patent Office, and contains comprehensive general provisions relating to patentability of inventions, the application for and issuance of patents, patent fees, and the compulsory licensing to any applicant of patents which have remained unexploited or "unworked" two years after letters patent have issued.

RA 165 has been amended a number of times over the years. The most important of these amendents occurred during the Martial Law era via:

> Presidential Decree No. 1263 which required voluntary license contracts to be approved by and registered with the Technology Resource and Livelihood Center; fixed ceilings for royalty payments on license agreements; and defined the correlative rights of the licensor and the licensee in such agreements; and
>
> Presidential Decree No. 1520 which "specifically repealed" the insertions of PD 1263 into the Patents Law "insofar as industrial technology in concerned."

11.3.3.2 Pharmaceuticals as Patentable "Inventions"

The Rules of Practice in Patent Cases enumerates three(3) patentable matters: (1) inventions, (2) industrial designs, and (3) utility models.

Inventions[1] - From a reading of the definitions of these terms, it would appear that pharmaceuticals would fall under the category of an "invention," i.e. as a "new and useful product or substance" under Section 7 of RA 165. Unlike the U.S. Patents Law, RA 165 and its implementing regulations do not distinguish between an "invention" and a "discovery." It is under discovery where pharmaceuticals, particularly their "active ingredients," properly pertains.

"Any invention of a new and useful machine, manufactured product or substance, process, or an improvement of any of the foregoing, shall be patentable." (Rule 31, Rules of Practice in Patent Cases quoting Section 7, RA 165).

The redent progress in microbiology, has created and may create a whole range of new and useful products (particularly in the plant and animal kingdoms) which, because they are not "manufactured," will not be patentable under the foregoing definition.

However, the "process" involved in the microbiological creation of a new and useful breed of animal or plant life may be patentable as an invention.

But simply because only the "process" and not also its and "product" is patentable, the proprietary rights of the patentee will be violable simply through the natural process of animal husbandry or agricultural propagation.

Industrial Designs - In order to be entitled to a patent, an industrial design must be new, original and ornamental, and it must be for an article of manufacture. (Rule 122, Ibid).

Utility Models - A patentable utility model is one which is "a new model of implement or tool, or of any industrial product, or a part of the same, which does not possess the quality of invention, but which is of practical utility by reason of its form, configuration, construction, or composition." (Rule 133, Ibid).

11.3.3.3. "Newness" and "Public Use:" Their Effect on Patentability

An invention, industrial design, or utility model is not patentable by its inventor, under the Patents Law and Rules now in effect, if the patentable matter was known or used by others in this country before his invention thereof; or if it had been patented or described in any printed publication in the Philippines or any foreign country for more than one year(2) before the application for a patent therefor; or if it had been in public use of on sale in the Philippines for more than one year(*) before such application.

If the matter involved is already patented in the Philippines, it may no longer be the subject of another patent.

11.3.3.4 Alienage of the Inventor and the Domesticability of Foreign Patents

The Philippines is not a member of the International Patents and Copyrights Convention. Therefore, latter's patent issued in favor of inventors by foreign countries do not have automatic effect in this country. For the domestication of that right in the Philippines, the law requires that the non-resident of foreign inventor must also file a corresponding application in this country within twelve (12) months from the earliest date on which the foreign application was filed.

(*) This period is reduced to six(6) months in the case o application for over industrial designs and utility models.

Where **"reciprocity"** exists, the timely filing of an application for patent by a non-resident inventor in the Philippines has the effect of **"antedating"** the time of such filing to the date the foreign application was filed. This therefore has the effect of priorizing the right of the legitimate non-resident applicant over competing applications that may have been filed by applicant residents.

"Reciprocity" is a state of things whereby the country of the non-resident applicant, by treaty, convention, or law, affords similar privilages to citizens of the Philippines in the application and perfection of letters patent.

It must be mentioned that, despite the apparent implication 7 Section 17, Article XIV of the 1987 Constitution that the State is mandated to protect the intellectual properties only of its **"gifted citizens,"** that protection extends as well to non-citizens under the mantle of the **"Equal Protection Clause"** of the same Charter's Bill of Rights.

Still, in all, the invention of a foreign resident which is patented in his country but is not patented in the Philippines, cannot be the subject of an infringement suit in our courts. Neither, on the other hand, may the local **"infringer"** be able to secure a patent over the same in this country because after the passage of the 12-month regulatory filing period (from **knowledge** through printed foreign publication of the invention), the invention would in contemplation of Philippine Law/become public domain property in effect.

11.3.3.5 Duration of Patent Use

The patentee's **"monopolistic franchise"** over his patented invention endures for 17 years, in the case of Invention Patents; and all other patents five (5) years.

Compulsory Licensing, in General - The **"none-user"** of a patented invention in a commercially meaningful scale or fashion by the patentee (or his licensees) gives rise to situation for compulsory licensing (Article 2, Chapter VIII, RA 165). This occurs after the expiration of two (2) years from the date the patent was granted.

Compulsory Licensing, Pharmaceuticals - Pharmaceuticals (along with patented food products), being necessary for public health and safety, is automatically susceptible to compulsory licensing under the law even if the patented drug product is being commercially well exploited.

Any person who is fully capacitated may apply to be a compulsory licensee under the foregoing described circumstances.

11.3.3.6 The Highly Specialized Aspects of Patents Law & Practice

Patents Law and Practice is a highly specialized field in the Philippines. Its more important distinctions are highlighted below.

1. Philippine jurisprudence accords a high stature to the Philippine Patents Office, a rank equal to that of the Public Service Commission -- said the Supreme Court in a case. (Honda Giken Kogyo Kobushiki Kaisha, et al. vs. San Diego, et al., G.R. No. L-2276, 18 March 1966). Thus, the ordinary trial courts may not inhibit the actions of the Patent Office by a writ of injunction because its decisions are appealable only (prior to RA 5434, @9 September 1968) to the Supreme Court. Now, decisions of the Patent Office are appealable to the Intermediate Appellate Court.

2. While the admission of lawyers into the Philippine Bar automatically qualifies them to appear in representation of clients before any court of Law (including even the Supreme Court), lawyers must specifically qualify and apply with the Director of Patents to appear in representation of clients before the Patent Office as a quasi-judicial body.

3. The Rules of Practice and Procedure in patent cases are distinct and separate from the Rules of Court. The latter apply only in suppletory effect on the former.

4. The proceedings in a Patent Application Case is somewhat similar to the process of the Papal Canonization of a Catholic Saint. The Examiner of Patents assumes the role of a "Devil's Advocate" and is actually under legal duty to find fault with the patent application so that letters patent may not issue in favor of substandard inventions.

11.3.4. Taxation

Two general kinds of taxes are in force and collected in the Philippines. These are:

a) National Taxes, namely those imposed by the national government under the National Internal Revenue Code and other laws, particularly the Tariff and Customs Code; and

b) Local Taxes, namely those which local government units (i.e. provinces, chartered cities, municipalities, and "barangays" or villages comprising a municipality) may impose under the Local Tax Code and the additional 1% realty tax levied for the Special Education Fund created under RA 5447.

Considered as national taxes are the following:

- income tax (Secs. 20-76, NIRC)
- estate tax and donors tax (Secs. 77-98, NIRC)
- value-added tax or VAT (Secs. 99-111, NIRC)
- other percentage taxes (Secs. 112-125, NIRC), viz: on hotels, motels, and others; on caterers; on carriers and keeper of garages; on dealers in securities and lending investors on franchises; on overseas communications; on banks and non-bank financial intermediaries; on finance companies; on insurance companies; on amusements; and on winnings.

PHARMACEUTICAL INDUSTRY

SPECIFIC PROVISIONS OF THE INTERNAL REVENUE CODE IMPINGING ON THE PHARMACEUTICAL INDUSTRY

INCOME TAX:

Corporate Income Tax

1. If it is a domestic coporation

   Subject to the corporate income tax of 35% upon its taxable income (Sec. 24 of Chapter III of the Tax Code, as amended by E.O. 37 dated July 31,1986).

2. If it is a resident foreign corporation

   If engaged in trade or business within the Philippines, subject to 35% of the taxable income from all sources within the Philippines.

3. If it is a non-resident foreign corporation

   Subject to 35% of the gross income from all sources within the Philippines, if not engaged in trade or business in the Philippines, except capital gains subject to tax under sub-paragraph 5(c) of the Tax Code.

Individual Income Tax

If the entity is a single proprietorship

Subject to the ordinary income tax on citizens or residents (Sec. 31 of Chapter II of the Tax Code, as amended by E.O. 37 dated July 31, 1986).

REMITTANCE TAXES:

Branch Profit Remittance Tax

If the company is a branch of a foreign company

Any profit remitted by a branch to its head office shall be subject to 15% (except those registered with Export Processing Zone Authority) (Sec. 25 (a) (5) of the Tax Code.

SALES TAXES/VALUE ADDED TAX

Before E.O. 273 (VAT)

1. If the firm is a dealer or distributor of drugs and other pharmaceuticals.

   a) It is subject to a fixed tax of P200.00 under Sec. 161 of the Tax code, as amended.

   b) Subject to tax of 1.5% on subsequent sales on its gross selling price or gross value in money. (Sec. 165 (B)).

2. If it is a manufacturer of drugs and pharmaceuticals.

   Subject to 10% of the gross selling price or gross value in money on articles sold as essential articles under Sec. 165 of the Tax Code, as amended.

After E.O. No. 273 (VAT) starting January 1, 1988

Subject to 10% of the gross selling price or gross value in money of goods sold under Sec. 100, Chapter I Title IV, as output tax, input taxes (tax credits) under Sec. 104 (a) of the same Chapter, to be deducted or credited against it.

- excise taxes imposed on certain goods (Secs. 126-151, NIRC), i.e. on products of alcohol; tobacco products; petroleum products; and on miscellaneous other articles such as cinematographic films, saccharine, automobiles, non-essential goods (jewelry, perfumes and toilet water, and pleasure crafts or vessels), and mineral products.

- documentary stamp taxes, and

- customs duties.

National taxes appicable to the pharmaceutical industry are briefly set forth in the preceeding outline. Local taxation together with

- VAT, which is a major innovation on Philippine percentage taxation, of fairly recent vintage (Executive Order No. 273 which took effect only on 01 January 1988), and

- customs duties which now stands as the only line of protection of domestic products in the light of the ongoing "import liberalization program"

is given special discussion in this report.

11.3.4.1. The Value Added Tax

The value added tax is a uniform tax imposition of 10% on each sale of goods and services as they pass along the production and distribution chain in industry and trade. The imposition derives its name from the fact that the levy is limited to, or impacts only on the value added by the seller to the goods or services which is the object of the sale. It is also levied on every importation of goods.

The tax is a direct liability of the seller or the importer, but such party usually passes on the burden to the buyer by tacking on the value of the tax to the selling price.

The VAT does not impact on a so-called "Zero-Rated Sale" and an "Exempt Sale".

"Zero Rated Sales" refer to the manufacture and sale of goods, and/or the rendition of services, for an in exchange of foreign currency inwardly remitted into the country and therefore contributes to the balance of payments. Export sales are the best examples of zero-based transactions. In essence and strictly speaking, a zero based sale is a taxable transaction, but by reason of the national exports promotion policy, the seller is not required to pay the corresponding VAT "output tax". In addition, such exporter is entitled to a tax credit on the value of the "input tax" which his supplier may have tacked on to the sale of raw materials to the manufacturer-importer by way of covering the liability of such supplier for his own "output tax" under the VAT. The "input" and "output tax" concepts are hereafter explained and illustrated.

In an exempt sales transaction, the input and output taxes do not figure, and neither does the tax credit apply, because the non-susceptibility to the VAT levy inheres in the goods and services themselves and not on the nature of the transaction, as in the case of the zero based sale.

The sale will be exempt from the VAT if the goods and services involved are any one or more of the following: agricultural products in their original state; printing and sale of books and newspapers, services rendered by persons subject to other percentage taxes (refer to early discussion on Taxation above), medical dental, hospital and vetrinary services, lease of real property, services performed in the exercise of a profession, services performed by employees or workers for an employer, sales/and/or services performed by small business enterprises (sole proprietors) whose annual gross sales or receipts do not exceed ₱200,000.00.

In the VAT system "input tax" refers to the tacked on value of the VAT passed on by a supplier of goods to one who processes such goods or resell them in the original form in which they were acquired. The "output tax" is the VAT liability which impacts on the resale of the goods in the second instance.

The Tax Code allows the input tax already paid to be credited against the cutput tax due on the transaction. Therefore, the VAT payable is the excess of the output tax on sale of goods or services over the input tax on importation (if any) and local purchase. Based on assumed figures, the computation of the VAT payable is as follows:

Sales		₱500,000.00	
Brokerage Expenses		300,000.00	
Total		₱800,000.00	
Output Tax (10%)			₱80,000.00
Cost of Sales:			
Importation		₱200,000.00	
Local Purchases -			
Raw Materials	₱60,000.00		
Supplies	40,000.00		
Capital Equipt.	150,000.00		
Services	50,000.00		
Total		₱300,000.00	
Total Cost of Sale		₱500,000.00	
Input Tax (10%)			₱50,000.00
VAT Payable			₱30,000.00

The VAT replaced the percentage taxes which were collectible only on original sales, i.e. sale in the first instance. In fact, VAT also replaced the annual fixed tax on business (percentage and annual fixed taxes being subsumed under the general classification of "Privelege Tax on Business"), since the fixed tax was imposeable only on establishments which did not (as mere merchandisers) make original sales but only secondary sales. Now, everybody pays the VAT as the goods as these pass along from hand to hand in the ordinary course of trade.

11.3.4.2. Local Taxation and the Local Autonomy Movement

The 1987 Constitution of the Philippines recognizes four levels or hierarchies of territorial and political subdivisions: provinces, cities, municipalities, and barangays.

A traditionally higher territorial, but not a political grouping are the "regions", usually demarcated along ethnic lines. Regions have more of the legal characteristics of "counties" than local units of governance (i.e. municipal corporations). They are arbitrarily circumscribed economic-geographic areas which serve as the Central Government's divisional reference for statistical analysis, economic development planning and coordination, and as the tie points for the dispersal and location of territorial branches of national cabinet departments responsible for delivering central government services to the "frontlines".

Local government units (LGU's) resent the presence of cabinet branches in their respective territories because, in the presently centralized structure of governance, these branches almost invariably pre-empt LGU's in the planning, management and husbanding of developmental activities in the regions concerned. Because the Central Government gets the lion's share of the taxes, practically nothing of significance happens at the grassroots level unless the regional directors of the branches give it their blessing and support. Moreover, since the purse strings of the Government are pulled or loosened in Manila, the allocations of development finance seldom bears any correlation with the contributions of each region or province to the GNP.

South Cotabato, for instance, rich exports about US$ 110 Million of canned pineapples and other processed fruits annually, get less than US$ 1.0 Million of national development funds in 1985. Oil-rich Palawan complains that it is subsidizng the rest of the country while it only gets a pittance of national aid from the Central Government.

These inequities has fueled a strong agitation for local autonomy, federalization, and in the case of certain sectors in Muslim Mindanao, outright secession. These centrifugal tendencies manifested themselves during the convention of the Constitutional Commission in 1986-1987. The result was the constitutional mandate to set up the so-called "autonomous regions" of Muslim Mindanao and the Cordilleras.

The Taxation Aspect of the Autonomous Regions - The creation of the autonomous regions put the Philippine state structure one step towards federalization. In fact, the quintessential legal condition that underlies a federation now exists between the Central Government and the autonomous regions: the powers of the local governments (the autonomous regions in the Philippine case) are constitutionally guaranteed to them. The national government, under the arrangement, will therefore retain only residual powers.

It is the mandate of the 1987 Constitution that within eighteen (18) months from the time of the organization of Congress (24 January 1988) it shall pass an "organic act" for each of the autonomous regions "with the assistance and participation of the regional consultative commission" whose members are appointed by the President.

Among the powers which will be guaranteed to the autonomous regions - through the instrumentality of the regional charters - are: legislative authority over:

a) Administrative organization

b) Creation of sources of revenue (i.e. taxing powers)

c) Ancestral domain and natural resources

d) Personal, family and property relations

e) Regional urban and rural planning and development

f) Economic, social and tourism development

g) Educational policies

h) Preservation and development of the cultural heritage; and

i) Such other matters as may be authorized by law for the promotion of the general welfare of the people of the region.

The Constitution further provides that the preservation of peace and order within the regions shall be the responsibility of the local police agencies. Their defense and security has however been reserved by the supreme law of the land to the National Government.

Because of the autonomous regions perceived lack of equal access to development and investment capital due to past inequities under the old unitary form of government, it is highly probable that the regions might enact a more progressive system of taxation that will try to outhustle the national government's bid to attract foreign investments. Because of the predominantly

Muslim population in Mindanao, it is logical to expect a skewing of the incentives towards attracting risk capital specifically from the petro-dollar-rich Middle Eastern economics such as Saudi Arabia, Kuwait, Bahrain and the Emirates.

Taxation by the Non-Federalized LGU's - Taxation by the non-federalized LGU's, remaining under the control of Congress, will remain limited.

At present, taxation by LGU's embraces two aspects, namely:

a) Levy of taxes, fees and charges under the Local Tax Code enacted under Presidential Decree No. 231, dated 28 June 1973 (as amended by PD 426 and 796); and

b) Real property taxation, which is governed by

   i) The Real Property Tax Code enacted under Presidential Decree No. 426 dated 20 May 1974 (as amended); and

   ii) The Education Fund Law (Republic Act No. 5447, approved on 25 September 1968) relating to the additional tax collected by the National Government (Sec. 41, Real Property Tax Code).

Local Taxes are very minimal imposition which, as a rule -

- have rates fixed in the enabling law, therefore, obviating the possibility of indiscreet levy by local boards and councils, and

- limits discretionaly rate fixing to a band ranging from 1/16 of 1% to 1% ad valorem.

11.3.4.3. Custom Duties

All imported articles, when imported from any foreign country into the Philippines are subject to duty upon each importation. Duty rates impact on each item of import according to its commodity classification and on the basis ad valorem, specific, or compounded computation.

The Philippines observes the Brussels System of Commodity Classification making its tariff schedule easily comparable to those of the rest of the world. Under the Flexible Tariff Clause, however, the President of the Philippines is authorized to change tariff classification to serve the ends of domestic commodity protection imperatives.

The duty is said to be ad valorem if it is based on the value or price of the importation. It is specific, it is based on the weight or volume of the article.

Compounded duties use both value and weight/volume as basis for the levy.

There are two types of customs duties: a) the ordinary or regular customs duties, which are imposed and collected purposely for revenue and incidentally for protection of domestic productive enterprises; and b) special customs duties, which are imposed and collected in addition to ordinary or regular customs duties purposely to protect local products against foreign competition and incidentally to raise revenue.

Ad valorem, specific and compounded duties enumerated in Section 104 of the Tariff and Customs Code of 1978 (Presidential Decree No. 1464, as amended), are the ordinary customs duties imposed by law.

The special duties include: dumping duties, countervailing duties, marking duties, and retaliatory or discriminating duties.

Dumping duty on a specific kind or class of foreign article which is being imported into the Philippines at a price less than its fair value so that its sale might injure or retard the establishment or growth or an industry producing like goods in the Philippines.

Countervailing duty is imposed on foreign products which are granted by the country of origin any bounty or subsidy, whether or not their importation causes or is likely to cause injuries to domestic industries.

Marking duty is imposed on imported articles which have not been properly marked as to indicate their country of origin.

Retaliatory duty is imposed on articles of a foreign country which discriminates against Philippine commerce.

NATIONALIZATION LAWS AND OTHER REQUIREMENTS
(Reproduction "Doing Business in the Philippines" SGV Group)

Subject Matter	Minimum Filipino Ownership Requirement (%)	Legal Provision
Banking		
Banking institutions (including private development banks)	70% of voting stock (60% with President's approval)	Republic Act (R.A.) 337, as amended by Presidential Decree (P. D.) 71, Batas Pambansa (B.P.) 61, B.P. 63, and P.D. 119
Rural Banks	100%	R.A. 720, as amended by P.D. 122, P.D.1794, and B.P.65
Savings & loan associations, pawnshops	70% of voting stock except where a new association is established as a result of the consolidation of existing associations in which there are foreign-owned voting stocks at the time of consolidation	R.A.3779, P.D.113, P.D.1796, and B.P. 62
Relending of foreign loans by government financial institutions	No requirement but capital stock, if not fully subscribed, must be open to subscripion by the general public for projects authorized by the charters of government-owned or controlled financial institutions	R.A. 4860, P.D. 81
Public utilities		
Public Utility	60%	Constitution (Sec. 11, Article XII)
Domestic air commerce/ transportation	60%	R.A. 776
Finance institutions		
Financing companies	60%	R.A. 5980
Insurance business	No requirement	P.D. 612, as amended
Insurance companies	All directors must be Filipino	R.A. 2629
Investment houses	Majority of voting stock	P.D. 129

NATIONALIZATION LAWS AND OTHER REQUIREMENTS
(Reproduction "Doing Business in the Philippines" SGV Group)

Subject Matter	Minimum Filipino Ownership Requirement (%)	Legal Provision
Government contracts		
Public works construction	75%	Commonwealth Act (C.A.) 541 (odified by R. A. 76)
Supplier to government corporations	60% unless there is a foreign law granting reciprocity	R.A. 5183
Supplier to government offices	75%	C.A. 138 (odified by R.A. 76 and amended by R.A. 6142 and P.D. 66)
Public works and construction for national defense	75%	C.A. 541
Mass media	100%	Constitution (Sec. 11 (1), Article XVII
Private lands		
Transfer or assignment of private agricultural land	100%	Constitution (Sec.7,Art.XII)
Public lands		
Disposition, exploitation, development & utilization of agricultural, timber & mineral lands and other lands of public domain; mineral, petroleum & other natural resources	60%, subject to lease only (Note: Except for agricultural lands, all other lands of public domain are not alienable)	Constitution (Sec.2,Art.XII)
Lease of coal-bearing lands	60%	Public Act 2719
Disposition, exploitation, development, or utilization of minerals and mineral lands of the public domain	60%	C.A. 137, as amended by P.D. 463
Fishing and other aquatic rights		
Fishing operations	60%	P.D. 704
Retail Trade		
Trading rice and corn	100%	R.A. 3018
Cooperatives		
Cooperative associations	No requirement	P.D. 175

NATIONALIZATION LAWS AND OTHER REQUIREMENTS
(Reproduction "Doing Business in the Philippines" SGV Group)

Subject Matter	Minimum Filipino Ownership Requirement (%)	Legal Provision
Geothermal energy		
Lease for exploitation, tapping & utilization of geothermal energy, natural gas & methane gas	60%	R.A. 5092
Coconut Industry		
Coconut oills	Majority	R.A. 1369

RESTRICTED

17397
(3 of 3)

DP/ID/SER.A/1166/Add.2
9 March 1989
ORIGINAL: ENGLISH

PHILIPPINES PHARMACEUTICAL INDUSTRY DEVELOPMENT STUDY

DP/PHI/87/019

PHILIPPINES

Technical report: Environment and possibility of the Pharmaceutical Industry in the Philippines of upstream integration*

Prepared for the Government of the Philippines
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Dr. K. Ivanov, Chief Technical Adviser
Drs. William Padolina and Modesto Chua - Biotechnology and Human Resources
Atty. Hiram Mendoza - Law, Mr. Nicanor Gabunada and
Dr. Ruperto Alonzo - Economics

Backstopping Officer: Dr. Zoltan Csizer, Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

V.89-52792

TABLE OF CONTENTS

XII THE DEPARTMENT OF HEALTH

12.1 Mission

The Department of Health (DOH) is the Government agency mandated to ensure the development of a health and productive citizenry. Specifically, the DOH is tasked to undertake the following:

1. To improve the health and nutrition status of the population by providing accesible, appropriate and adequate basic health services to the people.
2. To upgrade the hospital capabilities to patient care by providing sufficient supply of drugs and medicines, medical and other supplies and materials needed for their operations.
3. To sustain and gradually accelerate health program activities addressed to the main health problems of the nation.
4. To direct priority improvement in health programs towards the worst off sectors of the population.
5. To institutionally strengthen the planning, implementing and service delivery capabilities of the national health network.
6. To improve the financial and mangerial base of the network in order to preserve and expand program and national gains.

The DOH plays a crucial role in integrating the various components of health care. It is responsible for assessing the health needs of the entire population of the country and providing the resources, in terms of human, physical and financial resources, to ensure that these needs are adequately met.

The DOH is committed to provide accesible, affordable, appropriate and adequate health services to all Filipinos, particularly the poor, through well-planned and well-implemented run by an effectively-led and efficient organization.

12.2 The DOH Organization

The functions of the Department of Health are carried out by five offices, namely: Office for Public Health Services, Office for Hospitals and Facilities Services, Office for Standards and Regulations, Office for Management Services and Office of the Chief of Staff.

The organizational chart of the DOH is shown in Figure 71. The key function areas and some selected features of each of these five offices are shown in Table 178.

12.2.1. Service Programs

The DOH implements 26 service programs enumerated as follows:

12.2.1.1. OFFICE FOR PUBLIC HEALTH

1. Maternal and Child Health Program
2. Expanded Program on Immunization
3. Control of Diarrhoeal Diseases
4. Acute Respiratory Illness Control Program
5. Malaria Control Program
6. Schistosomiasis Control Program
7. Tuberculosis Control Program
8. Nutrition Program
9. Dental Health Program
10. Family Planning
11. Environmental Health Program
12. Leprosy Control Program
13. AIDS Control Program/STD Control Program
14. Cardiovascular Control Program
15. Cancer Control Program

12.2.1.2. OFFICE FOR HOSPITAL AND FACILITIES SERVICES

1. Hospital Care Improvement Program/Hospital Networking
2. Medical Care Program/Medical-Surgical Outreach
3. Radiation Health Program
4. Mental Health Program

FIGURE 62

ORGANIZATIONAL CHART OF THE DEPARTMENT OF HEALTH

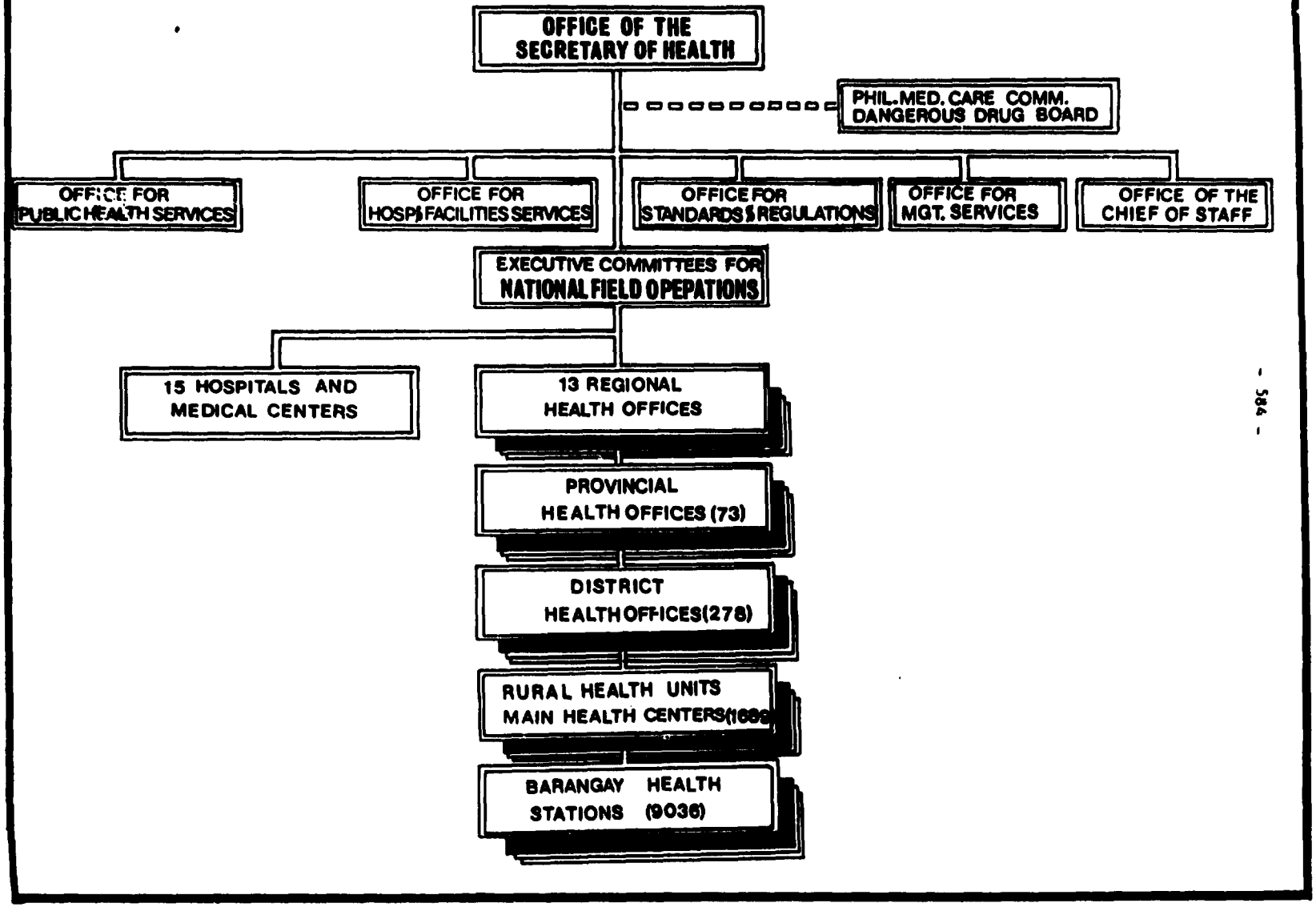


TABLE 178
SELECTED FEATURES OF THE FIVE(5) DOH OFFICES

FEATURE	PUBLIC HEALTH	HOSPITALS AND FACILITIES	STANDARDS AND REGULATIONS	MANAGEMENT SERVICES	CHIEF OF STAFF
KEY FUNCTION AREA	PREVENTIVE CURATIVE SERVICE AT COMMUNITY LEVEL.	HOPITAL BASED CARE	QUALITY ASSURANCE OF MEDICINE, LABORATORY RELATED SERVICE	FINANCE ADMINISTRATION AND MANPOWER DEVELOPMENT	PLANNING AND PERSONNEL
CONSTITUENCY	90-95 % of WHOLE POPULATION	80 % OF PERSONS WHO NEED HOPITAL BASED CARE	WHOLE POPULATION	WHOLE POPULATION	WHOLE POPULATION
SOME KEY SERVICES	TUBERCULOSIS IMMUNIZATION MALARIA	SEVERAL HOSPITAL SERVICES SPECIALIZED CARE (HEART AILMENTS, KIDNEY DISEASES	SAFETY, EFFICACY AFFORDABILITY OF MEDICINES AND BIOLOGICALS SAFETY OF BLOOD SUPPLY	BUDGETING, SUPPORT SERVICE FOR DOH	PLANNING ORGANIZATION INFORMATION COMMUNICATION
SOME KEY FIGURES	26 PUBLIC HEALTH PROGRAMS REACHING 50 + M PEOPLE	537 HOSPITALS THROUGHOUT THE COUNTRY	450 LABORATORIES AND BLOOD BANKS THROUGHOUT THE COUNTRY	MANAGEMENT OF ₱6.6 BILLION BUDGET	PLANNING AND ORGANIZATION FOR 67,000 + DOH PERSONNEL THROUGHOUT THE COUNTRY

Source: Office for Management Services, DOH

12.2.1.3. OFFICE FOR STANDARDS AND REGULATIONS

1 Laboratory Service Program
2 National Quarantine Program
3 Licensing and Regulations Program
4 Food and Drug Regulation Program

12.2.1.4. OFFICE OF THE CHIEF OF STAFF

1 Health Communications Program

12.2.1.5. ATTACHED AGENCIES

1 Dangerous Drug Control Program
2 Medicare Program

12.2.2 Support Programs

In addition to the service programs, the DOH implements 12 support programs as follows:

12.2.2.1 OFFICE FOR HOSPITAL AND FACILITIES SERVICES

1 Infrastructure Program
2 Maintenance Program

12.2.2.2 OFFICE FOR MANAGEMENT SERVICES

1 Training and Human Resources Development
2 Management Information
3 Procurement and Logistics
4 Administration, Personnel, Accounting and Budgetting

12.2.2.3 OFFICE OF THE CHIEF OF STAFF

1 Health Information
2 Planning
3 Foreign Assistance Coordination
4 Decentralization, Managerial and Organizational Development
5 Accountability and Public Ethics
6 Community Health Program

12.3 Manpower Complement

The number of positions available to various occupational groups in the DOH totals to 67,824, 13.47% of which are positions for physicians. However, only 64,026 of these positions have incumbents. It is worth noting that the DOH is still in need of 1,339 physicians. (Please refer to Table 179).

Table 179
DOH Manpower Complement
(As of May 1988)

Occupational Grouping	Complement		Vacancy	
	No.	% to total	No. Vacant	Rate
1. Nurses	12166	17.94%	724	5.95%
2. Midwives	10307	15.20%	142	1.38%
3. Physicians	9137	13.47%	1339	14.65%
4. Rural Sanitation Inspectors	2035	3.00%	51	2.51%
5. Med. Technologists/ Technicians	1806	2.66%	111	6.15%
6. Dentists	1165	1.72%	40	3.43%
7. Pharmacists	730	1.08%	65	8.90%
8. Dietitians	450	0.66%	5	1.11%
9. Medical Social Workers	355	0.52%	12	3.38%
10. Nutritionists	236	0.35%	7	2.97%
11. Health Educators	136	0.20%	17	12.50%
12. Others	29301	43.20%	1285	4.39%
	67824	100.00%	3798	5.60%

Source: Office for Management Services, DOH

12.4 Budget

The appropriations of the DOH has grown from ₱1.4 Billion in 1980 to ₱6.6 billion in 1989. In relation to the total budget of the entire government, the DOH budget has also been increased, however minimal, from 3.5% in 1980 to 5.0% in 1989. (Table 180)

Table 180
DOH BUDGET AS PERCENTAGE TO NATIONAL BUDGET

YEAR	DOH AUTHORIZED APPROPRIATIONS (Excludes Attached Agencies		NATIONAL AUTHORIZED APPROPRIATIONS		PERCENTAGE DOH BUDGET OVER NATIONAL BUDGET
	AMOUNT (₱)	GROWTH RATE	AMOUNT (₱)	GROWTH RATE	
1980	1.4 B	-	39.8 B	-	3.5%
1981	1.7 B	21%	54.9 B	38%	3.1%
1982	2.1 B	24%	59.7 B	9%	3.5%
1983	2.2 B	5%	61.8 B	4%	3.6%
1984	2.2 B	0%	59.5 B	-4%	3.7%
1985	2.3 B	5%	58.3 B	-2%	3.9%
1986	3.3 B	43%	90.8 B	56%	3.6%
1987	4.1 B	24%	79.3 B	-13%	5.2%
1988	5.0 B	22%	87.5 B	10%	5.7%
1989	6.6 B	32%	131.2 B	50%	5.0%

Source: Office for Management Services, DOH

The translation of the DOH budget to per capita budget is shown in Table 181 . Although the nominal per capita budget increased from ₱34.63 in 1981 to ₱110.72 in 1989, the real per capita budget has actually decreased from ₱0.11 in 1981 to ₱0.06 in 1985. A steady though slight improvement was manifested beginning in 1986 when the per capita budget increased to ₱0.08. However, in 1988, the per capita budget is only on the same level as the per capita budget in 1981. A slight improvement is expected in 1989.

TABLE 181
PER CAPITA DOH BUDGET
(1981 - 1989)

YEAR	DOH BUDGET (In Thousand Pesos)	Population (In Thousand)	Per Capita Budget (In Pesos)	
			Nominal	Real*
1981	1,715,521	49,536	34.63	0.11
1982	2,051,737	50,782	40.40	0.12
1983	2,216,154	52,055	42.57	0.11
1984	2,187,099	53,351	40.99	0.07
1985	2,341,919	54,668	42.84	0.06
1986	3,272,270	56,004	58.43	0.08
1987	4,147,565	57,356	72.31	0.10
1988	4,994,154	58,721	85.05	0.11
1989	6,653,837	60,097	110.72	0.13

* Deflated by the Implicit Price Index of the Gross National Product (1972 = 100) since inputs to government health services run the gamut of all goods and services.

