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Philippine Institute for Development Studies

Identifying Areas of Support in Research and Development for the Manufacturing Sector

Liberty Nolasco

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**PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES
AND THE
DEPARTMENT OF BUDGET AND MANAGEMENT**

**IDENTIFYING AREAS OF SUPPORT IN
RESEARCH AND DEVELOPMENT FOR
THE MANUFACTURING SECTORS
(FINAL REPORT)**

**LIBERTY NOLASCO
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MAKATI CITY**

Chapter I

STATUS OF THE MANUFACTURING SECTOR: A STUDY TO IDENTIFY AREAS OF SUPPORT IN RESEARCH AND DEVELOPMENT

Introduction

The successful Industrial Revolution that wedged through the economy of Europe elevated countries like England, France, Germany and Italy to the level of powerful nations in the 18th century. The revolutionary industrialization that swept the lands of the United States of America (USA) and Japan in the mid-19th century up to the 20th century, has paved the way for their eventual growth. The dramatic developments which flowed into the economic leaders stress the role and utilization of technology. It is evident that the adoption and modernization of technology determine the course of a nation's economy.

With the onset of globalization, nations are compelled to increase more the level of their competitiveness in the international market. Competitiveness is made possible through technological innovation and increases in the level of labour productivity to produce quantities of quality outputs valued at an affordable rate. In such era where economic mobility¹ is greatly sought for, both territorially and internationally, the engagement of a nation in research and development (R&D) is already proven to be significantly beneficial, considering the progress reaped by the tiger economies of Asia such as Japan, South Korea, Taiwan and Singapore.

¹ Economic mobility here encompasses only the vertical movement or growth of the economy; wherein technological progress or advancement is considered as one of its factors.

The Philippines is in a crucial state of development, yet R&D role in nation building is still in a fresh state of acceptance and promotion. Magpantay² postulated, “...if we desire a better future and a meaningful role for our children, then national innovation system should be a major concern”. He cited the indispensability of the “Industry”³, the base of a country’s innovation system, in collectively undertaking R&D activities⁴. In this respect, the latter is expected to deliver by heavily investing and spending on R&D related activities.

It is defined in the earlier claims of the study⁵ that the public sector has a major role to play in any related activities of the economy: “to provide an appropriate policy environment that would induce the private sector to invest on technology...R&D in particular”. Government, through creating appropriate, workable and enforceable plans and guidelines for this matter, is deemed to be of great assistance in so far as the industry’s productivity and success are concerned, since the latter is expected to answer immediately the market demands. In this view, these two entities do not exist *in vacuo* but in a continuum of reinforced support, in the same way needed by one another. Thus, R&D is not a one-sector undertaking but a joint undertaking of both the government and private sector⁶.

Take off Point of the Study

The study aims to;

1. Review the performance and problems of the manufacturing sector;

² The quotation from the study of Dr. Magpantay aimed to present his view about the country’s role in the international division of labour, contained in the global economic system. Industry Development Council-Bureau of Investments, The Republic of the Philippines. ***Industrial Development Plan of the Philippines: A Preliminary Report***. October 1997, p.3.

³ Quoted, as spelled by the author. *Ibid*.

⁴ These can be manifested in the following forms: creating and implementing research programs and projects, personnel training, acquisition of technology and modernization of facilities and processes, accordingly. *Ibid*.

⁵ Philippine Institute for Development Studies, The Republic of the Philippines. ***Study on Public and Private Expenditures on Research and Development. Inception Report***. November 1997, p4.

⁶ Most especially manufacturing sector.

2. Study and analyze the government policies and plans that affect the involvement of the manufacturing sector in R&D related activities;
3. Document the participation and interaction of the two sectors: manufacturing sector and the government, in undertaking and promoting R&D related activities; and,
4. Recommend courses of action which will;
 - a. bridge the need of the manufacturing sector to the government, vice versa, if there are gaps identified; or,
 - b. intensify linkages, if sectoral efforts are found to be supportive and essential to the undertaking of the former.

Methodology and Other Procedures Used in the Study

The study made use of the modified problem-based approach in answering the four objectives of this study. A tentative assumption is made as a requisite of the approach, that is: the manufacturing sector has not yet intensified its R&D.

Market performance and problems of the manufacturing sector were garnered from the *Industry Profile* of the Board of Investments (BOI). Five industry groups were considered in reviewing the manufacturing sector's performance: 1) food industry group; 2) garments and textiles; 3) electronic; 4) chemicals; and, 5) metals. Another sector was studied in this regard, the energy sector. The performance and plans of this sector were also tackled and given implication since the energy sector provides the fundamental support infrastructure to the manufacturing industry.

Government policies and plans were identified in the following documents:

A. Manufacturing Industry Sector

1. The Industry Development Plan of the Philippines (IDPP) of the BOI.
2. Omnibus Investment Code (OIC) of 1997
3. Investments Priority Plan (IPP) of the BOI from 1968-1997.
4. Guidelines for Granting Incentive Packages in R and D of the BOI
5. R&D Guidelines of the Philippine Council on Industry and Energy Research and Development-Department of Science and Technology (PCIERD-DOST)
6. Medium Term Philippine Development Plan 1993-1998
7. 1987 Philippine Constitution

B. Energy Sector

1. Philippine Energy Development Plan, 1996-2025 of the Department of Energy (DOE)
2. Philippine Energy Development Plan, 1996-2025 Update of the DOE
3. Power Development Plan of the Philippines 1997-2010 of the National Power Corporation (NPC).

Case studies were used to have a better view of the problems related to R&D. Historical studies were also used to have a better understanding of the present policies, plans and incentive packages for the R&D. Triangulation⁷ of

⁷This explains why there are two SWOT Analyses in the study. The first is a counter SWOT analysis (prepared by the researcher using the BOI Industry Profile, please see page p.68) to complement the SWOT Analysis of the BOI (identified in the Industrial Development Plan of the Philippines-please see page 38).

events and responses were also utilized to assess the validity of the details presented. Further, participatory observation was undertaken to support the findings of triangulation and validate the preliminary data.

Key informant interview was also conducted. Two phases of interviews were conducted. The first phase was done in December 1997, which aimed to:

1) determine the effects of R&D on their operations; and, 2) solicit suggestions on how to promote R&D. The second phase was conducted between February and March which was designed to; 1) determine how firms were able to avail of incentives (for R&D); and, 2) solicit suggestions on promoting the said package.

Chapter II

THE PERFORMANCE OF THE MANUFACTURING SECTOR

“How Viable is Our Manufacturing Sector?”

The Food Manufacturing Subsectors

Eight subsectors comprise the food manufacturing industry which are classified as follows: 1) coffee and cocoa industries; 2) meat preparation and processing; 3) flour milling and bakery products; 4) beverage; 5) fish and other marine organism preparation and processing; 6) fruit and vegetable canning and preservation; 7) processing of dairy products; and, 8) feeds preparation.

1. The cocoa industry⁸

The cocoa subsector is viable because of the nature of its product application⁹. Cocoa products such as cocoa butter, liquor and cake are used for making confection, chocolate drinks and other flavorings.

There are 13 establishments engaged in cocoa processing and choco manufacturing. BOI estimated that there are only 7 establishments that are directly involved in the processing of cocoa.

⁸ No available BOI profiles on coffee sub industry .

⁹ Industrial and common (chocolate mix) applications.

These establishments¹⁰ were the major companies in 1993 that produced 36,000 metric ton per year (MTPY) with 60-70% capacity utilization.

2. Fruits and Vegetables Processing

Dehydrated fruits, preserved fruits and vegetables, puree concentrates and canned vegetables are the products included in this subsector. There are two features that make it very demandable in the market: first fruits and vegetables are readily consumable; and, second they are capable of being laterally developed, in the following manner:

- Dehydrated fruits or vegetables = when mixed with other dried fruits would make them ready for eating
= ingredients for natural fruit flavour and baked items
- Fruit puree = ingredients for different varieties of food (BOI, May 1997)

¹⁰ These are the following companies: 1) Cocoa Specialties, Inc.; 2) T.P. Food Processing Corporation; 3) CFC Corporation; 4) Philippine Cocoa Corporation; 5) Nestle Philippines, Inc.; 6) Serg's Product; and, 7) Commonwealth Food Corporation.