Source: Office for Management Services, DOH

Table 182
RATE OF PRICE INCREASE : AMPICILLIN AND AMOXYCILLIN vs FOREX
1982-1988

A. Rate of Price Increase: Ampicillin Prices VS. Forex
1982-1988

Year	Peso/US$ Rate	% change	Ampicillin peso per kg.	% change
1982	8.37		1,402	
1983	12.16	12.2%	1,526	8.8%
1984	14.00	14.0%	1,985	30.1%
1985	20.60	47.1%	2,290	15.4%
1986	20.42	-0.9%	2,290	0.0%
1987	20.46	-0.2%	2,275	-0.7%
1988	21.05	2.9%	2,200	-3.3%
Annual Compound Growth Rate		16.6%		7.8%

B. Rate of Price Increase: Amoxycillin Prices VS. Forex
1982-1988

Year	Peso/US$ Rate	% change	Amoxycillin peso per kg.	% change
1982	8.37		2,210	
1983	12.16	12.2%	2,231	1.0%
1984	14.00	14.0%	2,633	18.0%
1985	20.60	47.1%	2,970	12.8%
1986	20.42	-0.9%	2,970	0.0%
1987	20.46	-0.2%	2,925	-1.5%
1988	21.05	2.9%	2,700	-7.7%
Annual Compound Growth Rate		16.6%		3.8%

This had a definite moderating effect on the price increase of finished dosage specialties manufactured from locally-produced Ampicillin and Amoxycillin. Price data of finished dosage specialties showed that while the prices of finished dosage specialties using imported materials rose at almost the same rate as the average rate of Peso depreciation, those of finished dosage specialties manufactured from locally-produced Ampicillin and Amoxycillin increased at much slower rates, as shown in the following table:

Table 183
AVERAGE PRICES OF SELECTED MEDICINES, 1982 & 1988

	Average price/capsule		Annual compound growth rate
	1982	1988	
Ampicillin 250 mg. capsule	1.34	2.78	12.9%
Amoxycillin 250 mg. capsule	1.83	4.11	13.7%
Cloxacillin capsule	1.70	4.21	16.3%
Chloromycetin capsule	0.69	2.53	24.1%
Penicillin capsule	1.31	3.50	17.8%
Tetracycline capsule	0.30	0.75	16.5%
Oxytetracycline capsule	0.68	2.37	23.2%
Doxycycline	3.65	10.08	18.5%

12.2.2 Foreign exchange savings

The estimated net foreign exchange savings to the country of the local production and sale of Ampicillin and Amoxycillin from 1983 when import regulation started to the first semester of 1988, was about US$ 40.0 million. This estimate was based on the 1980-1982 average import prices of Ampicillin and Amoxycillin and the equivalent US dollar prices of the locally-manufactured products.

Table 184
ESTIMATED FOREIGN EXCHANGE SAVINGS

	Import Price $C&F/KG	Local Price $C&F/KG	Local Qty.Sales KGW	Import Price x Qty.Sales $ 000	Local Price x Qty.Sales $ 000	Forex Savings $ 000
A. Ampicillin						
1983	188.19	97.70	26,480	4,983	2,587	2,396
1984	188.19	110.40	32,792	6,171	3,620	2,551
1985	188.19	86.55	37,524	7,062	3,248	3,814
1986	188.19	87.30	30,220	5,687	2,638	3,049
1987	188.19	86.57	47,268	8,895	4,092	4,803
1stSem 88	188.19	82.80	13,053	2,456	1,081	1,376
Total				35,255	17,266	17,989

Table 184
(con't)
ESTIMATED FOREIGN EXCHANGE SAVINGS

	Import Price $C&F/KG	Local Price $C&F/KG	Local Qty.Sales KGW	Import Price x Qty.Sales $ 000	Local Price x Qty.Sales $ 000	Forex Savings $ 000
B. Amoxycillin						
1983	391.39	142.83	8,600	3,366	1,288	2,138
1984	391.39	146.44	11,462	4,486	1,679	2,808
1985	391.39	112.24	15,939	6,238	1,789	4,449
1986	391.39	113.23	15,069	5,898	1,706	4,192
1987	391.39	111.30	20,349	7,964	2,265	5,700
1stSem 88	391.39	101.62	6,559	2,567	667	1,901
Total				30,520	9,334	21,186
Total Foreign Exchange Savings(1)						39,175

12.2.3 Total Taxes Paid

The domestic production is at a disadvantage as compared to imports due to the relatively high taxes imposed. This situation is apparent from a review of the total taxes paid by Chemfields to the government for the year 1981 to the first semester of 1988 which indicates a total of P 165 million, or about 23 % to 26% of sales inspite of incentives.

Competing products from other established export producers are enjoying subsidy on exports. Aside from a duty and tax free imports of raw materials, some foreign producers from countries such as India, for instance, are being given a 6 % bonus based on FOB prices, in addition to tax free profit made from the operation. Others receive very special credit terms, as a part of the country's export promotion policies.

This is further compounded by the situation wherein duties and taxes on the raw material used to manufacture the local product are at the same level as importation of competing bulk raw materials.

---

(1) The foregoing estimate of foreign exchange savings is actually understated, since only a portion of Chemfield's price represents reported inputs.

12.2.4 Industrial development

For the first time in the country, national scientists and technicians were given the opportunity to learn and perform chemical synthesis in an actual industrial setting.

The few years of experience have already yielded some fruits:

a. The local plant is now considered as a very efficient plant in its class

b. Similar plants were built in Thailand and Indonesia by means of technology transfer provided by Chemfields. Today, Filipino scientists occupy key operating positions in these plants.

More important perhaps is the confidence provided by this experience to scientists to evaluate the feasibility to move one step farther to fermentation, towards a full up-stream integration in this subsector of the pharmaceutical industry.

The general perception is, however, that in order to achieve this, there should be a strong political will with firm commitments and sustained Government effort, with stable and consistent rules of the game and with reduced flexibility in implementation of the incentives.

Table 185
RECAPITULATION OF THE PROPOSED PLANTS

Product	Investment (millions US $)	Manuf. Capacity (M. Tons)	Sales (000 US $)	Prod. Costs	Manpower (No.)
1. Penicillins and 6-APA	26-30.00	295	11,630	6,600	190
2. Fermentation pilot-plant	1.5-2.00	-	-	-	20
3. Erythromycin Base, Rifamycin and Tetracycline Base	3300	147	10,330	6,240	220
4. Semi-synthetic Penicillins (Ampicillin, Amoxycillin, Cloxacillin, Cephalexin)	5.90	74	7,620	6,461	45
5. Erythromycin Derivatives and Rifampicin	1.53	45	7,788	6,859	27
6. Tetracycline Hydrochloride Oxytetracycline Hydrochloride	1.20	35	1,240	920	21
7. Multi-purpose pilot-plant for Chemical Synthesis	5.2	83	1,302	-	48

XIII THE BUREAU OF FOOD AND DRUGS

The tremendous expansion of the food, drug and cosmetics industries during the last half of the 20th century made it mandatory in the government to adopt measures to protect the health of the people.

In 1963, the Philippine Congress passed Republic Act No. 3720, otherwise known as the Food, Drug, and Cosmetic Act, creating the Food and Drug Administration (FDA). This was further strengthened with the creation of the Bureau of Food and Drugs (BFAD) by nature of Executive Order 851 transferring the function of FDA to the BFAD.

13.1 Function and Services of BFAD

13.1.1 Functions

The Bureau of Food and Drugs is mandated to implement the following functions:

1. Administers and supervises the implementation of all laws under BFAD jurisdiction ;

2. Provides for the collection of samples of product under its jurisdiction ;

3. Inspects establishments to check compliance with existing law and regulations ; and issues licenses of establishments.

4. Analyzes samples ;

5. Establishes analytical data to serve as basis for the preparation of Food, Drug and Cosmetic Standards and to recommend Standards of Identify, Purity, Quality and Fill of Containers ;

6. Issues license and certificate of product for registration ;

7. Levies, assesses and collects fees for inspection, analysis and testing of product and materials submitted in compliance with Laws and Regulations ;

8. Certifies batches of antibiotics and antibiotic preparations ;

9. Prescribes general standards and guidelines with respect to the veracity of nutritional and medicinal claims in the advertisement of food, drugs and cosmetics in the various media, to monitor such advertisements, and to call upon any erring manufacturer, distributor, or advertiser to desist from such inaccurate or misleading nutritional or medicinal claims in their advertising ;

10. Provides consultative training and advisory services to all agencies and organizations involved in food and drug manufacturing and distribution with respect to assuring safety and efficacy of food and drugs ; and

11. Maintains a corps of specially trained food and drug inspectors for assignment to the various field offices of the Department of Health.

13.1.2 Services

The services provided by BFAD are summarized as follows:

As a staff bureau, BFAD provides consultative and advisory services and acts as the executive arm of the Department of Health on matters pertinent to food, drugs, device, cosmetic and household substances. It develops and recommends rules, regulations and standards in accordance with the present BFAD laws.

Technical supervision of the Food and Drug Services of the 12 RHO in the implementation of the rules and regulations on food, drugs, cosmitics, devices and household products containing hazardous substances is provided by the Office.

BFAD provides the guidelines for the maintenance of a pharmaceutical laboratory, determine and classifies the products to be manufactured by the same, and sets forth inspection guidelines on the buildings and premises of the phamaceutical laboratory involved on whether the buildings and premises are fit as such, the serviceability, condition and adequacy of the equipment used therein, the number of personnel, their aptitude and skill, their training and experience, the determination of quality control on facilities and raw materials, on production and processes and such other items vital and necessary for the establishment and maintenance of a pharmaceutical laboratory.

As a regulatory body, BFAD determines and classifies a drug producer, the physical set-up of a drug establishment, of the contracts entered into by it and its validity, the products distributed, the nature, mode and manner of its distribution and such other items as may be set forth by the body.

BFAD as a regulatory and licensing agency sets forth as well the guidelines for the opening and inspection of a cosmetic laboratory the requirements of which is analogous to that of a pharmaceutical laboratory and of a drug store and hospital pharmacy.

Line functions in the National Capital Region are undertaken by conducting inspections licensing establishments and collection of product samples. Testing of all products under BFAD jurisdiction is done by the Laboratory Division for purposes of checking the safety and good quality of products for consumer protection.

BFAD also issues the following certificates, permits/ clearance/ authorization

13.1.2.1 Licenses/Certificates

1. License to Operate Food Establishment
2. License to Operate Drugstore
3. License to Operate Cosmetic Laboratory
4. License to Operate Pharmaceutical Laboratory
5. License to Operate Drug Department
6. License to Operate Hospital Pharmacy
7. License to Operate Botica sa Barangay
8. License to Operate Household Hazardous Substance Establishment

9. Renewal of License to Operate:

    a. Household Remedy Store
    b. Chinese Drug Store

10 Certificate of Compliance with Technical Requirements
11. Certificate of Product Registration
12. Certificate of Registration of Medical Director

13. Certificate/Report of Laboratory Analysis
14. Certificate of Registered Products of a Drug Company
15. Certificate of Registered Establishments

13.1.2.2 Permits/Clearance and Authorizations

1. Clearance of Business/Trade Names
2. Clearance of Product Brand Names
3. Export Commodity Clearance for Food Products
4. Import Clearance for Food Color Additices
5. Authority to Import Potassium Cyanide, Chlorofluorocarbon and Borax
6. Authorityj to Release Imported Samples (Finished Products) from Custom Custody
7. Authority to Release Imported Products Under BFAD jurisdiction from Point of Entry
8. Permit to Export Pharmaceuticals
9. Permit to Import Antibiotics
10. Permit to Send Samples for Laboratory Analysis Abroad
11. Permit to Mail/Handcarry to other countries drugs and food for personal use

13.2 Organization

Six division implement the function of BFAD

REGULATION DIVISION I takes charge of the inspection of outlets for foods, drugs, devices, household hazardous substances, and cosmetics and issues licenses of establishments.

REGULATION DIVISION II spearheads the inspection of manufacturers of foods, drugs, devices, cosmetics and household hazardous substance, and licenses of establishments.

LABORATORY SERVICES DIVISION conducts all the tests, analysis, and trials of products under its jurisdiction.

PRODUCT SERVICES DIVISION oversees the evaluation and registration of all foods, drugs, devices, cosmetics, and household hazardous substance, including monitoring of adverse drug reactions.

LEGAL DIVISION takes charge of legal and other aspects of compliance and information activities of the Bureau, including monitoring of advertisements and promotions of products under BFAD jurisdiction.

ADMINISTRATIVE DIVISION provides the Bureau with logistics and administrative support for the effective operation of the Bureau

13.3 Manpower

In 1988, the BFAD has a total manpower complement of 240. The occupational groupings of the BFAD staff are as follows:

	Occupational Group	Number
3.1	Physician	1
3.2	Pharmacists	38
3.3	Chemists	25
3.4	Medical Technologists	5
3.5	Veterinarians	3
3.6	Holders of Bachelor's degree in other fields	86
3.7	Others	82
3.8	T o t a l	240

13.4 Annual Report

The annual report of BFAD given in the following pages shows the complexity of its tasks anf given a brief review of its accomplishments. It is worthwhile to mention that out of 12,492 completed analysis of antibiotics only 124 failed to meet the requirements (0.99%).

LABORATORY SERVICES DIVISION
Annual Accomplishment Report
1988

Sections	Carry over from 1987	Samples Recorded	Total Samples for Analysis	Completed Analysis	Unfinished total	% of Unfinished	No. of Exams	Violations
Antibiotics	332	13,895	14,227	12,492	1,735	12.2	13,607	124
Drugs	453	10,487	10,940	9,949	991	9.05	15,135	244
Foods	658	5,420	6,078	5,589	489	8.04	25,239	605
Cosmitics/HHS	69	2,053	2,122	1,975	147	6.93	7,488	86
Toxicology	18	1,039	1,057	1,039	18	1.7	4,242	-
Food Micro	-	3,710	3,710	3,710	-	-	9,824	256
Total	1,530	36,604	38,134	34,754	3,380	8.86	75,535	1,315

REPUBLIC OF THE PHILIPPINES
MINISTRY OF HEALTH
BUREAU OF FOOD AND DRUGS
MANILA

ANNUAL REPORT

CY-1988

INTRODUCTION :

Great is the year 1988 for the new Bureau of Food and Drugs (BFAD) for it has brought several achievements beneficial to the nation. In collaboration with the workforce and with the viability and availability of modern facilities extended to it by the Japan International Cooperation Agency (JICA), the Bureau executed and is now doing its task with utmost efficiency and integrity, thus, bringing to the forefront the emergence of the new and stronger BFAD.

HIGHLIGHTS OF ACCOMPLISHMENTS :

Some of the marked achievements which the BFAD had accomplished worthy to note are summarized as follows:

A. General Administration :

1. Issued permanent closure orders to the following drug establishments for violation of the provisions of R.A. 3720 as amended, re: selling adulterated and misbranded drug products:

   1.1 Danfen Drug House and Pharmaceuticals - Caloocan City

   1.2 Global Incorporated - Timog Avenue, Quezon City

2. Issued temporary closure orders to the following drug establishments for violation of the provisions of R.A. 3720 as amended; for operating without the presence of a pharmacist and non-compliance with GMP requirements:

2.1 Mirage Drugstore - Manila

2.2 Visa Drug Branch I - Quezon City

2.3 Belgar Drugstore - Malabon, M.M.

2.4 Ravago Drug - Quezon City

2.5 Sampaguita Drug - Baguio City

2.6 Weisser Chemical & Industry - Valenzuela, M.M.

3. Hosted the ASEAN Seminar/Workshop to Review and Adopt the Curriculum and Operational Manual on Drug Evaluation and Control in connection with the Technical Cooperation Among ASEAN Countries on Pharmaceutical held on October 25-27, 1988 in Manila.

4. Coordinated with DOH, Congress, Office of the President and other concerned agencies in the development and passage of the Republic Act No. 6625 otherwise known as the Generics Act of 1988.

5. Conducted series of meetings and dialogues with the representatives of the pharmaceutical industry in connection with the drafting and development of rules and regulations which resulted among others in the approval and issuance of:

5.1 BFAD Regulation No. 1 s. 1988 - Amended General Regulations for the Licensing of Drug Establishments.

5.2 DOH Administrative Order No. 55 s. 1988 - Requirements for Labelling Materials of Pharmaceutical Products.

6. Issued the following technical Circulars to all concerned:

6.1 BFAD Memorandum Circular No. 88-001

re: Compliance of all vinegar manufacturers to Administrative Order No. 134 s. 1970; Regulation Prescribing the Standards of Identity and Quality of Vinegar.

6.2 BFAD Memorandum Circular No. 88-002

re: Classification of all Pharmaceutical products containing ephedrine, pseudoephedrine or their salts as ordinary prescription drug pursuant to DDB Board Regulation No. 2 s. 1988.

6.3 BFAD Memorandum Circular No. 88-003

re: Methanol content in alcoholic beverages is zero (0) ppm. as a measure to ensure pure and safe supply of food in the country.

6.4 BFAD Memorandum Circular No. 88-04

re: BFAD General Guidelines on Donation of pharmaceutical products.

6.5 BFAD Memorandum Circular No. 005-88

re: Registration of Diagnostic Reagents and Test Kits for AIDS.

6.6 BFAD Memorandum Circular No. 007-88

re: Proliferation in the market of "Mommy's Like Baby Oil", which upon evaluation by this Office is a complete simulation or imitation of duly registered product.

6.7 BFAD Memorandum Circular No. 008-88

re: Drug and Medical Device Registration. All drug establishments are cautioned to see to it that all pharmaceutical products/medical device they manufactured, offer for sale, sell, distribute or transfer are covered by a valid certificate of Product Registration.

6.8 BFAD Memorandum Circular No. 009-88

re: Confirmation of the Phase out action on Mercury containing Preparation for Antiseptic use

6.9 BFAD Memorandum Circular No. 010-88

re: Submission of samples for analysis by Food and Drug Inspectors with complete documents to ascertain the legitimacy of source.

6.10 BFAD Memorandum Circular No. 011-88

re: Seizure and confiscation of Amplifen Capsule 250 mg. with Lot No. 041021 and Expiry Date of October 1989 purportedly manufactured by Sigjohn Pharmaceuticals, Q.C., which was found adulterated and misbranded.

6.11 BFAD Memorandum Circular No. 012-88

re: Proliferation of fake Fenix Capsules of Ethegal Laboratories; to determine legitimacy of source, Food and Drug Inspectors are directed to inspect all outlets and distributors thereof.

6.12 BFAD Memorandum Circular No. 013-88

re: Seizure and confiscation of "Muscle Pain"/Methyl Salicylate manufactured by Breagh Food Products without proof of BFAD Registration.

6.13 BFAD Memorandum Circular No. 014-88

re: To seize and confiscate fake Pentrexyl 500 mg. Capsule; PL 734; 11/90 purportedly manufactured by Bristol Laboratories, Inc. which are found without proper sales invoice and unknown address of supplier/distributor.

6.14 BFAD Memorandum Circular No. 015-88

re: Alaska Full Cream Milk product with expiry dates of May & June 1989 which were banned in 1986 for having exceeded the radioactivity limits.

6.15 BFAD Memorandum Circular No. 016-88

re: Birch Tree Milk Powder with expiry dates of May 1989 and June 1989 which were bannedin 1986 for sale and distribution in the local market having exceeded the levels of radioactivity limits.

6.16 BFAD Memorandum Circular No. 017-88

re: All Food and Drug Inspectors are directed to inspect all outlets and distributors of Medicycline 250 mg. to determine legitimacy of source and distributors as reported by Global Inc.

6.17 BFAD Memorandum Circular No. 018-88

re: Food and Drug Inspectors to monitor, seal and confiscate unregistered and adulterated Dairy Meadow Full Powdered Milk.

6.18 BFAD Memorandum Circular No. 019-88

re: Drugstores and Drug Outlets are reminded that sale or offer for sale of unregistered Sensitive Eye Effervescent Cleansing Tablet manufactured by Bausch and Lamb is prohibited by R.A. 3720 as amended.

B. Regulation Division I

1. Intensified campaign against absentee pharmacists of drugstores by way of imposing the temporary closure of drugstores found operating without the registered pharmacists for three (3) consecutive inspections.
2. Effectively reduced the indiscriminate sale of OTC abused cough syrups through:
   2.1 The constant monitoring of the dispensing of these products in drugstores; and
   2.2 The re-classification of ephedrine, pseudo-ephedrine and its salts from OTC to Rx drugs.
3. Checked the entry of imported food products contaminated with radioactivity into the country including the "contaminated milk" imported from Poland by New Zealand intended to be re-exported to the Third World Countries.
4. Implemented the BFAD Regulation No. 1 on Licensing of Drug Establishments.
5. Monitoring of the compliance with BFAD Regulation re: withdrawal of oral anti-inflammatory proteolytic enzymes.
6. Registered and issued Licenses to Operate food, drugs, cosmetics, and Household Hazardous establishments.
7. Supervised the destruction of expired, damaged and violative products.
8. Sealing and confiscation of milk products (Birch Tree Instant Milk Powder) in Lamoiyan warehouse in Paranaque which contain radioactive substance exceeding the set level of 22 Bq.

9. Survey of Ampicillin and Chloramphenicol injectables intended for government use in different drugstores fronting government hospitals. No stocks of the abovementioned medicines were noted.

10. Investigation of complaints received, re-establishments operating without LTO and the sale of unregistered products.

11. Monitoring and inventory of Alaska Full Cream Milk with expiry dates May and June 1989, found contaminated with radioactivity exceeding 22 Bq. at the importer's warehouse.

C. Regulation Division II

1. Intensified the inspection of food, drug and cosmetic manufacturer, implemented the closure order of the following drug establishments:

   1.1 Danfen Drug House and Pharmaceuticals - Caloocan City, for selling adulterated and misbranded drugs.

   1.2 Global Inc., Quezon City - manufacturing of adulterated drug product.

2. Assisted the DOH Bidding Committee in the evaluation of capabilities of bid awarded drug suppliers:

   2.1 Out of 38 drug establishments who won in the bidding, 20 were found inadequate which likewise recommended to undertake measures for improvement of their facilities.

3. Destruction of expired, deteriorated pharmaceutical products with estimated value of P2,859,367.32

4. Accreditation of Quality Control facilities and equipment of pharmaceutical laboratories.

5. Random sampling of drugs and cosmetics and food for monitoring of quality thereof.

6. Accreditation of blister packaging and equipment operation.

7. Accreditation of dissolution test assembly.

8. Supervision of deliveries of pharmaceutical products for DOH.

9. Supervision of blister packaging of anti-TB drugs for DOH.

D. Product Services Division

1. Based on the review done by the National Drug Committee on WHO list of Restricted, Withdrawn, Banned drugs in other countries, the following list of drugs were prepared:

   1.1 Drug banned in other countries but still marketed in the Philippines.

   1.2 List of drugs banned in other countries and also in the Philippines.

2. Prepared lists of marketed drug products per therapeutic category with corresponding dosage and strength as required by the NDC to be entered in the National Drug Formulary.

3. Conducted lectures on current registration procedures and rules and regulation for marketed drugs, new drugs, medical devices, cosmetics and household hazardous products during the seminar/ workshop of the Food and Drug Inspectors.

4. Prepared flow chart indicating job descriptions and functions of the Division with standards for review by the OSR.

5. Strict enforcement of the Administrative Order on Fixed-Dose Combination No. 7 s. 1986 for Initial/Renewal of fixed-dose combination products.

6. Coordinated with the DDB on the review/deliberation for the classification of ephedrine and pseudoephedrine containing preparations.
7. Prepared a list or checklist of revised requirements for initial registration of drug products.
8. Prepared requirements and standards for different categories of drug products.
9. Formulated proposed targetted delisting process of questionable registered drugs.
10. Prepared a list of all registered drugs indicating the brand and the generic names in compliance with the Generic Act of 1988.
11. Required accelerated registration for donated drugs and medical devices.

E. Laboratory Services Division

1. Continuous monitoring of food, drugs and devices, cosmetics, household hazardous substances and other products within BFAD's jurisdiction to ensure compliance with existing standards and regulations.
2. Completion of assay of proposed Salbutamol Sulfate Substance. Raw materials for the collaborative assay have also been sent to the Asean Co-laboratories.
3. Asean Reference Standards of Paracetamol and Chlorpheniramine Maleate, proposed for adoption by the Philippines and have been adopted for utilization, are now ready for dispatch, locally and to the Asean co-laboratories.
4. Continuous assistance to the Bureau of Fisheries and Aquatic Resources (BFAR) in the analysis (bioassay) of paralytic shellfish poison (PSP) commonly known as the "Red Tide". To date, a total of 166 samples from BFAR (mussels) have been analyzed by the Food Laboratory Section for the neurotoxin content.

5. Physico-chemical analysis of Acetaminophen Tablets both branded and generics have been initiated to determine the uniformity or variability of the tablets in term of quality specifications. Samples from sixty (60) branded and generic products manufactured by thirty six (36) pharmaceutical companies have been analyzed. The Dissolution rate testing of these products will soon be undertaken.

6. Successful breeding and production of specific pathogen free animals:

   6.1 Continuous breeding and production of mice and rats without any health problem. These animals are being utilized for BFAD's safety experiments.

   6.2 Out of the original number of 10 female and 10 male rabbits from Japan, there are 10 Philippine born rabbits.

7. Establishment of the Pyrogen Testing facilities utilizing the pyrogen test processor which can conduct the test of 5 to 10 samples/day.

8. Continuous development of manpower through in-house service training on instrumental techniques of analyses and foreign training on the field of food, drug and antibiotic and cosmetic analysis.

   8.1 Successful training on the use of the polygraph system in the conduct of the Depressor Substance Test and Pressor Substance Test.

   8.2 Successful training on pesticide residue analysis using GC-FPD and GC-ECD.

9. Assessment of program for assuring the safety of food, including alcoholic beverages by Dr. G.G. Moy, Food Safety Adviser, Promotion of Environmental Planning and Applied Studies (PEPAS).

9.1 Preparation of the:

9.1.1 Draft Standard for Alcoholic Beverages

9.1.2 Draft Standard for Vinegar, vinegar products and artificial vinegar.

F. Drug Information Unit

1. Dessimated information on:

1.1 Development of drugs and other related products on current International Scientific Literature.

1.2 Serious side effects of some pharmaceutical products.

1.3 BFAD regulations/decisions resulting on withdrawal, restriction and banning of specific product.

G. Legal Information and Compliance Division

1. Provided technical and legal advisory services to the Director and organizational units of the Bureau.
2. Conducted administrative investigations relative to cases of alleged violations of RA 3720 as amended, (Food, Drugs and Devices and Cosmetic Act), PD 881 (Hazardous Substance Decree), RA 5921 (Pharmacy Act) and its implementing rules and regulations.
3. Assisted the different regional trial courts in the hearing of the civil cases filed by complainants for violation of BFAD laws.
4. Coordinated with the Bureau of Domestic Trade, SEC, Philippine Board of Advertising and other government and non-government agencies in the compliance and information activities of the Bureau.

Submitted by :

CATALINA C. SANCHEZ
Director

ANNUAL REPORT REGULATION DIVISION I
LICENSING SECTION FROM
JANUARY TO DECEMBER
1 9 8 8

Annex A

- 610 -

I. NO. OF LICENSESTO OPERATE FOOD & DRUG ESTABLISHMENTS- OPENING - 476 OPENING CTR - 476

A. Drug Establishments	436	436
1. Drug Store	366	366
Metro Manila	153	153
RHO I	13	13
RHO II	2	2
RHO III	20	20
RHO IV	38	38
RHO V	24	24
RHO VI	18	18
RHO VII	24	24
RHO VIII	15	15
RHO IX	15	15
RHO X	22	22
RHO XI	9	9
RHO XII	13	13
TOTAL RHO	213	213
2. Drug Department	56	56
Metro Manila	43	43
RHO I	1	1
RHO IV	2	2
RHO VII	3	3
RHO VIII	2	2
RHO IX	1	1
RHO XI	1	1
RHO XII	3	3
TOTAL RHO	13	13
3. Hospital Pharmacy	14	14
Metro Manila	1	1
RHO I	1	1
RHO II	1	1
RHO III	1	1
RHO IV	3	3
RHO V	2	2
RHO VIII	1	1
RHO X	1	1
RHO XII	3	3
TOTAL RHO	13	13
B. Food Establishments	40	40
Metro Manila	38	38
RHO VII	2	2
TOTAL RHO	2	2

II. NO. OF FOOD & DRUG ESTABLISHMENTS RENEWAL - - - - - 3596 RENEWAL CTR - - - - - 3596

A. Drug Establishments	3460	3460
1. Drug Store	2956	2956
Metro Manila	1522	1522
RHO I	221	221
RHO III	56	56
RHO IV	776	776
RHO V	3	3
RHO VI	7	7
RHO VII	34	34

RHO VIII	145	145
RHO IX	13	13
RHO X	26	26
RHO XI	148	148
RHO XII	5	5
TOTAL RHO	1434	1434
2. Drug Department	408	408
Metro Manila	318	318
RHO I	13	13
RHO III	3	3
RHO IV	25	25
RHO VII	11	11
RHO VIII	14	14
RHO IX	12	12
RHO XI	12	12
TOTAL RHO	90	90
3. Hospital Pharmacy	59	59
Metro Manila	9	9
RHO I	5	5
RHO III	1	1
RHO IV	22	22
RHO V	3	3
RHO VII	1	1
RHO VIII	3	3
RHO IX	1	1
RHO X	1	1
RHO XI	13	13
TOTAL RHO	50	50
4. Drug Department (Chinese Drug)		4
Metro Manila	4	4
TOTAL RHO	0	0
5. Chinese Drug Store	22	22
Metro Manila	21	21
RHO XI	1	1
TOTAL RHO	1	1
6. Household Remedy Store	1	1
Metro Manila	0	0
RHO I	1	1
Total RHO	1	1
B. Food Establishments	146	146
Metro Manila	142	142
RHO IV	2	2
RHO V	1	1
RHO XII	1	1
TOTAL RHO	4	4

III. NO. OF FOOD & DRUG ESTABLISHMENTS WHICH CLOSED BUSINESS - - - - - - 317

A. Drug Establishments	316
1. Drug Store	276
Metro Manila	170
RHO I	4
RHO II	1
RHO III	7
RHO IV	13
RHO VI	4

RHO VII - - - - 37
RHO VIII - - - - 3
RHO X - - - - 2
RHO XI - - - - 10
RHO XII - - - - 3
TOTAL RHO - - - - - - - 106

2. Drug Department - - - - - - - - - 36
Metro Manila - - - - - 31
RHO III - - - - 2
RHO IV - - - - 1
RHO XI - - - - 2
TOTAL RHO - - - - - - - 5

3. Chinese Drug Store - - - - - - 1
Metro Manila - - - - - 1
TOTAL RHO - - - - - - 0

4. Botica Sa Barangay - - - - - - 1
Metro Manila - - - - - 0
RHO X - - - - 1
TOTAL RHO - - - - - - - 1

5. Hospital Pharmacy - - - - - - - 1
Metro Manila - - - - - 1
TOTAL RHO - - - - - 0
6. Drug Department (Chinese Drugs) - - 1
Metro Manila - - - - - 1

B. Food Establishments - - - - - - - - - - - - -1
RHO VII - - - - 1
TOTAL RHO - - - - - - - 1

IV. HOUSEHOLD HAZARDOUS SUBSTANCES

A. Household Hazardous Substances - Opening - - - 37
Metro Manila - - - - - 12
RHO I - - - - 8
RHO II - - - - 4
RHO III - - - - 1
RHO IV - - - - 1
RHO VII - - - - 2
RHO IX - - - - 7
RHO XI - - - - 2
TOTAL RHO - - - - - - - 25

B. Household Hazardous Substances - Renewal - - - 642
Metro Manila - - - - - 402
RHO II - - - - 4
RHO III - - - - 1
RHO IV - - - - 64
RHO VI - - - - 1
RHO VII - - - - 1
RHO VIII - - - - 7
RHO IX - - - - 136
RHO X - - - - - 1
RHO XI - - - - - 25
TOTAL RHO - - - - - - - 240

C. Household Hazardous Substances - Closure - - - 4
Metro Manila - - - - - 3
RHO IV - - - - 1
TOTAL RHO - - - - - - - 1

Annex A-1

REGULATION DIVISION I
Inspection Section

	Target	Accomplished	% Accomplished
1. Number of Establishments	3,269		
2. Number of Inspection	4,200	4,656	110% = Total
a) Drugstores	3,500	3,740	106%
b) Drug Department	300	416	138%
c) Food (Import/Export)	200	230	115%
d) Cosmetics	50	90	180%
e) Household Hazardous	150	180	120%

PRODUCT SERVICES DIVISION (PSD)

Annex B

ANNUAL REPORT

STATISTICAL DATA

January - December 1988

	Total Number
DRUGS	
Initial Application	3,175
Renewal Registration	5,989
Approved Registration (initial)	4,010
Approved Registration (renewal)	6,100
New Drug Application	16
New Drug with Temporary Permit Approval	6
FOODS	
Initial Application	799
Renewal Application	1,337
Approved Registration	1,650
Abeyance	490
COSMETICS	
Initial Application	1,166
Renewal	861
Approval	1,269
Abeyance	482
HAZARDOUS SUBSTANCES	
Initial Application	115
Renewal "	133
Approved Registration	207
Abeyance	27

LEGAL INFORMATION & COMPLIANCE DIVISION STATISTICAL REPORT (JANUARY TO DECEMBER 1988)

A. No. of Violative Products - - - - - - - - - - - - - - - - - 867

1. Drugs - - - - - - - - - - - - - - - - 367

2. Foods - - - - - - - - - - - - - - - - - 500

B. Action Taken:

1. Scheduled for Formal Hearing:

1.1 Drugs - - - - - - - - - - - - - - 5

1.2 Foods - - - - - - - - - - - - - - 52

2. Referred to Regional Health Office for investigation - 433

2.1 Drugs - - - - - - - - - - - - - 220

2.2 Foods - - - - - - - - - - - - - 263

3. Scheduled for Summary Investigation - - - - - - - 250

3.1 Drugs - - - - - - - - - - - - - 78

3.2 Foods - - - - - - - - - - - - - 172

4. Number of:

4.1 Warnings Issued - - - - - - - 3

4.2 Order/Resolution/Decision - 14

Drug - - - - - - - - - - - 14

4.3 Cease and Desist Order - - - 56

Drug - - - - - - - - - - - 2

Food - - - - - - - - - - 54

4.4 Confiscation - - - - - - 3

Drug - - - - - - - - - - - 3

4.5 Withdrawn - - - - - - - - - - 1

4.6 Lifting Order - - - - - - - 1

Drug - - - - - - - - - - - - 1

XIV THE NATIONAL DRUG POLICY

14.1 Primer on the National Drug Policy

1. What is objective of the National Drug Policy?

The National Drug Policy (NDP)is a policy program of the national government to ensure that safe and effective drugs are made available to all Filipinos at any time and place and at a reasonable cost.

2. When was the National Drug Policy announced?

President Corazon C. Aquino enunciated the National Drug Policy on 30 April 1987 during the inauguration of the new Bureau of Food And Drugs (BFAD) building in Alabang, Metro Manila.

3. Why is the NDP needed?

The unavailability and unaffordability of safe and effective drugs has always been a problem in this country. Ironically; the local market is flooded with 12,000 different drugs. Many of these are of dubious quality; most of them are beyond the means of most consumers. And yet, according to the World Health Organization, 90% of all ailments can be cured by 250 drugs which may be deemed to be essential. There is a need to put order into a chaotic situation and to promote the rational use of drugs.

4. How was the NDP formulated?

Through the initiatives of the Department of Health, a Task Force on Pharmaceuticals was set up in June 1986. The Task Force went through several steps in formulating the NDP.

a) **Consultations.** Two major multi-sectoral conferences were held with 61 organizations and 99 individual participants in attendance. Consultations were also conducted with the pharmaceutical industry, professional organizations, academic and consumer groups. During these fora, 25 position papers were submitted to the Task Force.

b) **Local Research.** The local research component was carried out between September 1986 and March 1987. A review of local research efforts and publications dealing with drugs and pharmaceuticals was undertaken. A situational analysis that identified seven basic issues in the Pharmaceutical industry was developed by the Task Force.

c) **International Research.** The international research component was conducted between November 1986 and 1987 with visits to Indonesia, Malaysia, and Thailand. During that period, extensive face-to-face consultations were held and the experience of other countries in formulating a drug policy were compiled and analyzed.

5. What are the components of the NDP?

The NDP rests on four pillars which form an integral unit and are mutually complementary and supportive of each other. These are:

a) **Quality Assurance of Drugs** - The quality assurance of safe and effective pharmaceutical products through quality control is a basic need. This pillar requires the regulation of the importation, manufacture, marketing, and consumer utilization of all pharmaceutical products. This is the task of the BFAD.

b) **Rational Use of Drugs by Health Professionals and Consumers** - The second pillar calls for the promotion of the rational use of drugs by health professionals and consumers. Rational use of drugs refers to the practice of using only the necessary and effective drugs in treating an illness. Abuse and misuse of drugs are the antitheses of rational use.

c) **National Self-Sufficiency in Pharmaceuticals** - The third pillar of the NDP is the development of national self-sufficiency in drug manufacturing. It is intended to reduce the country's dependence on the multinational drug companies.

d) **Rationalization of the DOH's Procurement Program** - Since the National government is the single biggest buyer and user of pharmaceutical products, its procurement program can be designed to achieve economies of bulk purchasing and enhance the impact of DOH resources.