Currently, the industry has the following capacity:

Table 1: CAPACITY FEATURES OF FRUIT SUB INDUSTRY

INDUSTRY	NUMBER OF FIRMS		CAPACITY		CAPACITY PER FIRM	
	May 1997	Sept. 1997	May 1997	Sept. 1997	May 1997	Sept. 1997
A. Dried or Dehydrated Fruits	22	26	38,718 (MT)	40,274 (MT)	1760	1549
B. Concentrates						
1. Puree	16	16	52,094(M T)	41,379 (MT)	3256	2586
2. juices	8	11	958 (ML)	22,016,62	119.75	2001511(
3. coconut	14	15	34 (ML)	2 * 85.5 (MT)	2.43	c/f) 5.7
C. Preserved						
1. Fruits	33	56	175,699 (MT)	149785	5324	2675
2. Coco	11		31,471		2861	

Source: Processed Food and Beverage Division, AFFD-BOI. *Industry Profile on Processed Fruit*. May 1997 and September 1997.

Major players identified in the said sector are: 1) Arc Men Food Industry; 2) KLT Fruits, Inc.; 3) Jo-Na's International Phils., Inc.

* in cases.

3. *Ethnic food and other marine organisms preparation and processing*

Ethnic foods

These are food mixes used to prepare Filipino dishes which are good substitutes for natural/common ingredients in cooking like: a) fish sauce (*patis*); 2) fish paste (*bagoong*, mollusk-based); 3) shrimp paste; 4) food seasonings; 5) banana sauce; 6) *lumpia* wrapper; 7) *canton* and *bihon*. (BOI, 15 April 1997)

There are thirty firms in the industry with a combined total capacity of 476,490 (MT); of which, 10 are BOI registered¹¹ and are export members of Philfoodex¹².

Marine products

The country has an estimated capacity of 58,631 (MT) per year for processing shrimps and prawns. Thirty-nine business establishments are registered in BOI¹³, having 15,000 workforces.

AA Export and Import Corporation and HJR International Corporation are the major industry players. SHRIMPLEX, on the other end, is the biggest prawn/shrimp association throughout the country (BOI, September 1997).

Tuna Canning

General Santos City and Zamboanga City are the known centers for tuna. In 1996, there were 17 firms engaged in canning tuna. Seven

¹¹ Figure holds true as of September 1997 only.

¹² An industry association.

¹³ Also registered as exporters.

of them were active and capable of producing 8.5 million cases while the others were non-exporters. Some of these firms are presently no longer in operation. The following firms are the largest in the industry: 1) Celebes Canning Corporation; 2) Century Canning Corporation; 3) Mar Fishing Co., Inc.; 4) Nautica Canning Corp.; 5) Permex Producer and Exporter Corp.; 6) RFM Corp.; 7) Sancano Canning Corp.; and, 8) Seatrade Development Corp.

Sales of tuna canning industry increased thru time with an average growth rate of 16.9%, from the years 1991- 1996 (H1).

Table 2: 1991-1996 SALES OF TUNA CANNING INDUSTRY

Year	Volume (MT)	Value (\$'000)
1996	27,816	61,813
1995	46,738	111,118
1994	58,034	138,803
1993	55,488	121,454
1992	51,724	89,690
1991	46,120	104,472

Source: BOI, *Industry Profile*, 1997.

4. Meat Processing

This industry covers the non-comminuted¹⁴ and comminuted production. 500 firms are engaged in meat processing but only 65 are, however, accredited by National Meat Inspection Commission. Present in this industry are the three scales of production,

¹⁴ Products from whole, cuts or chunks of meat.

Table 3: MAJOR PLAYERS PER SCALE OF PRODUCTION

Scale of Production	Players
Large Scale	Purefoods Corp. Swift Foods, Inc. SM Campofrio Corp. Monterey Farms, Corp.
Medium Scale	Del nor Foods CDO King Sue Ham and Sausages Maya Foods
Small scale	-backyard producers-

Source: BOI, *Industry Profile*, 1997.

5. Flour Milling

The flour milling industry caters to: 1) 96% domestic demand of the bakery¹⁵ products (Sanchez, 1997, p.6); 2) pasta manufacturers and large scale cookies, crackers and biscuits manufacturers.

This particular industry is composed of 13 flour mills, at the same time members of the Philippine Association of Flour Mills (PAFMIL). Five of these are member of Confederation of Philippine Flour Mills (CPFM). For the bakery products, small and home-based industries account for 90% of the industry's total production (*Ibid*, p.4).

¹⁵ These, on the average, are consuming 80% of the flour production.

The Food Industry in General

This industry contributes the largest returns in the manufacturing sector.(Tanseco, 1996, p.14). The performance of food industry reached the peak of its returns-on-sales (ROS) estimated at 7.67%, in 1992¹⁶ but was in a declining trend from 1993-1994.

Table 4: FOOD INDUSTRY ROS

Year	Returns on Sales (in %)
1986	1.46
1987	3.93
1988	7.48
1989	5.99
1990	5.65
1991	6.91
1992	7.67
1993	6.04
1994	2.63

Source: Tanseco, 1996.

The gross value added (GVA) of the food industry was slowly increasing, with a growth rate of merely 0.03% from 1995-1997, contributing only 34% of the manufacturing sector's GVA, compared to 34.96% in 1995 and 35.29% in 1996.

Table 5: FOOD INDUSTRY GVA: SHARES AND GROWTH

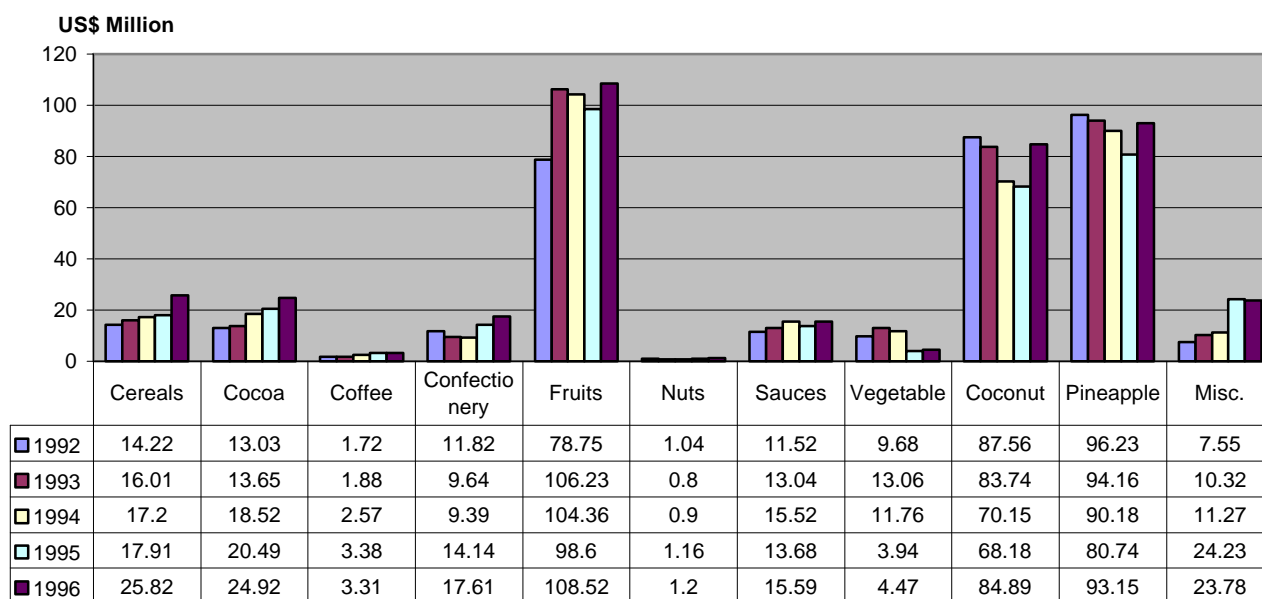
Industry Group	1995		1996		1997		95-96	95-97
	Value+	%*	Value+	%*	Value+	%*	%*	%*
Food Manufactures	71067	34.96	75746	35.29	75971	34.04	6.6	0.3
Manufacturing Sector (total)	203271		214613		223118		5.6	4.0

/_ *Growth Rate, 95-96 and 95-97; * Share in Manufacturing Sector GVA for 1995, 1996 and 1997; +At Constant Prices. From ESSO-NSCB, The Republic of the Philippines. *National Accounts of the Philippines*. January 1998, p.48.

¹⁶ Just within the 1986-1994 time frame

This trend was wholly attributed to “production slack” in milled and refined sugar, milk and dairy products and animal feeds. (*Ibid.*)

TABLE 6: FOOD INDUSTRY EXPORT PERFORMANCE



Source: BOI. IDPP 1998 to the 21st Century.