6. How will the objectives of the NDP be achieved?

a) To assure the quality of drugs and medicines, the DOH is strengthening the capabilities of BFAD to undertake quality control, product registration, and licensing of sales establishments. Currrent efforts are underway at the BFAD to delist medicines that are banned, restricted or withdrawn from other countries but are still available here.

b) To ensure the rational use of drugs by consumers and health professionals, the following are underway:

1) the passage of bills in Congress requiring generic labelling, prescribing, and dispensing of medicines;

2) the creation of the National Drug Formulary by the National Drug Committee (see question 8);

3) the regulation of the advertising and promotion of pharmaceutical products.

c) To achieve self-sufficiency in basic manufacturing, a fundamental plan is being developed with the participation of the United Nations Industrial Development Organization (UNIDO). Based on this plan, private investment will be given incentives to produce raw materials and intermediates of pharmaceutical products.

d) To rationalize DOH procurement of medicines, purchases have been based on generic nomenclature. All future purchases will be based on the National Drug Formulary.

7. What are generic names? What are the advantages of using them?

A generic name is a simpler term for the scientifically-recognized active ingredient of a drug. For example, paracetamol is the generic name for n-acetyl-p-aminophenol. Paracetamol is a medicine to control fever. Brand names of paracetamols include Tempra, Biogesic, and Tylenol.

Using generic names will reduce the cost of treatment by reducing the promotions and advertising costs which are associated with brand-name drugs.

Some examples of generic names, brand names, and their prices are:

Therapeutic use	Generic name		Brand name	
For fever	Paracetamol	P0.50	Biogesic	P0.62
			Tempra	P0.70
			Tylenol	P1.00
Antibiotic	Ampicillin (250 mg.)	P2.02	Pensyn	P2.99
			Pembritin	P3.35
			Amopen	P3.47
Vitamin C	Ascorbic Acid	P0.35	Citrovit	P0.67
			Cetrin	P0.68
			Cecon	P1.20

8. What is the National Drug Formulary (NDF)?

The NDF is the list of medicines officially recognized and approved by the DOH. It is composed of a core list of medicines considered essential and a complementary list of drugs considered useful if not essential. This formulary is currently being prepared by the National Drug Committee and when completed will be regularly revised and updated.

9. What is an Essential Drugs List (EDL)?

The EDL is a concept promoted by the World Health Organization and refers to those drugs which cure the vast majority of illnesses and should be affordable and available to all persons. The EDL will be incorporated into the National Drug Formulary.

10. What are the obstacles to the successful implementation of the NDP?

The obstacles include:

a) companies that stand to lose money when their products which are judged unsafe and ineffective are delisted and taken off the market. As is already happening, these companies file court suits to prevent the delisting of their products.

b) fly-by-night companies which will try to take advantage of the new law on generic labelling, prescribing, and dispensing to market products of inferior quality with the hope of getting away with it.

c) individuals and groups that want to maintain the status quo because they benefit from it in terms of large revenues or promotional perks.

11. How can medical practitioners promote the NDP?

Physicians should practice generic prescribing. They should also maintain a healthy professional distance from the drug companies. Medical societies should provide better post-graduate education to their members so that reliance on drug companies for updating through drug promotions is minimized.

12. How can pharmacies and sales establishments promote the NDP?

Pharmacies and sales outlets should provide information concerning generic names of brand-name drugs and their comparative prices. This service will afford the consumer a wider and more informed choice of medicines for his/her needs.

13. How can the ordinary citizen promote the NDP?

The ordinary citizen must use medicine wisely. He must seek pertinent information from his physician and from the pharmacist on medicine that is necessary and affordable to him/her. He must inform himself about the range of choices in a generic prescription in order to make the proper purchase.

14. Who manages the implementation of the NDP?

The NDP Management Committee is a special group within the DOH which oversees the implementation of the NDP. It is headed by the Assistant Secretary for Standards and Regulations.

The group has several units.

a) the Advisory Committee to BFAD is responsible for spearheading the upgrading of capabilities within BFAD. Experts from the UP College of Pharmacy and the Department of Pharmacology of the UP College of Medicine are members of this committee.

b) the National Drug Committee (NDC) is a team of pharmacologists, pharmacists, and clinicians whose main task is to prepare the National Drug Formulary and recommend to the BFAD the drugs for delisting.

c) other units involved in administration, legal affairs, and communication and information.

For further inquiries, pleases call or write:

1. Office of the Secretary of Health, DOH
   Ask for the Public Relations Officer
   Telephone: 711-61-05

2. Public Information and Health
   Education Service, DOH
   Ask for National Drug Policy
   Information Officer
   Telephone: 711-63-05

3. Bureau of Food and Drugs
   DOH, Alabang
   Ask for National Drug Policy Coordinator
   Telephone: 842-22-13

14.2 The National Drug Policy

The formulation of a National Drug Policy was the product of a long process of consultations and deliberations that arose as a response to a felt need which was conveyed to the government by people from various sectors of society.

In fact, in all the President's regional consultation, the problem of drugs and medicine being beyond the reach of the majority of Filipinos was among the most common issues raised. Similar consultations by the DOH yielded the same complaint and citizens pressed for some form of government intervention and relief. There was widespread concern over the issues of availability of drugs and medicines, which could not be ignored. At the same time, there was a basic agreement that free market forces could not resolve these problems.

The DOH recognizes the fact that drugs and medicines are a vital component of health care. Given the low levels of income of the vast majority of the Philippine population, the cost of pharmaceuticals is a major, if not dominant, factor in the overall cost of health care. Furthermore, the Constitution recognizes the citizens' right to health and mandates the government to address the issue of assuring the availability of necessary drugs and medicines.

Aware of these concerns, the Department of Health initiated and supervised a process of policy formulation with four basic components: a) determination of the need, scope, and process for policy formulation, 2) conduct of orderly and documented consultations, 3) conduct of local research, and 4) conduct of international research. Initial studies conducted from September to October 1986 arrived at a consensus to develop the Policy.

Subsequently, the DOH conducted consultations from November 1986 to March 1987 among the different sectors of the drug industry, the medical profession, and consumer groups. These included two major multisectoral conferences with 61 organizations represented and 99 individual participants. During these fora, 25 position papers were submitted, resulting in the identification of seven issues: 1) a proposed Essential Drug List (EDL), 2) the use of Generics versus brand names, 3) advertising and promotions, 4) procurement and self-sufficiency, 5) self-medication, 6) basis for registration of pharmaceuticals, and 7) pricing.

Simultaneously with these discussions, both local and international research activities were conducted. The local research component was carried out between September 1986 and March 1987. A situational analysis and seven working papers on the issues mentioned previously were prepared. A bibliography of local research efforts and papers dealing with drugs and pharmaceuticals was also prepared. The international research component, conducted between November 1986 to April 1987, focused on the compilation of the national drug policies of ten (10) countries, extensive consultations with World Health Organization, face-to-face discussions with experts in Indonesia, Thailand and Malaysia, and inquiries with local embasssies of ten (10) countries.

On April 30, 1987, during the inauguration of the Bureau of Food and Drug Laboratories in Alabang, Muntinglupa, President Corazon C. Aquino announced the National Drug Policy and the government's commitment to its implementation.

The National Drug Policy,
Its Four Pillars or Components

The National Drug Policy is set on four main pillars designed to eventually bring about the availability and affordability of safe, effective, and good-quality drugs for all sectors of the country, especially for the poor who need them most, but who can least afford them. These four pillars form an integral unit, mutually complementary and supportive of each other.

The first pillar is the **assurance of the safety, effectiveness and usefulness of pharmaceutical products through quality control.** This will involve the regulation of the importation, manufacture, marketing, and consumer utilization of all drugs and their intermediates.

The absence of effective and sound regulation of the drug industry allowed the importation and sale of drugs whose efficacy have not been scientifically established or confirmed, and the continued sale of drugs which are banned or considered unsafe in other countries for reasons of safety. To remedy this unfavorable state of affairs, the capabilities and powers of the Bureau of Food and Drug are being strengthened and expanded, as it will be the lead agency in the regulation of the industry. The inauguration of its new laboratories in April 1987 marked the first step in this direction. A strengthened BFAD will be be able to function as the national quality control center and regulatory body for the pharmaceutical industry in the Philippines.

The second pillar rests on the promotion of the rational use of drugs by both health professionals and the general public. Rational use of drugs refers to a carefully-considered pattern of behaviour on the part of the consumer - be he the prescribing physician or the end-user. This will limit the use of medicines, be they commercial preparation or herbel medicines, to situations where there are clear indications for them. Furthermore, only the most necessary and scientifically-proven efficacious drugs should be used.

Bound up in this activity is the creation of a National Drug Formulary (NDF) which shall list those drugs which are most essential for therapeutic usage. Aside from this, the rules and regulations governing the promotion and advertising of pharmaceutical products shall be reviewed and amended in order to contribute towards the promotion of rational use of drugs. With these twin moves, consumers will now be properly guided as to which drugs to use for their particular needs and conditions.

The third pillar of the National Drug Policy is the development of self-sufficiency in the local pharmaceutical industry. This pillar seeks to strengthen Filipino capabilities in government as well as the private sector for the manufacture of basic and intermediate ingredients for drugs and medicines. By developing a capability to produce essential drugs locally, the country's dependence on multinational drug firms can be greatly reduced.

This pillar is an ambitious undertaking towards which trade and investment policies must be supportive. More and more, the government will encourage the strengthening of local capabilities in government as well as the private sector for the manufacture of basic and intermediate ingredients for drugs and medicine. With increased self-sufficiency, local industry will be in a better position to respond to the needs of the population for the most essential of drugs.

The fourth pillar of the National Drug Policy relates to the targeted procurement of drugs by government with the objective of making available to its own clientele, basically government-owned and operated hospitals and health centers which cater to the lower-income sectors of the society, the best drugs at the lowest possible cost. It is is widely acknowledged that the government is the single largest purchaser of drugs in the country, allocating half of its health budget for drugs and medicines.

The government, therefore, is in a strong position to influence the market, providing initiative and direction so that the benefits will extend to all the sectors of the society. Bulk purchasing and contract manufacturing are among the mechanisms by which the government can exert its influence. Through these mechanisms, the government can guarantee that only high-quality drugs are used in its hospitals and health centers.

The four pillars of the National Drug Policy form a dynamic whole and each element is meant to reinforce the other three. The tenets of rational use will serve as a basis for regulation in both government and private sectors. In turn, fair and thorough regulation should fuel the incentives for rational use. The active participation of government in procurement, production, and distribution will lead the way towards some measure of self-sufficiency. This should also provide impetus for private enterprise to move toward the manufacture of the more basic ingredients of drugs, if private industry is to retain its competitive edge.

Our hope is that this National Drug Policy will eventually remedy the gross imbalance in the Philippine pharmaceutical market where a strong supply side, which is controlled by multinational corporations and almost completely import-dependent, dominates an extremly weak demand side, which is a poorly informed public that is dependent on health professionals who are invariably influenced by the aggressive and expensive marketing practices of pharmaceutical companies. It is, of course, anticipated that such a program will be opposed by elements who are reaping enormous profits from the maintenance of the industry status quo. Already, such resistance has manifested itself in a lobby against the National Drug Policy and in letters of concern from two U.S. senators and the President of the American Chamber of Commerce in the Philippines.

The Department of Health seeks your support and the support of all sector of society in the effort to implement the National Drug Policy. The NDP relates to the health of each and every Filipino and certainly deserves the cooperation of everyone.

14.3 The National Drug Policy Updated

It has been 16 months since the National Drug Policy was announced in 30 April 1987 by President Corazon C. Aquino. Great strides have been made. The following have been accomplised:

1. Re-organization of BFAD. The Bureau of Food and Drugs (BFAD), our government's key regulatory agency for pharmaceuticals, has been reorganized; a major strengthening program is underway to upgrade the capabilities of the staff through technical cooperation projects supported by the Japanese International Cooperation Agency (JICA), UNDP and WHO.

2. Review of BFAD Systems. Staff from the UP College of Pharmacy and the Department of Pharmacology of the UP College of Medicine have re-inforced the existing BFAD staff. These experts are at work in evaluating the current policies, standards, and procedures for product registration, licensing of sales establishments, and quality control in the laboratory.

3. Delisting of Banned Drugs. Upon the recommendation of the National Drug Committee, the BFAD has initiated the process to delist drugs that are banned, restricted, or withdrawn from other countries but are still being sold here. There are 18 categories of these drugs which include dipyrones, oral proteolytic enzymes, and chloramphenicol in fixed-dose combinations.

4. Legislation on use of Generic names. Both houses of Congress have proposed bills for the use of generic names in the labelling and prescribing of medicines. The Senate and Lower House have approved the final version of the Generics Act of 1988. President Corazon C. Aquino will sign the bill into law on 13 September 1988.

5. Work on National Drug Formulary (NDF). The National Drug Committee is conducting a systematic review of all drugs according to therapeutic categories. This work has already resulted in the identification of 265 drugs which have been recommended to the BFAD for delisting. It will eventually result in a National Drug Formulary which will contain core and complementary lists of drugs officially sanctioned by the Department of Health for sale in the Philippines. This will be ready by the first quarter of next year.

6. Master Plan for Pharmaceutical Development. In line with the drive towards self-sufficiency, a study is being conducted with the United Nation Industrial Development Organization (UNIDO) to arrive at a plan for the production of pharmaceutical chemicals in the Philippines. Based on this plan, private investment will be invited to go into the production of raw materials and intermediates needed to produce drugs and medicines.

7. Improvement in DOH procurement of medicines. Cost-saving measures have resulted in a 30% rise in procurement for each peso spent. Procurement is presently based on a therapeutic list using generic nomenclature.

8. Budgetary Outlay for the implementation of the NDP. A budget to support the implementation of the National Drug Policy has been included for 1989.

9. Management Committee to oversee implementation of the NDP. A Committee headed by the Assistant Secretary for Standards and Regulations has been formed to coordinate all efforts toward the implementation of the National Drug Policy.

Our hope is that this National Drug Policy will eventually remedy the gross imbalance in the Philippine pharmaceutical market where a strong supply side, which is controlled by multinational corporations and almost completely import-dependent, dominates an extemely weak demand side, which is a poorly-informed public that is dependent on health professionals who are invariably influenced by the aggressive and expensive marketing practices of pharmaceutical companies.

Oppositions to the NDP and the Generics Act have been manifested by drug companies and by the Board of Governors of the Philippine Medical Association. Letters of concern from two US senators and the President of the American Chamber of Commerce in the Philippines have been publicized as symbolic of the resistance of groups which wished to preserve the status quo.

The Department of Health seeks your support and the support of all sectors of society in the effort to implement the National Drug Policy. The NDP relates to the health of each and every Filipino and certainly deserves the cooperation of everyone.

XV AUXILIARY INDUSTRIES

15.1 Long-Term Sectoral Plan for Plastic Processing

The local plastic processing industry refers to that sector which undertakes the transformation of the major thermoplastic resins currently in use in the world today (i.e., polyethylene, polypropylene, polyvinyl chloride and polystyrene) into various plastic products for both consumer and industrial applications. According to a UNIDO study conducted in 1981, the plastic processing sector comprises 400 companies ranging from relatively large to small, one-machine operations (the figure may not account for some 100 outfits, mostly film bag makers and companies engaged in injection moulding). Some 150-200 firms are classified as fabricators, while the rest merely assemble, cut, glue or machine semi-finished products, or cast polyester resin into glass fiber. The greater proportion of plastic manufacturers range from 6-10 machine outfits.

For purposes of analysis, the industry was divided according to process and corresponding products as follows:

Extrusion process : film bags, netting and ropes, pelletized/recycled plastic products, pipes, profiles sheets, wires and cables, woven sacks

Molding process (injection, blow, rotational, compression) : housewares, industrial parts/products (e.g. crates), packaging containers (e.g. bottles), personal care products, toys and novelties, wearables

Specialty process : adhesive tapes, calendered products, castings, dip coated products, laminated/coated/metallized products, office and school supplies, printed plastic products, vacuum formed products

The estimated size of the domestic market in 1986 was estimated as follows :

SYNTHETIC RESIN USED IN MANUFACTURING PRODUCT	ESTIMATED SIZE OF DOMESTIC MARKET (MT)	% OF TOTAL
Polyethylene (PE)	85,400	50
Polypropylene (PP)	51,000	30
Polyvinyl chloride (PVC)	27,000	16
Polystyrene (PS)	7,000	4
TOTAL SIZE OF MARKET	170,400	100
ESTIMATED VALUE	P4.2 billion	

The estimated resin consumption were derived from importations by plastic processors and local production of synthetic resins manufacturers. The major products produced for the domestic market include film bags, calendered products, housewares, woven sacks, industrial products, and packaging containers.

The domestic consumption of the four major synthetic resins covered in this study is estimated to reach 263,000 MT and 466,000 MT by the year 1992 and 2000, respectively. The projections are based on a regression equation which correlated historical values of GNP in constant 1972 prices and consumption/importaion of the four major synthetic resins.

On the other hand, based on the Foreign Trade Statistics of the NCSO, exports of plastic products made from the four major synthetic resins under consideration have been fluctuating during the past seven years. In 1986, exports of plastic products totalled 9,446 MT valued at US$13.461 million. Items of PVC constituted 77% of total exports, while polypropylene products constituted 21%. There were minimal exports of plastic products. Export statistics exclude indirect exports such as the polybags used by garments exports.

With the exception of Hong Kong, Philippine exports account for less than 1% of the markets for plastic products of the country's major trading partners. Targets for export market growth are based on increase in the country's share of specific foreign markets. These foreign markets were assumed to grow at a conservative rate of 5 % annually. Export targets of US $ 50 million, US$61.8 million, and US$155.0 million (CIF value) have been set for 1990, 1992, and 2000, respectively. The US market presents a remarkable opportunity for export in view of the lifting of the generalized system of preferences (GSP) status of exports from newly industrialized countries (i.e., Taiwan, Korea, Hong Kong, and Singapore).

The following strengths and weaknesses of the sector have been identified :

Strengths : Creditworthiness due to low level of long-term indebtedness

Potential for expansion due to current low level of capacity utilization

Weaknesses : High cost of electricity and poor service of the power utility company

Power-intensive nature of plastic processing

Uncompetitive productivity of Philippine labor relative to labor in other Asian countries

Labor unrest

Ineffective and red-tape laden mechanism for claiming duty on imported raw materials

Rampant smuggling of synthetic resin

High tariff rates on imported synthetic resins

Lagging technology for some product lines

Inconsistent quality of products

To ensure the growth of the sector and its corresponding contribution to national economic recovery and development goals, the following strategic objectives and action plans are recommended :

To update the level of technology of the sub-sector :

Review the 1980 UNIDO study entitled "The Plastic Industry in the Philippines" and determine which recommendations can be implemented

Parties involved : BOI, PPIA
Target completion date : October 1988

Establish a Plastic Research and Development Center which will provide technical support to the plastics industry

Parties involved : BOI, PPIA
Target completion date : mid-1989

Intensify training in mould-making technology by providing basic training on mould operations, mould materials and machinery through a public institution

Parties involved : BOI, MIRDC, PPIA, an academic institution or technical institute
Target completion date : December 1988 (for finalization of institutional linkages)
ongoing seminars would be held periodically during the year

Establish quality standards and sufficient laboratory testing facilities for plastic products

Parties involved : PSA, PPIA
Target completion date : mid-1989

Promote technical seminars (to be held periodically during the year) on new trends in plastic processing

Parties involved : BOI, PPIA, other international technology transfer agencies

To meet the projected domestic market target :

Promote the usage of locally produced plastic products by domestic user-industries (e.g. cement, flour, pharmaceutical, garments, fertilizer, construction, and toy industries) through joint industry meetings to be held periodically during the year

Parties involved : BOI, PPIA, other business or industry associations

To meet the projected export market targets :

Disseminate information on the automatic duty drawback mechanism

Parties involved : BOI, PPIA
Target competion date : December 1988

Identify the specific export market opportunities with the assistance of DTI's Bureau of Export Trade Promotion (BEPT)

Parties involved : BEPT, PPIA
Target completion date : December 1988 (for establishment of BEPT-PPIA liaison)
ongoing coordination thereafter

Review the US General System of Preferences (GSP) to determine the plastic products which are traditionally supplied by the Taiwan, Korea, Hong Kong and Singapore

Parties involved : BEPT, PPIA
Target completion date : October 1988 (for BEPT briefing on GSP)
ongoing coordination thereafter

Develop a plastic products catalogue with the assistance of CITEM

Parties involved : CITEM, PPIA
Target completion date : 1989 (for publication of first product catalogue)
yearly publication thereafter

Participate in international trade fairs sponsored by CITEM

Parties involved : CITEM, PPIA
Target completion date : December 1988 (for establishment of CITEM-PPIA liaison)
ongoing coordination thereafter

Promotion of investment missions from Taiwan, Hong Kong, Korea and Singapore in order to encourage them to relocate production facilities in the country.

Parties involved : BOI, PPIA, bilateral business councils
Target completion date : December 1988 (for correspondence/liaison with bilateral business councils)
1988-92 (for concentrated promotion efforts before setting up of Bataan Petrochemical Corporation)

Promote the Bataan Export Processing Zone as a plastic center for new local and foreign investments

Parties involved : EPZA
Target completion date : 1988-92 (for concentrated promotion efforts before setting up of Bataan Petrochemical Corporation)

<u>To ensure a stable and adequate supply of quality synthetic resins at internationally competitive price levels</u> :

Review government policy regarding local PVC and PS resin manufacturers

Parties involved : BOI, Tariff Commission
Target completion date : December 1988

Provide safeguards against the possibility of the local plastic processing sector having to subsidize exports of the Bataan Petrochemical Corporation in the future (to be done during the processing of BOI registration of the petrochemical complex)

Parties involved : BOI

Reduce tariff and duty levels of synthetic resin imports provided that the reduction is offset by the increased economic activity in the sector

Parties involved : BOI, Bureau of Customs (BOC), Department of Finance

Crackdown on smuggling (ongoing activity)
Parties involved : BOC, PPIA, DTI

15.2 Packaging Industry

15.2.1 Sector Coverage

The packaging sector could be subdivided into five groups based on the type of raw materials used: glass, paper, metal, rigid plastics and flexible:

A) Glass-based - includes bottles for preserved food, softdrinks, wines and liquor, drugs and pharmaceuticals (intravenous bottles, bottles, bottles and vials for antibiotics, sera and other injectables as well as bottles for other medicines); stoppers; perfumes vials, jars, demijohns, carboys and tubular containers, opal glass containers, medicine dropper.

B) Paper-based - includes corrugated carton boxes, folding boxes, paper of paperboard labels, paperbags, multiwall bags.

C) Metal-based - includes cases, cans, boxes and similar containers of iron/steel/aluminum/tin, crown curbs and stoppers, bottlecaps (screwcap type other than crown aluminum vial caps for soft drinks and beverage bottles, capsules, aluminum vial caps for for medicinal or capsules bottles, other packing accessories, rigid tubular containers, steel strapping seals.

D) Rigid Plastic-based - includes hard bottles/containers for cosmetics, soaps, detergents toiletries, pharmaceuticals, plastic chimes.

E) Flexibles - include film bags, polypropylene woven sacks, thermoformed containers, flexible tubular containers, laminates.

15.2.2 Strengths/Weaknesses:

Strengths:

A) Glass-Based

Technology: There are locally available raw materials; use of neutral materials; glass containers are reusable and can be recycled.

Economic Factor: There are high entry barriers as in large capital requirement, economies of scale in purchasing/manufacturing, and absence of formal manpower training programs.

B) Metal-Based

Technology: The materials used are highly durable and have multiple purposes.

Economic Factor: Barriers to entry include absence of formal training program and learning curve theny.

C) Paper-Based

Technology: The materials used are durable, lighweight, disposable.

Economic Factor: There are high entry barriers as in large capital investments, difficulty in man-power sourcing and also high exit cost.

D) Rigid Plastics/Flexibles

Technology: Film bags and woven sacks are reusable Plastic-based containers are convenient to use.

Economic Factor: There is a robust demand for plastic based containers. Entry barrier includes difficulty in manpower sourcing.

A) Glass-Based

Technology: Power-intensive/high debt-service burden

B) Metal-Based

Technology: Dependence on tinplates whose raw materials are imported.

Marketing Factor: Inability to cope with changing trends.

C) Paper-Based

Technology: Capital intensive; dependence on only one supplier of linerboard and corrugating medium made from origin pulp.

D) Rigid Plastics/Flexibles

Technology: Dependence on imported raw materials

Economic: Industry is composed of fragmented small firms.

15.2.3 Targets

The PDCP study cited 3-long-run development objectives of the packaging subsector:

1) To strengthen interlinkages within and between the subsector and various suppliers as well as end-users.

2) To develop the domestic market fully and then slowly penetrate the export market.

3) To exploit opportunities via adoption of new technologies which can improve the subsector's efficiency and competitiveness in the export market.

In terms of quantitative targets, the packaging subsector is projected to grow at an average real annual growth rate of 9.6% until 2000. This is in terms of sales volume deflated to constant 1986 prices.

As to individual subsectors, the range of real annual growth rates indicate that the glass-based and plastic-based annual growth rates of the different subsectors are as follows:

		Low	Medium	High
1)	Glass	9%	18%	28%
2)	Plastic/Rigid	10%	16%	26%
3)	Plastic/Flexible	5%	8%	12%
4)	Metal	3%	6%	13%
5)	Paper	3%	6%	10%

15.2.4 Opportunities and Threats

Opportunities:

A) Packaging Sector - appreciation of currencies of major country competitors which will make their exports more expensive than ours; appreciation of currencies of Philippines major supplies of finished packaging items which will make them more expensive than local packaging items;

- increasing population vis-avis an improving per capita income

B) Glass-Based - improvement in price of copra will result in higher beer sales due to higher income levels. Beer is a major end-user of glass container.

C) Metal-Based - lifting of countervailing duty of RP Tuna Exports.
- Improvement in copra prices - demand for beer and beverages will go up and consequently more metal crowns and caps will be needed.
- Pick-up in construction activities - demand for paints which are packaged in metal based containers will remain strong
- Additional market for cans - shrimp and prawns which are packed in metal-based containers will boost sales of this subsector.

D) Paper-Based - favorable developments for fresh fruit exports - usually packaged in paper-based materials
- Pack-up in constructions activities - will result in higher demand for cement which is a major user of multi-craft socks.

E) Rigid Plastic-Based - buoyed up demand for various sizes and shapes of plastic bottles which use the containers as part of their marketing strategy

- Shift towards use of plastic bottles for food condiments and new chocolate drink.

F) Flexible Plastic-Based - trend towards economy or refill packs
- Trend towards sackets/blister packs.
- Substitution towards flexibles - duty plastic bags and tetrapacks are preferred over glass bottles/and tin cans
- Wide acceptance of fast foods which are packed in thermo-formed containers and laminates.

Threats:

A. Packaging - appreciation of currencies of country suppliers (other than U.S.) of raw materials - will make raw materials imports more expensive.
- entry of competition due to backward integration, entry of new firms and diversification of other firms.
- Labor unrest

B. Glass-based - presence of attractive substitutes as in rigid plastic or flexibles
- lack of skilled manpower
- high energy cost

C. Metal-based - threatened by paper and flexibles
- absence of formal training programs

D. Paper-based - presence of possible substitutes as in plastics
- stiff competition faced by end-users

E. Rigid Plastics/Flexibles
- oil price increase will translate itself into higher prices of resins.
- smuggling - smuggled resins account for 40% to 60% of total supply.

15.2.5 Strategies and Programs of Action to Achieve Targets

Strategy - I Institutionalize Planning, Packaging, Education and Promotion for the Domestic and Export Markets

Action Plan:

1) Packaging Institute of the Philippines (PIP) must participate in the regular national planning for packaging by organizing a planning committee composed of members who have decision-making authority in their own firms.

2) PIP must provide training courses for unskilled workers in cooperation with NMYC or DCP.

3) To increase pool of technicians/engineers, PIP and DTI must make arrangements with engineering schools/technical institutes for them to offer specialized post-graduate courses in Packaging Technology and Applied Research.

4) An award system must be devised which will encourage packaging innovations that utilize indigenous materials and meet product standards.

5) Establish non-profit corporate entity which will put up quality control and testing laboratories in cooperation with the Design Center of the Philippines and Bureau of Product Standards.

6) PIP must conduct more market research and selling missions through grants from DTI and foreign sponsors.

Strategy II - Exploit Opportunities for Direct and Indirect Exporters

Action Plan:

1) To increase direct exports and market packaging items in markets recently served by the NICs.

2) Coordinate closely and regularly with trade representatives/attaches of DTI to identify specific markets and products in large demand abroad.

3) Optimize the use of new technologies and available capabilities for increasing sales to lucrative foreign markets and end-users engaged in export.

4) Improve customer service to export-oriented end-users who expect increases in export sales and packaging requirements.

Strategy III - Glass-Based
Diversify, Differentiate Product, Reduce Energy Cost and Defend Market Shares

Actio ian:

1) Diversify into other product/packaging materials that complement existing operation/businesses.

2) Downgrade or divert from product lines that are most vulnerable to threats and substitutes.

3) Differentiate products to insulate the group from substitutes (emphasize reusability and durability of glass).

4) Adopt cost-reduction measures and new technologies as in energy efficient furnaces, modernize machinery and equipment, use glass-forming processes and computer-aided production facilities, and avail of BOI incentives.

5) Improve customer service.

Strategy IV - Meta.-Based
Tap New Markets and Modern Technologies

Action Plan:

1) Improve sales to tuna and sardine canners but venture into non-traditional markets that are promising (e.g. fruits, nuts and vegetable exporters)

2) Tin-free steel or TFS should be seriously considered as alternative material over tinplate.

Strategy V - Paper-Based
Take Advantage of Increase in Exports and Other Favorable Developments

Action Plan:

1) Continue sales to agricultural export sector.

2) Sell aggressively to new users of paper as in those engaged in aseptic packaging of fruit juices, concentrates and other liquefied food products.

3) Establish closer linkages/relationship with the lone domestic supplier of linerboard and corrugating medium (from virgin pulp) to avoid supply disruptions.

Strategy VI - Flexibles/Rigid Plastics
Organize and Contribute for the Proper Exploitation of Market Opportunities and Technological Trends

Action Plan:

1) Small and medium-sized firms should band together as a cohesive group under the auspices of PIP and Filipino-Chinese Chamber of Commerce.

2) PIP should arrange with foreign counterparts to make available to the group, product and market information in certain target markets.

3) Flexible producers must keep abreast of technological breakthroughs and utilize the latest available processing, techniques and materials. Metallized laminates and blister packs are the latest innovations which the flexible group could tap for local, indirect sales.

4) Participate and contribute to the establishment of an exclusive monthly market almanac or publication.

5) PIP should form a strong lobby group to pressure cartel of importers to lower resin prices for the pooled purchases of small-and-medium sized firms.

15.2.6 Comments and Recommendations

A. Scope of Study: low percentage of respondents among invitees - 13% or 15 firms out of 119 invitees.

B. Methodology:

1) How representative is sample size chosen of total populations if random sampling were employed, responses may not be typical responses of the whole sector.

2) No exlicit statement of assumptions at sub-sectoral level regarding numerical value of growth rates using high, medium and low assumptions.

3) Listing of supply and demand data could be better expressed in terms of physical units rather than peso values since monetary figures may represent inflationary effects. Physical units of measurements measure actual productivity and volume of sales.

C Findings, Recommendations and Suggested Action Plan

1) No recommendation on inter-linkages among packaging sub-sectors-extent of complementarily or substitutability was not elaborately covered in general strategies plan: seems that each sub-sector is isolated from the other.

2) While strategies were expressed on a sub-sectoral basis-action plans could be presented according to particular area covered as in marketing aspect, technical as in marketing aspect, technical aspect, financial or economic aspect.

3) Incorporate specific quantitative targets as to production levels and sales volume to be attained in the coming ten years.

5) Suggest specific measurements of technical efficiency which are monitorable on a sub-sectoral level.

XVI PRINCIPLES IN THE DETERMINATION OF CUSTOMS DUTIES AND TAXES ON IMPORTED PHARMACEUTICALS

16.1 Brief History of Philippine Tariff Policy

At the turn of the 20th century, the authority to levy import duty was spelled out in the Philippine Tariff Act of 1909 which was enacted by the U.S. Congress with the basic objective of raising government revenue. It was superseded on 12 June 1987 with the enactment of Republic Act (R.A.) No. 1937 otherwise known as the Tariff and Customs Code of the Philippines.

Under the Code, the tariff structure consisted of ad valorem and specific rates and the nomenclature was generally three (3) digits. The ad valorem ranged from 10% to 100% and the specific rates from US$0.05/100 kg. to US$10.00/kg. Tariff was applied primarily as a fiscal measure.

In 1957, tariff emerged as an economic policy instrument with the enactment of R.A. No. 1937. The policy sought to enhance the establishment and expansion of domestic industries, promote foreign trade, conserve foreign exchange, and protect the consumers' interest in addition to the basic function of raising government revenue.

Accordingly, high rates of duty from 30% ad valorem to 250% ad valorem were applicable on imports not available locally in sufficient quantity and comparable quality. Low rates of duty from zero to 25% ad valorem were imposed on raw materials and capital goods required by domestic manufacturers and consumer goods needed by the masses.

A majority shift was effected with the issuance of P.D. No. 34 in October 1972 mainly to simplify the tariff structure, protect economically desirable and deserving local industries, serve as an instrument for international bargaining, properly allocate available resources, and prevent technical smuggling, in addition to revenue generation.

Subsequent revisions were made with the promulgation of P.D. No. 1404 in June 1978 which was further amended by P.D.'s No. 1500, No. 1526 and No. 1673 and Executive Orders (E.O.) No. 521, No. 609, No. 624, No. 632-A and No. 706. More and more emphasis was placed on the export-oriented policy to attain efficiency and competitiveness rather than tariff protection, which was observed counter-productive rather than developmental.

The first step taken to rationalize the tariff structure was set the tariff at reasonable levels. Thus, 50% ad valorem tariff rate was considered the highest and made applicable to 177 tariff lines consisting of non-essential consumer (NEC) items and unclassified consumer (UC) items. The reduction began in January 1981 from 100% ad valorem to 70% ad valorem. Further reduction was effected in January 1982 to 50% ad valorem.

With the ceiling of 50% ad valorem, the rates were aligned according to the degree of processing (raw materials and finished products) and whether or not the commodity is locally produced/available. The rates, therefore range as follows:

1. Raw Materials

   1.1 Sufficient to meet local demand . . . . 10% - 20%
   1.2 Insufficient to meet local demands. 10%

2. Intermediate Goods . . . . . 20% - 30%

3. Finished Goods

   3.1 Capital equipment and producer goods. . 20% - 30%
   3.2 Consumer Goods . . . . . 40% - 50%

In sum, a ceiling of 50% ad valorem and a base rate of 10% (with certain exceptions) had been set. However, the tariff modification was to be staged over a 4-year period to cushion the impact of tariff adjustments on the various sectors of Philippine economy and taking into consideration the interests of the consuming public.

16.2 Basis of Dutiable Value

Under Section 201 of the Tariff and Customs Code of the Philippines, as amended by E.O. No. 156 dated 30 March 1987, the dutiable value of an imported article subject to ad valorem rate of duty is based on the cost (fair market value) of same, like or similar article, as bought and sold or offered for sale freely in the usual wholesale quantities in the ordinary course of trade in the principal markets of the exporting country on the date of exportation to the Philippines. Internal taxes to be remitted or rebated are excluded, but included as part of the dutiable value are the values of all containers, coverings and/or packings of any kind and all other expenses, costs and charges incident to placing the article in a condition ready for shipment to the Philippines, freight as well as insurance premium covering the transportation of the goods to the port of entry in the Philippines.[1]

Where the fair market value of price of the imported article cannot be ascertained in accordance with the above provision or where there exists a reasonable doubt as to the fairness of such value or price, it is ascertained in the order as enumerated:

1. The domestic wholesale value (fair market value) of the article in the principal markets of the country of manufacture or origin;

---

[1] Customs Administrative Order No. 4 dated 04 May 1987, implementing E.O. No. 136.

2. The domestic wholesale value (fair market value) in the principal market of a third country with the same stage of economic development as the country of exportation.

The above mentioned values are ascertained by the Commissioner of Customs from the reports of the Revenue or Commercial Attaches or other Philippine Diplomatic Officers or Customs Attaches and from such information as may be available to the Bureau of Customs.

3. Where the domestic wholesale value cannot be ascertained in the preceeding manner, the value to be used is the domestic wholesale selling price of such or similar article in the principal markets of the Philippines on the date the duty becomes payable on the article under appraisement and in the ordinary course of trade, minus not more than twenty-five percent (25%) thereof for expenses and profits, and duties and taxes paid thereon.[2]

16.3 Components of Dutiable Value

Dutiable value consists of the cost (fair market value)[3] or price, insurance, freight, and other charges and fees.

1. The cost may be the value or price declared in the covering commercial, trade or sales invoices which conform with Section 1308 of the Tariff and Customs Code of the Philippines. If, however, the invoice fails to conform with Section 1308 of the Code, the importer may be required to produce records or accounts of invoices or othe documents pertianing to the value of the imported article under appraisement which are material to or in the assessment of duty. Except when the value in the invoice or the value reported by the SGS[4] in the Clean Report of Findings is higher, the value as determined by the Collector of Customs or the Commissioner of Customs serve as the basis for assessing the duties and taxes as appearing in the publication of values or as established by the Collector of Customs/Commissioner of Customs.

2. The insurance premium covring the transportation of the imported article to the port of entry in the Philippines is that quoted in the covering invoice. However, in the absence of such quotation, the insurance premium is computed at two percent (2%) of the invoice value (F.O.B.) for genral cargo and four percent (4%) of the invoice value (F.O.B.) for inflammables, chemicals, and other "high-risk" cargoes.

---

[2] Id.
[3] Id.
[4] Societe Generale de Surveillance pursuant to Joint Order No. 1-87 dated 06 March 1987 covers Japan, Hongkong and Taiwan.

3. The freight charges covering the transportation of the imported article to the port of entry in the Philippines is determined in accordance with the following guidelines:

3.1 Sea Freight - It shall be the amount specified in the covering Bill of Lading or in other related shipping documents, but in no case lower than 70% of the gross conference rate;

3.2 Air Freight - It shall be the amount specified in the covering Air Waybill or in other related shipping documents or, in the absence thereof, the International Air Transport Association (IATA) rate.

4. Other charges and fees include:

4.1 The value of all containers, coverings and/or packings of any kind. If the invoice does not specify the value of such containers, coverings and/or packings, an amount equivalent to three percent (3%) of the fiar market value is added in lieu thereof except in the following cases:

4.1.1 When the article is imported in bulk, i.e., without external packing, as wheat, crude oil, and similar articles.

4.1.2 When the article is exported to the Philippines in its original packing as when sold for domestic consumption in the country of manufacture, as wheat flour in bags, sugar in bags, canned milk, canned vegetables, canned fruits, canned fish, or meat in standard cartons and similar articles.

4.2 And all other costs, charges and expenses incident to placing the article in a condition ready for shipment to the Philippines, which shall include:

4.2.1 Labor for export packing
4.2.2 Export marketing
4.2.3 Commission and selling commission
4.2.4 Buying commission when the shipper and seller or the buyer and seller are the same person in the covering invoice
4.2.5 Cartage and drayage to rail, decks, airport or post office
4.2.6 Customhouse and brokerage expenses, forwarders fees
4.2.7 Export documentation and legalization fees and/or stamps

4.2.8 Inspection and certification fees and/or stamps
4.2.9 Clearance fees
4.2.10 Internal insurance
4.2.11 Export duties and taxes
4.2.12 Inland freight and pier handling charges. As a rule, these charges are dutiable except when the article is exported from a landlocked country passing through another country to a seaport for shipment to the Philippines.
4.2.13 Airport and handling charges
4.2.14 And such other charges, which by their nature are incident to placing the article ready for shipment to the Philippines.

16.4 Publication of Values

For several years now, the Bureau of Customs puts out a publication of imported articles, including pharmaceutical products and raw materials used in their manufacture. Updated monthly, the publication of values or Home Consumption Values (HCV) are based on information sources which include:

1. Reports of the Revenue or Commercial Attaches (Foreign Trade Promotion Attaches);

2. Reports of other Philippine diplomatic officers or Customs Attaches; and

3. Other sources that may be available to the Bureau such as the SGS Clean Reports of Findings, values declared in commercial, trade or sales invoices, etc.

Design for the guidance of the transacting public, the publication of values contains the name/description of the imported article, the country of origin, the unit value, the tariff heading as well as the rate of import duty. The percentage of published/established values of imported pharmaceuticals to-date is shown below:

Finished products -

a. With published values 26.76%
b. With established values 73.24%

Raw materials -

a. With published values 70%
b. With established values 30%

16.5 Classification of Imported Pharmaceuticals

As with any imported article, the rate of duty of imported pharmaceuticals would depend upon its proper classification. In general, the classification of articles imported in the Philippines is governed by the following principles:

Rule 1. For legal purposes, classification is determined according to the terms of the headings or sub-headings and related Section and Chapter Notes.

Rule 2. Any reference in a heading to an article is taken to include a reference to that article incomplete or unfinished, provided that, as imported, the incomplete or undfinished article has the essential character of the complete or finished article. it is also taken to include a reference to that article complete or finished (or falling to be classified as complete or finished by virtue of this Rule), imported unassembled or disassembled.

Rule 3. When for any reason articles are, prima facie, classifiable under two or more headings, classification shall be effected as follows:

(a) The heading which provides the most specific description shall be preferred to headings providing a more general description.

(b) Mixtures, composite articles containing different materials or made up of different components, and goods put up in sets which cannot be classified by reference to 3(a) are classified as if they consisted of the material or component which gives them their essential character, insofar as this criterion is applicable.

(c) When articles cannot be classified thus by reference to 3(a) or (b). they are classified under the heading which occurs latest among those which equally merit consideration.

Rule 4. Articles not falling within any heading of the nomenclature are classified under the heading appropriate to articles to which they are most akin.

Under the Tariff and Customs Code of the Philippines, the classification of imported raw materials for pharmaceuticals in addition to chemicals are found in Chapters 28 and 29, and finished pharmaceutical products in Chapter 30 of Section VI as follows:

1. Chapter 28 comprising -

I. Chemical Elements (10% - 50% rate of duty)
II. Inorganic Acids and Oxygen Compounds of Non-Metals (10% - 30% rate of duty)
III. Halogen and Sulphur Compounds of Non-Metals (10% rate of duty)
IV. Inorganic Bases and Metallic Oxides, Hydroxides and Peroxides (10% - 30% rate of duty)
V. Metallic Salts and Peroxysalts of Inorganic Acids (10% - 30% rate of duty)
VI. Miscellaneous (10%, except Carbides at 30% rate of duty)

2. Chapter 29 comprising -

I. Hydrocarbons and Their Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives (10% - 30% rate of duty)

II. Alcohols and Their Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives (10% - 30% rate of duty)

III. Phenols, Phenol-Alcohols, and Their Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives (10% rate of duty)

IV. Ethers, Alcohol Peroxides, Ether Peroxides, Epoxides with a Three or Four Member Rings, Acetals and and Hemacetals, and Their Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives (10% rate of duty)
V. Aldehyde-Function Compounds (10% - 20% rate of duty)
VI. Ketone-Function Compounds and Quinone-Function Compounds (10% rate of duty)
VII. Carboxylic Acids and Their Anhydrides, Halides, Peroxides and Peracids, and Their Halogenated, Sulphonated Nitrated or Nitrosated Derivatives (10% - 30% rate of duty)
VIII. Inorganic Esters and Their Salts, and Their Halogenated, Sulphonated, Nitrated or Nitrosated Derivatives (10%)
IX. Nitrogen-Function Compounds (10% - 50% rate of duty)
X. Organo-Inorganic Compounds and Heterocyclic Compounds 10% rate of duty)
XI. Provitamins, Vitamins, and Hormones, Natural or Reproduced by Synthesis (10% rate of duty)
XII. Glycosides and Vegetable Alkaloids, Natural or Reproduced by Synthesis, and Their Salts, Ethers, Esters and Other Derivatives (10% - 30% of duty)
XIII. Other Organic Compounds (10% - 30% rate of duty)

3. Chapter 30 which comprises "Pharmaceutical Products" with duty rates ranging from 10% to 20%. It will be observed that the Code does not determine those that are covered and those excluded. For example, among the articles covered are "medicaments" which are taken to mean goods other than foods or beverages such as dietetics, diabetic or fortified foods, tonic beverages, spa water not falling within heading No. 30.02 or 30.04 which are either:

(a) Products comprising two or more constituents which have been mixed or compounded together for therapeutic or prophylactic uses; or

(b) Unmixed products suitable for such uses put up in measured doses or in forms or in packings of a kind sold by retail for therapeutic or prophylactic purposes.

Chapter 30 covers, in effect, the manufactured or prepared pharmaceuticals.

It should be mentioned that pharmaceuticals are to be found classified under various headings/descriptions in other Chapters such as Chapter 33 where under heading 33.06 aqueous distillates and aqueous solutions of essential oils, including such products suitable for medicinal uses (at 20% to 50% rate of duty).

Antibiotics are found under Chapter 29 at 10% rate of duty ad valorem under the following sub-headings:

29.44 100 Penicillins and their derivatives
200 Streptomycins and their derivatives
300 Tetracyclines and their derivatives
900 Others

In addition to the above-mentioned principles in the interpretation on tariff classification, the proper tariff classification of imported commodities are also determined in reference to the Explanatory Notes to the Customs Cooperation Council Nomenclature (CCCN) and the compendiums of tariff decisions issued regularly by the CCCN. It is to be noted that Philippine tariff law was bodily lifted from and aligned with the CCCN. There are only a few decided cases by Philippine courts pertaining to the classification of imported commodities.

The Value-Added Tax (VAT)

Pursuant to E.O. No. 273, the value-added tax (VAT) system took effect 01 January 1988. The Order amended the National Internal Revenue Code and applies to all importations. The VAT on imported articles replaces the advance sales tax and compensating tax under the National Internal Revenue Code.

The rate of the VAT is 10% and the tax base in the case importations consists of:

(a) The total value which is used by the Bureau of Customs in determining tariff and Customs duties plus Customs duties, excise taxes, if any, and other charges; provided that

(b) Where the Customs duties are determined on the basis of quantity or volume of the goods, the VAT shall be based on the landed cost plus excise taxes, if any.

Note: The sample computations shown hereunder consist of one without the excise tax and the other with excise tax both under the VAT system as compared to the previous method when the VAT was not yet in effect.

16.6 Related Regulations

Under Central Bank Circular No. 1029 dated October 1984, there are commodities the importation of which requires clearances/permits from various government agencies but do not need prior Central bank approval. As regards imported pharmaceuticals, the commodities requiring such clearance/permit prior to importation include:

1. Agency - Dangerous Drugs Board
   Commodities: Acetic anhydrides and dangerous drugs

2. Agency - Bureau of Food and Drugs
   Commodities: Chinese medicinal herbs, Sodium cyanide and antibiotics (not put up as medicaments and those in dosage form)

It should also be mentioned that under Section 101 of the Tariff and Customs Code of the Philippines, prohibited importations include: (1) drugs and substances intended or adapted for producing unlawful abortion; (2) adulterated or misbranded drugs; synthetic drugs which are habit forming or any compound, manufactured salt, derivative preparation thereof, except by duly authorized entities for medicinial purposes only.

Sample Computations

1. Without excise tax: 6 AMINO PENICILLANIC ACID (4,020 kgs)

HCV @ $64.50/kg	$ 259,290.00
Ocean Freight @ $120/MT	482.40
Insurance (2%)	5,185.80
Other Charges (3%)	7,778.70
	$ 272,736.90
	x 21.00*
Taxable value	₱5,727,474.90
Bank charges	7,159.34
Duty (10%)	572,747.49
Wharfage	94.47
Brokerage fee	1,350.00
Documentary stamps	31.50
Arrastre charges	105.32
Import processing fee (IPF)	250.00
Landed Cost	₱6,309,213.02

PRIOR TO VAT		UNDER VAT	
Landed Cost	₱6,309,213.02	Landed Cost . .	₱6,309,213.02
Plus: 25% mark-up . .	1,577,303.26	- No Mark-up -	
Total	₱7,886,516.28		
Advance Sales Tax (10%)	₱ 788,652.00	10% VAT	₱ 630,921.00

SUMMARY: DUTY AND TAX PAID

Duty (10%)	₱ 572,747.00	₱ 572,747.00
Tax	788,652.00	630,921.00
	₱,361,399.00	₱,203,668.00

*Exchange rate: ₱21.00 - US$1.00

2. With excise tax : Sodium Saccharine (600 kgs)

HCV @ $4.22/kg	$ 2,532.00
Ocean Freight	98.67
Insurance	50.64
	$ 2,681.31
	x 21.00*
Taxable value	₱56,307.51
Bank charges	70.38
Duty (10%)	5,631.00
Wharfage	23.00
Brokerage fee	1,350.00
Documentary stamps	31.50
Arrastre charges	26.50
Import processing fee (IPF)	250.00
Landed Cost	₱63,689.64

PRIOR TO VAT		UNDER VAT	
Landed Cost	₱63,689.64	Landed Cost	₱63,689.64
Plus: 25% mark-up . . .	15,922.41	- No mark-up -	
		Excise tax (60/kg). .	36,000.00
T o t a l	₱79,612.05	T o t a l	₱99,689.64
Advance Sales Tax (10%)	₱ 7,961.05	10% V A T	₱ 9,969.00

SUMMARY: DUTY AND TAX PAID

Duty (10%)	₱ 5,631.00	₱ 5,631.00
Tax	7,961.00	9,969.00
Excise Tax	-.-	36,000.00
IPF	250.00	250.00
Total	₱13,842.00	₱51,850.00

Notes: *Exchange rate: ₱21.00 - US$1.00
In this shipment there are no Other Charges in the absence of extra packings.

XVII. THE UPSTREAM INTEGRATION OF THE PHARMACEUTICAL INDUSTRY IN THE PHILIPPINES.

17.1 Chemfields, Inc.

Chemfields was registered with the Board of Investments as a preferred-pioneer enterprise engaged in the manufacture of semi-synthetic Penicillins from imported intermediates and started manufacturing in 1981.

After 8 years of continuous operations, Chemfields, with an initial capacity of 25 m tons, has reached a production volume of over 75 tons of semi-synthetic Penicillins and is still the only up-stream integrated entity in the pharmaceutical industry of the Philippines.

In 1982, Chemfields was granted protection with the issuance of Executive Order No. 776, taking the form of import regulations. Importations of semi-synthetic antibiotics already being produced in the country would be allowed only if it could be demonstrated that their recent landed costs were at least 20% lower than the prices of the domestic manufactured products.

What did Chemfields achieve and was it worth to grant privileges and protective measures?

17.2 Assessment of Chemfields' Economic Contributions

Among the major economic contributions that the Chemfields' semi-synthetic antibiotics project promised to deliver were: (1) price moderation of the prices of finished dosage forms through lower raw material prices and their slower growth, (2) foreign exchange savings by means of effective import substitution, and (3) technological upgrading of the pharmaceutical industry.

17.2.1 Price moderation

With an annual compound growth rate of 16.2% Peso depreciation in the period 1982-1988, at the very least the prices of Ampicillin and Amoxycillin, as well as the prices of finished dosage specialties manufactured from them, would have increased at the same rate had they been imported. Over the same period, however, the actual prices of locally-produced Ampicillin and Amoxycillin increased at annual compound growth rates of only 7.8% and 3.8%, respectively. In fact, during the inflationary period of 1984-1986, Chemfields did not increase its prices, although any price increase in this period would have been easily justified. In 1987, Chemfields even decreased the prices of all its products.

XVIII MARKET, FINANCIAL, AND ECONOMIC ASPECTS FOR SELECTED INDUSTRIAL PROFILES

18.1 Selected Industrial Profiles

At this stage of the study, there has emerged a consensus that the main thrust of the country's efforts in the field of pharmaceutical manufacture should be initially focused towards the development of antibiotics, with particular attention towards optimizing the use of indigenous available raw materials and energy sources. To this end specific projects have been identified and initial market, technical and socio-economic evaluation is being done. These projects include:

a) multi-purpose fermentation pilot-plant for antibiotics
b) Penicillin and 6-APA plant
c) plant for semi-synthesis of Ampicillin, Amoxycillin, Cloxacillin and Cephalexin
d) Erythromycin derivatives and Rifampicin production plant
e) multi-purpose pilot plant for chemical synthesis

INDUSTRIAL PROFILE No. 1
FERMENTATION PILOT-PLANT FOR ANTIBIOTICS

1 General considerations

The establishment of a fermentation pilot-plant for antibiotics fits with one of the main objectives of the National Drug Policy of the DOH, that is to create a reliable and affordable supply of basic drugs for the people's health programs by developing the domestic drug industry, including fermentation-based production facilities.

1.1 Objectives

The main objective of such a pilot plant should be:

1.1.1 To investigate the locally available raw materials and their quality and suitability for antibiotics fermentation, the main condition for the implementation of large scale production plants. Mostly raw materials from agricultural origin are investigated.

1.1.2 To train technical personnel with special skills and expertise in the production of antibiotics. In fact, a Manpower Development Program would be the first step on the road to Biotechnology development. From this point of view, a modern fermentation pilot-plant would be a formidable source of researchers, industrial microbiologists, engineers and operators, who could be utilized in the development of a large scale fermentation plant.

1.1.3 Such a fermentation pilot-plant should be development oriented and not research oriented. It would not be realistic, at least in a first phase, to undertake microorganisms strain improvement programs, or reproducing already achieved results, that would require long periods of time and the utilization of a large team of skilled microbiologists, who are not available in the Philippines at present (both from the point of view of technical expertise and of numbers). In other words, it would not be worthwhile to compete with R & D centers of large International Companies staffed with thousands of researchers who have already improved high yield strains after working for many years, while the same strains and the related technologies are available on the market at reasonable prices. Development of new technologies could be the objective of the work of the Pilot-plant in a second phase, after having fullfilled points 1 and 2 mentioned above. Another point to be underlined, is that a very detailed program of activities should be formulated when preparing the project document. For obvious reasons, it is not advisable to focus on the most advanced antibiotic fermentations. The development of Penicillin should be one of the main objectives of the pilot-plant. Non beta-lactam antibiotics that should be investigated are:

1.1.3.1 - Erithromycins
1.1.3.2 - Rifamycin
1.1.3.3 - Tetracyclines

Vague and generalized programs envisioned to include many types of antibiotics might not be the proper approach to the problem, as a lack of manpower and local resources, as well as a dilution of efforts on too many products, would mean a loss of time and energy.

Furthermore, a well conceived proposal for a fermentation pilot-plant should not be based on the massive assistance of foreign consultants, but on the contrary, it should underline the necessity of involving the maximum number of available local technical personnel. The former approach would probably make it difficult to reach the main goal of development of new skills and specialized manpower and it will only increase the cost of the project. The assignment of international experts, who are required for the preliminary operation of the plant, should be therefore in proportion to the size of the national experts team assigned to the latter.

1.2 Local Institutions

The local Institutions engaged at present in fermentation related activities are:

1.2.1 ITDI (Industrial Technology Development Institute), Department of Science and Technology and in particular the Microbiology & Genetics Division, supervised by Dr. Lydia Joson, who performed some studies on antibiotics as well as on ethanol and citric acid fermentation.

1.2.2 BIOTECH, U.P. Los Banos. In this center, directed by Dr. William Padolina, research conducted on ethanol fermentation, nitrogen fixation technologies and biofuels, as well as on vaccines and antibiotics is taking place.

1.2.3 NSRI (National Science Research Institute). U.P. The institute supports projects in biology, chemistry, physics. earth science and mathematics.

1.2.4 USTRC (University of Santo Tomas Research Center), U.P. Fermentation studies on antifungals and antibiotics have been undertaken.

1.2.5 College of Science. U.P. A Molecular Biology and Biotechnology Program, coordinated by Dr. Apolinario Nazarea, has started recently.

Due to the nature of the research activities, the expertise of the staff and the presence of modern equipment, especially at Biotech in Los Banos, only the first two intitutions could be taken into consideration for the coordination of a project having as objective the development of a fermentation pilot-plant for antibiotics. However, present manpower resources of ITDI Microbioloby and Genetics Division[1], as well as that of BIOTECH seem to be severely lacking both in quantity and quality, to be able to handle the above mentioned project and both of them should increase significantly the number of technical experts to fulfill the objectives of the pilot-plant.

---

(1) It seems that a maximum number of 5 part-time researchers could be provided from the ITDI, a number insufficient by any standards to run a fermentation pilot-plant.

A solution to the problem of limited human resources could be envisaged in the case, that an inter-departmental national project could be launched involving the cooperation of these two intitutions, allowing an optimization in the utilization of human resources, as well as of existing facilities. (It is realized that there could be complications and difficulties from a logistic, management and financial point of view).

The establishment of a well integrated pilot-plant would require from 2 to 3 years, while at least three additional years should be expected before obtaining the first valid outputs.

A proposal concerning a fermentation pilot-plant for antibiotics has been already submitted by ITDI to UNIDO in 1987. Though it could be taken as reference for a further study of this subject, it should be reconsidered on the basis of the above mentioned general considerations.

2. Investment costs

The total investment costs, including equipment materials, instrumentation and installation, but excluding civil works, have been estimated at about US $1.5-2.0 million (1988).

However, if the pilot-plant is installed as an extension of the the existing facilities at BIOTEC-, Los Banos, the above mentioned costs could be reduced by 40%-50%, e.g. to approximately US $ 900,000-1,200,000.

3. Manpower requirements

The total manpower requirements of the microbiology laboratory and the pilot-plant itself would be 20 persons, as follows:

3.1	Microbiology laboratory personnel	
3.1.1	Team leader	1
3.1.2	Senior microbiologists	2
3.1.3	Microbiologists	2
3.1.4	Workers	3
	T o t a l	8
3.2	Pilot-plant personnel	
3.2.1	Team leader	1
3.2.2	Senior microbiologists	2
3.2.3	Microbiologists or Chemists	3
3.2.4	Workers	5
3.2.5	Chemical engineer	1
	T o t a l	12

3.3 Qualifications

3.3.1 Microbiology laboratory personnel

3.3.1.1 Team leader. Preferably with PhD in Biology with experience of at least two years in the technique of strains selection, mutagenesis, inoculum development, etc. A proper training period in an industrial facility, as well as in a university highly specialized in this field, is very important.

3.3.1.2 Senior microbiologist. A Master's degree in Biology should be required with some practical experience in the fields already mentioned for the team leader. Also in this case a training period abroad should be planned.

3.3.1.1 Microbiologist - A Bachelor's degree in Biology should be required.

The above mentioned staff should be involved fulltime in the activity of the antibiotic project. A part time involvement of other technical personnel, such as analysts and chemists is to be foreseen.

3.3.2 Pilot-plant personnel

3.3.2.1 Team leader. A Master's degree in Biology or Chemistry and some experience in running of antibiotics fermentation processes and in scaling-up techniques is required. He should have a basic training as far as equipment, instrumentation and maintenance are concerned. A training period in an industrial facility or in a pilot-plant should be foreseen.

3.3.2.2 Senior Microbiologist - A Master's degree in Biology should be required eventhough Chemical engineers with some experience in Microbiology and Biochemical engineering could be accepted. An experience in running of fermentation processes should be required. A training period in a pilot-plant would be desirable.

3.3.2.3 Microbiologists or Chemists. A Bachelor's degree is required

3.3.2.4 Chemical engineer. A Master's degree is accetable, provided that the candidate has some basic training in Biochemical engineering and some knowledge of fermentation equipment and maintenance problems, his responsibilities being the technical maintenance of the plant.

4. Pilot-plant location

The pilot-plant should be located in the premises of BIOTECH at Los-Banos, as an expansion of the existing facilities, as follows:

4.1 Erecting a second floor at about a 4.0 meters level in the existing building with a total height of 8.0 meters. The microbiology laboratory should be installed on this floor.

4.2 Erecting a new local of about 300/400 m^2, adjacent to the existing building. The new equipment for antibiotics extraction should be installed there.

4.3 Installing, in the existing building, some new fermentors in addition to the existing ones.

4.4 Improving the capacity of some of the utilities generation systems, in particular the one of chilled water.

INDUSTRIAL PROFILE No. 2

PENICILLIN AND 6-AMINO-PENICILLANIC ACID PLANT

Investment	:	US $ 30,000,000
Annual Output	:	295 tons
Sales Estimates	:	US $ 11,630,000
Operating Costs	:	US $ 6,600,000
Manpower	:	190

1. Plant description

The plant is subdivided into the following sections

1.1 Penicillin fermentation and extraction
1.2 Solvent recovery
1.3 6-APA production (including enzyme fermentation)
1.4 Injectable and feed grade Penicillins production
1.5 Utilities generation units
1.6 Laboratories
1.7 Waste treatment
1.8 Auxilliary services (workshops, administration, canteen, etc.)

2. Annual manufacturing output

The annual output of the plant could be summarized as follows:

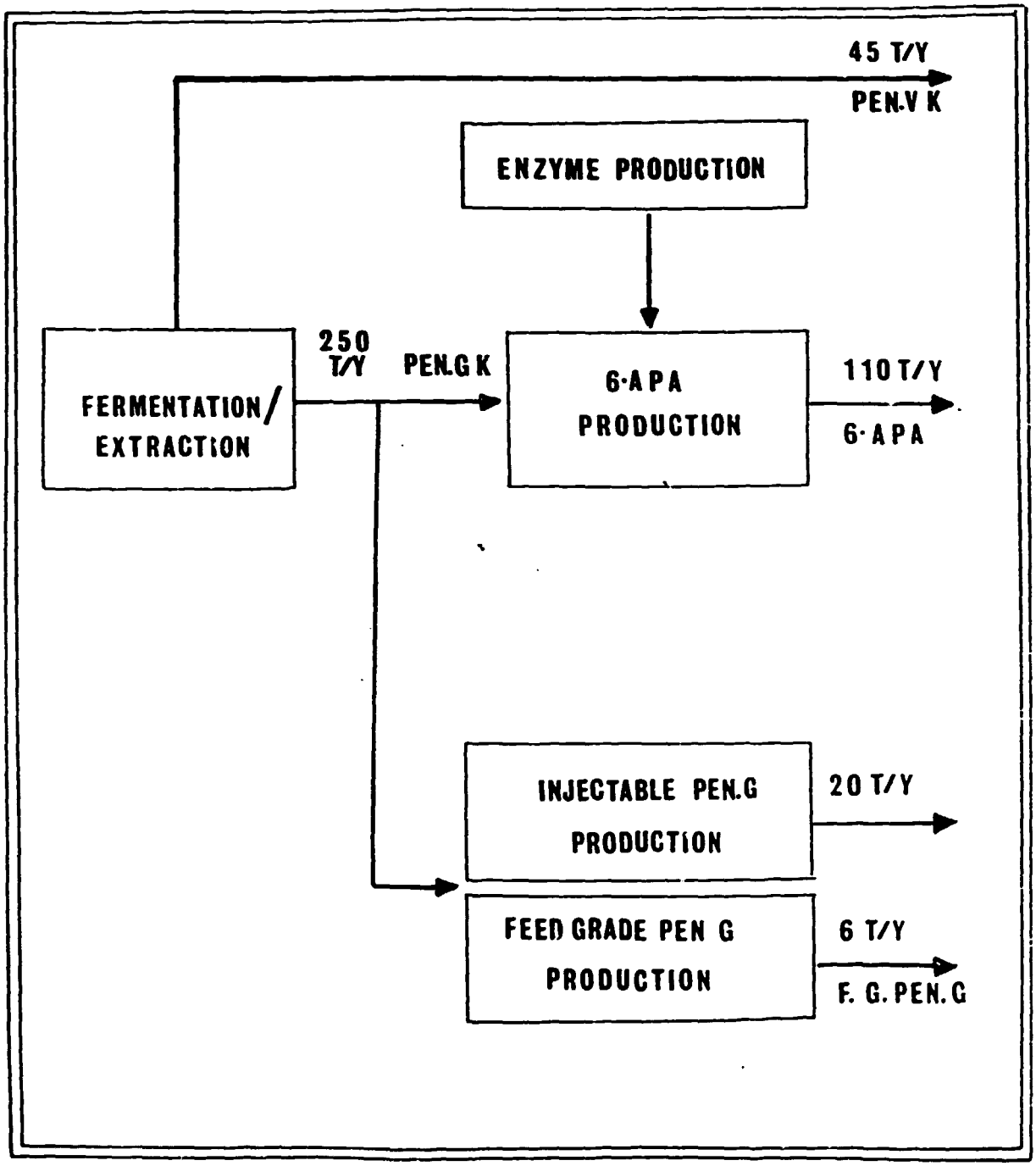
		Tons
2.1	Penicillin G	250
2.2	Penicillin V	45
2.3	6-APA	110
2.4	Injectable Penicillins G	20
2.5	Feedgrade Penicillins G	6

The manufacturing capacity calculation was based on a fermentation yield of 100 B.U./m^3/month corresponding to 40,000 Units/ml.[1]

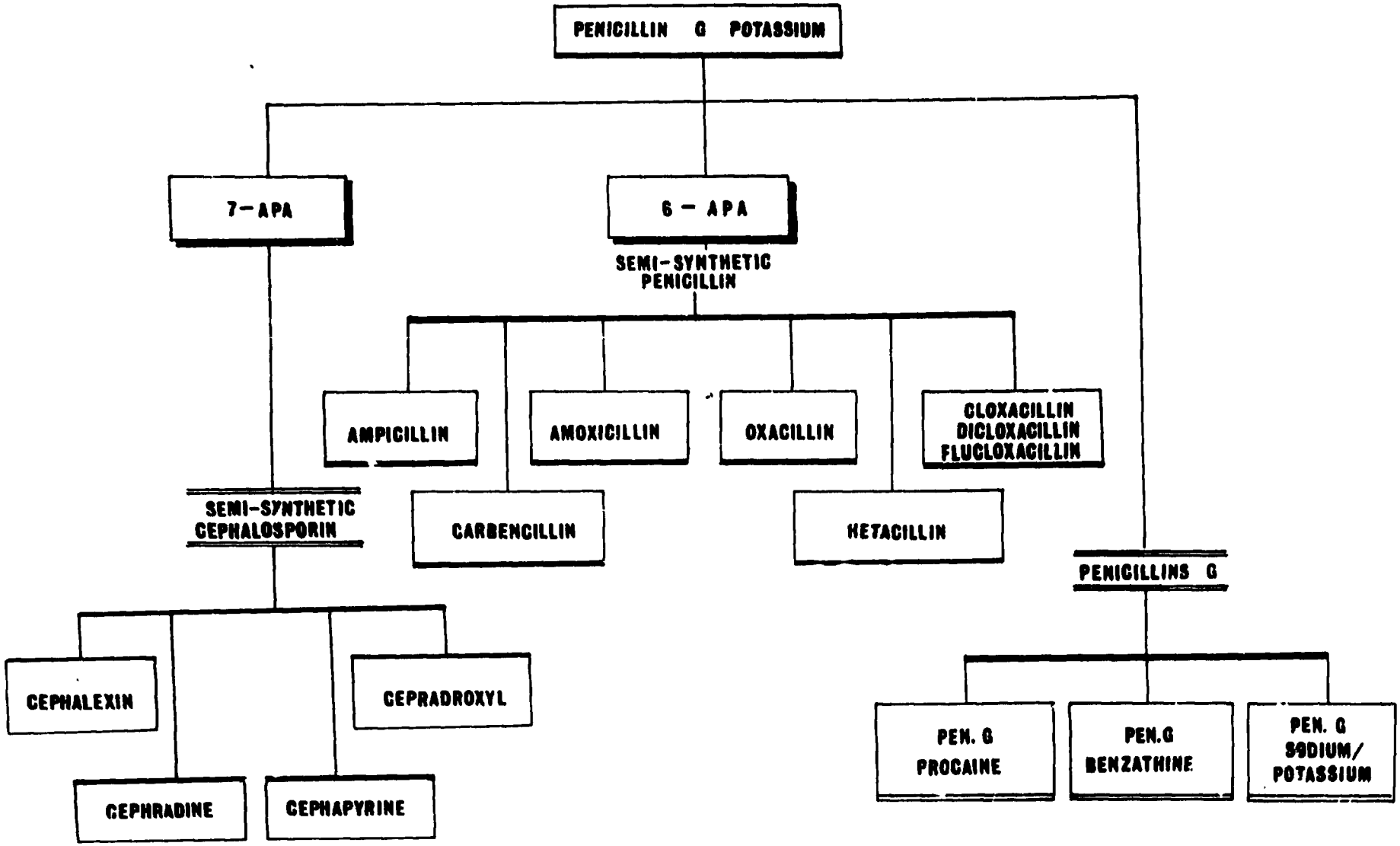
The 6-APA, the Injectable Penicillin G and the Feedgrade Penicillin G, will be produced out of the 250 Tons Penicillin G (see Flowchart).

(1) One B.U. is equivalent to 1.595 kg. of activity of Pen G Potassium.

PENICILLIN PLANT



FLOW CHART



MANILA - AUGUST, 1988

TABLE

The annual capacity was calculated on the basis of a 24 hours operation during 330 days per year.

The importance of Penicillin as a strategic product has been illustrated on Table .

3. Investment costs

The total estimated investment costs of the complex would be on the range of US $26-30 million (1988), the latter taken as a basis for calculation. The break-down of this cost is 50% for production units, 33% for utilities units and 17% for civil works. The estimated investment costs include:

3.1 Machinery and equipment
3.2 Bulk materials (piping, instrumentation and electic systems
3.3 Spare parts
3.4 Transportation
3.5 Erection
3.6 Civil works (including land preparation)
3.7 Engineering
3.8 Know-how (Penicillin and 6-APA) including strains and technology
3.9 Personnel training
3.10 Construction and start-up assistance

4. Annual sales estimates (1988 base)

The annual sales were estimated as follows:

			US $
4.1	6-APA	(110 tons)	7,260,000
4.2	Penicillin V	(45 tons)	2,270,000
4.3	Injectable Penicillin G	(20 tons)	1,800,000
4.4	Feedgrade Penicillin G	(6 tons)	300,000
	Total sales		US $ 11,630,000

For the sales estimates, the international market prices of the different products have been increased by about 10% , to take into account the transportation cost, and other expenses related to the fact that at present these products are imported.

The above mentioned amounts are based on a projected 1995 consumption on the Philippines only without taking into account possible exports.

5. Operating Costs

5.1 The total operating costs excluding depreciation and financial charges could be summarized as follows:

		US $
5.1.1	Raw materials	4,000,000
5.1.2	Manpower	800,000
5.1.3	Energy and utilities	600,000
5.1.4	Other expenses (1)	1,200,000
5.1.5	Total	6,600,000

Provided that the same yields could be reached, the following figures could serve as a very rough comparison of Penicillin manufacturing costs in Europe, utilizing traditional raw materials and energy and in the Philippines locally available raw materials and bagasse as energy source:

US $ per B.U.

	EUROPE	PHILIPPINES
Raw materials		
Carbohydrates	3.5 raw sugar	1 - 2 molasses
all the rest	4.5	5 - 5.5
Energy/Utilities	6 - 6.5	1 - 1.5
Manpower	2	1 - 1.5
Other expenses	2 - 3	2
Total	17.50 - 19.50 (2)	10.00 - 12.50

(1) All other expenses not directly connected to manufacturing

(2) This manufacturing cost is relevant to a Penicillin broth potency in the range of 40,000 U/ml.

6. Raw materials

6.1 Penicillin G and V

The main raw materials utilized in the manufacture of Penicillin G or Penicillin V are as follows:

6.1.1 Fermentation

6.1.1.1 - Corn-steep liquor
6.1.1.2 - Glucose solution that can be substituted either by raw cane sugar, or by molasses or cane juice.
6.1.1.3 - Lard oil or coconut oil
6.1.1.4 - Potassium Phenylacetate (for Pen G) or Sodium Phenoxy Acetate (For Pen V). These products act as precursors of the Penicillin biosynthesis.
6.1.1.5 - Calcium carbonate, Ammonium sulphate, Calcium hydroxide
6.1.1.6 - Anhydrous Ammonia and Sodium Hydroxide

6.1.2 Extraction:

6.1.2.1 - Sulfuric Acid
6.1.2.2 - Potassium Bicarbonate
6.1.2.3 - Solvents such as Butylacetate (could be substituted by Amylacetate or Methylisobutylketone) and Butanol
6.1.2.4 - Demulsifier and dispersing agents
6.1.2.5 - Formaldehyde
6.1.2.6 - Activated charcoal and filter aid

The carbohydrate source (glucose solution, or sugar, or molasses) is the most cost effective raw material in European conditions and represents about 45-50% of the total raw materials cost in the Penicillin G production .

The raw materials which could be locally manufactured are corn-steep liquor, raw sugar (or glucose solution, or molasses), lard oil, or coconut oil and sulfuric acid. Raw materials consumption greatly varies with the different technologies for Penicillin production and depends on the fermentation yields.

For Penicillin G K, the glucose solution consumption is ranging from 8 to 10 Kgs. per B.U. of Penicillin [1]. If molasses are utilized, the consumption would be 10-15 Kgs. per B.U.

---

(1) : B.U. is equivalent to 1.595 kg of activity of Pen G k.

In the case of raw sugar utilization, the consumption would be of 5 - 6 Kgs. per B.U. It should be pointed out that most of the glucose solution available in the Philippines seems to be of lower quality than the one utilized in European factories and the relevant consumption could be accordingly higher (the above mentioned consumption data refer to European high quality glucose from corn).

6.1.3 Cost of domestic carbohydrates

The cost of the domestic carbohydrate sources could be summarized as follows:

6.1.3.1 - Glucose solution : US $ 4 to 6 per B.U.