The processed food is classified a major industry in the Industry Development Plan (BOI) due to the competitiveness of its products, most especially the preserved fruits, coconut (demand of oil, coco, etc.) and pineapple. In addition, the worldwide health and body trends shaped up demand for these products in the international market, positively affecting the industry performance.

As of 1996, there was an estimated 1,065 exporting firms in food processing. Although indigenous raw materials were used in the initial stage of production, the packaging massively used imported components¹⁷.

¹⁷ 14-80% imported material-content according to the BOI.

The Chemical Sub Industries

The chemical industry embodies a rich and dynamic processes, industry outputs and applications, and industry users; thus, placing this as the third largest sector in the manufacturing industry.

The industry is comprised of 1,000 firms. Among the chemical sub industries, petrochemicals, oleochemicals¹⁸, and fertilizer groups are identified in the sixteen strategic industry groups in the IDPP.

In the fertilizer sub industry, twelve firms are direct manufacturers of fertilizers. Two of them are government owned, namely: Philippine Phosphate Fertilizer Corporation (Philphos) and Atlas Fertilizer Corporation (AFC).

The petrochemical sub industry is in its infant stage. Several BOI approved investments for the petrochemicals are expected to be operational by 1998. Among the investors, only PETROCOP¹⁹ has so far started operations. In the 90's, only the Mabuhay Vinyl Corporation and Philippine Vinyl Consortium; D and L Industries, Inc., Philip Petrochemical Production, Inc. and Polystyrene Manufacturing, Inc. have successfully invaded the petrochemical arena. Players were expected to multiply in time for the foreseen surge in demand.

¹⁸Major contributor is the cocochemicals.

¹⁹ It started its operation, H1 of the year 1997, for the production of polypropylene.

Table 7: CHEMICAL INDUSTRY FEATURES

Scale of Production	End Users	Nature	Outputs
Small to Medium Scale	Consumer Chemicals	For consumption/end users	<ul style="list-style-type: none"> • Medicine • cosmetics and body products • soaps • pastes and sealants • inks and varnishes • rubber products • alcoholic beverages
Large	Industrial chemicals <ul style="list-style-type: none"> • agriculture • mining • electronics • construction • metals and engineering products • packaging • health care • textiles • food processing • national defense 	Basic/intermediate Products	<ul style="list-style-type: none"> • fertilizers and pesticides • flotation agents, leaching, etc. • electronics (plastics, ind'l gas) • paints, coatings, adhesives • foundry resins, industrial gases • plastics, adhesives, surface • drug and pharmaceuticals • dyes, resins, finishes • preservatives, colorants, flavourings, • shortenings • explosives

Source: BOI, *Industry Profile*, 1997.

Table 8: PETROCHEMICAL DEMAND FORECAST (in '000 MT)

Petrochemical	1995	2005	Growth Rate (%)
PE	217	524	9.2
PP	194	435	8.4
PVC	81	225	10.8
PS	10	17	5.4
ABS/SAN	79	106	No record

Source: Industry Profile: Petrochemical Industry, September 4, 1997.

Substances derived from the vegetable and animal fats were the raw outputs of the sub industry called oleochemicals. The biggest share came from

the coco oil-based chemical known as the coco-chemicals. Below is the existing oleochemical companies vis-à-vis industry capacity,

Table 9: CAPACITY FEATURES OF THE OLEOCHEMICAL SUB INDUSTRY

COMPANY	FATTY ACIDS	FATTY ALCOHOL	METHYL ESTERS	GLYCERINE	FATTY AMINES	ALKANOL AMIDES	COC FATTY ALCOHOL SULFATE	SOAP NOODLES
United Coconut Chemicals, Inc.	65,000	36,000	-	8,500	-	-	-	7,200
Pilipinas Kao, Inc.	-	30,000	-	5,000	6,500	-	-	-
Colgate-Palmolive	-	3,000	4,200	1,100	-	4,100	-	-
D&L Laboratories	-	-	3,000	1,800	-	1,200	-	-
Proton Chemicals	-	-	13,200	600	-	2,400	-	-
Chemphil A&W	-	-	-	-	-	-	14,400	-
International Pharmaceuticals	-	-	-	600	-	-	-	-
Procter and Gamble	-	-	-	-	-	-	43,500	-
Royal Industrial	-	-	-	-	-	-	15,500	-
Sakamoto Orient	-	-	-	8,000	-	-	-	-
Stepan Philippines	-	-	-	-	-	-	36,600	-
Unilever (PRC)	-	-	-	-	-	-	19,200	-

Source: BOI, September 4, 1997.

The Chemical Industry in General

The Chemical industry had experienced a fair rate of return²⁰ (based on ROS) for eight years. It reached its peak at 8.83% in 1993, although a slight drawback occurred in 1994 by 67%.

²⁰Years considered: 1986-1996. From Tanseco, p. 24.

Table 10: CHEMICAL INDUSTRY ROS

Years	Rate of Returns (%)
1986	6.29
1987	7.07
1988	7.53
1989	7.32
1990	6.81
1991	7.13
1992	7.99
1993	8.83
1994	8.16

Source: Tanseco, p.24

The GVA of chemical industry is increasing for the past three years. The increase in 1997 was attributed to increase in production of drugs, medicine, cosmetics and toilet preparation, although the said strategic sub industries contributed also in the said positive trend.

Table 11: CHEMICAL INDUSTRY GVA: SHARES AND GROWTH

Industry Group	1995		1996		1997		95-96	95-97
	Value+	%*	Value+	%*	Value+	%*		%*
Chemical and chemical products	12582	6.19	13309	6.20	14127	6.33	5.8	6.1
Manufacturing Sector (total)	203271		214613		223118		5.6	4.0

/_ *Growth Rate, 95-96 and 95-97; * Share in Manufacturing Sector GVA for 1995, 1996 and 1997; +At Constant Prices. From ESSO-NSCB, The Republic of the Philippines. *National Accounts of the Philippines*. January 1998, p.48-49.

From the period of 1990-1995, the industry, although has experienced upward downward trends in foreign exchange earnings a remarkable upsurge is observable from 1994-1995.

Table 12: CHEMICAL INDUSTRY EXPORT PERFORMANCE

EXPORT	1990	1991	1992	1993	1994	1995	1996
Organic Chemicals							
Inorganic Chemicals	66	51	46	41	43	49	45
Resins and Plastic Materials	38	41	20	17	19	9	10
Dyeing, Tanning and Coloring Materials	24	31	38	37	45	56	49
Medicinal and Pharmaceutical Products	7	9	11	15	16	19	
Essential Oils and Perfume Materials	14	23	27	24	33	39	
Fertilizers, Manufactured	71	116	88	85	102	120	114
Miscellaneous Chemicals Products	30	32	34	36	39	42	
Total Chemical Exports	251	304	268	262	304	343	
Growth Rate (%)		21.1	-11.8	-2.2	16.0	12.8	
Average Growth Rate						7.20	

Source: BTEP-DTI and BOI, September 4, 1997, p. 2

The Philippine Garments and Textile Industry

1. Garments

Garments industry has two bases. The first base is the direct production of wearing apparel ranging from clothes, gloves, underwear, footwear, and neckwear. The second base is decorative in nature, consisting of: embroidery, and sewing services like dyeing, knitting and laundry. The latter is supportive of the first base.

These processes are done mostly through subcontracting. As such, most of the enterprises²¹ are family-owned and/or have joint venture in other Asian countries (Cororaton, 1996, p.5).

There are 81 major firms in the country which are mostly concentrated in the National Capital Region (NCR), Central and South Luzon, Central Visayas, Central Mindanao, Ilocos, Bohol and Western Visayas. 57 percent of which are engaged in spinning process²² (Cororaton, p. 5). Known associations are the Garment Business Association of the Philippines (GBAP), Confederation of Garment Exporters of the Philippines (CONGEP), and Foreign Buyer's Association of the Philippines (FOBAP).

2. Textile

The production of textile has different processes²³. From over one hundred of firms engaged in textile production, only 19 big firms are integrated or could contain these multi-processes within a single production plant.

Based on the BOI figures, the registered capacity of each production segment is presented below:

²¹ Countries like South Korea, Taiwan and People's Republic of China.

²² Like making of yarn or thread out of fibers

²³ Like spinning, weaving through looms whose main products are denims and fabric finishing in the form of bleaching, dyeing, coloring or printing.

Table 13: TEXTILE INDUSTRY CAPACITY

ACTIVITY	No. of Firms	CAPACITY (MT)	AVERAGE CAPACITY
Spinning	70	202,775	2,897
Stable Fiber	1	20,000	20,000
Filament Yarn	2	21,240	10,620
a. Polyester	1	12,600	12,600
b. Nylon	1	8,640	8,640
Weaving	55	107,699	8,640
Knitting	104	146,380	1,406
Finishing	34	117,188	3,447

Source: BOI, *Industry Profile*, 1997.

A change in per capita consumption is projected to occur from 2.2 kgs. in 1991 to 3 kgs. in the year 2000. To meet the forecasted needs, production capacities have to be pulled in the following manner:

Table 14: DEMAND FORECAST FOR TEXTILE

ITEM	POTENTIAL DEMAND (MT)	CURRENT CAPACITY (MT)	TO BE INSTALLED (in MT, BY 2000)
Polyester SF	190,000	20,000	170,000
Spurn Yarn	682,000	202,775	479,225
Filament Yarns	55,000	21,200	33,760
	727,000	244,015	682,985
Woven Fabrics	291,000	107,699	183,301
Knitted Fabrics	436,000	146,380	289,620
Finishing	727,000	254,079	472,921

Source: BOI, *Industry Profile*, 1997.***BOI Computed Values.

The Garments and Textile Manufacturing Industries in General

The rate of returns on sales by the textile industry varied through time where the peak was attained in 1994 at 8.12%.

Table 15: TEXTILE INDUSTRY ROS

YEAR	RATE OF RETURNS ON SALES (%)
1986	1.58
1987	4.62
1988	-2.88
1989	6.99
1990	3.08
1991	4.69
1992	3.66
1993	1.46
1994	8.12

Source: Tanseco, p.17.

The garments industry, on the other hand, had two peak rates of return, 7.36% and 3.66% for the years 1988 and 1992, respectively.

Table 16: GARMENT INDUSTRY ROS

YEAR	RATE OF RETURNS ON SALES (%)
1986	.40
1987	2.61
1988	7.36
1989	2.45
1990	<2.00*
1991	<2.00*
1992	3.36
1993	2.36
1994	1.35

Source: Tanseco, 1996./_Estimated by the researcher.

The performances of these two industries are as shown through their GVA and shares in the manufacturing sector's over-all performance. Footwear and wearing apparel showed a good comeback in 1997, brought about by the "heightened global demand" that resulted from the following: 1) improvement in the quality of local garment products; 2) effective promotion of activities and marketing of the two sectors: the government and private sector. On the other

hand, the textile industry experienced deterioration due to its inability to cope with international competition.

**Table 17: FOOTWEAR AND WEARING APPAREL GVA:
SHARE AND GROWTH**

Industry Group	1995		1996		1997		95-96	95-97
	Value+	%*	Value+	%*	Value+	%*	%*	%*
Footwear wearing apparel	13201	6.49	12036	5.61	12298	5.51	-8.8	2.2
Manufacturing Sector (total)	203271		214613		223118		5.6	4.0

/_*Growth Rate, 95-96 and 95-97; * Share in Manufacturing Sector GVA for 1995, 1996 and 1997; +At Constant Prices. From ESSO-NSCB,

The Republic of the Philippines. *National Accounts of the Philippines*. January 1998, p.48-49.

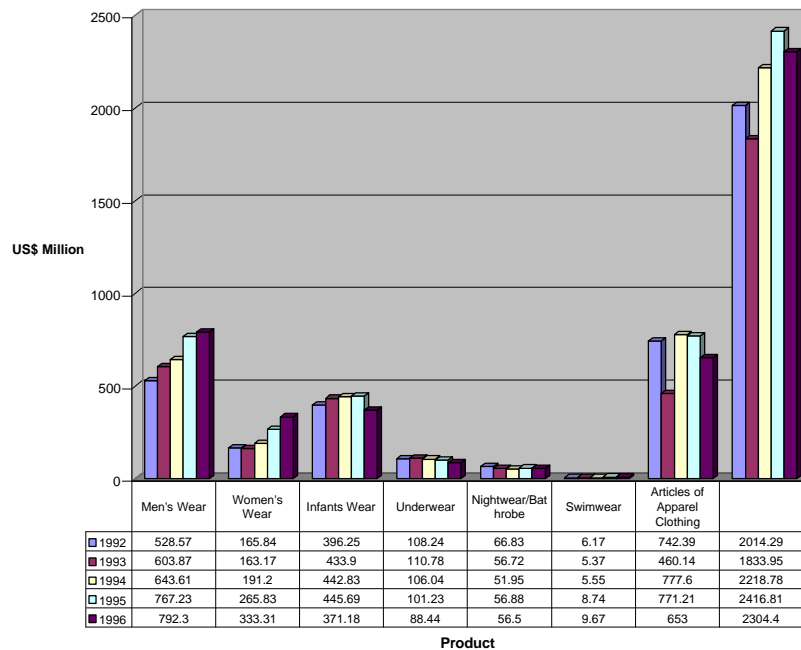
Table 18: TEXTILE INDUSTRY GVA: SHARE AND GROWTH

Industry Group	1995		1996		1997		95-96	95-97
	Value+	%*	Value+	%*	Value+	%*	%*	%*
Textile	5611	2.76	5498	2.56	5299	2.37	-2.0	-3.6
Manufacturing Sector (total)	203271		214613		223118		5.6	4.0

/_*Growth Rate, 95-96 and 95-97; * Share in Manufacturing Sector GVA for 1995, 1996 and 1997; +At Constant Prices. From ESSO-NSCB,

The Republic of the Philippines. *National Accounts of the Philippines*. January 1998, p.48-49.

Table 19. EXPORT PERFORMANCE OF GARMENTS



Source: BOI, *IDPP 1998-21st Century*

The Metal Industry

The metal industry includes parts and parcels of finished products of automobiles, appliances, machineries and construction materials created through the process of metal casting, forging, staffing and marking.

In the country, this industry has a capacity utilization of 60-70% of its total production.

The ROR for metal industry ranged from 0.37 in 1986 to a high of 4.54% in 1989. From 1990-1994, the performance of the industry was very volatile.

Table 20: METAL INDUSTRY ROS

YEARS	RATE OF RETURNS (%)
1986	.37
1987	3.07
1988	3.29
1989	4.54
1990	1.88
1991	3.28
1992	3.56
1993	2.96
1994	2.13

Tansec, p. 32

Table 21: METAL INDUSTRY GVA: SHARE AND GROWTH

Industry Group	1995		1996		1997		95-96	95-97
	Value+	%*	Value+	%*	Value+	%*	%*	%*
Metal Industries	4569	2.25	5061	2.36	4833	2.17	10.8	-4.5
Manufacturing Sector (total)	203271		214613		223118		5.6	4.0

/_ *Growth Rate, 95-96 and 95-97; * Share in Manufacturing Sector GVA for 1995, 1996 and 1997; +At Constant Prices. From ESSO-NSCB,

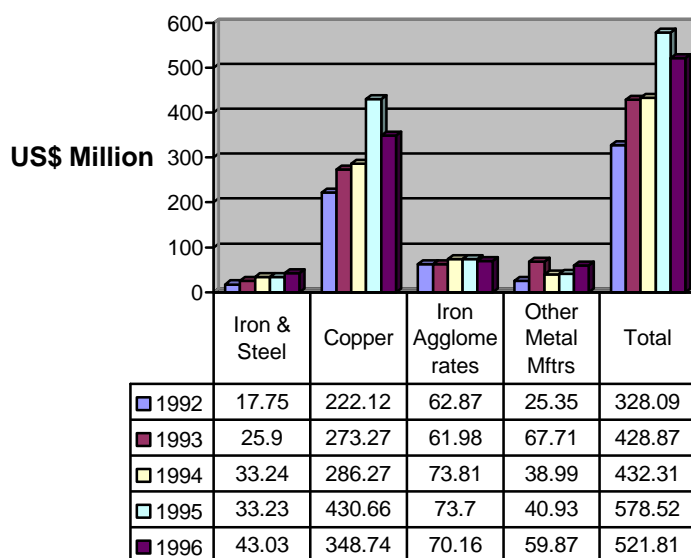
The Republic of the Philippines. *National Accounts of the Philippines*. January 1998, p.48-49.

The volatility was influenced by the peso devaluation which also caused deceleration in other industries, particularly the rubber and transport equipment²⁴.