6.1.3.2 - Raw sugar : US $ 2 per B.U.

6.1.3.3 - Molasses[1]: US $ 0.9 to 1.1 per B.U.

From these figures, it appears that raw sugar and molasses are more attractive raw materials, compared with glucose solution. Molasses utilization should be checked with fermentation tests, since its quality could greatly affect the yields.

All the other raw materials should be imported, the most cost effective imported being the Phenylacetate (or Phenoxyacetate)

The cost of all the other raw materials for Penicillin G K, excluding the carbohydrate source is expected to be $5-7 per B.U., including transport costs.

6.1.4 Supply of domestic carbohydrates.

As mentioned before, some of the raw materials and their quantities necessary for Penicillin production are as follows:

6.1.4.1 Corn steep liquor (from wet millings of cor 4 Kgs/kg Penicillin produced

6.1.4.2 Glucose solution (70% glucose equivalent) 16kgs/kg Penicillin produced

---

(1) Sugar cane juice could also be considered, but it is very perishable

Around 0.77-088m^3 of corn-steep liquor (CSL) is recovered during the wet milling process (May, 1987). This material (CSL) contains 5% total solids, thus having around 0.04-0.05mt solids/mt corn. On the basis of the assumption that 4 kg CSL of 50% total solids is needed in combination with other ingredients to give one kg of penicillin, the recovered CSL which May (1987) considers has to be further concentrated to 50% solids. One then gets an equivalence of 22 kg penicillin that can be manufactured out of one mt of corn. Since the estimated 1988 penicillin demand is 175 mt/year, the total amount of corn needed to supply enough CSL for fermentation is 7,945.5 mt/year coming from about 7,192 hectares of corn planted land.

As for glucose solution requirements, the local source would be glucose syrup produced from cassava starch. Glucose syrup from Philippine sources contains 360 grams glucose obtained from one kg of tubers and has to be concentrated to about twice its glucose content for penicillin production. Thus, based on the requirement of 16 kg of glucose solution containing 70% reducing sugars to produce one kg of Penicillin, 29.8 kg of glucose syrup is necessary. This means an annual requirement of 5,215 mt of glucose syrup or 125,000 mt of cassava tubers from 15,822.8 hectares of land.

In 1986, the Philippines produced 3,922,000 mt of shelled corn from a land area of 3,544,700 hectares (Agricultural Policy and Strategy Team, 1987) and 1,726,587 mt of cassava from 218,000 hectares of land (Villamayor, 1987). To produce the local requirement of 175 mt of penicillin/year, 0.20% of the total shelled corn, or of the corn land area in 1986 and 7.2% of the total cassava tubers produced, or of the cassava area in the same year have to be directed for penicillin production. This clearly indicates that the Philippines are capable of supplying the corn-steep liquor and glucose solution requirements of the penicillin plant, provided that the supply of corn and cassava products to other end-users is not jeopardized.

6.2 6-APA

The most important raw material in the 6-APA production is the immobilized enzyme, with prices on the European market reaching $ 3000 - 5000 per Kg. It is therefore convenient to produce the enzyme by fermentation in the same plant, as it has been suggested. Under these conditions, the total raw materials cost of 6-APA would be much lower, expected to reach $ 1 to 2 per Kg. of 6-APA.

The other raw materials are:

6.2.1 Ammonia solution,
6.2.2 Sulfuric Acid,
6.2.3 Caustic Soda
6.2.4 Solvents (Butylacetate or Acetone).

6.3 Injectable and Feed Grade Penicillins

The cost of raw materials for this production can be considered as negligeble, if compared with the fermentation raw materials. The most significant are:

6.3.1 - Procaine Hydrochloride (for Pen G Procaine productic

6.3.2 - N-N-dibenzyl-ethylendiamine-diacetate (for Pen G Benzathine)

These products are to be imported.

7. Manpower requirement

7.1 The manpower requirement for the plant is as follows:

	Production	Utilities, Eng. & Maintenance	Laboratories	Administration	Planning & Purchasing
Plant Manager & Supervisory Personnel	8	4	3	2	2
Operators, Technicians, Clerks, and Laboratory specialists	25	15	12	5	5
Skilled workers	30	15	5	1	1
Unskilled workers	37	20	-	-	-
	100	54	20	8	8

Total need : 190 persons

7.2 The personnel qualifications and skills could be summarized as follows:

Head of Departments	- University Degrees in Chemistry Biology or Chemical Engineering
Head of Laboratories	- PhD in Microbiology with at least 2 years experience in strains development
Laboratory Technicians	- Master's Degree in Microbiology Bachelor's Degree in Biology or Chemistry with experience on analytical chemistry and the use of modern equipment

7.3 Laboratories(1)

The following laboratories are foreseen for the Penicillin Plant:

7.3.1 Industrial Microbiology Laboratory.

This laboratory is located in the Fermentation building and its scope is to supply the inoculum to be fed to the industrial fermenters. It consists of the following sections:

7.3.1.1 - Master Culture preparation and preservatio
7.3.1.2 - Inoculum Development
7.3.1.3 - Glassware cleaning and Media Preparation A
7.3.1.4 - In process laboratory

7.3.2 Quality Control Laboratory.

7.3.2.1 Chemical Analysis Laboratory
7.3.2.2 Microbiological Laboratory
7.3.2.3 Sterility Control Laboratory
7.3.2.4 Biological Laboratory and Animal House (mainly for pyrogen-free tests).

(1) In view of the nature of the process and the special importance of the preparation and preservation of strains, this subject has been singled out.

7.4 Training

A selected group of supervisors and technicians should be trained in an existing industrial fermentation facility. This training program should therefore be performed abroad.

At least the heads of Fermentation, Extraction and Injectable Penicilins units should be trained for a minimum of 3-4 months.

Also three of the graduated laboratory technicians should be trained for 3-4 months in a modern microbiological laboratory abroad.

On the spot training in Good Manufacturing Practices (GMP), especially on "problem oriented teaching", e.g. personal hygiene, health habits, basics of quality assurance, etc. is important. Key personnel in injectable Penicillin production could be given periodical specific training programs, concerning injectables.

Other specific training programs should be undertaken for quality control key personnel.

Furthermore, it is suggested that at the initial stage, for two years at least, to have the support of foreign experts. Three experts could be employed as:

7.4.1 Plant and Production Manager
7.4.2 Quality Control Manager
7.4.3 Engineering and Maintenance Manager

During their stay on the spot, the three experts will cooperate with the national staff and will continue their training program in order to complete, as soon as possible, the transfer of management and technical responsibilities of the plant to Nationals.

A management and a secondment agreement with foreign companies, participating or not in this venture, could also be considered, the management team, being part of it.

8. Plant location

The plant should be installed adjacent to an existing sugar factory, for securing a cheap source of energy like bagasse, as well as carbohydrates, such as raw sugar, molasses or cane juice, minimizing the high transportation costs.

INDUSTRIAL PROFILE No.3

SEMI-SYNTHESIS OF AMPICILLIN, AMOXYCILLIN, CLOXACILLIN AND CEPHALEXIN (EXPANSION OF EXISTING FACILITIES)

Investment	:	US $ 5,900,000
Annual Output	:	74 tons
Sales Estimates	:	US $ 7,620,000
Operating Costs	:	US $ 6,461,000
Manpower	:	45

1. Plant description

The plant for the production of semi-synthetic Penicillins is composed of 8 stainless steel reactors ranging from 1 to 5 m^3. capacity, one press and one plate filter, some tanks for mother liquors, two stainless steel centrifuges and two driers. Minor equipment (centrifugal pumps, grinder, sieve etc.,) are also provided. Solvents come from external tanks through metering pumps. The following units will be required:

1.1 One distillation unit to increase the present capacity of Chemfields, taking into account also the recovery needs for the Erythromycin and Rifampicin production plant, which we suggest to be located in the same compound.

1.2 One refrigeration unit for production of brine at 30 ^{o}C, with 40 tons capacity

1.3 One unit for demineralized water production

1.4 One boiler for steam production

1.5 One cooling tower for cooling water.

2. Annual manufacturing output and plant utilization

2.1 Manufacturing output

The annual plant output will be as follows:

2.1.1	Ampicillin	35 tons
2.1.2	Amoxycillin	30 tons(1)
2.1.3	Cloxacillin	3 tons
2.1.4	Cephalexin	6 tons
	Total	74 tons

An additional capacity of 28 tons for the manufacture of an intermediate (Dane-Salt) in the Amoxicillin Semi-synthesis is also provided.

2.2 Plant utilization

The data concerning the duration of the operation for each product, the number of batches required and the total time of utilization of the plant, are as follows:

	Product	Output per batch (kg)	Duration of each batch (hours)	Number of batches	Total working days
2.2.1	Ampicillin Trihydrate	300	36	117	117
2.2.2	Amoxycillin Trihydrate	300	36	100	100
2.2.3	Cloxacillin Sodium Monohydrate	150	36	20	20
2.2.4	Cephalexin Monohydrate	150	36	40	40
2.2.5	Dane salt for Amoxycillin	500	36	56	56

When the plant will reach the full production capacity, it will be occupied for the entire year, additional capacity being obtained with an increase of the number of batches by working on three shifts. There will be 284 working days a year since Dane salt will be prepared at the same time with other products using additional equipments.

---

(1) In case the Amoxycillin purchases by the DOH do not follow the present growth trend and are shifted to Ampicillin, having a similar therapeutic value at lower cost, the production could follow and instead of Amoxycillin, Ampicillin could be produced

3. Investment cost

The estimated investment cost could be summarized follows:

		US $
3.1	Plant	2,350,000
3.2	Equipment (transportation included)	
3.3	Erection (piping, mounting, electrical parts,	
3.4	Instrumentation, insulation, painting etc.)	2,350,000
3.5	Engineering 7%	330,000
3.6	Construction assistance 7%	330,000
3.7	Cost of technology (Cephalexin)	165,000
3.8	Training of personnel	100,000
3.9	Laboratory equipment (additional)	120,000
3.10	Buildings	
3.11	Main building	70,000
3.12	Warehouse (air conditioned)	85,000
	T o t a l	5,900,000

The figures do not include the land cost. The investment for the utilities (refrigeration unit, cooling tower, .boil , demineralizer, distillation columns) take into ccount .so the utilities needed for the Erythromycin derivatives and Rifampicin, which will be located in the same factory. Some spare capacity being already available in the Chemfields plant, the capacity to be installed for some utilities will be lower than the total capacity required.

Since satisfactory technologies for Ampicillin, Amoxycillin and Cloxacillin are already available in the country, the cost of the technology includes only Cephalexin.

4. Annual sales estimates

The annual sales estimates could be summarized as follows:

		US $
4.1	Ampicillin	2,940,000
4.2	Amoxycillin	3,060,000
4.3	Cloxacillin	324,000
4.4	Cephalexin	1,296,000
	Total	7,620,000

The above mentioned figures have been based on prevailing international prices augmented by 20%, deeemed to cover freight, insurance, import duties and taxes.

5. Operating Costs

The operating cost have been calculated to reflect two possibilities, namely manufacturing with imported 6-Amino-Penicillanic Acid (6-APA) and with a locally produced one.

They are as follows:

		Imported	Domestic
		(US $)	
5.1	Ampicillin	2,765,000	2,450,000
5.2	Amoxycillin	2,520,000	2,220,000
5.3	Cloxacillin	234,000	210,000
5.4	Cephalexin (1)	942,000	942,000
5.5	Total	6,461,000	5,822,000

6. Raw materials

The required raw materials could be summarized as follows:

6.1 Ampicillin Trihydrate

Hereunder is the list of the main raw materials needed for one batch of 300 Kg and the corresponding quantities for one Kg. of Ampicillin trihydrate.

The amounts of solvents in brackets are the quantities used, the other figures being the consumptions, considering a 70% recovery for Dichloromethane and Acetone.

---

(1) Cephalexin is produced only from imported 7-ADCA, thus the prices in both columns are the same for comparative purposes.

6.1.1	6-APA		194 Kg		0.647	Kg
6.1.2	Phenylglycine chloride hydrochloride		185 Kg		0.62	Kg
6.1.3	Trimethylchlorosylane		94 Kg		0.31	Kg
6.1.4	Dimethylaniline		180 Kg		0.61	Kg
6.1.5	Dichloromethane	(3800 Kg)	1140 Kg	(12.6 Kg)	3.8	Kg
6.1.6	Triethylamine		105 Kg		0.35	Kg
6.1.7	Acetone	(200 Kg)	60 Kg	(0.66kg)	0.2	Kg
6.1.8	Diethylamine		105 Kg		0.35	Kg

6.2 Amoxycillin Trihydrate

The main raw materials needed for one batch of 300 Kg. and the corresponding quantities for one Kg of Amoxycillin trihydrate are indicated hereunder. The amounts of the solvents in brackets are the quantities used, the other figure being the consumptions, considering the following percentage of recovery:

Dichlorometane	70%
Methylisobutylketone	85%
Acetone	80%

6.2.1	6-APA	193.5	Kg		0.645	Kg
6.2.2	Dane salt,ethyl potassium	282	kg		0.94	kg
6.2.3	Ethylchlorocarbonate	108	Kg		0.36	Kg
6.2.4	Acetone (1050 Kg)	210	Kg	(3.2 Kg)	0.70	Kg
6.2.5	Dichloromethane (960 Kg)	290	Kg	(3.2 Kg)	0.96	Kg
6.2.6	Methylisobutyiketone(780 Kg)	115	Kg	(2.6 Kg)	0.38	Kg
6.2.7	Triethylamine	99	Kg		0.33	Kg
6.2.8	Concentrated Hydrochloric acid					
6.2.9	Ammonia 28 Be.					

6.3 Dane Salt

Listed hereunder are the main raw materials needed for one batch of 500 Kg and the corresponding quantities for one Kg of Dane Salt. The amounts of solvents in brackets are the quantities used, the other figures being the consumption taking into consideration an 80% recovery yield.

6.3.1	D(-)p-hydroxyphenylglycine	305	Kg		0.61	Kg
6.3.2	Ethylacetoacetate	260	Kg		0.52	Kg
6.3.3	Potassium Hydroxyde	102	Kg		0.204	Kg
6.3.4	Absolute Ethanol (2400 Kg)	480	Kg	(4.8 Kg)	0.96	Kg

6.4 Cloxacillin Sodium Monohydrate

Hereunder are listed the main raw materials needed for one batch of 150 kg and the corresponding quantities for one kg of Cloxacillin Sodium Monohydrate. The amounts of the solvents in brackets are the quantities used,the other figures being the consumptions taking into account a 70% recovery for both solvents.

6.4.1	6-APA		85.5 Kg		0.57 Kg
6.4.2	Methylisobuthylketone	(1830 Kg)	400 Kg	(12.2 Kg)	2.7 Kg
6.4.3	Acetone	(975 Kg)	200 Kg	(6.5 Kg)	1.3 Kg
6.4.4	Sodium-2-ethylhexanoate		72 Kg		0.48 Kg
6.4.5	3-(2-chlorophenyl)-5-methyl-isoxazolyl-carboxychloride		17 Kg		0.11 Kg
6.4.6	Sodium hydroxide		108 Kg		0.72 Kg

6.5 Cephalexin Monohydrate

The main raw materials needed for one batch of 150 kg of Cephalexin Monohydrate and the corresponding quantitites for one kg are listed hereunder. The amounts of solvents in brackets are the quantitites used, the other figures being the consumption considering a 70% recovery for Dichloromethane and Acetone.

6.5.1	7-ADCA		111 Kg	0.74 Kg
6.5.2	Phenylglycine chloride HCl		95 Kg	0.63 Kg
6.5.3	Diethylamine		39 Kg	0.26 Kg
6.5.4	Trimethylchlorosylane		52 Kg	0.345 Kg
6.5.5	Dimethylaniline		102 Kg	0.68 Kg
6.5.6	Triethylamine		61 Kg	0.41 Kg
6.5.7	Methylene chloride	(1,800 Kg)	540 Kg	3.6 Kg
6.5.8	Acetone	(1,000 Kg)	300 Kg	2.0 Kg

7. Manpower requirements

7.1 The manpower requirements could be summarized as follows:

7.1.1	Plant Manager	1
7.1.2	Supervisors	4
7.1.3	Senior Production Technicians	8
7.1.4	Production Technicians	12
7.1.5	Production Aides	6
	Total	31

7.2 The additional personnel required to the already existing one at Chemfields is as follows:

	Technical Services	
7.2.1	Senior Laboratory Technician	1
7.2.2	Quality Control Inspector	1
7.2.3	Laboratory Technicians	2
	Engineering Services	
7.2.4	Utilities Operator	1
7.2.5	Mechanics/Electrician	2
	Warehouse	
7.2.6	Supervisor	1
7.2.7	Stock Clerk	1
7.2.8	Warehouse Aides	3
	Administration	
7.2.9	Clerks	2
	T o t a l	14

7.3 Qualifications and Skills

The qualifications and skills of the personnel are:

7.3.1 The Plant Manager should have a Master's Degree in Chemistry and a proven track-record, as well as experience in running a plant. If a person of that caliber is not available, it is suggested that for a minimum of one year, he should be flanked by one expatriate to gain experience in managing a chemical plant.

7.3.2 The Supervisor should have a Master's Degree in Chemistry and technical experience in running a chemical plant. This experience could be gained by working in the Chemfields plant, for instance. If an experienced Supervisor is not available, a person with a Master's Degree in Chemistry should be trained by working for a period of six months to one year in a fine chemicals plant abroad.

7.3.3 The Senior Production Technicians should have a Bachelor's Degree in Chemistry and should have gained some practical experience in a fine chemicals production plant. In case experienced persons are not available, they should be trained for a minimum period of four months either at the Chemfields plant, or abroad.

7.3.4 The Production Technicians should have a Bachelor's degree in Chemistry; for them a more limited experience is required, since they will work together with the Senior Production Technicians and could gain experience locally .

7.3.5 For the Production Aides no previous experience is required.

7.3.6 The Senior Laboratory Technicians should have a Master's Degree in Chemistry and a specialization in analytical chemistry with experience in the use of modern equipment, such as gas chromatography, U.V. spectroscopy, HPLC, etc. If the experience required is not present, they should be trained for three to four months in the Analytical Department of a reputable Pharmaceutical Company.

7.3.7 The Quality Control Inspector should have a Master's Degree in Chemistry and be familiar with the Quality Control Procedures. If an experienced person is not available, he should be trained for a six months period in the Quality Control Department of a reputable Pharmaceutical Company.

7.3.8 The Laboratory Technicians should have a Bachelor's Degree in Chemistry and some experience in chemical synthesis. If not available, they might be trained in the Chemfields laboratory.

The additional manpower for the Engineering Department should possess the following qualifications:

7.3.9 The Utilities Operator should have some knowledge of the use and regulation of the various utilities; he could be trained locally. The Mechanics/Electricians are qualified workers who might be locally available. The additional manpower for the warehouse and the administration is available and could be hired without difficulty.

8. Plant location

The Semi-synthetic Penicillins are sophisticated beta-lactam antibiotics. In order to avoid cross-contamination with other products, they must be produced in a plant devoted only to their manufacture, complying with the "Good Manufacturing Practice" rules. Furthermore, high technical skills are essential for their production. As a production of beta-lactam antibiotics is already running in the Chemfields factory and since the technicians employed there are already well acquainted with the technology of semi-synthetic Penicillins, it would be only natural that the plant should be located in the Chemfields factory, where 5 hectares are available for expansion.

All the technical services (quality control, maintenance, warehouse, administration, etc.) and some spare capacity for utilities being already available in the factory, a limited increase of equipment and of people would be necessary to cope with the new needs, meaning a limited investment, production and administration costs, etc.

Finally, one should also mention that there are established habits of 3 shifts working schedules, as well as of solvents transportation, storage, etc.

Thus, the majority Government equity and the shareholding of United Drugs in this enterprise are incidental and have no bearing on this recomendation.

INDUSTRIAL PROFILE No. 5

ERYTHROMYCIN DERIVATIVES AND RIFAMPICIN PRODUCTION PLANT

Investment	:	US $ 1,530,000
Annual Output	:	45 tons
Sales Estimates	:	US $ 7,788,000
Operating Costs	:	US $ 6,984,000
Manpower	:	27

1. Plant description

1.1 Erythromycin

The installation consists essentially of two reactors, the larger having a capacity of 4000 lt and the smaller one of 1500 lt.

The purpose of the plant is to transform Erythromycin base which could be produced according to one option in a multipurpose fermentation plant, into the derivatives stearate and ethylsuccinate, which are the most common ones used in the medical practice together with the free base.

The estolate has not been considered since only one multinational company is selling this product as specialty. The thiocyanate, used in the veterinary field in small quantities has been taken into account.

Another option could be the production of Erythromycin derivatives starting from imported Erythromycin base, in case the project for its local production is not implemented, or before the start-up of the fermentation plant. In this case the margin will be lower, but it has the advantage to train people in this new technology.

1.2 Rifampicin

The installation consists essentially of two stainless steel jacketed reactors with stirring, one press filter (or as alternative a Sparkler type filter), one centrifuge and tanks for mother liquors. One drier (or as alternative a fluid bed drier) and equipment for grinding and sieving of the product. Solvents come from external tanks through metering pumps. Deionized water is produced in a separate unit. Centrifugal pumps are installed for circulation. Rifampicin will be produced using as a starting material 8-formyl-rifamycin SV; Rifampicin B will be produced in the multipurpose plant, according to one of the proposed options.

At the beginning, in the period in which locally made Rifampicin is not yet available, its production is proposed from an advanced intermediate, 8-formyl-rifamycin SV, available in some countries like China etc., in order to be acquainted with the production and gain some experience with this expensive antibiotic.

The different antibintics will be produced in succesive cycles e.g. three months Erythromycin Stearate, two months Ethysuccinate etc. The production program will be prepared according to the market requirements.

2. Plant output and utilization

2.1 Plant output

2.1.1 Erythromycins

The projected quantities of the Erythromycin derivatives output is 25 tons annually, subdivided as follows:

		Tons
2.1.1.1	Erythromycin Stearate	11
2.1.1.2	Erythromycin Ethylsuccinate	11
2.1.1.3	Erythromycin Thiocyanate	3

2.1.2 Rifampicin

The annual output of Rifampcin is estimated at 20 tons

2.2 Plant utilization

On the following table are listed data concerning the duration of the operations for the manufacture of the products, the number of the batches required and the total time of the plant utilization:

Product	Output per batch	Duration of each batch	Number of batch	Total Working days
Erythromycin Stearate	125 Kg	1 day	88	88
Erythromycin Ethylsuccinate	165 Kg	1 day	67	67
Erythromycin Thiocyanate	165 Kg	1 day	18	18
Rifamycin	330 Kg	36 hours	61	90
T o t a l				263

The 263 days correspond more or less to the number of working days per year in the Philippines. That means that when the plant will be fully operational, it will be working the whole year. Additional capacity can be reached by working with two or three shifts per day depending on the product.

3. Investment costs

The investment costs could be summarized as follows:

3.1 Plant

		US $
3.1.1	Equipment (transportation included)	400,000
3.1.2	Erection (Piping, mounting, electrical parts, instrumentation, insulation and painting etc.	400,000
3.1.3	Engineering 7%	60,000
3.1.4	Assistance to the erection	60,000
3.1.5	Cost of Technology	300,000

3.2	Building	
3.2.1	Plant	50,000
3.2.2	Warehouse (air conditioned)	85,000
3.2.3	Laboratory equipment (additional)	105,000
3.2.4	Sub-total	1,460,000
3.3	Training of Personnel	70,000
3.4	Grand Total	1,530,000

4. Annual sales (Base 1988)

The annual sales could be summarized as follows:

		US $
4.1	Erythromycin Stearate	1,122,000
4.2	Erythromycin Ethylsuccinate	1,782,000
4.3	Erythromycin Thiocyanate	324,000
4.4	Rifampicin	4,560,000
4.5	T o t a l	7,788,000

The above mentioned figures are based on the prevailing international prices increased by 20%, deemed to cover freight, insurance, custom duties and value added tax.

5. Operating Costs

The total operating costs including depreciation could be summarized as follows:

		US $
5.1	Erythromycin Stearate	1,078,000
5.2	Erythromycin Ethylsuccinate	1,584,000
5.3	Erythromycin Thiocyanate	342,000
5.4	Rifampicin	3,980,000
5.5	T o t a l	6,859,000

In the manufacturing cost calculations, the raw materials costs were calculated based on the assumption that the Erythromycin Derivatives are produced out of imported Erythromycin Base.

6. Raw materials

6.1 Erythromycin stearate

Hereunder are listed the main raw materials needed for one batch of 125 Kg. and the corresponding quantities for one Kg. of Erythromycin stearate. The amount of solvent used is indicated in brackets, the other figure being the consumption taking into account a 60% recovery. The later is true for all Erythromycin derivatives.

6.1.1	Erythromycin base		99 Kg		0.79 Kg
6.1.2	Acetone	(320 Kg.)	125 Kg	(2.56 Kg)	1.00 Kg
6.1.3	Stearic Acid		44 Kg		0.35 Kg
6.1.4	Activated carbon		2 Kg		0.016Kg

6.2 Erythromycin Ethylsuccinate

The main raw materials needed for one batch of 165 Kg and the corresponding quantities for 1 Kg of Erythromycin Ethylsuccinate are:

6.2.1	Erythromycin base		194 Kg		1.18 Kg
6.2.2	Ethylsuccinoyl chloride		53 Kg		0.32 Kg
6.2.3	Acetone	(750 Kg)	300 Kg		1.80 Kg
6.2.4	Alkali		112 Kg		0.68 Kg

6.3 Erythromycin Thiocyanate

The main raw materials needed for the production of one batch of 165 Kgs and the corresponding quantities for one Kg of Erythromycin Thiocyanate are:

6.3.1	Erythromycin base		165 Kg		1.0 Kg
6.3.2	Potassium Thiocyanate		24 Kg		0.145Kg
6.3.3	Solvent	(600 Kg)	250 Kg	(3.5 Kg)	1.5 Kg

6.4 Rifampicin

Hereunder are listed the main raw materials needed for the production of one batch of 330 Kg and the corresponding quantities for one Kg of Rifampicin

6.4.1	8-formyl-rifampicin SV	320 Kg	0.97 Kg
6.4.2	1-methyl-4-aminopiperazine	54 Kg	0.163Kg
6.4.3	Acetone-ethylacetate mixture	(2000 Kg)250 Kg	(6.1 Kg) 1.9 Kg

The amounts of solvents used are indicated in brackets, the other figure being the consumption taking into account a 70% recovery. The mixture of Acetone-Ethylacetate is recovered by distillation, restoring the requested composition by addition of the lacking component.

7. Manpower

7.1 The manpower requirements could be summarized as follows:

7.1.1	Plant Manager	1
7.1.2	Supervisors	4
7.1.3	Senior Production Technicians	4
7.1.4	Production Technicians	4
7.1.5	Production Aides	4
	T o t a l	17

7.2 The additional personnel to be employed in the existing services is as follows:

7.2.1	Technical services	
	Senior Laboratory Technician	1
	Quality Control Inspector	1
	Laboratory Technicians	2
7.2.2	Warehouse	
	Warehouse Aides	3
	Supervisor	1
	Clerk	1
7.2.3	Administration	
	Clerk	1
		10

The required qualifications and skills of the personnel are indicated in to industrial profile for semi-synthetic Penicillins.

8. Plant location

The production of Erythromycin derivatives and Rifampicin has limited dimensions. For economic reasons, it is advisable to erect a new complex for the plant. The plant should be placed in the Chemfields factory in a new building, which should be separated from the one for Beta-lactam (Semi-synthetic Penicillins) production to avoid cross-contamination. The Chemfields plant has all the required facilities, an existing organization and a staff which has to be slightly increased to cope with the new needs. Some of the existing utilities have spare capacity, thus it will be possible to limit the investment.

INDUSTRIAL PROFILE No. 7

MULTI-PURPOSE PILOT-PLANT FOR CHEMICAL SYNTHESIS

Investment	:	US $ 5,265,000
Annual Output	:	83 tons
Sales Estimates	:	US $ 2,040,000
Manpower	:	48

1. General consideration

The introduction and installation of a development orientated multi-purpose chemical pilot plant is viewed as the the strategy in the development of the upstream integration of the pharmaceutical industry. Although production levels tend to be lower, the plant will provide a positive contribution not only to the domestic requirements and supply of pharmachemicals but also to overhead and labour absorption in running the unit.

The most important features of the multi-purpose pilot plant are to provide the facilities to:

1.1 introduce and develop the experience of chemical synthesis of fine chemicals and pharmachemicals

1.2 provide the range of equipment for adequate scaling up facilities and for research and development

1.3 provide some limited capacity in production of several pharmachemicals or fine chemical intermediates (e.g.in semi-synthetic antibiotics)

1.4 provide sufficient facilities and capacity to incorporate development of additional upstream integration or introduction of new products

1.5 provide a training facility

1.6 develop the atmosphere for progressive advancement in scientific skills from innovation to accomplishment.

2. Plant description

A multi-purpose pilot-plant is suited for installation in developing countries when the first stage of backward integration from the pharmaceutical industry is being considered. Such plants are particularly useful in providing a secure basis for education, training and experience in chemical processing and later for the development of "in house" processes.

The installation of a multi-purpose pilot plant is coupled with the acquisition of appropriate technology which has to be determined for each unit proposed. Operation of this technology (purchase of which should include if possible prior training in the suppliers own units) gives the experience in plant operation and training of personnel. The purchase of technology also can give a lead time for development of future products.

A multi-purpose pilot-plant consists of an assembly of several reactors fabricated principally in stainless steel and glass enamel together with some smaller units in industrial glass. The sizes of the reactors will range from perhaps 50 liters through 200 liters, 500 liters and 1000 liters to a maximum in the order of 4500 liters. The reactors are fitted with the condensers and receivers mostly to furnish "general purpose" units though some may have special function such as high vacuum distillation.

Auxillary items such as pumps, centrifuges, filters, driers, etc. complete the installation.

Such plants would normally be designed to produce a maximum of 150 tons products per annum.

3. Products and Plant Capacity

The following pharmachemicals will be produced at the levels indicated:

	Pharmachemical	Tons
3.1	Trimethoprim (anti-bacterial)	1
3.2	Sulfamethoxazole (anti-bacterial)	4
3.3	Ethambutol (anti-TB)	10
3.4	Ibuprofen (anti-rheumatic, anti-inflammatory, analgesic)	10
3.5	Mefenamic Acid (analgesic and antipyretic)	5
3.6	Pyrazinamide (anti-TB)	5
3.7	Furazolidone (anti-diarrhoeal)	15
3.8	Glaphenine (analgesic and antipyretic)	2
3.9	Isoniazid (anti-TB)	30
3.10	Metronidazole (anti-bacterial, anti-amoebics, anti-trichomonas)	1
3.11	T o t a l	83

4. Sales

Based on an estimated annual need in 1989, the following sales values are projected:

	Pharmachemical	Estimated Annual Need 1989 (kg)	% level production proposed	Production level sales Value US $
4.1	Trimethoprim	2,500	40 %	22,000
4.2	Sulfamethoxazole	8,000	50 %	60,000
4.3	Ethambutol	25,000	40 %	290,000
4.4	Ibuprofen	17,500	60 %	200,000
4.5	Mefenamic Acid	15,000	33 %	55,000
4.6	Pyrazinamide	10,000	50 %	215,000
4.7	Furazolidone	35,000	42 %	135,000
4.8	Glaphenine	4,000	50 %	130,000
4.9	Isoniazid	65,000	45 %	180,000
4.10	Metronidazole	2,000	50 %	15,000
	T o t a l			1,302,000 (1)

(1) These figures were determined using latest prices of bulk chemicals quoted in U.K. There is some difference compared with the import prices in the Philippines in 1987. Using the reported Philippine import prices in 1987, the total sales value would be US $ 2.04 million, which is 55% higher than when using the UK prices.

5. Investment Costs

5.1 The estimated costing in plant. equipment and building construction costs are based on:

5.1.1 plant and equipment prices in UK as of mid 1987 (F.O.B)

5.1.2 construction costs in the Philippines as of mid 1988.

5.2 The investment costs could be summarized as follows:

		US $
5.2.1	Reaction Units, extraction	660,000
5.2.2	Centrifuges	255,000
5.2.3	Driers, filters	150,000
5.2.4	Pumps, mill, sieve	97,000
5.2.5	Tanks, mobile bins	136,000
5.2.6	Column, crubbing	56,000
5.2.7	Scales	35,000
5.2.8	Laboratory equipment	136,000
		1,525,000
5.2.9	Service utilities	200,000
5.2.10	Un-installed Equipment total	1,725,000
5.2.11	Estimated installed cost	4,312,500
	Building:	
5.2.12	Production hall (1,000 m^2)	400,000
5.2.13	Hydrogeration hall (50 m^2)	17,500
5.2.14	Warehouse	120,000
5.2.15	Administration/Lab	165,000
5.2.16	Site Preparation	250,000
5.2.17	Estimated building cost	952,000
5.2.18	Total estimated cost	5,265,000
5.2.19	With contingencies	5,750,000

An alternative building with smaller production hall and hydrogenation hall may be considered. The total estimated cost of this building is:

Cost	:	US $ 5,058,000
With contingency	:	US $ 5,500,000

The price of technology, which has not been included in the figures, amounts to US $ 100,000 to $ 250,000.

6. Manpower

The manpower requirement and the corresponding qualifications can be summarized as follows:

	Total	PhD	S/BS	Other
General manager	1	1 (Chem. Eng)	-	
Senior managers	4	3 (Chem.)	-	
		1 (Eng.)		
Middle managers	5	-	3	2
Chemists	11	-	11	-
Technicians	6	-	-	6
Tradesmen	7	-	-	7
Others (administration)	7	-	-	7
Unskilled	7	-	-	7
T o t a l	48	5	14	29

The lack of experience in the field of synthesis of Filipino PhD graduates pose to be a problem in the operation of the pilot-plant. Training will therefore have to be an important feature and such should be incorporated as part of any technology transfer package arrangement. Some months training at the suppliers establishment should be agreed.

It may also be necessary, and desirable to hire back to the Philippines some expatriate chemists, preferably those with experience learned abroad in the field of synthesis of pharma-chemicals or fine chemicals.

Insofar as the rest of the personnel are concerned, the majority requirement of the staff would be Bachelor's degree and no problems in staffing at this level are foreseen. The basic training of education at this level can certainly be assessed as good.

7. Location

The multi-purpose plant can be situated at Chemfields, Inc.[1] This arrangement will have advantages such as savings in general administration and infrastracture and possible shared facilities in some instances of chemical storage or solvent recovery facilities.

(1) Government majority equity and the United Drug shareholding in Chemfields are purely incidental and have no bearing on the recommendation.

8. Research and Development[1]

8.1 Functions

Some of the main function of the research and development department of the plant are as follows:

8.1.1 Provision of familiarisation with any transferred technologies covering not only reaction procedures but also analytical control of intermediates and products

8.1.2 Scaling up of processes

8.1.3 Supervision of, and advice on, initial production commissioning.

8.1.4 Trouble-shooting in the event of any production problems

8.1.5 Monitoring of any new or alternative supplies of critical raw materials or chemicals

8.1.6 Process improvement

8.1.7 Development of processes for alternative synthetic routes

8.1.8 Development of processes leading to new product

8.1.9 Defining of new products or intermediates the analytical control parameters and methods of determination.

8.2 Proposed areas of interest in R & D

8.2.1 Process development

8.2.2 Method development for production of pharmachemicals newly, or shortly becoming, free of product patent coverage. As an example, between 1984 and 1996 some 96 drugs fall into this category/

Some of the products in consideration under this philosophy might be : Praziquantel, Fenoprofen, Dilitazem, Amikacin, Carbidopa, Nadolol, Prazepam, Cimetidine, Ranitidine, Clotrimazole and Atenolol.

---

(1) This topic has been singled-out in view of the development orientation of the multi-purpose plant.

8.2.1 Process development

8.2.2 Method develpment for production of pharmaceutical newly, or shortly becoming, free of product patent coverage. As an example, between 1984 and 1996 some 96 drugs fall into this category.

Some of the products in consideration under this philosophy might be: Praziquantel, Fenoprofen, Dilitazem, Amikacin, Carbidopa, Nadolol, Prazepam, Cimetidine, Ranitidine, Clotrimazole and Atenolol.

18.2 Market, Financial and Economic Introduction to the Study

A. Background

One of the major objectives of the Philippine Pharmaceutical Industry Development Study (PPIDS) is the identification of projects leading towards the formation of an integrated pharmaceutical industry in the country, in support of the national health goals and in accordance with the National Drug Policy. The mainthrust of the PPIDS has been on the selection of upstream activities for possible backward integration. In particular, from extensive consultations with experts and representatives from Government, the academe, and the industry itself, the Study has decided to focus on the manufacture of antibiotics.