The export performance of the metal industry was poor in 1996. Export shares of copper industry was one of the largest in the entire industry; earning the title an export winners (refer to the performance of the metal industry for the past four years presented in the diagram).

²⁴ Analyzed by the ESSO-NSCB.

Table 22. METALS INDUSTRY EXPORT PERFORMANCE



Source: BOI, *IDPP 1998-21st Century*

The Electronics Industry

This industry has four sub industries, namely: 1) consumer electronics, 2) telecommunications equipment; 3) computers and related equipment; and, 4) components and devices.

By the end of 1993, there were over 300 electronic establishments in the country, mostly owned by Japanese investors. For the past five years, (1991-1996) it has been the consistent top export winner of the country.

The biggest sector of the industry is the manufacturing of circuits, transistors, diodes, resistors, capacitors, coil fixtures and pcb assemblies.

The momentous EDSA revolution sparked fires attracting numerous investors to start or expand their electronics business in the country. Thus for

1986, this industry attained the highest registered ROS at 7.71%²⁵. In 1991, performance fell although the following years were more favorable with ROS reading 5.54% in 1994.

Table 23: ELECTRONICS INDUSTRY ROS

YEAR	RATE OF RETURNS (%)
1986	7.02
1987	7.71
1988	6.64
1989	6.83
1990	4.98
1991	3.75
1992	4.33
1993	5.19
1994	5.54

Source: Tanseco, 1996.

The favourable increase was likewise manifested in the GVA patterns of the industry where a sustained increase occurred was from 1995-1997, the highest among all the manufacturing groups. This dramatic change was linked to the swelling “global demand” for microcircuits.

Table 24: ELECTRONICS INDUSTRY GVA: SHARE AND GROWTH

Industry Group	1995		1996		1997		95-96	95-97
	Value +	%*	Value+	%*	Value+	%*	%	%*
Electrical Machinery	12086	5.95	13867	6.46	18139	8.13	14.7	30.8
Manufacturing Sector (total)	203271		214613		223118		5.6	4.0

/_ *Growth Rate, 95-96 and 95-97; * Share in Manufacturing Sector GVA for 1995, 1996 and 1997; +At Constant Prices. From ESSO-NSCB,

The Republic of the Philippines. *National Accounts of the Philippines*. January 1998, p.48-49.

²⁵Years of comparison: 1986-1994.

The electronics industry is largely dependent on imported materials (shown in table 26). However, export outpaced import in terms of growth, indicative of the industry's viability in the international market.

Table 25: ELECTRONIC EXPORT PERFORMANCE**

YEARS	EXPORT	
	(in Million Php)*	Growth Rate (%)
1995	19,563	
1996	25,104	28.33
1997	35,239	40.37

Table 26: ELECTRONIC IMPORT PERFORMANCE*

YEARS	IMPORT	
	(in Million Php)*	Growth Rate (%)
1995	47,452	
1996	58,691	23.68
1997	71,260	21.42

THE MANUFACTURING SECTOR

The performance of the manufacturing sector can be described by the difficulties engulfing the sub-industries.

* NSCB, *National Accounts of the Philippines*, 1995-1997.

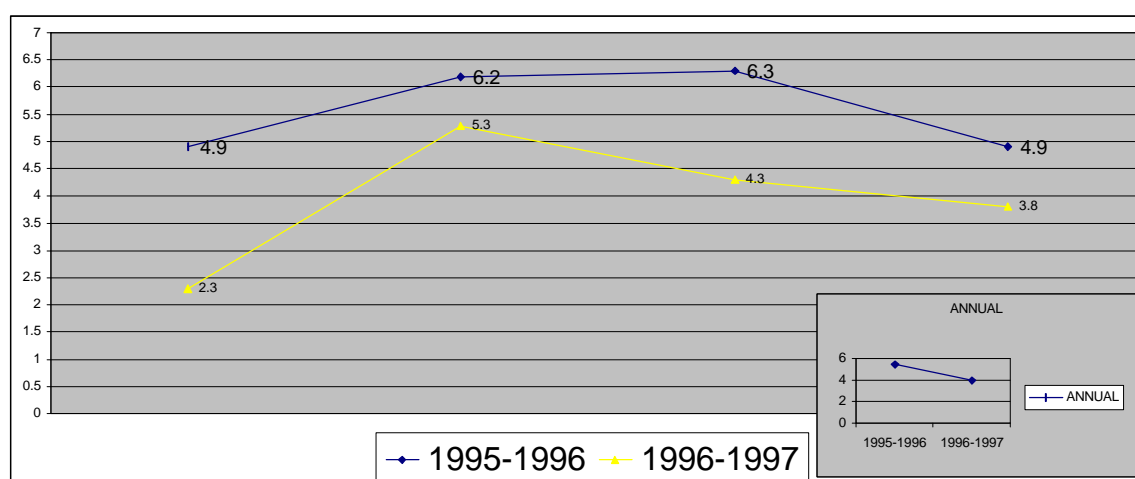
* At constant prices.

* At constant prices.

Table 27: MANUFACTURING SECTOR IN THREE YEARS

Items	1995	1996	1997
A. Manufacturing	203271	214613	223118
B. Gross Domestic Product	802866	848451	891530
C. Gross National Product	825164	882399	933284
D. Industry	284504	302482	319834
E. Ratio of A&B	25.30	25.29	24.02
F. Ratio of A & C	24.63	24.32	23.91
G. Ratio of A&D	71.45	70.95	69.76
H. A Growth Rate (%)	-	5.6	4.00

Table 28: Manufacturing Sector Quarterly and Annual Performance and Trends



Source: National Statistical Coordinating Board, Republic of the Philippines. *National Accounts of the Philippines, 1995-1997 Annual and Quarterly.*

Manufacturing sector showed dipping growth trends for three years, from 1995-1997, and industry share constantly declining. In 1997, it started the quarter with a very low growth rate but surging in 1992. However, this was never sustained.

The performance of the manufacturing sector is significantly tapered off by the kind of guidelines and policies on investments and exports prevailing the country. This non-resiliency cast back light to the industry's level of productivity and quality of production²⁶. Despite influx and development of efficient processes and machines around the globe, the industry is still performing poorly. Only electronics industry has managed to steadily grow in terms of its exports and output performance.

To date, the viability or competitiveness of the manufacturing industry is way below the force that can boost industrialization and modernization in the country.

²⁶For further reading, see Cororaton and Abdula, "The Productivity of Manufacturing Sector", 1997.

Chapter III

THE SUPPORT SECTOR

How Vital is the Energy Sector?

The manufacturing industry could not attain its goals if the necessary infrastructure or services are not ready to support the operations. Crucial to this respect is the efficient and effective production and distribution of energy services. Thus, energy plans should fit in to the desired targets of the economy.

The aggregate nationwide consumption of the entire industry has been consistently increasing every year. It is projected from 1997 to 2010, energy consumption will be higher than before because of the foreseen brisk in businesses that the GATT, APEC and other soon-to-be-formed trade blocs are expected to set forth.

Table 29: Annual Manufacturing Sector Consumption: Selected Major Establishments

ZONE/ AREA	Industry CATEGORY	CONSUMPTION IN KWH		
		1995	1996	1997
Luzon	a. Chemical Products	65,908,286	79,817,520	109,549,604
	b. Food Processing	108,821,091	110,669,974	52,759,477
	c. Industrial Machinery and Equipment	1,405,600	1,981,700	1,927,800
	d. Iron and Steel			
	e. Textiles	61,686,185	88,654,677	141,951,264
	Subtotal	<u>30,767,120</u>	<u>44,133,577</u>	<u>46,574,084</u>
		268,588,282	325,257,448	352,762,209
Visayas	a. Chemical Products	141,480,048	156,392,140	157,962,436
	b. Food Processing	22,281,469	18,697,954	23,810,925
	c. Iron and Steel			
	Subtotal	<u>223,897,559</u>	<u>234,924,100</u>	<u>225,066,366</u>
		387,659,076	410,014,194	406,839,727
Mindanao	a. Chemical Products	177,659,880	144,807,628	170,574,329
	b. Food Processing	73,181,030	70,417,556	80,469,250
	c. Iron and Steel			
	Subtotal	<u>655,867,286</u>	<u>723,434,484</u>	<u>698,808,661</u>
		906,708,196	938,659,668	949,852,240
	TOTAL	1,562,955,554	1,673,931,310	1,709,454,176
			TOTAL consumption for the past three years	4,946,341,040

Source: Annual Industrial Energy Consumption, NPC, 1997.