The PPIDS has been guided by 15 general criteria for the identification and selection of the subsectors for upstream integration, which can be described as falling under the following categories: (a) market potential, based on present consumption levels and expected future growth, in the light of the country's health profile and world market trends; (b) availability of inputs, including raw materials, manpower, utilities, and technology; and (c) conformity with the National Development Plan and the National Drug Policy. As these aspects have been discussed extensively in the Main Report, this follow-up study on market, financial and economic aspects will concentrate on those products that have been identified in the Industrial Profiles presented at the Experts' Group Meeting in Vienna on October 27-28, 1988(IO/R.83, UNIDO, 1988).These Industrial Profiles are: (a) the Penicillin and 6-Amino-Penicillanic Acid (6-APA) Plant; (b) the Plant for Semi-Synthesis of Ampicillin, Amoxycillin, Cloxacillin, and Cephalexin; and (c) the Erythromycin Derivatives and Rifampicin Production Plant.

A Multi-Purpose Plant for Erythromycin, Tetracyclines and Rifamycin Production (Industrial Profiles Nos. 4 and 6) has also been initially proposed, but this proposal has been withdrawn as initial indications showed poor potential. A discounted cash flow analysis of this project will nevertheless be presented to confirm its lack of viability.

This chapter of the follow-up study discusses common issues pertaining to the market, financial, and economic aspects of the proposed projects, particularly the methodologies employed in the evaluation of the specific profiles and the feasibility indicators used. The next four chapters then look at each of the profiles in detail, discussing the estimates of projected domestic demand and supply together with the results of the financial and economic evaluations. The individual profiles are so presented that they may be read independently of each other (with the text often repeated across chapters), but reference to Chapter 18.2 may be helpful for the general methodology.

B. Broad Market Issues

1. The Product Markets

A study on the domestic consumption patterns for pharmaceutical products estimates the income elasticity of demand at 1.02 and the price elasticity of demand at 0.51. With real GNP projected to grow at at least 6.5%/year in the medium term, with the government's thrust towards greater income equality and countryside development, and with the Department of Health's aggressive program of providing health care to the population, a robust and expanding market for the pharmaceutical industry as a whole may be expected.

However, the market for antibiotics covers a wide range of products, some of which are close substitutes for each other, so that different rates of growth in domestic demand may be expected for the different types of drugs that the industrial profiles have identified for import-substituting domestic production. Investment plans for particular drug production activities should therefore examine the submarkets specific to their products instead of relying on general industry trends.

The projections of domestic consumption levels and prices used in the financial and economic analyses for the Study, culled mainly from the individual reports of the technical consultants on the pharmaceutical industry, are contained in the discussions on the separate industrial profiles. The absence of any reliable time series data on the specific products constrains the market study from using an econometric approach. What is done instead is to establish first a base domestic consumption estimate for a given year (1987 in most cases), using domestic production (if any) and import data. Of the drugs under consideration, only the Beta-Lactams (Ampicillin, Amoxycillin, and Cloxacillin) are being manufactured locally. Philippine exports of antibiotics are minimal, so that domestic consumption may be estimated as the sum of domestic production plus imports.

A growth factor is then applied to the base estimate of consumption, with judgmental considerations that take into account world market trends as well as planned government purchases. The proposed plant capacities for the different products are taken as the difference between the size of the domestic market projected for 1995 and the expected domestic production by the private sector (if any) for that year.

It should be noted that the projections on the size of the domestic market are on the conservative side, as the official import figures may be understated due to underdeclaration for the avoidance of duties. Industry sources also note a significant amount of smuggling of drugs into the country, with estimates running to as high as 20% of import volume.

2. The Input Markets

The manufacture of pharmaceuticals is very intensive in the use of chemical raw materials, which usually comprise some 80% of production cost (including depreciation). Most of these raw material requirements of the proposed projects will be sourced from imports, which carry duties ranging from 10% to 20%.

The Penicillins Plant, however, will be using domestically available raw sugar in the fermentation process, as a substitute for glucose solution which is two or three times more expensive. It is further envisioned that a fermentation pilot plant for antibiotics (Industrial Profile No. 1) might prove successful in developing even cheaper carbohydrate sources from locally available raw materials; for example, the use of molasses in place of raw sugar, if found successful, would further reduce the cost of the carbohydrate source by 40% to 60%.

For the manpower requirements, an earlier chapter has shown that the domestic supply of technical manpower in the biological and chemical fields would be adequate to meet the requirements of the proposed projects, although the project personnel may need short-term training abroad.

No bottlenecks are anticipated either with the supply of utilities. Nevertheless, for the Penicillins Plant, a separate power generation facility using bagasse is proposed in order to reduce the operating cost.

C. The Financial Evaluation

Both the financial and economic analyses were conducted by applying the UNIDO Computer Model for Feasibility Analysis and Reports (COMFAR). It should be noted that technical and market data have been gathered by the pharmaceutical experts for the compilation of the industrial profiles and are used only for the preliminary assessment of project commercial profitability and economic viability. Thus, the financial and economic analyses by COMFAR should be read with these limitations in mind.

All financial flows appearing in the individual profiles are in U.S. dollars at constant 1988 prices, with the official exchange rate at ₱21/$1, the average for the year. Similarly, all relative prices, including that of foreign exchange, are assumed to remain the same throughout the project life.

Project construction is assumed to begin in 1991, lasting over two years. At the start of operations in 1993, the plants are expected to operate at only 60% of capacity, rising to 80% on the second year, and reaching full development by the third year. A 15-year operating life is considered, with the following schedule for salvage value: 50% on land and site development; 15% on buildings and structures; 10% on machinery and equipment and other incorporated fixed assets; and 0% on pre-production training expenses. For tax purposes, depreciation expense is spread over ten years. It is assumed that pre-operating expenditures (excluding training, but including interest during construction for the financing option) are allowed to be charged depreciation allowances.

For initial investment costs, foreign exchange disbursements are on machinery and equipment (including spare parts), technology acquisition, and 70% of erection costs (piping, mounting, electrical installation, instrumentation, etc.). Sites and structures, engineering and construction management, and 30% of erection costs are included under local disbursements. For the project profiles considered, this gives a range of 70% to 75% for the foreign exchange componert of initial investment costs.

During production, raw sugar for the Penicillins Plant, while sourced locally, is treated as foreign, as the project's use of this input may displace exports. Similarly, for the Beta-Lactams Plant, 6-APA is treated as an import, even if the plant would eventually buy its requirements from the Penicillins Plant, since 6-APA is an import substitute. For the remaining raw materials, 80% of the expenses are considered foreign, while the other 20% are considered local together with the other production costs (utilities, labor, factory overhead, administration expenses). During the first two years of operation, raw materials consumption varies with the production level, while all other expenses are treated as fixed.

In the estimates of working capital requirements, the following assumptions on minimum coverage are adopted: accounts receivables and payables, 30 days, and raw materials, work-in-progress, and finished products, 15 days. For the Penicillins plant, utilities are given a coverage of 15 days for the bagasse to be used as fuel for the power facilities. The buildup of working capital begins on the first year of operations.

The output prices used in the financial analysis reflect f.o.b. world prices plus 10% allowance for freight, insurance, and handling expenses, and another 10% for tariffs. In this regard, for some of the industrial profiles, the sales values appearing in this follow-up study may differ from those presented by the pharmaceutical experts at the International Ad-Hoc Panel Meeting in Vienna. For example, for the Penicillins Plant (Industrial Profile No. 2), the price of 6-APA used in the earlier study was only $66/kg, which is the border price before the duty protection.

For the machinery and equipment and for the raw materials, duty-free importation is assumed, as the projects may fall under the Omnibus Incentives Code. The exception here is 6-APA as an input to the Beta-Lactams Plant, for which the price used is the selling price of the Penicillins Plant ($72/kg) so as to maintain consistency in the analysis.

The base case assumes the 35% corporate income tax to apply as soon as the venture earns taxable income. The effects of four-year and six-year income tax holidays on profitability are also explored.d

Discounted cash flow techniques are then applied to the investment and production cash flow profiles using UNIDO's COMFAR program. The discussions on the individual projects focus on the Financial Internal Rate of Return (FIRR) calculations from the viewpoint of total investment with sensitivity analyses on the effects of the different types of tax incentives on profitability. For economy of presentation, not all of the COMFAR schedules are presented, but they are available on diskettes for all the profiles under different scenarios.

D. The Economic Evaluation

The economic analysis takes off from the financial analysis. The major adjustments considered are: (a) the treatment of duties and income tax payments as transfers; and (b) the application of the shadow exchange rate factor on direct and indirect foreign flows. The indicators reported are the Net Present Value (NPV) with price adjustments, the Economic Internal Rate of Return (EIRR), and the Domestic Resource Cost (DRC).

The estimates of prices used in the financial evaluation of the industrial profiles include duties of 10% on top of border prices for the project outputs, while imported project inputs are assumed to be exempt from customs duties under the Omnibus Incentives Code. The economic analysis adjusts the output prices back to their border prices which more properly reflect the true value of the import-substituting products to the economy.

At the same time, all inflows and outflows involving direct and indirect uses of foreign exchange are multiplied by the shadow exchange rate factor of 1.2, as official estimates place the shadow exchange rate at 20% higher than the official rate. Thus, raw sugar as an input to Penicillin production is treated as a traded good; its use by the project involves a real cost to the economy that is higher than the financial cost. Similarly, 6-APA, as an import-substituting, foreign exchange-saving output of the Penicillins Plant, is valued from the economy's viewpoint at higher than its selling price; this same value is used to cost it as an input to the production of Beta-Lactams, even if it is produced locally.

These economic price adjustments bring about a 10% premium on the outputs of the proposed ventures (20% premium for foreign exchange saving less 10% penalty for the duty protection), and a 20% penalty for the traded initial investment and raw material inputs. The net outcome is an economic internal rate of return that is slightly lower than the financial internal rate of return (before the corporate income tax).

While the employment generation potentials may be low because of the capital-intensive nature of the manufacture of pharmaceuticals, there are of course numerous other positive externalities and intangible benefits to import substitution in this strategic industry. Upstream activities such as the manufacture of chemical raw materials may be stimulated. A reasonable degree of self-sufficiency in the provision of drugs and medicine to the population also may be necessary in the light of a world market where the products are highly differentiated and prices vary considerably across suppliers, and where charges of transfer pricing are often heard. The government's National Drug Policy is an indication that policymakers in the health sector are keenly aware of these issues. While these intangibles by their very nature are difficult to quantify, they should be borne in mind as one evaluates the results of the financial and economic analyses of the proposed projects.

18.3 Penicillin and 6-Amino-Penicillanic Acid Plant, Industrial Profile No. 2

A. Project Background

The proposed project involves the fermentation and extraction of Penicillin and the production of 6-APA, Penicillin V, injectable Penicillin G, and feedgrade Penicillin G. At full development, the plant will produce an intermediate annual output of 250 MT of Penicillin G Potassium through the fermentation and extraction process, together with the fermentation of the enzymes used in 6-APA production. The final annual output of the plant operating at full capacity will be as follows: (a) 6-APA, 110 MT/year; (b) Penicillin V, 45 MT/year; (c) Injectable Penicillin G, 20 MT/year; and (d) Feedgrade Penicillin G, 6 MT/year.

B. Market Aspects

1. 6-Amino-Penicillanic Acid (6-APA)

In the absence of a Penicillin fermentation and extraction plant, there is at present no domestic production of 6-APA, although substantial amounts are imported for the local manufacture of Ampicillin and Amoxycillin. For 1987, import data from the National Census and Statistics Office (NCSO) show 29.6 MT coming into the country with a value of $2.0 million, or a unit f.o.b. price of $66/kg. These import figures are even on the low side, for the 1987 domestic production of Amoxycillin (51.7 MT) and Amoxycillin (22.5 MT) by Chemfields implies the use of 48 MT of 6-APA for that year, given that about 0.65 kg of 6-APA is used for 1 kg of Ampicillin and 1 kg of Amoxycillin.

The domestic demand for 6-APA basically derives from the demand for the final products to which it serves as an intermediate. One therefore has to examine the future consumption and production trends for the final products. The market study for these products (see Industrial Profile No. 3) shows that by 1995, domestic consumption would be as follows: Ampicillin, 85 MT/year; Amoxycillin, 80 MT/year; and Cloxacyllin, 6 MT/year. With a utilization rate (kg of 6-APA input per kg of output) of 0.65 for the first two products and 0.57 for the third, and with the proposed expansion of domestic production of these products to cover domestic demand, the expected 1995 domestic consumption of 6-APA would then be 110 MT/year, the capacity set for the plant.

The 1987 import price (f.o.b.) of 6-APA, based on NCSO trade statistics, was about $66/kg. However, the world price in 1988 has hovered at only about $60/kg, and is expected to remain fairly stable at that level. With an allowance of 10% for insurance and freight charges and 10% for the duty protection at current rates, the domestic selling price of 6-APA is taken as $72/kg for the financial study.

2. Penicillin V

As with 6-APA, there is no domestic production of Penicillin V. The 1987 NCSO trade statistics show 32.2 MT of Penicillin V imports (valued at $1.3 million or $41/kg f.o.b.), although an independent source (Business Statistics Monitor) has the import volume for the same year at 41.4 MT, with f.o.b. prices ranging from $30/kg to $60/kg. The domestic demand for this antibiotic is expected to grow at 4%/year, which would yield a 1995 demand level of 45 MT/year using the NCSO base, or 57 MT/year using the BSM base. Plant production is conservatively set at 45 MT/year by full development in 1995, as this product is of relatively low value. The price used is the financial projections is $54/kg, which is based on 1988 world prices plus 20% allowance for duty, insurance and freight.

3. Injectable and Feedgrade Penicillin G

Also with no local production, imports of injectable Penicillin G amounted to 13.6 MT in 1987 valued at $0.9 million, according to official NCSO figures. At a growth rate of 5%/year, domestic consumption is expected to reach 20 MT/year by 1995, and the proposed plant production is expected to meet this demand. For feedgrade Penicillin G Procaine, the 1987 imports were 11.75 MT valued at $0.4 million (or a unit price of $35/kg). With the basic raw material going to the production of the more highly valuable products, only 6 MT/year of feedgrade Penicillin G production is projected at full development.

The average unit price for injectable Penicillin G derived from the NCSO trade statistics actually covers a range of products, with Penicillin G Potassium at $52/kg, Penicillin G Benzathine at $84/kg, and Penicillin G Sodium at $86/kg. With the proposed plant focusing on the more valuable forms, the price used for injectable Penicillins in the financial study is $90/kg, which again includes a 20% allowance for insurance, freight, and duties. For feedgrade Penicillin G, the projected future world price is $40/kg, which is closer to the 1988 world price than the average unit price of $35/kg derived from the NCSO data for 1987. With the 20% adjustment, the financial price used is $48/kg.

4. Sales at Full Development

In summary, the sales program envisioned for the Penicillin plant at full capacity in 1995 is as follows:

	Product	Output (MT/yr)	Price ($/kg)	Value ($'000)
1.	6-APA	110	72	7,920
2.	Penicillin V	45	54	2,430
3.	Injectable Penicillin G	20	90	1,800
4.	Feedgrade Penicillin G	6	48	288
	TOTAL	181		12,438

C. Financial Evaluation

The production of Penicillins is a highly capital-intensive process, with estimates of the initial investment requirements running between $26 million and $30 million. For the financial study, the midpoint level of $28 million is taken as the investment cost, spread over the two years of construction with 35.75% on the first year and 64.25% on the second year. COMFAR Table II reports the Project Summary Schedule. The breakdown by type of expenditure is given in COMFAR Table II.1, where it is seen that 70.82% of the initial investment involves the use of foreign exchange; much of this goes to the purchase of machinery and equipment and the corresponding erection costs.

Production during the early years of operation is expected to be at 60% of capacity on the first year and 80% of capacity on the second year, with full development reached by the third year. The production cost schedule is given in COMFAR Table II.2. Raw materials expenses are expected to vary proportionately with capacity utilization, while all other factory costs and administrative expenses remain constant throughout.

For raw materials, raw sugar, which comprises one-fourth of total raw materials expenses (or $1 million per year at full capacity), will be bought locally, but both the financial and economic analyses treat this as a foreign exchange expense, since raw sugar will be diverted away from exports. Other raw materials are assumed to be 80% foreign and 20% local, as the Philippines does not have a chemical industry of sufficient scale to supply all the project needs.

All other expenses (direct labor, utilities, administrative expenses) are treated as local. The estimated administrative expenses of $1.2 million are split between 70% factory overhead and 30% general administration, which is in turn split evenly between labor and nonlabor costs. The schedule of depreciation allowance in COMFAR Table II.2 follows the assumptions stated in Chapter 18.2. Since the base case assumes full equity coverage of initial investment, there are no financial charges.

The working capital requirements given in COMFAR Table II.3 are also based on assumptions enumerated in Chapter 18.2. With the gradual buildup over the first three years of operation, they amount to 14% of production costs excluding depreciation at full capacity.

The projected net income statements for the 15 years of project operation appear in COMFAR Table II.4. On the first year, taxable income is negative, so that the income tax expense is still zero. Net profit after income tax as a percentage of initial investment is -1.17% on the first year, gradually rising until it reaches 13.12% on the eleventh year, when all assets are fully depreciated for tax purposes.

For financial evaluation, it is of course the cash flows that matter, and the projected cash flow statements are given in COMFAR Table II.5. A cash surplus of $1.7 million is realized by the first year of operation, peaking up to $4.8 million on the fourth year, and settling down to $3.8 million by the eleventh year when income tax liabilities increase again as the assets are fully depreciated. However, because of the huge initial investment and the corporate income tax payments, the financial internal rate of return (FIRR) is only 11.28%, making the project relatively unattractive to domestic investors, unless incentives are offered.

If the proposed activity is given a four-year tax holiday for non-pioneering ventures under the Omnibus Investment Code, the FIRR rises to 12.30%. The application of a six-year tax holiday for pioneering ventures raises the FIRR on total investment to 12.95%. Without the corporate income tax, the FIRR is 15.02%. The increases in profitability with tax incentives are not all that dramatic because of the huge initial investment requirements of the project. The financial feasibility indicators under these different options are summarized in the Table at the end of this chapter.

D. Economic Evaluation

Ordinarily, cash flow adjustments reflecting prices from the economy's viewpoint lead to measures of economic viability that are higher than those of financial viability, as the value of foreign exchange to the economy is often higher than what the official exchange rate indicates, while the cost of labor to the economy is often lower than its cost to the project. This is especially true of import-substituting activities which are meant to save on the use of scarce foreign exchange and create domestic employment.

In this particular case, however, the financial analysis discussed above assumes a positive rate of protection whereby the outputs of the proposed enterprise enjoy a 10% tariff protection while the raw material inputs are imported free of any customs duties. From the economy's viewpoint, for every dollar's worth of output that the project manufactures, the gross saving in foreign exchange is only ninety cents; the other ten cents represents a transfer of the forgone duties of the government to the project. At the same time, the capital- and technology-intensive nature of the enterprise limits the employment creation potentials mainly to highly technical manpower whose opportunity cost is often equal to the salaries received. The project may nevertheless generate some net saving in foreign exchange which, in the Philippine context, is valued at 1.2 times the official rate.

The economic analysis thus imputes a net increase in the financial value of the output of 10% to reflect the 10% duty transfers and 20% shadow exchange rate (SER) premium, and a 20% increase in the initial investment and raw materials expenses involving the direct and indirect use of foreign exchange. The project's use of raw sugar, for example, while purchased locally, is considered as displacing exports, so that the opportunity cost of this raw material to the economy is considered to be higher than its financial cost.

The Project Summary Schedule reflecting these adjustments from the economy's view point is given in COMFAR Table II 6 while the annual cash flows are presented in COMFAR Table II.7. With the foreign components valued at 1.2 times their financial costs, the initial investment requirements of the project rise to $32.0 million. At full capacity, the value of annual sales also rises to $13.7 million, while annual operating costs before depreciation rise to $10.5 million. The economic internal rate of return (EIRR) is 14.42%, yielding a net present value (NPV) of $4.8 million at a 12% discount rate, but -$1.0 million at a 15% discount rate.

The present government guidelines for public sector investment require a 15% EIRR, which is slightly higher than that of the project. But it should be recalled that the the annual cash flows have been constructed using conservative estimates of output prices; although the estimates are based on world prices for bulk purchases of 6-APA, actual 6-APA imports as reflected in the NCSO statistics cost some 10% more. If output prices were 10% higher, the EIRR would be 18.04% and above the official hurdle rate.

The production process also assumes the use of raw sugar as the carbohydrate source for the fermentation of Penicillin. If molasses were used, a reduction of 50% of sugar costs could be realized, raising the EIRR to 16.03%. At present, the technology of using molasses has not been perfected yet, with the experience of other countries showing a wide variability in yields. But Philippine molasses with its high carbohydrate content is deemed by experts to be a good potential raw material source, and this stresses the need for further research and the importance of the pilot plant for Penicillin fermentation as proposed in Industrial Profile No. 1. The present value of the cost savings to be realized with the use of molasses could amount to $2.8 million at a 15% social discount rate.

Even with the costing of raw cane sugar, the financial analysis uses a liberal figure, as the future prospects for this export crop do not look all that bright because of the increasing use of sugar substitutes. If sugar prices were to fall by 20% by the time the project operates, the EIRR of the project would rise to 15.08%, which would be above the official hurdle rate.

The 15% social discount rate being used by the Philippine government may itself be on the high side, penalizing capital-intensive ventures like the Penicillins Plant. It is highly likely that future interest rates would be lower, especially if the so-called Philippine Assistance Program takes off and a substantial amount of capital from multilateral and bilateral sources does flow in.

Aside from the NPV and the EIRR, another instructive indicator of the economic worth of an activity is the Domestic Resource Cost (DRC). The DRC is the ratio of the discounted economic cost of domestic resources, measured in units of the local currency, used by the project to earn or save one unit of foreign exchange; its dimension is the same as the exchange rate. If the DRC of a given activity is less than the SER, then the country has a comparative advantage in that activity, as it is able to generate or save foreign exchange at a cheaper cost than the rest of the economy.

The results of the estimates of the different indicators of economic project worth (NPV, EIRR, and DRC) are summarized in the Table at the end of this chapter. For the DRC, the figures should be compared against the SER of ₱25.20/$1.

E. Summary

The financial analysis under the existing institutional environment (where project output is given tariff protection at 10% while project inputs can be purchased duty-free under existing incentive laws) shows that the FIRR on total investment in the project does not quite reach 12%, after the government's share of corporate income taxes is deducted. Even full exemption from income taxes raises the FIRR to only 15%. Given the capital-intensive nature of the project, it is highly unlikely for domestic private investors to come in at this rate of profitability. Even with sufficient tax incentives, the FIRR on total investment reaches only 15%. Cheaper foreign capital, whether in the form of loans or joint ventures, may be necessary for the project to push through.

From the economy's viewpoint, if 1988 prices prevail in the future and if the venture is funded purely from domestic resources, the returns would be marginal at an EIRR of slightly less than 15%. However, if a breakthrough in Penicillin fermentation using molasses is achieved, the economic feasibility of the project would be significantly enhanced.

Finally, it should be noted that the cost-benefit calculations from the economy's viewpoint given above do not yet take in to account the "intangibles" that accrue to having a strong local capability to produce a vital commodity such as drugs. The presence of a regular supply source at stable prices would certainly contribute to a better provision, both public and private, of the people's basic health needs.

INDUSTRIAL PROFILE NO. 2
FINANCIAL EVALUATION
SENSITIVITY ANALYSIS

OPTIONS	NET PRESENT VALUE 12% (In $'000)	NET PRESENT VALUE 15% (In $'000)	FIRR
w/ corp. income tax	-1147	-5105	11.28%
w/ 4-yr tax holiday	469	-3657	12.30%
w/ 6-yr tax holiday	1498	-2790	12.95%
w/o corp. income tax	5352	31	15.02%

INDUSTRIAL PROFILE NO. 2
ECONOMIC EVALUATION
SENSITIVITY ANALYSIS

ASSUMPTIONS	NPV (In $'000) 12%	NPV (In $'000) 15%	EIRR	DRC (In P/$) 12%	DRC (In P/$) 15%
Base Case (SER/OER=1.2)	4835	-986	14.42%	21.41	26.28
Output prices higher by 10%	12608	5438	18.04%	17.23	20.54
Molasses used (50% cheaper)	8207	1804	16.03%	19.3[illegible]	23.44
Sugar prices lower by 20%	6184	130	15.08%	20.54	25.07

18.4 Plant for Semi-synthesis of Ampicillin, Amoxycillin, Cloxacillin and Cephalexin, Industrial Profile No. 3

A. Project Background

This proposed project is basically an expansion of existing domestic production capacity. A local drug company (Chemfields) produtes ampicillin, amoxycillin, and cloxacillin, but its current production is not sufficient to meet the present and the expected future domestic demand. The major raw material for the production of these drugs is 6-APA, which is proposed to be produced domestically (see Industrial Profile No. 2). Dane salt, an important raw material for amoxycillin production, will be produced in the same plant.

At full development in 1995, the annual output of the plant will be as follows: (a) Ampicillin, 35 MT/year; (b) Amoxycillin, 30 MT/year; (c) Cloxacillin, 3 MT/year; and (c) Cephalexin, 6 MT/year.

B. Market Aspects

1. Ampicillin

Only one pharmaceutical company in the Philippines (Chemfields) currently produces Ampicillin from imported 6-APA. It reached a production level of 51.66 MT in 1987, from about 40 MT in 1985. According to NCSO statistics, the 1987 imports amounted to 1.5 MT valued at $120 thousand, for an average of $80/kg, while the BSM data show a 1987 import level of 1.6 MT with prices ranging from $60/kg to $85/kg.

The projected annual growth rate in the domestic consumption of Ampicillin is only about 6%/year, given that some shift in demand is expected away from this drug towards Amoxycillin. Adding together the 1987 production and imports as an estimate of base domestic consumption and applying the 6% annual growth rate, one gets a volume of 85 MT/year for domestic consumption in 1995. For the price, $84/kg is used, reflecting a 20% addition to the 1988 world price of $70/kg to reflect freight, insurance, port handling charges, and 10% import duty.

2. Amoxycillin

Chemfields produced a substantial amount of Amoxycillin in 1987 at 22.5 MT, for sale to the private domestic market. Meanwhile, local procurements of the Department of Health (DOH) from sources other than Chemfields were 11.5 MT in 1987 for distribution to the Rural Health Units, while direct regional procurements were 1.6 MT. NCSO figures show an importation level of only 2.16 MT for 1987, valued at $253 thousand. (Since the DOH does not import drugs directly, the discrepancy between DOH procurements and NCSO import figures illustrates the degree of understatement that may exist in the official import statistics.) A minimum estimate of total domestic consumption for 1987 would therefore be the sum of Chemfield production and DOH and procurements, or 35.6 MT.

With the anticipated shift in the market away from Ampicillin in favor of Amoxycillin, private consumption of Amoxycillin is expected to grow at 15%/year up to 1990, declining to 8%/year from 1990 to 1995. (An international market study estimates that for the group of countries to which the Philippines belongs, the growth rate in demand for semi-synthetic penicillin derivatives would be 14%/year up to 1990 and 8%/year from 1990 to 1995.) This puts expected private consumption in 1995 at 50 MT/year. DOH, on the other hand, has programmed Amoxycillin purchases of 23.5 MT for 1988, and these direct procurements are expected to grow at 4%/year, giving a level of 30 MT by 1995. The expected total domestic market for 1995 may therefore reach 80 MT/year.

The proposed plant capacity for Amoxycillin production of 30 MT/year, plus Chemfields production of 22.5 MT/year, still allows room for imports of this drug, or future expansion of domestic production capacity. With respect to the price of Amoxycillin, the financial projections use a world price of $85/kg plus 20% for insurance, freight, and duties, or $102/kg.

3. Cloxacillin

A limited amount of this drug was produced by Chemfields in 1986 (0.5 MT), but no production was recorded for 1987. Imports for 1987 amounted to 5.27 MT valued at $1.07 million, according to NCSO statistics. At a growth rate of 4%/year, the level of domestic demand would be about 7.5 MT/year by 1995. The proposed plant capacity of 3 MT/year for Cloxacillin again leaves much room for importation. A conservative base world price of $90/kg, or $108/kg gross of freight, insurance, and duties, is used in the financial projections.

4. Cephalexin

There is no domestic production of Cephalexin. Imports in 1987 were 3.56 MT valued at $884 thousand, according to official NCSO trade statistics. The growth in demand for this drug is placed at 10%/year, giving a domestic market of 6.5 MT/year by 1995 which would be about filled up by the proposed plant capacity of 6 MT/year. A selling price of $216/kg (20% over the world price of $190/kg) is used in the projections.

E. Sales at Full Development

In summary, the sales program envisioned for the Beta-Lactams Plant at full capacity in 1995 is as follows:

	Product	Output (MT/yr)	Price ($/kg)	Value ($'000)
1.	Ampicillin	35	84	2,940
2.	Amoxycillin	30	102	3,060
3.	Cloxacillin	3	108	324
4.	Cephalexin	6	216	1,296
	TOTAL	74		7,620

C. Financial Evaluation

The proposed Beta-Lactams Plant, as an upstream activity, does not require as much investment as the Penicillins Plant. Estimates of the initial investment requirements amount to only $5.9 million, with 32.37% on the first year and 67.63% on the second year. The foreign component is 74.24%, going mainly to the purchase of machinery, equipment, and technology, and erection costs that include piping, electrical facilities, etc. Pre-production capital expenditures comprise of training abroad

for the technical personnel. The Project Summary Schedule is given in COMFAR Table III, while the breakdown by type of expenditure is given in COMFAR Table III.1.

Production during the early years of operation is expected to be at 60% of capacity on the first year and 80% of capacity on the second year, with full development reached by the third year. The production cost schedule is given in COMFAR Table III.2. Raw materials expenses are expected to vary proportionately with capacity utilization, while all other factory costs and administrative expenses remain constant throughout.

The major raw material for the Beta-Lactams Plant is 6-APA; for consistency, whether this ingredient is imported or bought locally if the proposed Penicillins Plant pushes through, it is treated as a foreign expense, and the financial price considered is the same at $72/kg, which yields a total cost of 6-APA at full capacity operations of $3.15 million per year. Other raw materials costing $2.57 million at full capacity are assumed to be 80% foreign and 20% local, as the Philippines does not have a chemical industry of sufficient scale to supply all the project needs.

All other expenses (direct labor, utilities, administrative expenses) are treated as local. The estimated administrative expenses of $188 thousand are split between 70% factory overhead and 30% general administration, which is in turn split evenly between labor and nonlabor costs. The schedule of depreciation allowance in COMFAR Table III.2 follows the assumptions stated in Chapter 18.2.

The working capital requirements given in COMFAR Table III.3 are also based on assumptions enumerated in Chapter 18.2. With the gradual buildup over the first three years of operation, they amount to 12.7% of production costs (excluding depreciation) at full capacity.

The projected net income statements for the 15 years of project operation appear in COMFAR Table III.4. On the first year, the project is already expected to earn profits even at 60% capacity, with net profit after income tax of $61 thousand. As a percentage of initial investment, this amounts to only 0.96% on the first year, but it gradually rises until it reaches 14.05% on the eleventh year, when all assets are fully depreciated for tax purposes.

For financial evaluation, the projected cash flow statements are given in COMFAR Table III.5. A net cash inflow of $153 thousand is realized by the first year of operation, peaking up to $1.15 million from the fourth to the eighth year, and settling down to $0.94 million by the eleventh year when income tax liabilities increase again as the assets are fully depreciated. The financial internal rate of return (FIRR) is 12.72% after corporate income taxes, but 17.08% before taxes. The difference is substantial because of the huge tax bite compared to the

relatively small initial investment. The difference also suggests that if the project proves worthwhile from the economy's viewpoint but the FIRR of 12.72% is found unattractive by domestic investors, fiscal incentives in the form of corporate income tax exemptions may be sufficient to entice private domestic capital to come in.

If the proposed activity is given a four-year tax holiday for non-pioneering ventures under the Omnibus Investment Code, the FIRR rises to 14.16%. The application of a six-year tax holiday for pioneering ventures raises the FIRR on total investment to 14.95%. Without the corporate income tax, the FIRR is 17.08%. The increases in profitability are more sensitive to the tax incentives relative to the Penicillins project because of the smaller initial investment requirements of the Beta-Lactams project. The financial feasibility indicators under these different options are summarized in the Table at the end of this chapter.

D. Economic Evaluation

As in the previous case of the Penicillins Plant, the financial analysis discussed above assumes a positive rate of protection whereby the outputs of the proposed enterprise enjoy a 10% tariff protection while the raw material inputs are imported free of customs duties. From the economy's viewpoint, for every dollar's worth of output that the project manufactures, the gross saving in foreign exchange is only ninety cents; the other ten cents represents a transfer of the forgone duties of the government to the project. At the same time, the technology-intensive nature of the enterprise limits the employment creation potentials mainly to highly technical manpower whose opportunity cost is often equal to the salaries received. The project may nevertheless generate some net saving in foreign exchange which, in the Philippine context, is valued at 1.2 times the official rate.

The economic analysis thus imputes a net increase in the financial value of the output of 10% to reflect the 10% duty transfers and 20% shadow exchange rate (SER) premium, and a 20% increase in the initial investment and raw materials expenses involving the direct and indirect use of foreign exchange. Thus, as mentioned earlier, 6-APA as a raw material, even if purchased locally, is considered as a tradable good, so that the social opportunity cost of 6-APA as an input in the Beta-Lactams Plant is taken to be equal to its marginal social value as an output of the Penicillins Plant.

The Project Summary Schedule reflecting these adjustment from the economy's view point is given in COMFAR Table III.6, while the annual cash flows are presented in COMFAR Table III.7. With the foreign components valued at 1.2 times their financial costs, the initial investment requirements of the project rise to

$6.8 million. At full capacity, the value of annual sales also rises to $8.4 million, while annual operating costs before depreciation rise to $6.9 million. The economic internal rate of return (EIRR) is 15.09%, yielding a net present value (NPV) of $1.4 million at a 12% discount rate, but only $36 thousand at a 15% discount rate.

The project's EIRR is only slightly higher than the present hurdle rate of 15% used for public sector investments. But it should be recalled that the annual cash flows have been constructed using conservative estimates of output prices. If output prices were 10% higher, the EIRR would be 24.50% and way above the official hurdle rate. The high sensitivity of economic returns to output prices is a reflection of the relatively low value added of the activity.

It is also interesting to note the effects of a possible decline in the price of 6-APA in case a breakthrough in the use of molasses for the fermentation of Penicillin is achieved. A 10% drop in the price of 6-APA raises the EIRR on investment in the Beta-Lactams Plant to 19.47%; even a smaller 5% drop raises the EIRR to 17.33%.

The results of the estimates of the different indicators of economic project worth (NPV, EIRR, and DRC) are summarized in the Table at the end of this chapter. For the DRC, the figures should be compared against the SER of ₱25.20/$1.

E. Summary

The financial analysis under the existing institutional environment (where project output is given tariff protection at 10% while project inputs can be purchased duty-free under existing incentive laws) shows that the FIRR on total investment in the project barely reaches 12%, after the government's share of corporate income taxes is deducted. However, with sufficient tax incentives, the rate of return on total investment may increase substantially, as the FIRR before taxes is 17%. The profitability of the venture from the viewpoint of domestic equity is enhanced further if cheaper foreign sources of capital come in.

From the economy's viewpoint, if 1988 prices prevail in the future and if the venture is funded purely from domestic resources, the returns would be marginal at an EIRR of slightly more than 15%. However, if a breakthrough in Penicillin fermentation using molasses is achieved and gets passed on in the form of cheaper raw materials for the Beta-Lactams Plant, the economic feasibility of the project would be significantly enhanced. Similarly, an inflow of cheaper foreign capital would help raise the returns to domestic equity.

Finally, to repeat what has been mentioned earlier, it should be noted that the cost-benefit calculations from the economy's viewpoint given above do not yet take into account the "intangibles" that accrue to having a strong local capability to produce a vital commodity such as drugs. The presence of a regular supply source at stable prices would certainly contribute to a better provision, both public and private, of the people's basic health needs.

INDUSTRIAL PROFILE NO. 3
FINANCIAL EVALUATION
SENSITIVITY ANALYSIS

OPTIONS	NET PRESENT VALUE 12% (In $'000)	NET PRESENT VALUE 15% (In $'000)	FIRR
w/ corp. income tax	260	-710	12.72%
w/ 4-yr tax holiday	764	-256	14.16%
w/ 6-yr tax holiday	1051	-15	14.95%
w/o corp. income tax	2045	715	17.08%

INDUSTRIAL PROFILE NO. 3
ECONOMIC EVALUATION
SENSITIVITY ANALYSIS

ASSUMPTIONS	NPV (In $'000) 12%	NPV (In $'000) 15%	EIRR	DRC (In P/$) 12%	DRC (In P/$) 15%
Base Case (SER/OER=1.2)	1391	36	15.09%	21.11	25.06
Output prices higher by 10%	6162	3983	24.50%	13.56	15.34
6-APA price 10% lower	3516	1794	19.47%	16.91	19.54
6-APA price 5% lower	2454	915	17.33%	18.78	21.96

18. 5 Erythromycin Derivatives and Rifampicin Plant Industrial Profile No. 5

A. Project Background

The original purpose of this project was to utilize the output of a proposed multi-purpose fermentation plant which would produce the Erythromycin base and Rifamycin B (Industrial Profile No. 6). The multi-purpose fermentation plant, however, does not look economically viable at this point. Nevertheless, it will be examined if the production of Erythromycin derivatives and Rifampicin would still be worthwhile even with the use of imported raw materials. The annual output of the proposed plant at full capacity is expected to be as follows: (a) Erythromycin

Stearate, 11 MT/year; (b) Erythromycin Ethylsuccinate, 11 MT/year: (c) Erythromycin Thiocyanate, 3 MT/year; and (d) Rifampicin, 20 MT/year.