Table 30: Ratio to Actual Energy Sales

Zone	Years					
	1995		1996		1997	
	Share*		Share*		Share*	
Luzon	23323665490	76%	25031011166	76%	27326098094	76%
Visayas	3031617887	10%	3336115569	10%	3668021070	10%
Mindanao	4435457659	14%	4745152650	14%	5020928400	14%
Philippines	30790741036	100%	33112279385	100%	36015047564	100%

Source: Department of Energy, 1997. The share values were computed and rounded off to the nearest ones./_*Share, the ratio of the energy sales in a zone and the energy sales in the country.

Luzon gained the highest share in energy sales from 1995-1997. This resulted from the manufacturing firms and people congesting the NCR and urban areas nearby. Supported by the 1996 figures of the Department of Energy (DOE), the industrial sector garnered the biggest electrical consumption share at 32.3%²⁷.

Table 31: Electrical Consumption of Each Sector

SECTOR	1996	1995	Growth Rate (%)
a. Residential	9,150	8,223	11.30
b. Commercial	7,072	6,328	11.70
c. Industrial	11,842	10,950	8.20
d. Transport	27	25	9.50
e. Others	1,140	1,067	6.80
f. Total End Use	29,232	26,953	9.90
g. Station Service	1,340	1,226	9.30
h. Losses	6,147	5,696	7.90
TOTAL	36,719	33,515	9.60

Source: 1996 Energy Sector Annual Report, DOE, p.12. Modified presentation for the purposes of this study.

²⁷Followed by the residential sector, 24.9% and the commercial sector at 19.3%.

How Viable is the said Sector?

The Pre-Reformation

When the power crises loomed over the country during 1992-1993, industrial productivity became sluggish and, the economic growth was adversely affected. (Serafica, First Draft, 1997).

According to the study undertaken by the ADB, the country's electricity density was higher 0.74 (US\$/KwH) compared to other Asian neighbours, particularly Indonesia and Malaysia having 0.25 and 0.44, respectively. This is an indication of inefficiency. Energy likewise increased prior to 1993, from 0.152 \$/KwH in 1986 to 0.117 in 1988 to 0.095 in 1990 to 0.1 in 1992 compared with Indonesia, Malaysia and Taiwan: 0.114, 0.104, 0.096 in 1986 to 0.068, 0.071, 0.069 in 1992²⁸, respectively. This implies that the cost of energy in the country is higher compared to our Asian neighbours, consequently affecting manufacturing sector by way of latching burden to the cost of production. This could partially explain why some commodities could not be priced lower or the same with reference to what other Asian countries could offer. Electrification was made accessible only to 40% of the population as of 1994, which were enjoyed mostly by urban dwellers. This gives an explanation why there were unparallel and dual development between rural and urban areas; concentration of industrial establishments in the latter.

This bugging scenario undulated the attention of the government to set up reforms to address the pressing demands of a particular community.

There are so many issues that this particular reform sought to address, particularly: electrification/connection/linkage, distribution and consumption,

²⁸ There were also fluctuations in the said years for these countries. Interestingly enough, they were able to maintain these fluctuations way below the performance of the Philippines: 95<69>68 US\$/KwH.

system loss reduction/efficiency of delivery, developing and utilization of alternative energy sources.

The Plan

In general, the concerned government agency, DOE, proposed to make the industry viable by setting up a plan to increase energy resources to a total of P 2,643,992 (in million) from 1996-2025 (DOE, *Energy Plan 1996-2024 UPDATE*, p.4). This translates to a power generation equivalent to 459,409 GwH by the year 2025 (Philippine Energy Plan 1996-2025, p. 32).

Table 32: Power Generation from 1996-2025

<i>GENERATION*</i>			
	1996	2010	2025
hydro	15.3	8.6	5.2
Coal	20.5	16.1	12.5
Geo	22.6	12.6	9.5
Oil	41.6	8.3	2.9
Gas	-	19.6	9.8
NRE	-	1.5	3.2
Other			
Fuels	-	33.3	57.0
Total by 2025 : 459,409 GwH			

Source: Philippine Energy Plan 1996-2025, p.32.

*Compressed for the purposes of the study.

On electrification. Underdevelopment of rural areas and some areas in the metropolis (called the urban poor) have finally been contained in the plan of the DOE. It was envisioned to reach a total of 11.1 million household in 2025 and energized municipalities and *barangays*

TABLE 33: ELECTRIFICATION PROGRAM

ELECTRIFICATION PROGRAM			
Physical Targets	1996	2010	2050
Philippines			
Household ('000)			
Potential	10,969	13,407	16,710
Target	7,468	12,127	16,710
Electrification Level (%)	68.08	90.45	100.00

Source: DOE, Power Development Plan of the Philippines, 1996-2025.

On distribution, transmission and consumption. DOE is expecting to bridge the energy differences through inter-island grid connection. Five of these are expected to be completed within the 1997-2000 period:

- Inter-island connection of Leyte-Luzon
- Extra high voltage, EHV-connection development in Luzon
- Leyte-Cebu Interconnection
- Apo Geothermal plants line extension
- Leyte-Mindanao interconnection

Aside from the grid connection, DOE is also expecting to rehabilitate 104,472 kms. distribution lines and expand electric connection distribution line to an additional 105 ,825 kms.

On alternative sources of energy. The new and renewable sources of energy are expected to contribute to the total energy mix by 15.4% (or equivalent to 214.4 MMBFOE) as a response to the increasing consumption of energy from 1992-1997 (please see table 35).

Table 34: Total Energy Mixed Targets from 1996-2025

Energy mix	YEARS		
	1996	2010	2025
INDIGENOUS ENERGY	95.72	236.19	574.48
Oil	.45	2.07	8.59
Gas	.15	40.25	147.67
Coal	9.63	33.98	94.11
Hydro	9.50	22.95	40.03
Geothermal	14.01	33.39	72.42
Wood/woodwastes	47.05	61.98	94.67
Municipal wastes	0.00	2.92	7.30
Bagasse	5.88	13.08	29.14
Coconut Residues	5.78	12.18	22.98
Rice Residues	2.54	6.55	15.86
Animal Manure	0.52	4.92	11.08
Black Liquor	0.16	0.19	0.22
Others	0.01	1.73	33.11

Source: DOE, *Philippine Energy Plan 1996-2025*, p. 19. Modified for the purposes of the study./_In Million Barrels of Fuel Oil Equivalent, MMBFOE.

The National Power Corporation (NPC), has a complementary energy plan known as the Power Development Plan of the Philippines from 1997-2010. This aims to optimize “the power supply and power demand” (Pres. Delgado, NPC) as part of the DOE Power Energy Plan. This plan relies on different resource options, yet placed much emphasis on indigenous energy resources utilization in order for the country to set energy prices in the soonest time possible. From 1997-2005, a total of 6,647 MW (60%) are expected to have been generated from the energy projects. From 2006-2010, additional capacities of 4,435 MW are expected to upstream the energy system. Renewable resources are expected to add 50Mw annually to the total electrical generation (see Table 36).

TABLE 35. COMPARATIVE PRIMARY ENERGY CONSUMPTION

	1992		1993		1994		1995		1996		1997	
	MMBFOE	%	MMBFOE	%	MMBFOE	%	MMBFOE	%	MMBFOE	%	MMBFOE	%
INDIGENOUS ENERGY	38.00	30.50	39.27	28.70	42.17	28.78	92.24	43.98	95.57	43.18	99.32	42.21
CONVENTIONAL	23.03	18.48	25.49	18.63	28.14	19.21	27.41	13.07	28.98	13.09	31.44	13.36
OIL	0.54	0.43	1.19	0.87	0.54	0.37	0.03	0.01	0.45	0.20	0.25	0.11
COAL	5.00	4.01	5.86	4.28	6.59	4.50	6.09	2.90	5.06	2.29	7.70	3.27
HYDRO	7.66	6.15	8.67	6.34	10.11	6.90	10.71	5.11	12.17	5.50	10.87	4.62
GEOTHERMAL	9.83	7.89	9.77	7.14	10.90	7.44	10.58	5.04	11.30	5.11	12.62	5.36
NEW AND NON-RENEWABLE	14.97	12.02	13.78	10.07	14.03	9.58	64.83	30.91	66.59	30.09	67.88	28.85
BAGASSE	5.06	4.06	4.89	3.57	5.20	3.55	4.15	1.98	7.89	3.57	7.03	2.99
AGRIWASTE	9.46	7.59	8.42	6.15	8.28	5.65	60.58	28.88	58.45	26.41	60.46	25.70
COCONUT HUSK/SHELL			5.73	4.19	5.76	3.93	15.08	7.19	12.98	5.87	12.58	5.35
RICE HUSK			0.86	0.63	0.95	0.65	4.06	1.94	4.12	1.86	4.69	1.99
WOOD/WOODWASTE			1.83	1.34	1.57	1.07	39.34	18.76	39.25	17.74	39.30	16.70
CHARCOAL							2.10	1.00	2.10	0.95	3.89	1.65
OTHERS	0.45	0.36	0.47	0.34	0.55	0.38	0.10	0.05	0.25	0.11	0.39	0.17
IMPORTED ENERGY	86.59	69.50	97.54	71.30	104.34	71.22	117.51	56.02	125.74	56.82	135.97	57.79
OIL	83.91	67.35	94.79	69.29	102.18	69.74	113.98	54.34	117.40	53.05	125.77	53.45
COAL	2.68	2.15	2.75	2.01	2.16	1.47	3.53	1.68	8.34	3.77	10.20	4.34
TOTAL ENERGY	124.59	100.00	136.81	100.00	146.51	100.00	209.75	100.00	221.31	100.00	235.29	100.00
OIL	85.45	67.78	95.98	70.16	102.72	70.11	114.01	54.36	117.85	53.25	126.02	53.56
NON-OIL	40.14	32.22	40.83	29.84	43.79	29.89	95.74	45.64	103.46	46.75	109.27	46.44
COAL	7.68	6.16	8.61	6.29	8.75	5.97	9.62	4.59	13.40	6.05	17.90	7.61

Note:

1997 data are estimates.

Household consumption of new and non-renewable energy was accounted only starting 1995.

Source : DOE

Revision 2

**Table 36. 1997 NPC POWER DEVELOPMENT PROGRAM
INDICATIVE MW CAPACITY ADDITION
(1997 NPC LOW FORECAST)**

YEAR	LUZON		VISAYAS		MINDANAO		PHILIPPINES	
	INS. CAP.	AA	INS. CAP.	AA	INS. CAP.	AA	ANNUAL	CUM.
1997			Leyte-Cebu	158		100	258	258
			Leyte GeoA	158	ZAMBOANGA DIESEL	100		
1998	Leyte-Luzon Intercon	320						
	BACMAN-II-2 GEO	20		440		58	810	1,068
	MASINLOC 1 COAL	300	Leyte GeoB	440	GEN SANTOS DIESEL	58		
1999	Sual 1&2 Coal	1,000	1,440					
	CASECNAN HYDRO	140	Leyte-Bohol	0				
	MASINLOC 2 COAL	300	Intercon.		MINDANAO GEO 2	48		
2000		70				135	205	2,761
	BAKUN A/C HYDRO	70			MINDANAO SC-GT	135		
		300	UPRATING	0				
2001	SAN PASCUAL COGEN	300	LEYTE-CEBU T/L		MINDANAO C. CYCLE	65		
		1,200		40		200	1,440	4,566
2002	ILIJAN (GREENFIELDS)	1,200	MAMBUCAL GEO	40	MINDANAO COAL	200		
				161			229	4,795
2003			TIMBABAN HYDRO	29				
			VILLASIGA HYDRO	32				
			PANAY BASELOAD	100				
		300		375				
2004	KALAYAAN 3/4 PS	300	CEBU BASELOAD	200	BUL.-BATANG HYDRO	132		
			BOHOL BASELOAD	100	MINDANAO PEAKING A	50		
			SAMAR COAL	15				
		345		300		368	1,013	6,665
2005	SAN ROQUE HYDRO	345	CEBU BASELOAD B	100	PULANGUI v	218		
			CEBU PEAKING	50	MINDANAO MID-RANGE A	150		
			PANAY PEAKING	100				
			BOHOLPEAKING	50				

2006	PEAKING PLANT	150	150	VISAYAS BASELOAD A	200	200	AGUS III	224				
2007	PEAKING PLANT	300	300	VISAYAS PEAKING A	100	100	MINDANAO MID-RANGE B	300	300	700	7,939	
2008	MID-RANGE PLANT A	100		VISAYAS PEAKING B	250		MINDANAO MID-RANGE C	150				
	ILAGUEN B HYDRO	88					MINDANAO PEAKING B	50				
2009	MID-RANGE PLANT B	600	600	VISAYAS PEAKING C	200	200	MINDANAO BASELOAD	150	150	950	9,527	
2010	ABGULU HYDRO	360		VISAYAS BASELOAD B	200		MINDANAO BASELOAD B	300				
	MID-RANGE PLANT C	600		VISAYAS PEAKING D	100							
TOTAL			6,173			2,524			2,390		11,087	

Note: AA - Annual Addition

Changes After

On electrification. Positive changes in the electrification level have occurred. From 1994, the level was only 60% but this increased to 68.8% after two years. Total connections have reached 7.8 million households, increasing provision of energization to 19 municipalities with 421 barangays.

Table 37

19 Municipalities with an Increased Energization Level
<ul style="list-style-type: none"> • Amlan, Negros Oriental • Balaban, Kalinga • Pasil, Kalinga Apayao • San Vicente, Palawan • Limasawa, S. Leyte • Kalawit, Zamboanga del Norte • Sigay, Ilocos Sur • San Lorenzo, Guimaras • Sibunag, Guimaras

The private utilities, however, had an average growth rate (in terms of electricity lines connected) of 3.1% or equivalent to 790,591 total actual connections, representing 79.8% of total electricity level.

On pricing. From 1994 to the present time, the price and cost of plants were 12% lower.²⁹

Table 38: Average Philippine Prices and Costs of IPP's for Base Load Generation

By Commissioning Period	Financial Price	Economic Costs
1991 to early 1994	.0687	.0591
1994 onwards	.0604	.0521

/_Financial Price: Financial assessment focuses on levelized energy prices that NPC or MERALCO will pay for each project; Economic Cost, Economic analysis estimates total generation costs and other indicators of economic viability.

²⁹ Quoted in Serafica's study. Quoted from World Bank, Philippines Power Sector Study (Washington, D.C.: World Bank, 1994).

Implications of the plans, current reforms and changes

- The goals of these plans, although realizable, can only be exacted by the amount of investments poured in (public and private) because of the industry's capital-intensive requirement.
- Energy generation mix (EGM). Although local alternative sources of energy are being developed in the country, the situation in EGM will remain the same: particularly, the ratio of import and local sources of energy. By the end of 2010, the ratio of EGM is expected to reach 53:47 (imported as to indigenous).

Although this is a major move in achieving self-sufficiency in generating energy, the projected ratio might pose great danger in the near future. By 2020 onwards, it is feared that coal might start to reach the threshold of its availability, so goes with the other conventional sources of energy that our country at present is much dependent on. It is believed and expected that energy forms will become very expensive ("Polevaulting" *The Power*, 1997, p.19) adding burden to the end consumers and manufacturing sector.

Chapter IV

SITUATING RESEARCH AND DEVELOPMENT IN STATE POLICIES NATIONAL AND AGENCIES AGENDA *“What is the General Framework for Promoting R&D?”*

Are There Targets and Consistent Frameworks
for R&D and Private Investments on R&D (PIORD)?