B. Market Aspects

1. Erythromycins

Import data of the NCSO on Erythromycins show 12.56 MT coming in to the country in 1987, with a value of $1.65 million. An international market study on drugs estimates that, for a country like the Philippines, the growth in demand for Erythromycins would be 6%/year up to 1990, declining to 4%/year from 1991 to 1995. These growth trends look low, considering that Erythromycin is a broad spectrum antibiotic with very limited substitutes. Nevertheless, for conservatism, these rates are applied to the 1987 base import figures, yielding a private sector demand level of 18.6 MT for 1995. Government procurement for 1988 was programmed at 4 MT; if this would grow at 6%/year, total government purchases for 1995 would be 6 MT, giving an aggregate domestic demand of 25 MT for this year of the project's full development. This is broken down into 11 MT for E. Stearate, 11 MT for E. Ethylsuccinate, and 3 MT for E. Thiocyanate, which are the targeted capacities of the project.

The product prices used in the projections, again based on 1988 world prices plus 20% allowance for freight, insurance, and duties, are $102/kg, $162/kg, and $108/kg, respectively.

2. Rifampicin

This expensive product presently assumes an important role in the government's anti-tuberculosis and anti-leprosy programs, with government procurement in 1987 reaching 13 MT. Private sector imports for that year were 7.97 MT, with a value of $1.93 million.

The DOH has reduced its programmed procurement to 11 MT for 1988, and expects this to decline to only 7.6 MT by 1992, if its anti-tuberculosis and anti-leprosy campaigns would prove successful. However, with allowances for new cases, recurrence, and coverage of those previously escaping diagnosis, it is possible that by 1995, government procurement of Rifampicin would remain at the 1988 level of 11 MT/year. Meanwhile, private sector demand may grow at 3%/year to 10 MT by 1995, yielding a total of 21 MT/year as the target size of the domestic market for the project, with a financial price of $228/kg (based on a 1988 world price of $190/kg, plus the 20% adjustment).

3. Sales at Full Development

In summary, the sales program envisioned for the Erythromycins Plant at full capacity in 1995 is as follows:

Product	Output (MT/yr)	Price ($/kg)	Value ($'000)
1. Erythromycin Stearate	11	102	1,122
2. Erythromycin Ethylsuccinate	11	162	1,782
3. Erythromycin Thiocyanate	3	108	324
4. Rifampicin	20	228	4,560
TOTAL	45		7,788

C. Financial Evaluation

The proposed Erythromycins Plant, as an upstream activity like the Beta-Lactams Plant, does not require as much investment as the Penicillins Plant. Estimates of the initial investment requirements amount to only $1.5 million, with 41.50% on the first year and 58.50% on the second year. The foreign component is 75.49%, going mainly to the purchase of machinery, equipment, and technology, and erection costs that include piping, electrical facilities, etc. Pre-production capital expenditures comprise of training abroad for the technical personnel amounting to $70 thousand. The project Summary Schedule is given in COMFAR Table IV, while the breakdown by type of expenditure is given in COMFAR Table IV.1.

Production during the early years of operation is expected to be at 60% of capacity on the first year and 80% of capacity on the second year, with full development reached by the third year. The production cost schedule is given in COMFAR Table IV.2. Raw materials expenses are expected to vary proportionately with capacity utilization, while all other factory costs and administrative expenses remain constant throughout.

The major raw materials for the proposed project are Erythromycin Base for the Erythromycin derivatives and Rifamycin Base for Rifampicin. As mentioned earlier, the domestic production of Erythromycin base was part of the original proposal, but since this activity does not seem economically promising (see Chapter 18.6), this study considers the direct importation of this raw material, together with Rifampicin Base. capacity operations of $3.15 million per year. The total annual raw materials expenses of $6.49 million at full capacity are assumed to be 80% foreign and 20% local.

All other expenses (direct labor, utilities, administrative expenses) are treated as local. The estimated administrative expenses of $90 thousand are split between 70% factory overhead and 30% general administration, which is in turn split evenly between labor and nonlabor costs. The schedule of depreciation

allowance in COMFAR Table IV.2 follows the assumptions stated in Chapter 18.2. Since the base case assumes full equity coverage of initial investment, there are no financial charges.

The working capital requirements given in COMFAR Table IV.3 are also based on assumptions enumerated in Chapter 18.2. With the gradual buildup over the first three years of operation, they amount to 12.6% of production costs (excluding depreciation) at full capacity.

The projected net income statements for the 15 years of project operation appear in COMFAR Table IV.4. On the first year, the project is already expected to earn profits even at 60% capacity, with net profit after income tax of $228 thousand. As a percentage of initial investment, this already amounts to 11.11% on the first year, and it gradually rises until it reaches 27.96% on the eleventh year, when all assets are fully depreciated for tax purposes.

For financial evaluation, the projected cash flow statements are given in COMFAR Table IV.5. A net cash outflow of $145 thousand is realized by the first year of operation, because of the buildup of inventories. However, this becomes positive on the second year, peaking up to $719 thousand from the fourth to the eighth year, and settling down to $666 thousand by the eleventh year when income tax liabilities increase again as the assets are fully depreciated. The financial internal rate of return (FIRR) is 26.16% after corporate income taxes, 36.04% before taxes. The high level of profitability also shows that the project will prove highly attractive to the private sector, even in the absence of any incentives other than the existing ones governing new enterprises.

If the proposed activity is nevertheless given a four-year tax holiday for non-pioneering ventures under the Omnibus Investment Code, the FIRR rises to 32.19%. The application of a six-year tax holiday for pioneering ventures raises the FIRR on total investment to 34.02%. Without the corporate income tax, the FIRR is 36.04%. The increases in profitability are more sensitive to the tax incentives relative to the Penicillins project because of the smaller initial investment requirements of the Erythromycins project. The financial feasibility indicators under these different options are summarized in the Table at the end of this chapter.

D. Economic Evaluation

As in the previous cases examined, the financial analysis discussed above assumes a positive rate of protection whereby the outputs of the proposed enterprise enjoy a 10% tariff protection while the raw material inputs are imported free of any customs duties. From the economy's viewpoint, for every dollar's worth of output that the project manufactures, the gross saving in foreign exchange is only ninety cents; the other ten cents

represents a transfer of the forgone duties of the government to the project. At the same time, the technology-intensive nature of the enterprise limits the employment creation potentials mainly to highly technical manpower whose opportunity cost is often equal to the salaries received. The project may nevertheless generate some net saving in foreign exchange which, in the Philippine context, is valued at 1.2 times the official rate.

The economic analysis thus imputes a net increase in the financial value of the output of 10% to reflect the 10% duty transfers and 20% shadow exchange rate (SER) premium, and a 20% increase in the initial investment and raw materials expenses involving the direct and indirect use of foreign exchange.

The Project Summary Schedule reflecting these adjustments from the economy's viewpoint is given in COMFAR Table IV.6, while the annual cash flows are presented in COMFAR Table IV.7. With the foreign components valued at 1.2 times their financial costs, the initial investment requirements of the project rise to $1.8 million. At full capacity, the value of annual sales also rises to $8.6 million, while annual operating costs before depreciation rise to $7.8 million. The economic internal rate of return (EIRR) is 24.33%, yielding a net present value (NPV) of $2.0 million at a 12% discount rate and $1.3 million at a 15% discount rate.

The project's EIRR is much higher than the present hurdle rate of 15% used for public sector investments, even though the annual cash flows have been constructed using conservative estimates of output prices. The results, however, are highly sensitive to output prices, as a reflection of the relatively low value added of the activity. If output prices were 10% lower, the EIRR would be negative at -11.29% and way below the official hurdle rate.

It is also interesting to note the effects of a possible decline in the prices of raw materials on project profitability. A 10% drop in raw materials prices reduces the EIRR on investment in the Erythromycins Plant to 1.16%; even a smaller 5% drop reduces the EIRR to 13.72%.

The results of the estimates of the different indicators of economic project worth (NPV, EIRR, and DRC) are summarized in the Table at the end of this chapter. For the DRC, the figures should be compared against the SER of ₱25.20/$1.

E. Summary

The financial analysis under the existing institutional environment (where project output is given tariff protection at 10% while project inputs can be purchased duty-free under existing incentive laws) shows that the FIRR on total investment in the project is a high 26%, even after the government's share

of corporate income taxes is deducted. With additional tax incentives, the rate of return on total investment increases even more substantially. The profitability of the venture from the viewpoint of domestic equity is enhanced further if cheaper foreign sources of capital come in.

From the economy's viewpoint, if 1988 prices prevail in the future and if the venture is funded purely from domestic resources, the returns would also be at an EIRR of slightly more than 24%. However, both the financial and economic viability of the project is highly sensitive to output and raw materials prices, owing to the relatively low value added content of the activity.

Finally, to repeat what has been mentioned earlier, it should be noted that the cost-benefit calculations from the economy's viewpoint given above do not yet take into account the "intangibles" that accrue to having a strong local capability to produce a vital commodity such as drugs. The presence of a regular supply source at stable prices would certainly contribute to a better provision, both public and private, of the people's basic health needs.

INDUSTRIAL PROFILE NO. 5
FINANCIAL EVALUATION
SENSITIVITY ANALYSIS

OPTIONS	NET PRESENT VALUE 12% (In $'000)	NET PRESENT VALUE 15% (In $'000)	FIRR
w/ corp. income tax	1987	1323	26.16%
w/ 4-yr tax holiday	2604	1882	32.19%
w/ 6-yr tax holiday	2896	2129	34.02%
w/o corp. income tax	3702	2726	36.04%

INDUSTRIAL PROFILE NO. 5
ECONOMIC EVALUATION
SENSITIVITY ANALYSIS

ASSUMPTIONS	NPV (In $'000) 12%	NPV (In $'000) 15%	EIRR	DRC (In P/$) 12%	DRC (In P/$) 15%
Base Case (SER/OER=1.2)	2011	1284	24.33%	20.78	21.68
Output prices lower by 10%	-2859	-2747	-11.29%	36.10	38.57
Raw materials 10% costlier	-1490	-1613	1.16%	29.90	31.64
Raw materials 5% costlier	261	-165	13.72%	24.53	25.74

TABLE CONTENTS

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

PENICILLINS PLANT
31 JAN 1989
ALL EQUITY, AFTER CORP. INC. TAX

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: THOUSAND U.S. DOLLARS

Total initial investment during construction phase

fixed assets:	28000.00	70.821 % foreign
current assets:	0.00	0.000 % foreign
total assets:	28000.00	70.821 % foreign

Source of funds during construction phase

equity & grants:	28000.00	70.821 % foreign
foreign loans :	0.00	
local loans :	0.00	
total funds :	28000.00	70.821 % foreign

Cashflow from operations

Year:	1	2	3
operating costs:	5000.00	5800.00	6600.00
depreciation :	2800.00	2800.00	2800.00
interest :	0.00	0.00	0.00
production costs	7800.00	8600.00	9400.00
thereof foreign	51.58 %	54.69 %	57.27 %
total sales :	7462.80	9950.40	12438.00
gross income :	-337.20	1350.40	3038.00
net income :	-337.20	877.76	1974.70
cash balance :	1739.47	3577.76	4674.70
net cashflow :	1739.47	3577.76	4674.70

Net Present Value at: 12.00 % = -1146.75
Internal Rate of Return: 11.28 %
Return on equity1: 2.83 %
Return on equity2: 11.28 %

Index of Schedules produced by COMFAR

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Total Initial Investment in THOUSAND U.S. DOLLARS

Year	1991	1992
Fixed investment costs		
Land, site preparation, development	385.000	210.000
Buildings and civil works	2705.000	1460.000
Auxiliary and service facilities	0.000	0.000
Incorporated fixed assets	2085.000	9385.000
Plant machinery and equipment	4835.000	6535.000
Total fixed investment costs	10010.000	17590.000
Pre-production capital expenditures	60.000	140.000
Net working capital	0.000	0.000
Total initial investment costs	10070.000	17930.000
Of it foreign, in %	63.555	74.902

PENICILLINS PLANT --- 31 JAN 1989

Total Production Costs in THOUSAND U.S. DOLLARS

Year	1993	1994	1995-97	1998-2000	2001
% of nom. capacity (single product).	0.000	0.000	0.000	0.000	0.000
Raw material 1	600.000	800.000	1000.000	1000.000	1000.000
Other raw materials	1800.000	2400.000	3000.000	3000.000	3000.000
Utilities	600.000	600.000	600.000	600.000	600.000
Energy	0.000	0.000	0.000	0.000	0.000
Labour, direct	800.000	800.000	800.000	800.000	800.000
Repair, maintenance	0.000	0.000	0.000	0.000	0.000
Spares	0.000	0.000	0.000	0.000	0.000
Factory overheads	840.000	840.000	840.000	840.000	840.000
Factory costs	4640.000	5440.000	6240.000	6240.000	6240.000
Administrative overheads	360.000	360.000	360.000	360.000	360.000
Indir. costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Direct costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Depreciation	2800.000	2800.000	2800.000	2740.500	2562.000
Financial costs	0.000	0.000	0.000	0.000	0.000
Total production costs	7800.000	8600.000	9400.000	9340.500	9162.000
Costs per unit (single product)	0.000	0.000	0.000	0.000	0.000
Of it foreign, %	51.577	54.686	57.266	57.631	58.754
Of it variable,%	0.000	0.000	0.000	0.000	0.000
Total labour	980.000	980.000	980.000	980.000	980.000

Table II.2

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Total Production Costs in THOUSAND U.S. DOLLARS

Year	2002	2003- 7
% of nom. capacity (single product).	0.000	0.000
Raw material 1	1000.000	1000.000
Other raw materials	3000.000	3000.000
Utilities	600.000	600.000
Energy	0.000	0.000
Labour, direct	800.000	800.000
Repair, maintenance	0.000	0.000
Spares	0.000	0.000
Factory overheads	840.000	840.000
Factory costs	6240.000	6240.000
Administrative ovc.heads	360.000	360.000
Indir. costs, sales and distribution	0.000	0.000
Direct costs, sales and distribution	0.000	0.000
Depreciation	482.000	0.000
Financial costs	0.000	0.000
Total production costs	7082.000	6600.000
Costs per unit (single product)	0.000	0.000
Of it foreign, %	54.815	51.515
Of it variable,%	0.000	0.000
Total labour	980.000	980.000

Net Working Capital in THOUSAND U.S. DOLLARS

Year	mdc	coto	1993	1994	1995	1996-2007
Coverage						
Current assets						
Accounts receivable	30	12.0	416.667	483.333	550.000	550.000
Inventory and materials	15	24.0	125.000	158.333	191.667	191.667
Energy	0	—	0.000	0.000	0.000	0.000
Spares	0	—	0.000	0.000	0.000	0.000
Work in progress	15	24.0	193.333	226.667	260.000	260.000
Finished products	15	24.0	200.333	241.667	275.000	275.000
Cash in hand	30	12.0	166.667	166.667	166.667	166.667
Total current assets			1110.000	1276.667	1443.333	1443.333
Current liabilities and						
Accounts payable	30	12.0	386.667	453.333	520.000	520.000
Net working capital			723.333	823.333	923.333	923.333
Increase in working capital			723.333	100.000	100.000	0.000
Net working capital, local			468.333	483.333	498.333	498.333
Net working capital, foreign			255.000	340.000	425.000	425.000

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997
Total sales, incl. sales tax	7462.000	9950.400	12438.000	12438.000	12438.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	7462.000	9950.400	12438.000	12438.000	12438.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	7800.000	8600.000	9400.000	9400.000	9400.000
Operational margin	-337.200	1350.400	3038.000	3038.000	3038.000
As % of total sales	-4.518	13.571	24.425	24.425	24.425
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	-337.200	1350.400	3038.000	3038.000	3038.000
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	-337.200	1350.400	3038.000	3038.000	3038.000
Tax	0.000	472.640	1063.300	1063.300	1063.300
Net profit	-337.200	877.760	1974.700	1974.700	1974.700
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	-337.200	877.760	1974.700	1974.700	1974.700
Accumulated undistributed profit	-337.200	540.560	2515.260	4489.960	6464.660
Gross profit, % of total sales	-4.518	13.571	24.425	24.425	24.425
Net profit, % of total sales	-4.518	8.821	15.876	15.876	15.876
ROE, Net profit, % of equity	-1.204	3.135	7.052	7.052	7.052
ROI, Net profit+interest, % of invest.	-1.174	3.045	6.827	6.827	6.827

Table II.4

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	1998	1999	2000	2001	2002
Total sales, incl. sales tax	12438.000	12438.000	12438.000	12438.000	12438.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	12438.000	12438.000	12438.000	12438.000	12438.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	9340.500	9340.500	9340.500	9162.000	7082.000
Operational margin	3097.500	3097.500	3097.500	3276.000	5356.000
As % of total sales	24.904	24.904	24.904	26.339	43.062
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	3097.500	3097.500	3097.500	3276.000	5356.000
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	3097.500	3097.500	3097.500	3276.000	5356.000
Tax	1084.125	1084.125	1084.125	1146.600	1874.600
Net profit	2013.375	2013.375	2013.375	2129.400	3481.400
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	2013.375	2013.375	2013.375	2129.400	3481.400
Accumulated undistributed profit	8478.035	10491.410	12504.730	14634.190	18115.590
Gross profit, % of total sales	24.904	24.904	24.904	26.339	43.062
Net profit, % of total sales	16.187	16.187	16.187	17.120	27.990
ROE, Net profit, % of equity	7.191	7.191	7.191	7.605	12.434
ROI, Net profit+interest, % of invest.	6.961	6.961	6.961	7.362	12.037

PENICILLINS PLANT --- 31 JAN 1989

Table II.4

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	2003	2004	2005	2006	2007
Total sales, incl. sales tax	12438.000	12438.000	12438.000	12438.000	12438.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	12438.000	12438.000	12438.000	12438.000	12438.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	6600.000	6600.000	6600.000	6600.000	6600.000
Operational margin	5838.000	5838.000	5838.000	5838.000	5838.000
As % of total sales	46.937	46.937	46.937	46.937	46.937
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	5838.000	5838.000	5838.000	5838.000	5838.000
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	5838.000	5838.000	5838.000	5838.000	5838.000
Tax	2043.300	2043.300	2043.300	2043.300	2043.300
Net profit	3794.700	3794.700	3794.700	3794.700	3794.700
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	3794.700	3794.700	3794.700	3794.700	3794.700
Accumulated undistributed profit	21910.290	25704.980	29499.680	33294.380	37089.080
Gross profit, % of total sales	46.937	46.937	46.937	46.937	46.937
Net profit, % of total sales	30.509	30.509	30.509	30.509	30.509
ROE, Net profit, % of equity	13.552	13.552	13.552	13.552	13.552
ROI, Net profit+interest, % of invest.	13.120	13.120	13.120	13.120	13.120

Cashflow Tables, construction in THOUSAND U.S. DOLLARS

Year	1991	1992
Total cash inflow	10070.000	17930.000
Financial resources	10070.000	17930.000
Sales, net of tax	0.000	0.000
Total cash outflow	10070.000	17930.000
Total assets	10070.000	17930.000
Operating costs	0.000	0.000
Cost of finance	0.000	0.000
Repayment	0.000	0.000
Corporate tax	0.000	0.000
Dividends paid	0.000	0.000
Surplus (deficit)	0.000	0.000
Cumulated cash balance	0.000	0.000
Inflow, local	3670.000	4500.000
Outflow, local	3670.000	4500.000
Surplus (deficit)	0.000	0.000
Inflow, foreign	6400.000	13430.000
Outflow, foreign	6400.000	13430.000
Surplus (deficit)	0.000	0.000
Net cashflow	-10070.000	-17930.000
Cumulated net cashflow	-10070.000	-28000.000

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997	1998
Total cash inflow ..	7099.466	10017.070	12504.670	12438.000	12438.000	12438.000
Financial resources .	305.667	66.667	66.667	0.000	0.000	0.000
Sales, net of tax ..	7462.800	9950.400	12438.000	12438.000	12438.000	12438.000
Total cash outflow ..	6110.000	6439.307	7829.967	7663.300	7663.300	7684.125
Total assets	1110.000	166.667	166.667	0.000	0.000	0.000
Operating costs ...	5000.000	5000.000	6500.000	6500.000	6500.000	6500.000
Cost of finance ...	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax ...	0.000	472.640	1063.300	1063.300	1063.300	1084.125
Dividends paid ...	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit) .	1739.466	3577.761	4674.700	4774.700	4774.700	4753.875
Cumulated cash balance	1739.466	5317.227	9991.928	14766.630	19541.330	24295.200
Inflow, local	216.667	10.000	10.000	0.000	0.000	0.000
Outflow, local	3545.000	3577.640	4288.300	4263.300	4263.300	4284.125
Surplus (deficit) .	-3328.333	-3567.640	-4278.300	-4263.300	-4263.300	-4284.125
Inflow, foreign ...	7632.800	10007.070	12494.670	12438.000	12438.000	12438.000
Outflow, foreign ...	2465.000	2861.667	3541.667	3400.000	3400.000	3400.000
Surplus (deficit) .	5167.800	7145.400	8953.000	9038.000	9038.000	9038.000
Net cashflow	1739.466	3577.760	4674.700	4774.700	4774.700	4753.875
Cumulated net cashflow	-26260.530	-22682.770	-18008.070	-13233.370	-8458.674	-3704.799

PENICILLINS PLANT — 31 JAN 1989

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production is THOUSAND U.S. DOLLARS

Year	1999	2000	2001	2002	2003	2004
Total cash inflow . .	12438.000	12438.000	12438.000	12438.000	12438.000	12438.000
Financial resources .	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax . .	12438.000	12438.000	12438.000	12438.000	12438.000	12438.000
Total cash outflow . .	7684.125	7684.125	7746.600	8474.600	8643.300	8643.300
Total assets	0.000	0.000	0.000	0.000	0.000	0.000
Operating costs . . .	6600.000	6600.000	6600.000	6600.000	6600.000	6600.000
Cost of finance . . .	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax . . .	1084.125	1084.125	1146.600	1874.600	2043.300	2043.300
Dividends paid . . .	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit) .	4753.875	4753.875	4691.400	3963.400	3794.700	3794.700
Cumulated cash balance	29049.000	33802.950	38494.350	42457.750	46252.450	50047.150
Inflow, local	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, local	4284.125	4284.125	4346.600	5074.600	5243.300	5243.300
Surplus (deficit) .	-4284.125	-4284.125	-4346.600	-5074.600	-5243.300	-5243.300
Inflow, foreign . . .	12438.000	12438.000	12438.000	12438.000	12438.000	12438.000
Outflow, foreign . . .	3400.000	3400.000	3400.000	3400.000	3400.000	3400.000
Surplus (deficit) .	9038.000	9038.000	9038.000	9038.000	9038.000	9038.000
Net cashflow	4753.875	4753.875	4691.400	3963.400	3794.700	3794.700
Cumulated net cashflow	1049.076	5802.951	10494.350	14457.750	18252.450	22047.150

PENICILLINS PLANT --- 31 JAN 1989

Table II.5

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	2005	2006	2007
Total cash inflow	12438.000	12438.000	12438.000
Financial resources	0.000	0.000	0.000
Sales, net of tax	12438.000	12438.000	12438.000
Total cash outflow	8643.300	8643.300	8643.300
Total assets	0.000	0.000	0.000
Operating costs	6600.000	6600.000	6600.000
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	2043.300	2043.300	2043.300
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	3794.700	3794.700	3794.700
Cumulated cash balance	53841.850	57636.550	61431.250
Inflow, local	0.000	0.000	0.000
Outflow, local	5243.300	5243.300	5243.300
Surplus (deficit)	-5243.300	-5243.300	-5243.300
Inflow, foreign	12438.000	12438.000	12438.000
Outflow, foreign	3400.000	3400.000	3400.000
Surplus (deficit)	9038.000	9038.000	9038.000
Net cashflow	3794.700	3794.700	3794.700
Cumulated net cashflow	25841.850	29636.550	33431.250

PENICILLINS PLANT
31 JAN 1989
WITH SER/BER ADJUSTMENTS

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: THOUSAND U.S. DOLLARS

Total initial investment during construction phase

fixed assets:	31966.00	74.442 % foreign
current assets:	0.00	0.000 % foreign
total assets:	31966.00	74.442 % foreign

Source of funds during construction phase

equity & grants:	31966.00	74.442 % foreign
foreign loans :	0.00	
local loans :	0.00	
total funds :	31966.00	74.442 % foreign

Cashflow from operations

Year:	1	2	3
operating costs:	5400.00	6344.00	7280.00
depreciation :	3196.60	3196.60	3196.60
interest :	0.00	0.00	0.00
production costs	8604.60	9540.60	10476.60
thereof foreign	56.10 %	59.15 %	61.66 %
total sales :	8209.08	10945.44	13681.80
gross income :	-395.52	1404.84	3205.20
net income :	-395.52	1404.84	3205.20
cash balance :	2026.75	4484.44	6284.80
net cashflow :	2026.75	4484.44	6284.80

Net Present Value at: 12.00 % = 4835.01
Internal Rate of Return: 14.42 %
Return on equity1: 6.91 %
Return on equity2: 14.42 %

Index of Schedules produced by COMFAR

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow Tables, construction in THOUSAND U.S. DOLLARS

Year	1991	1992
Total cash inflow	11350.000	20616.000
Financial resources	11350.000	20616.000
Sales, net of tax	0.000	0.000
Total cash outflow	11350.000	20616.000
Total assets	11350.000	20616.000
Operating costs	0.000	0.000
Cost of finance	0.000	0.000
Repayment	0.000	0.000
Corporate tax	0.000	0.000
Dividends paid	0.000	0.000
Surplus (deficit)	0.000	0.000
Cumulated cash balance	0.000	0.000
Inflow, local	3670.000	4500.000
Outflow, local	3670.000	4500.000
Surplus (deficit)	0.000	0.000
Inflow, foreign	7680.000	16116.000
Outflow, foreign	7680.000	16116.000
Surplus (deficit)	0.000	0.000
Net cashflow	-11350.000	-20616.000
Cumulated net cashflow	-11350.000	-31966.000

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997	1998
Total cash inflow	8629.747	11023.440	13759.800	13681.800	13681.800	13681.800
Financial resources	420.667	78.000	78.000	0.000	0.000	0.000
Sales, net of tax	8209.080	10945.440	13681.800	13681.800	13681.800	13681.800
Total cash outflow	6683.000	6339.000	7475.001	7280.001	7280.001	7280.001
Total assets	1195.000	195.000	195.000	0.000	0.000	0.000
Operating costs	5488.000	6344.000	7280.001	7280.001	7280.001	7280.001
Cost of finance	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	2026.747	4684.440	6284.799	6401.799	6401.799	6401.799
Cumulated cash balance	2026.747	6511.188	12795.990	19197.790	25599.589	32001.389
Inflow, local	216.667	10.000	10.000	0.000	0.000	0.000
Outflow, local	3645.000	3105.000	3225.000	3200.000	3200.000	3200.000
Surplus (deficit)	-3428.333	-3095.000	-3215.000	-3200.000	-3200.000	-3200.000
Inflow, foreign	8413.080	11013.440	13749.800	13681.800	13681.800	13681.800
Outflow, foreign	2958.000	3434.000	4250.001	4080.001	4080.001	4080.001
Surplus (deficit)	5455.080	7579.440	9499.799	9601.799	9601.799	9601.799
Net cashflow	2026.747	4684.440	6284.799	6401.799	6401.799	6401.799
Cumulated net cashflow	-29939.250	-25454.810	-19170.010	-12768.210	-6366.416	35.383

PENICILLINS PLANT --- 31 JAN 1989

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production is THOUSAND U.S. DOLLARS

Year	1999	2000	2001	2002	2003	2004
Total cash inflow	13681.000	13681.000	13681.000	13681.000	13681.000	13681.000
Financial resources	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax	13681.000	13681.000	13681.000	13681.000	13681.000	13681.000
Total cash outflow	7280.001	7280.001	7280.001	7280.001	7280.001	7280.001
Total assets	0.000	0.000	0.000	0.000	0.000	0.000
Operating costs	7280.001	7280.001	7280.001	7280.001	7280.001	7280.001
Cost of finance	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	6401.799	6401.799	6401.799	6401.799	6401.799	6401.799
Cumulated cash balance	38403.180	44804.980	51206.770	57608.570	64010.370	70412.160
Inflow, local	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, local	3200.000	3200.000	3200.000	3200.000	3200.000	3200.000
Surplus (deficit)	-3200.000	-3200.000	-3200.000	-3200.000	-3200.000	-3200.000
Inflow, foreign	13681.000	13681.000	13681.000	13681.000	13681.000	13681.000
Outflow, foreign	4080.001	4080.001	4080.001	4080.001	4080.001	4080.001
Surplus (deficit)	9601.799	9601.799	9601.799	9601.799	9601.799	9601.799
Net cashflow	6401.799	6401.799	6401.799	6401.799	6401.799	6401.799
Cumulated net cashflow	6437.182	12838.980	19240.780	25642.580	32044.380	38446.180

Table II.7

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	2005	2006	2007
Total cash inflow	13681.000	13681.000	13681.000
Financial resources	0.000	0.000	0.000
Sales, net of tax	13681.000	13681.000	13681.000
Total cash outflow	7280.001	7280.001	7280.001
Total assets	0.000	0.000	0.000
Operating costs	7280.001	7280.001	7280.001
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	6401.799	6401.799	6401.799
Cumulated cash balance	76813.960	83215.760	89617.550
Inflow, local	0.000	0.000	0.000
Outflow, local	3200.000	3200.000	3200.000
Surplus (deficit)	-3200.000	-3200.000	-3200.000
Inflow, foreign	13681.000	13681.000	13681.000
Outflow, foreign	4080.001	4080.001	4080.001
Surplus (deficit)	9601.799	9601.799	9601.799
Net cashflow	6401.799	6401.799	6401.799
Cumulated net cashflow	44847.980	51249.770	57651.570

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

BETA LACTAMS PLANT
31 JAN 1989
ALL EQUITY, AFTER CORP. INC. TAX

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: THOUSAND U.S. DOLLARS

Total initial investment during construction phase

fixed assets:	5900.00	74.237 % foreign
current assets:	0.00	0.000 % foreign
total assets:	5900.00	74.237 % foreign

Source of funds during construction phase

equity & grants:	5900.00	74.237 % foreign
foreign loans :	0.00	
local loans :	0.00	
total funds :	5900.00	74.237 % foreign

Cashflow from operations

Year:	1	2	3
operating costs:	3887.92	5031.72	6175.53
depreciation :	590.00	590.00	590.00
interest :	0.00	0.00	0.00
production costs	4477.92	5621.72	6765.53
thereof foreign	79.53 %	81.87 %	83.41 %
total sales :	4572.00	6096.00	7620.00
gross income :	94.08	474.28	854.47
net income :	61.15	308.28	555.41
cash balance :	152.74	755.31	1002.43
net cashflow :	152.74	755.31	1002.43

Net Present Value at: 12.00 % = 259.61
Internal Rate of Return: 12.72 %
Return on equity1: 5.62 %
Return on equity2: 12.72 %

Index of Schedules produced by COMFAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net income statement
Working Capital requirements	Source of finance

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Total Initial Investment in THOUSAND U.S. DOLLARS

Year	1991	1992
Fixed investment costs		
Land, site preparation, development	0.000	0.000
Buildings and civil works	380.000	435.000
Auxiliary and service facilities	0.000	0.000
Incorporated fixed assets	450.000	2065.000
Plant machinery and equipment	1050.000	1420.000
Total fixed investment costs	1880.000	3920.000
Pre-production capital expenditures	30.000	70.000
Net working capital	0.000	0.000
Total initial investment costs	1910.000	3990.000
Of it foreign, in %	73.822	74.436

Total Production Costs in THOUSAND U.S. DOLLARS

Year	1993	1994	1995-2000	2001	2002
% of nom. capacity (single product).	0.000	0.000	0.000	0.000	0.000
Raw material 1	1890.346	2520.461	3150.576	3150.576	3150.576
Other raw materials	1541.070	2054.760	2568.450	2568.450	2568.450
Utilities	111.000	111.000	111.000	111.000	111.000
Energy	0.000	0.000	0.000	0.000	0.000
Labour, direct	157.500	157.500	157.500	157.500	157.500
Repair, maintenance	0.000	0.000	0.000	0.000	0.000
Spares	0.000	0.000	0.000	0.000	0.000
Factory overheads	131.600	131.600	131.600	131.600	131.600
Factory costs	3831.516	4975.321	6119.126	6119.126	6119.126
Administrative overheads	56.400	56.400	56.400	56.400	56.400
Indir. costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Direct costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Depreciation	590.000	590.000	590.000	582.250	10.000
Financial costs	0.000	0.000	0.000	0.000	0.000
Total production costs	4477.916	5621.721	6765.526	6757.776	6185.526
Costs per unit (single product)	0.000	0.000	0.000	0.000	0.000
Of it foreign, %	79.528	81.866	83.413	83.509	84.315
Of it variable,%	0.000	0.000	0.000	0.000	0.000
Total labour	185.700	185.700	185.700	185.700	185.700

Table III.2

Total Production Costs in THOUSAND U.S. DOLLARS

Year	2003- 7
Z of nom. capacity (single product).	0.000
Raw material 1	3150.576
Other raw materials	2566.450
Utilities	111.000
Energy	0.000
Labour, direct	157.500
Repair, maintenance	0.000
Spares	0.000
Factory overheads	131.600
Factory costs	6119.126
Administrative overheads	56.400
Indir. costs, sales and distribution	0.000
Direct costs, sales and distribution	0.000
Depreciation	0.000
Financial costs	0.000
Total production costs	6175.526
Costs per unit (single product)	0.000
Of it foreign, Z	84.290
Of it variable,Z	0.000
Total labour	:85.700

Table III.3

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Worki..g Capital in THOUSAND U.S. DOLLARS

Year			1993	1994	1995	1996-2007
Coverage	mdc	coto				
Current assets &						
Accounts receivable	30	12.0	323.393	419.310	514.627	514.627
Inventory and materials	15	24.5	143.284	190.943	238.601	238.601
Energy	0	—	0.000	0.000	0.000	0.000
Spares	0	—	0.000	0.000	0.000	0.000
Work in progress	15	24.0	139.646	207.305	254.964	254.964
Finished products	15	24.0	161.996	209.635	257.314	257.314
Cash in hand	30	12.0	28.792	28.792	28.792	28.792
Total current assets			817.712	1056.004	1294.297	1294.297
Current liabilities and Accounts payable	30	12.0	319.293	414.610	509.927	509.927
Net working capital			498.419	641.394	784.370	784.370
Increase in working capital			498.419	142.976	142.976	0.000
Net working capital, local			100.018	120.861	133.703	133.703
Net working capital, foreign			350.400	520.534	650.667	650.667

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, HAMBLA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997
Total sales, incl. sales tax	4572.000	6096.000	7620.000	7620.000	7620.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	4572.000	6096.000	7620.000	7620.000	7620.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	4477.916	5621.721	6765.526	6765.526	6765.526
Operational margin	94.084	474.279	854.474	854.474	854.474
As % of total sales	2.058	7.780	11.214	11.214	11.214
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	94.084	474.279	854.474	854.474	854.474
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	94.084	474.279	854.474	854.474	854.474
Tax	32.929	165.998	299.066	299.066	299.066
Net profit	61.155	308.281	555.408	555.408	555.408
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	61.155	308.281	555.408	555.408	555.408
Accumulated undistributed profit	61.155	369.436	924.844	1480.252	2035.660
Gross profit, % of total sales	2.058	7.780	11.214	11.214	11.214
Net profit, % of total sales	1.338	5.057	7.289	7.289	7.289
ROE, Net profit, % of equity	1.037	5.225	9.414	9.414	9.414
ROI, Net profit+interest, % of invest.	0.956	4.713	8.309	8.309	8.309

Table III.4

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	1998	1999	2000	2001	2002
Total sales, incl. sales tax	7620.000	7620.000	7620.000	7620.000	7620.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	7620.000	7620.000	7620.000	7620.000	7620.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	6765.526	6765.526	6765.526	6757.776	6185.526
Operational margin	854.474	854.474	854.474	862.224	1434.474
As % of total sales	11.214	11.214	11.214	11.315	18.825
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	854.474	854.474	854.474	862.224	1434.474
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	854.474	854.474	854.474	862.224	1434.474
Tax	299.066	299.066	299.066	301.778	502.066
Net profit	555.408	555.408	555.408	560.446	932.408
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	555.408	555.408	555.408	560.446	932.408
Accumulated undistributed profit	2591.069	3146.477	3701.885	4262.331	5194.739
Gross profit, % of total sales	11.214	11.214	11.214	11.315	18.825
Net profit, % of total sales	7.289	7.289	7.289	7.355	12.236
ROE, Net profit, % of equity	9.414	9.414	9.414	9.499	15.804
ROI, Net profit+interest, % of invest.	8.309	8.309	8.309	8.384	13.949

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	2003	2004	2005	2006	2007
Total sales, incl. sales tax	7620.000	7620.000	7620.000	7620.000	7620.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	7620.000	7620.000	7620.000	7620.000	7620.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	6175.526	6175.526	6175.526	6175.526	6175.526
Operational margin	1444.474	1444.474	1444.474	1444.474	1444.474
As % of total sales	18.956	18.956	18.956	18.956	18.956
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	1444.474	1444.474	1444.474	1444.474	1444.474
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	1444.474	1444.474	1444.474	1444.474	1444.474
Tax	505.566	505.566	505.566	505.566	505.566
Net profit	938.908	938.908	938.908	938.908	938.908
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	938.908	938.908	938.908	938.908	938.908
Accumulated undistributed profit	6133.647	7072.555	8011.463	8950.371	9889.279
Gross profit, % of total sales	18.956	18.956	18.956	18.956	18.956
Net profit, % of total sales	12.322	12.322	12.322	12.322	12.322
ROE, Net profit, % of equity	15.914	15.914	15.914	15.914	15.914
ROI, Net profit+interest, % of invest.	14.046	14.046	14.046	14.046	14.046

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow Tables, construction in THOUSAND U.S. DOLLARS

Year	1991	1992
Total cash inflow . .	1910.000	3990.000
Financial resources .	1910.000	3990.000
Sales, net of tax . .	0.000	0.000
Total cash outflow . .	1910.000	3990.000
Total assets	1910.000	3990.000
Operating costs . . .	0.000	0.000
Cost of finance . . .	0.000	0.000
Repayment	0.000	0.000
Corporate tax . . .	0.000	0.000
Dividends paid . . .	0.000	0.000
Surplus (deficit) .	0.000	0.000
Cumulated cash balance	0.000	0.000
Inflow, local	500.000	1020.000
Outflow, local	500.000	1020.000
Surplus (deficit) .	0.000	0.000
Inflow, foreign . . .	1410.000	2970.000
Outflow, foreign . . .	1410.000	2970.000
Surplus (deficit) .	0.000	0.000
Net cashflow	-1910.000	-3990.000
Cumulated net cashflow	-1910.000	-5900.000

Cashflow tables, production is THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997	1998
Total cash inflow . .	4891.293	6191.317	7715.317	7620.000	7620.000	7620.000
Financial resources .	319.293	95.317	95.317	0.000	0.000	0.000
Sales, net of tax . .	4572.000	6096.000	7620.000	7620.000	7620.000	7620.000
Total cash outflow . .	4738.557	5436.012	6712.884	6474.592	6474.592	6474.592
Total assets	817.712	238.293	238.293	0.000	0.000	0.000
Operating costs . . .	3887.916	5031.722	6175.526	6175.526	6175.526	6175.526
Cost of finance . . .	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax . . .	32.929	165.998	299.066	299.066	299.066	299.066
Dividends paid . . .	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit) .	152.736	755.305	1002.433	1145.408	1145.408	1145.408
Cumulated cash balance	152.736	908.041	1910.473	3055.881	4201.290	5346.698
Inflow, local	59.026	8.562	8.562	0.000	0.000	0.000
Outflow, local	964.688	1054.854	1290.660	1269.256	1269.256	1269.256
Surplus (deficit) .	-905.662	-1046.292	-1282.098	-1269.256	-1269.256	-1269.256
Inflow, foreign . . .	4832.267	6182.756	7706.755	7620.000	7620.000	7620.000
Outflow, foreign . . .	3773.869	4381.159	5422.225	5205.336	5205.336	5205.336
Surplus (deficit) .	1058.397	1801.597	2284.531	2414.664	2414.664	2414.664
Net cashflow	152.736	755.305	1002.433	1145.408	1145.408	1145.408
Cumulated net cashflow	-5747.264	-4991.959	-3989.526	-2844.118	-1698.710	-553.302

Table III.5

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	1999	2000	2001	2002	2003	2004
Total cash inflow	7620.000	7620.000	7620.000	7620.000	7620.000	7620.000
Financial resources	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax	7620.000	7620.000	7620.000	7620.000	7620.000	7620.000
Total cash outflow	6474.592	6474.592	6477.304	6677.592	6681.092	6681.092
Total assets	0.000	0.000	0.000	0.000	0.000	0.000
Operating costs	6175.526	6175.526	6175.526	6175.526	6175.526	6175.526
Cost of finance	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax	299.066	299.066	301.778	502.066	505.566	505.566
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	1145.408	1145.408	1142.696	942.408	938.908	938.908
Cumulated cash balance	6492.106	7637.514	8780.210	9722.618	10661.530	11600.430
Inflow, local	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, local	1269.256	1269.256	1271.968	1472.256	1475.756	1475.756
Surplus (deficit)	-1269.256	-1269.256	-1271.968	-1472.256	-1475.756	-1475.756
Inflow, foreign	7620.000	7620.000	7620.000	7620.000	7620.000	7620.000
Outflow, foreign	5205.336	5205.336	5205.336	5205.336	5205.336	5205.336
Surplus (deficit)	2414.664	2414.664	2414.664	2414.664	2414.664	2414.664
Net cashflow	1145.408	1145.408	1142.696	942.408	938.908	938.908
Cumulated net cashflow	592.107	1737.515	2880.210	3822.619	4761.527	5700.435

BETA LACTAMS PLANT --- 31 JAN 1989

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	2005	2006	2007
Total cash inflow	7620.000	7620.000	7620.000
Financial resources	0.000	0.000	0.000
Sales, net of tax	7620.000	7620.000	7620.000
Total cash outflow	6681.092	6681.092	6681.092
Total assets	0.000	0.000	0.000
Operating costs	6175.526	6175.526	6175.526
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	505.566	505.566	505.566
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	938.908	938.908	938.908
Cumulated cash balance	12539.340	13478.250	14417.160
Inflow, local	0.000	0.000	0.000
Outflow, local	1475.756	1475.756	1475.756
Surplus (deficit)	-1475.756	-1475.756	-1475.756
Inflow, foreign	7620.000	7620.000	7620.000
Outflow, foreign	5205.336	5205.336	5205.336
Surplus (deficit)	2414.664	2414.664	2414.664
Net cashflow	938.908	938.908	938.908
Cumulated net cashflow	6639.343	7578.251	8517.160

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

BETA LACTAMS PLANT
31 JAN 1989
WITH SER/BER ADJUSTMENTS

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: THOUSAND U.S. DOLLARS

Total initial investment during construction phase

fixed assets:	6776.00	77.568 % foreign
current assets:	0.00	0.000 % foreign
total assets:	6776.00	77.568 % foreign

Source of funds during construction phase

equity & grants:	6776.00	77.568 % foreign
foreign loans :	0.00	
local loans :	0.00	
total funds :	6776.00	77.568 % foreign

Cashflow from operations

Year:	1	2	3
operating costs:	4324.62	5612.53	6901.54
depreciation :	677.60	677.60	677.60
interest :	0.00	0.00	0.00
production costs	5002.22	6290.13	7579.14
thereof foreign	81.67 %	83.79 %	85.19 %
total sales :	5029.20	6705.60	8382.00
gross income :	26.98	415.47	802.86
net income :	26.98	415.47	802.86
cash balance :	151.57	932.08	1319.34
net cashflow :	151.57	932.08	1319.34

Net Present Value at: 12.00 % = 1391.45
Internal Rate of Return: 15.09 %
Return on equity1: 8.75 %
Return on equity2: 15.09 %

Index of Schedules produced by COMFAR

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow Tables, construction in THOUSAND U.S. DOLLARS

Year	1991	1992
Total cash inflow . .	2192.000	4584.000
Financial resources .	2192.000	4584.000
Sales, net of tax . .	0.000	0.000
Total cash outflow . .	2192.000	4584.000
Total assets	2192.000	4584.000
Operating costs . . .	0.000	0.000
Cost of finance . . .	0.000	0.000
Repayment	0.000	0.000
Corporate tax . . .	0.000	0.000
Dividends paid . . .	0.000	0.000
Surplus (deficit) .	0.000	0.000
Cumulated cash balance	0.000	0.000
Inflow, local	500.000	1020.000
Outflow, local	500.000	1020.000
Surplus (deficit) .	0.000	0.000
Inflow, foreign . . .	1692.000	3564.000
Outflow, foreign . . .	1692.000	3564.000
Surplus (deficit) .	0.000	0.000
Net cashflow	-2192.000	-4584.000
Cumulated net cashflow	-2192.000	-6776.000

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997	1998
Total cash inflow	5304.885	6812.926	8489.417	8382.000	8382.000	8382.000
Financial resources	355.685	107.326	107.417	0.000	0.000	0.000
Sales, net of tax	5029.200	6705.600	8382.000	8382.000	8382.000	8382.000
Total cash outflow	5233.314	5880.044	7170.079	6901.536	6901.536	6901.536
Total assets	908.692	268.314	268.543	0.000	0.000	0.000
Operating costs	4324.622	5612.530	6901.536	6901.536	6901.536	6901.536
Cost of finance	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	151.571	932.882	1319.338	1480.464	1480.464	1480.464
Cumulated cash balance	151.571	1083.453	2402.991	3883.456	5363.920	6844.384
Inflow, local	59.026	8.562	8.562	0.000	0.000	0.000
Outflow, local	931.759	888.856	991.594	970.190	970.190	970.190
Surplus (deficit)	-872.732	-880.294	-983.032	-970.190	-970.190	-970.190
Inflow, foreign	5325.859	6804.364	8480.855	8382.000	8382.000	8382.000
Outflow, foreign	4301.555	4991.988	6178.485	5931.346	5931.346	5931.346
Surplus (deficit)	1024.304	1812.376	2302.371	2450.654	2450.654	2450.654
Net cashflow	151.571	932.882	1319.339	1480.464	1480.464	1480.464
Cumulated net cashflow	-6624.429	-5692.347	-4373.009	-2892.544	-1412.080	68.384

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production is THOUSAND U.S. DOLLARS

Year	1999	2000	2001	2002	2003	2004
Total cash inflow ..	8382.000	8382.000	8382.000	8382.000	8382.000	8382.000
Financial resources .	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax ..	8382.000	8382.000	8382.000	8382.000	8382.000	8382.000
Total cash outflow ..	6901.536	6901.536	6901.536	6901.536	6901.536	6901.536
Total assets	0.000	0.000	0.000	0.000	0.000	0.000
Operating costs ...	6901.536	6901.536	6901.536	6901.536	6901.536	6901.536
Cost of finance ...	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax ...	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid ...	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit) .	1480.464	1480.464	1480.464	1480.464	1480.464	1480.464
Cumulated cash balance	8324.849	9805.313	11285.780	12766.240	14246.710	15727.170
Inflow, local	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, local	970.190	970.190	970.190	970.190	970.190	970.190
Surplus (deficit) .	-970.190	-970.190	-970.190	-970.190	-970.190	-970.190
Inflow, foreign ...	8382.000	8382.000	8382.000	8382.000	8382.000	8382.000
Outflow, foreign ...	5931.346	5931.346	5931.346	5931.346	5931.346	5931.346
Surplus (deficit) .	2450.654	2450.654	2450.654	2450.654	2450.654	2450.654
Net cashflow	1480.464	1480.464	1480.464	1480.464	1480.464	1480.464
Cumulated net cashflow	1548.849	3029.313	4509.777	5990.242	7470.706	8951.170

Table III.7

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	2005	2006	2007
Total cash inflow	8382.000	8382.000	8382.000
Financial resources	0.000	0.000	0.000
Sales, net of tax	8382.000	8382.000	8382.000
Total cash outflow	6901.536	6901.536	6901.536
Total assets	0.000	0.000	0.000
Operating costs	6901.536	6901.536	6901.536
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	1480.464	1480.464	1480.464
Cumulated cash balance	17207.640	18688.100	20168.570
Inflow, local	0.000	0.000	0.000
Outflow, local	970.190	970.190	970.190
Surplus (deficit)	-970.190	-970.190	-970.190
Inflow, foreign	8382.000	8382.000	8382.000
Outflow, foreign	5931.346	5931.346	5931.346
Surplus (deficit)	2450.654	2450.654	2450.654
Net cashflow	1480.464	1480.464	1480.464
Cumulated net cashflow	10431.630	11912.100	13392.560

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

ERYTHROMYCINS PLANT
31 JAN 1989
ALL EQUITY AFTER CORP. INC. TAX

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: THOUSAND U.S. DOLLARS

Total initial investment during construction phase

fixed assets:	1530.00	75.490 % foreign
current assets:	0.00	0.000 % foreign
total assets:	1530.00	75.490 % foreign

Source of funds during construction phase

equity & grants:	1530.00	75.490 % foreign
foreign loans :	0.00	
local loans :	0.00	
total funds :	1530.00	75.490 % foreign

Cashflow from operations

Year:	1	2	3
operating costs:	4160.40	5466.20	6764.00
depreciation :	153.60	153.00	153.00
interest :	0.00	0.00	0.00
production costs	4321.40	5619.20	6917.00
thereof foreign	74.75 %	75.96 %	76.72 %
total sales :	4672.80	6230.40	7788.00
gross income :	351.40	611.20	871.00
net income :	228.41	397.28	566.15
cash balance :	-145.01	388.06	556.92
net cashflow :	-145.01	388.06	556.92

Net Present Value at: 12.00 % = 1986.69
Internal Rate of Return: 26.16 %
Return on equity1: 26.99 %
Return on equity2: 26.16 %

Index of Schedules produced by COMFAR

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Total Initial Investment in THOUSAND U.S. DOLLARS

Year	1991	1992
Fixed investment costs		
Land, site preparation, development	0.000	0.000
Buildings and civil works	140.000	115.000
Auxiliary and service facilities	0.000	0.000
Incorporated fixed assets	250.000	450.000
Plant machinery and equipment	215.000	290.000
Total fixed investment costs	605.000	855.000
Pre-production capital expenditures	30.000	40.000
Net working capital	0.000	0.000
Total initial investment costs	635.000	895.000
Of it foreign, in %	70.079	79.330

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Total Production Costs in THOUSAND U.S. DOLLARS

Year	1993	1994	1995-2000	2001	2002
% of nom. capacity (single product).	0.000	0.000	0.000	0.000	0.000
Raw material 1	3114.720	4152.960	5191.200	5191.200	5191.200
Other raw materials	778.680	1038.240	1297.800	1297.800	1297.800
Utilities	90.000	90.000	90.000	90.000	90.000
Energy	0.000	0.000	0.000	0.000	0.000
Labour, direct	95.000	95.000	95.000	95.000	95.000
Repair, maintenance	0.000	0.000	0.000	0.000	0.000
Spares	0.000	0.000	0.000	0.000	0.000
Factory overheads	62.000	62.000	62.000	62.000	62.000
Factory costs	4140.400	5438.200	6736.000	6736.000	6736.000
Administrative overheads	28.000	28.000	28.000	28.000	28.000
Indir. costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Direct costs, sales and distribution	0.000	0.000	0.000	0.000	0.000
Depreciation	153.000	153.000	153.000	146.250	7.000
Financial costs	0.000	0.000	0.000	0.000	0.000
Total production costs	4321.400	5619.200	6917.000	6910.250	6771.000
Costs per unit (single product)	0.000	0.000	0.000	0.000	0.000
Of it foreign, %	74.749	75.962	76.720	76.795	76.772
Of it variable,%	0.000	0.000	0.000	0.000	0.000
Total labour	109.000	109.000	109.000	109.000	109.000

Total Production Costs in THOUSAND U.S. DOLLARS

Year	2003- 7
% of nom. capacity (single product).	0.000
Raw material 1	5191.200
Other raw materials	1297.800
Utilities	90.000
Energy	0.000
Labour, direct	95.000
Repair, maintenance	0.000
Spares	0.000
Factory overheads	62.000
Factory costs	6735.000
Administrative overheads	28.000
Indir. costs, sales and distribution	0.000
Direct costs, sales and distribution	0.000
Depreciation	0.000
Financial costs	0.000
Total production costs	6764.000
Costs per unit (single product)	0.000
Of it foreign, %	76.747
Of it variable,%	0.000
Total labour	109.000

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Working Capital in THOUSAND U.S. DOLLARS

Year			1993	1994	1995.	1996-2007
Coverage	adc	coto				
Current assets &						
Accounts receivable	30	12.0	347.367	455.517	563.667	563.667
Inventory and materials	15	24.3	162.475	216.550	270.625	270.625
Energy	0	---	0.000	0.000	0.000	0.000
Spares	0	---	0.000	0.000	0.000	0.000
Work in progress	15	24.0	172.517	226.592	280.667	280.667
Finished products	15	24.0	173.683	227.758	281.833	281.833
Cash in hand	30	12.0	15.417	15.417	15.417	15.417
Total current assets			871.458	1141.833	1412.208	1412.208
Current liabilities and Accounts payable	30	12.0	345.033	453.183	561.333	561.333
Net working capital			526.425	688.650	850.875	850.875
Increase in working capital			526.425	162.225	162.225	0.000
Net working capital, local			137.085	169.530	201.975	201.975
Net working capital, foreign			389.340	519.120	648.900	648.900

Note: adc = minimum days of coverage ; coto = coefficient of turnover .

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997
Total sales, incl. sales tax	4672.800	6230.400	7788.000	7788.000	7788.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	4672.800	6230.400	7788.000	7788.000	7788.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	4321.400	5619.200	6917.000	6917.000	6917.000
Operational margin	351.400	611.200	871.000	871.000	871.000
As % of total sales	7.520	9.810	11.184	11.184	11.184
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	351.400	611.200	871.000	871.000	871.000
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	351.400	391.200	871.000	871.000	871.000
Tax	122.990	213.920	304.850	304.850	304.850
Net profit	228.410	397.280	566.150	566.150	566.150
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	228.410	397.280	566.150	566.150	566.150
Accumulated undistributed profit	228.410	625.690	1191.840	1757.990	2324.140
Gross profit, % of total sales	7.520	9.810	11.184	11.184	11.184
Net profit, % of total sales	4.888	6.376	7.270	7.270	7.270
ROE, Net profit, % of equity	14.929	25.966	37.003	37.003	37.003
ROI, Net profit+interest, % of invest.	11.107	17.906	23.779	23.779	23.779

ERYTHROMYCINS PLANT --- 31 JAN 1989

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	1998	1999	2000	2001	2002
Total sales, incl. sales tax	7788.000	7788.000	7788.000	7788.000	7788.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	7788.000	7788.000	7788.000	7788.000	7788.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	6917.000	6917.000	6917.000	6910.250	6771.000
Operational margin	871.000	871.000	871.000	877.750	1017.000
As % of total sales	11.184	11.184	11.184	11.271	13.059
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	871.000	871.000	871.000	877.750	1017.000
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	871.000	871.000	871.000	877.750	1017.000
Tax	304.850	304.850	304.850	307.212	355.950
Net profit	566.150	566.150	566.150	570.537	661.050
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	566.150	566.150	566.150	570.537	661.050
Accumulated undistributed profit	2890.290	3456.439	4022.589	4593.127	5254.177
Gross profit, % of total sales	11.184	11.184	11.184	11.271	13.059
Net profit, % of total sales	7.270	7.270	7.270	7.326	8.488
ROE, Net profit, % of equity	37.003	37.003	37.003	37.290	43.206
ROI, Net profit+interest, % of invest.	23.779	23.779	23.779	23.963	27.765

ERYTHROMYCINS PLANT --- 31 JAN 1989

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Net Income Statement in THOUSAND U.S. DOLLARS

Year	2003	2004	2005	2006	2007
Total sales, incl. sales tax	7788.000	7788.000	7788.000	7788.000	7788.000
Less: variable costs, incl. sales tax.	0.000	0.000	0.000	0.000	0.000
Variable margin	7788.000	7788.000	7788.000	7788.000	7788.000
As % of total sales	100.000	100.000	100.000	100.000	100.000
Non-variable costs, incl. depreciation	6764.000	6764.000	6764.000	6764.000	6764.000
Operational margin	1024.000	1024.000	1024.000	1024.000	1024.000
As % of total sales	13.148	13.148	13.148	13.148	13.148
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	1024.000	1024.000	1024.000	1024.000	1024.000
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	1024.000	1024.000	1024.000	1024.000	1024.000
Tax	358.400	358.400	358.400	358.400	358.400
Net profit	665.600	665.600	665.600	665.600	665.600
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	665.600	665.600	665.600	665.600	665.600
Accumulated undistributed profit	5919.777	6585.377	7250.977	7916.577	8582.177
Gross profit, % of total sales	13.148	13.148	13.148	13.148	13.148
Net profit, % of total sales	8.546	8.546	8.546	8.546	8.546
ROE, Net profit, % of equity	43.503	43.503	43.503	43.503	43.503
ROI, Net profit+interest, % of invest.	27.956	27.956	27.956	27.956	27.956

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow Tables, construction in THOUSAND U.S. DOLLARS

Year	1991	1992
Total cash inflow	635.000	895.000
Financial resources	635.000	895.000
Sales, net of tax	0.000	0.000
Total cash outflow	635.000	895.000
Total assets	635.000	895.000
Operating costs	0.000	0.000
Cost of finance	0.000	0.000
Repayment	0.000	0.000
Corporate tax	0.000	0.000
Dividends paid	0.000	0.000
Surplus (deficit)	0.000	0.000
Cumulated cash balance	0.000	0.000
Inflow, local	190.000	185.000
Outflow, local	190.000	185.000
Surplus (deficit)	0.000	0.000
Inflow, foreign	445.000	710.000
Outflow, foreign	445.000	710.000
Surplus (deficit)	0.000	0.000
Net cashflow	-635.000	-895.000
Cumulated net cashflow	-635.000	-1530.000

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997	1998
Total cash inflow	5017.833	6338.550	7896.150	7788.000	7788.000	7788.000
Financial resources	345.833	108.150	108.150	0.000	0.000	0.000
Sales, net of tax	4672.000	6230.400	7788.000	7788.000	7788.000	7788.000
Total cash outflow	5162.848	5950.495	7339.225	7068.850	7068.850	7068.850
Total assets	871.458	270.375	270.375	0.000	0.000	0.000
Operating costs	4168.399	5466.200	6764.000	6764.000	6764.000	6764.000
Cost of finance	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax	122.990	213.920	304.850	304.850	304.850	304.850
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	-145.015	388.055	556.925	719.150	719.150	719.150
Cumulated cash balance	-145.015	243.041	799.965	1519.115	2238.265	2957.415
Inflow, local	85.473	21.630	21.630	0.000	0.000	0.000
Outflow, local	1399.228	1581.235	1931.725	1877.650	1877.650	1877.650
Surplus (deficit)	-1313.755	-1559.605	-1910.095	-1877.650	-1877.650	-1877.650
Inflow, foreign	4932.360	6316.920	7874.520	7788.000	7788.000	7788.000
Outflow, foreign	3763.620	4369.259	5407.500	5191.200	5191.200	5191.200
Surplus (deficit)	1168.740	1947.661	2467.020	2596.800	2596.800	2596.800
Net cashflow	-145.015	388.055	556.925	719.150	719.150	719.150
Cumulated net cashflow	-1675.015	-1286.959	-730.034	-10.884	708.266	1427.416

ERYTHROMYCINS PLANT --- 31 JAN 1989

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, RWANDA

Cashflow tables, production is THOUSAND U.S. DOLLARS

Year	1999	2000	2001	2002	2003	2004
Total cash inflow	7788.000	7788.000	7788.000	7788.000	7788.000	7788.000
Financial resources	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax	7788.000	7788.000	7788.000	7788.000	7788.000	7788.000
Total cash outflow	7068.850	7068.850	7071.212	7119.950	7122.400	7122.400
Total assets	0.000	0.000	0.000	0.000	0.000	0.000
Operating costs	6764.000	6764.000	6764.000	6764.000	6764.000	6764.000
Cost of finance	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax	304.850	304.850	307.212	355.950	358.400	358.400
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	719.150	719.150	716.788	668.050	665.600	665.600
Cumulated cash balance	3676.565	4395.715	5112.502	5780.552	6446.152	7111.752
Inflow, local	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, local	1877.650	1877.650	1880.012	1928.750	1931.200	1931.200
Surplus (deficit)	-1877.650	-1877.650	-1880.012	-1928.750	-1931.200	-1931.200
Inflow, foreign	7788.000	7788.000	7788.000	7788.000	7788.000	7788.000
Outflow, foreign	5191.200	5191.200	5191.200	5191.200	5191.200	5191.200
Surplus (deficit)	2596.800	2596.800	2596.800	2596.800	2596.800	2596.800
Net cashflow	719.150	719.150	716.787	668.050	665.600	665.600
Cumulated net cashflow	2146.566	2865.716	3582.503	4250.553	4916.153	5581.753

ERYTHROMYCINS PLANT --- 31 JAN 1989

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	2005	2006	2007
Total cash inflow	7788.000	7788.000	7788.000
Financial resources	0.000	0.000	0.000
Sales, net of tax	7788.000	7788.000	7788.000
Total cash outflow	7122.400	7122.400	7122.400
Total assets	0.000	0.000	0.000
Operating costs	6764.000	6764.000	6764.000
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	358.400	358.400	358.400
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	665.600	665.600	665.600
Cumulated cash balance	7777.353	8442.953	9108.553
Inflow, local	0.000	0.000	0.000
Outflow, local	1931.200	1931.200	1931.200
Surplus (deficit)	-1931.200	-1931.200	-1931.200
Inflow, foreign	7788.000	7788.000	7788.000
Outflow, foreign	5191.200	5191.200	5191.200
Surplus (deficit)	2596.800	2596.800	2596.800
Net cashflow	665.600	665.600	665.600
Cumulated net cashflow	6247.354	6912.954	7578.554

Cashflow Discounting:

a) Equity paid versus Net income flow:
   Net present value ..... 1751.03 at 12.00 %
   Internal Rate of Return (IRRE1) .. 26.99 %
b) Net Worth versus Net cash return:
   Net present value ..... 1986.69 at 12.00 %
   Internal Rate of Return (IRRE2) .. 26.16 %
c) Internal Rate of Return on total investment:
   Net present value ..... 1986.69 at 12.00 %
   Internal Rate of Return (IRR) .. 26.16 %
Net Worth = Equity paid plus reserves

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

ERYTHROMYCINS PLANT
31 JAN 1989
WITH SER/BER ADJUSTMENTS

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: THOUSAND U.S. DOLLARS

Total initial investment during construction phase

fixed assets:	1761.00	78.705 % foreign
current assets:	0.00	0.000 % foreign
total assets:	1761.00	78.705 % foreign

Source of funds during construction phase

equity & grants:	1761.00	78.705 % foreign
foreign loans :	0.00	
local loans :	0.00	
total funds :	1761.00	78.705 % foreign

Cashflow from operations

Year:	1	2	3
operating costs:	4790.72	6216.79	7002.24
depreciation :	176.10	176.10	176.10
interest :	0.00	0.00	0.00
production costs	4966.82	6392.89	7978.34
thereof foreign	78.03 %	78.87 %	79.02 %
total sales :	5140.08	6853.44	8566.80
gross income :	173.26	460.55	588.46
net income :	173.26	460.55	588.46
cash balance :	-254.85	458.39	566.38
net cashflow :	-254.85	458.39	566.38

Net Present Value at: 12.00 % = 2011.18
Internal Rate of Return: 24.33 %
Return on equity1: 24.83 %
Return on equity2: 24.33 %

Index of Schedules produced by COMFAR

Cashflow Tables, construction in THOUSAND U.S. DOLLARS

Year	1991	1992
Total cash inflow	724.000	1037.000
Financial resources	724.000	1037.000
Sales, net of tax	0.000	0.000
Total cash outflow	724.000	1037.000
Total assets	724.000	1037.000
Operating costs	0.000	0.000
Cost of finance	0.000	0.000
Repayment	0.000	0.000
Corporate tax	0.000	0.000
Dividends paid	0.000	0.000
Surplus (deficit)	0.000	0.000
Cumulated cash balance	0.000	0.000
Inflow, local	190.000	185.000
Outflow, local	190.000	185.000
Surplus (deficit)	0.000	0.000
Inflow, foreign	534.000	852.000
Outflow, foreign	534.000	852.000
Surplus (deficit)	0.000	0.000
Net cashflow	-724.000	-1037.000
Cumulated net cashflow	-724.000	-1761.000

Table IV.7

COMFAR 2.1 UNIDO

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production is THOUSAND U.S. DOLLARS

Year	1993	1994	1995	1996	1997	1998
Total cash inflow	5536.974	6972.200	8698.921	8566.000	8566.000	8566.000
Financial resources	396.033	118.839	132.121	0.000	0.000	0.000
Sales, net of tax	5140.000	6853.440	8566.000	8566.000	8566.000	8566.000
Total cash outflow	5791.828	6513.890	8132.542	7002.241	7002.241	7002.241
Total costs	1001.108	297.098	330.302	0.000	0.000	0.000
Operating costs	4790.720	6216.792	7802.241	7802.241	7802.241	7802.241
Cost of finance	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	-254.854	458.390	566.378	764.559	764.559	764.559
Cumulated cash balance	-254.854	203.535	769.914	1534.473	2299.032	3063.591
Inflow, local	85.473	21.630	21.630	0.000	0.000	0.000
Outflow, local	1276.238	1367.315	1626.875	1572.000	1572.000	1572.000
Surplus (deficit)	-1190.765	-1345.685	-1605.245	-1572.000	-1572.000	-1572.000
Inflow, foreign	5451.500	6950.650	8676.290	8566.000	8566.000	8566.000
Outflow, foreign	4515.590	5146.575	6505.667	6229.440	6229.440	6229.440
Surplus (deficit)	935.910	1804.075	2171.623	2337.359	2337.359	2337.359
Net cashflow	-254.855	458.390	566.378	764.559	764.559	764.559
Cumulated net cashflow	-2015.855	-1557.465	-991.087	-226.528	538.031	1302.590

ERYTHROMYCINS PLANT --- 31 JAN 1989

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production is THOUSAND U.S. DOLLARS

Year	1999	2000	2001	2002	2003	2004
Total cash inflow . .	8566.000	8566.000	8566.000	8566.000	8566.000	8566.000
Financial resources .	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax . .	8566.000	8566.000	8566.000	8566.000	8566.000	8566.000
Total cash outflow . .	7802.241	7802.241	7802.241	7802.241	7802.241	7802.241
Total assets	0.000	0.000	0.000	0.000	0.000	0.000
Operating costs . . .	7802.241	7802.241	7802.241	7802.241	7802.241	7802.241
Cost of finance . . .	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax . . .	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid . . .	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit) .	764.559	764.559	764.559	764.559	764.559	764.559
Cumulated cash balance	3828.150	4592.709	5357.268	6121.827	6886.386	7650.945
Inflow, local	0.000	0.000	0.000	0.000	0.000	0.000
Outflow, local	1572.800	1572.800	1572.800	1572.800	1572.800	1572.800
Surplus (deficit) .	-1572.800	-1572.800	-1572.800	-1572.800	-1572.800	-1572.800
Inflow, foreign . . .	8566.000	8566.000	8566.000	8566.000	8566.000	8566.000
Outflow, foreign . . .	6229.440	6229.440	6229.440	6229.440	6229.440	6229.440
Surplus (deficit) .	2337.359	2337.359	2337.359	2337.359	2337.359	2337.359
Net cashflow	764.559	764.559	764.559	764.559	764.559	764.559
Cumulated net cashflow	2067.149	2831.708	3596.268	4360.827	5125.386	5889.945

ERYTHROMYCINS PLANT --- 31 JAN 1989

COMFAR 2.1 - NATIONAL ECONOMIC & DEV. AUTHORITY, MANILA

Cashflow tables, production in THOUSAND U.S. DOLLARS

Year	2005	2006	2007
Total cash inflow	8566.000	8566.000	8566.000
Financial resources	0.000	0.000	0.000
Sales, net of tax	8566.000	8566.000	8566.000
Total cash outflow	7802.241	7802.241	7802.241
Total assets	0.000	0.000	0.000
Operating costs	7802.241	7802.241	7802.241
Cost of finance	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000
Surplus (deficit)	764.559	764.559	764.559
Cumulated cash balance	8415.504	9180.063	9944.621
Inflow, local	0.000	0.000	0.000
Outflow, local	1572.000	1572.000	1572.000
Surplus (deficit)	-1572.000	-1572.000	-1572.000
Inflow, foreign	8566.000	8566.000	8566.000
Outflow, foreign	6229.440	6229.440	6229.440
Surplus (deficit)	2337.359	2337.359	2337.359
Net cashflow	764.559	764.559	764.559
Cumulated net cashflow	6654.504	7419.063	8183.622

Cashflow Discounting:

a) Equity paid versus Net income flow:

Net present value	1739.44 at	12.00 %
Internal Rate of Return (IRRE1) ..	24.83 %	

b) Net Worth versus Net cash return:

Net present value	2011.18 at	12.00 %
Internal Rate of Return (IRRE2) ..	24.33 %	

c) Internal Rate of Return on total investment:

Net present value	2011.18 at	12.00 %
Internal Rate of Return (IRR) ..	24.33 %	

Net Worth = Equity paid plus reserves

XIX CONCLUSIONS AND RECOMENDATIONS

19.1 Background of the Philippine Pharmaceutical Industry Development Study

The Philippine pharmaceutical industry can be characterized as essentially a formulating and a packaging industry. Except for Ampicillin, Amoxycillin and Cloxacillin, all the raw material requirements for pharmaceutical production are imported.

In order to have quality pharmaceutical products more affordable and accessible, a national drug policy (NDP) was enunciated. One of the pillars of the NDP is to achieve relative self-reliance in the manufacture of strategic pharmaceutical products. The objective is to develop the capability to manufacture the pharmaceutical chemicals (i.e. intermediates and basic) so that the Philippines is not totally reliant on foreign sources and avoid the detrimental effects and vagaries of such dependence.

In this regard, the Philippine Government tapped the financial assistance of UNDP and the technical expertise of UNIDO to undertake a study that would identify areas where possible upstream integration of existing production capabilities can be done.

19.2 Presentation of the Study

The study utilized the expertise of both international and national experts whose individual reports have all been submitted to date.

To ensure that the premises of the technical recommendation of the international experts are valid, an independent group of experts was convened in Vienna on 27-28, October 1988. As a result of the meeting, there is now more confidence in the technical recommendation of the study and further socio-economic analyses can be undertaken.

At this stage of the study, there has emerged a consensus that the main thrust of the country's effort in the field of pharmaceutical manufacture should be initially focused towards optimizing the use of indigenous available raw materials and energy sources.

It was also decided that the technical reports of the international experts be published individually, while those of the national experts and the Chief Technical Adviser be compiled in one volume. Therefore it is noted that this report cannot be regarded as the terminal report on the Philippine Pharmaceutical Industry Development Study but only as a compilation of reports where each chapter bears the personal views of its author. A terminal report/executive summary of the Study will however be prepared before the completion of the project DP/PHI/87/019.

19.3 Indicated Follow-up Projects

The International Ad-Hoc Panel Meeting on the Pharmaceutical Industry Development Study for the Philippines held in Vienna has resulted a concensus on a list of projects to be pursued subject to the Philippine Government approval. Out of this list of projects which is given in UNIDO publication 10/R.83, 1988 the following received confirmation from the Philippine Government:

1. Establisment of a multipurpose fermentation pilot-plant on the premises of BIOTECH at Los Banos.

2. Conduct pre-feasibility studies in each of the following areas:

   (a) Cultivation and processing of Cinchona to manufacture Quinine and its derivatives.

   (b) Establishment of an industrial scale fermentation plant for Penicillin, including enzymatic conversion of Penicillin G into 6-APA.

   (c) Establishment of an Erythromycin derivatives and Rifampicin synthetic production plant at the site of Chemfields.

   (d) Establishment of a multi-purpose chemical pilot-plant.

   It should be noted that the pre-feasibility study under 2(a) will be carried out in the framework of the project DP/PHI/87/019.

   The above proposed pre-feasibility studies are intended to provide better grounds for potential investors to evaluate the projects. However, it is to be emphasized that interested investors need not wait for the result of such studies but that they could conduct their own feasibility studies if they so decide.

3. A meeting of UNIDO Advisory Panel on Preventive Medicine to validate the technical promises of the "Intercare Study on the Alabang Vaccine Complex" and give advice to the Government in the Field of donation production of biologicals. This meeting is scheduled to be held in Manila for 4 to 6 April, 1989.