R&D promotion and adoption, as a tool for national development, is contained in the following national plans and official documents:

1987 Philippine Constitution

Table 39: State Policies and Guidelines on R&D

Stated in:	R&D Related	PIORD Related
*Article II: State Policies	Sec. 17 “The State shall give priority to education, science and technology to foster patriotism and nationalism, accelerate social progress and promote total human liberation and development”	Sec. 20 “The State recognizes the indispensable role of the private sector, encourages private enterprise and promote incentives to needed investments”

<p>*Art. XIC: On Science and Technology (Subtitle)</p>	<p>Sec. 10</p> <p>“...Science and technology are essential for national development and progress. The state shall give priority to research and development, invention, innovation and their utilization. It shall support indigenous, appropriate and self reliant scientific and technological capabilities, and their application to the country’s productive systems and national life”</p> <p>Sec. 12</p> <p>“The State shall regulate the transfer and promote the adaptation of technology from all sources for the national benefit. It shall encourage the widest participation of private groups, local governments and community based organizations in the generation and utilization of Science and Technology.”</p>	<p>Sec. 11</p> <p>“The Congress may provide for incentives, including tax deductions, to encourage private participation in programs of basic and applied scientific research. Scholarships, grants-in-aid, or other forms of incentives shall be provided to deserving science students, researchers, scientists, investors, technologists and specially gifted citizens.”</p>
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1993-1998 Medium Term Philippine Development Plan (NEDA)

Table 40: R&D in the National Economic Plan

Stated in:	R&D Related	PIORD Related
Ch. 3.4: Sustainable Agricultural and Industrial Development Targets	<p>3.4.10.1 R&D expenditures shall increase from the 1992 level of .24% of GNP to 1% of GNP in 1998</p> <p>3.4.10.2. A total of 197 new technologies will be commercialized</p> <p>3.4.10.3. Scholarships, trainings and degree programs shall be provided for 10,037 deserving youths in Science and Technology courses</p> <p>3.5.1.2.5.g. "Strengthen industry-academe linkage in the development of IT R&D programs</p> <p>3.5.1.2.5.b. "Adopt a strong client-oriented approach to research and development by using, among others, gender specific needs and information technology requirements as a base for R&D activities"</p>	<p>3.5.1.2.3.a. "Provide assistance for product development and standardization"</p> <p>3.5.1.2.3.b. "Pursue aggressive and focused export promotion and an export diversification program that is product- and country-specific; provide financial, marketing, technical and institutional assistance by...continuing research and development...providing training and technical assistance to exporters in design and packaging and product quality improvement...improving the government databank/ information system and networks on market opportunities and technology development..."</p> <p>3.5.1.2.5.a. "Forge and active partnership between government, the private sector and non-government sectors for the joint development, adaptation, adoption, upgrading and utilization of technology through contract researchers, R&D incentives, technology business incubators and other means;"</p> <p>3.5.1.2.5.c. "Aggressively acquire and adopt appropriate technology"</p> <p>3.5.1.2.5.d. "Upgrade science and technology services and facilities for the development of world-class products"</p> <p>3.5.1.2.5.e. "Enhance information technology R&D to support technology development in agri-industry and other areas"</p>

Science and Technology Action Agenda:
Department of Science and Technology (DOST) vis-à-vis MTPDP

Table 41: R&D for DOST

POLICY DESCRIPTION	POLICY STATEMENT
FORGE MORE ACTIVE PARTNERSHIPS IN TECHNOLOGY DEVELOPMENT AND UTILIZATION	To encourage both the public and the private sectors to be more involved in joint technology development utilization to increase productivity and quality of products in agriculture, industry and the service sectors.
PURSUE MORE ACTIVE PARTNERSHIPS IN DEFINING DIRECTIONS AND PRIORITIES	To promote consultation and cooperation between the public and private sectors in defining the directions and priorities of research and development, technology transfer and manpower development activities
ADOPT A STRONG CLIENT-ORIENTATION IN RESEARCH AND DEVELOPMENT	To support R%D in the government sector by allocating sufficient budget and manpower on projects that would increase the Philippine's capacity to export, accelerate countryside development and promote sustainable development. R&D will be conducted in areas which address specific needs of clients specially agri/aqua enterprises and small and medium local manufacturers
INCREASE PRIVATE SECTOR PARTICIPATION IN S&T ACTIVITIES	To formulate appropriate laws and administrative policies which will promote private sector investment in science and technology, the private sector being the engine of growth and technological innovation.
AGGRESSIVELY ACQUIRE AND ADAPT TECHNOLOGY FROM DOMESTIC AND FOREIGN SOURCES	To support the transfer of technology from domestic and foreign sources including utilization of local and foreign experts by providing incentives and other privileges
UPGRADE S&T SERVICES	To upgrade and expand S&T services and facilities to ensure that local products meet required standards to be competitive in the world market
DEVELOP AND UPGRADE S&T MANPOWER	To increase the quality and quantity of scientists and engineers and encourage the private sector to play a bigger role in developing the nation's human resource base through more scholarship and training
STRENGTHEN INTERNATIONAL S&T LINKAGES	To expand and strengthen scientific and technical cooperation with other countries through technical assistance programs on technology transfer, joint research undertakings and exchange of experts in identified areas.
PROMOTE SCIENCE AND TECHNOLOGY CULTURE	To increase awareness and appreciation of the usefulness of science and technology in everyday life especially among the youth

IMPROVE THE WELFARE OF RESEARCHERS, SCIENTISTS AND TECHNOLOGISTS	To improve the work environment and incentives for S&T personnel including appropriate rewards for significant contributions to national socioeconomic growth.
STRATEGY DESCRIPTION	STRATEGIES
MODERNIZATION OF THE PRODUCTION SECTORS THROUGH MASSIVE TECHNOLOGY TRANSFER FROM DOMESTIC AND FOREIGN SOURCES	*Implementation of Comprehensive Technology Transfer & Commercialization
UPGRADING OF RESEARCH AND DEVELOPMENT CAPABILITY THROUGH INTENSIFIED ACTIVITIES IN HIGH PRIORITY SECTORS	*Providing incentives through the Investments Priority Plans (IPP) of the BOI *Adoption of the Research and Development Priorities Plan (RDPP)
DEVELOPMENT OF S&T INFRASTRUCTURE, INCLUDING INSTITUTION BUILDING, MANPOWER DEVELOPMENT AND DEVELOPMENT OF AN S&T CULTURE	*Establishment of Center of Excellence for undergraduate and graduate study levels *Scientific Careers System (CSC) establishment *Strengthening of key academic institutions in S&T through the Engineering and Science Education Project (ESEP)

There are certain targets for R&D. Moreover, there is a greater recognition on private sector's major role in the promotion, modernization and innovation of science and technology (S&T) and, of the educational institutions in nurturing human talents and potential. From the plans and agenda mentioned, R&D is viewed to be biased towards promoting science and scientific culture. Training, establishing institutions and infrastructures, and maintaining and upgrading of information systems are seen as related or support activities of R&D, and not R&D in their very form and nature.

As a recognized engine of growth, the manufacturing sector is expected to bring the core of R&D to the fore. The Department of Trade and Industry (DTI), through the BOI³⁰, identified the problems of this industry in the past and present times, which are found to be the following:

- Low product quality and non adherence to Established standards
- Additional taxes and inefficient tax reform programs

- Near absence of R&D activities
- Low level of technology
- Protection through tariffs

A paradigm shift in planning practices was embodied in the Industrial Development Plan of the Philippines (IDPP) 1988 to the 21st Century. Three time frames characterize the industry development plan: the short term, mid term and long term plans (see Table 42).

To further operationalize the short-term plan, BOI identified strategic industries on the bases of these selection criteria: (1) actual or latent industry competitiveness; (2) industry size; and, (3) impact on jobs; hence,

- Copper Products
- Decorative Crafts: Basketworks, Holiday decors, Jewelry, ceramics
- Electronics
- Fertilizer
- Footwear and Leathergoods
- Fresh fruits
- Furniture
- Garments and Textiles
- Industrial Tree Plantation including rubber products
- Iron and steel including metal products
- Marine products
- Motor Vehicles and components
- Oleochemicals
- Petrochemicals
- Processed Food
- Seaweeds and Carageenan

³⁰ BOI commissioned Dr. Jose A. Magpantay of the University of the Philippines-Diliman to do need analysis, and planning and policy framework designing, although the study was funded by Natural Sciences Research Institute of UP-Diliman.

Table 42: The Industry Development Plan of the Philippines and R&D

SHORT TERM	MEDIUM TERM	LONG TERM
<p>Time Frame: 1-3 years</p> <p>Objective: Address and identify foundations for sustainable development</p> <p>Strategies/Targets:</p> <ol style="list-style-type: none"> 1. Rationalization of cost of energy and installation of clean and efficient technologies 2. Macroeconomic development such as reforms in government policies, practices, undertaking and the private sector 3. Uplifting of science and technology and improvement of instruction in these areas 4. Change manager's outlook on technology and business resource, instead of looking at them as lost that need to be minimized 5. Determination of strategic industries using NEDA's classification including the proper packaging of incentives and the nurturing support industries that provide inputs and services 	<p>Time Frame: 4-9 years</p> <p>Objective: Bridge the short term plans and actions with that of the long term goals while improving scientific and technological competitiveness</p> <p>Strategies/Targets:</p> <p>--- Same with the Short Term---</p>	<p>Time Frame: 10 years- beyond</p> <p>Objective: Address and identify foundations for sustainable development</p> <p>Strategies/Targets:</p> <ol style="list-style-type: none"> 1. Stronger basic and advanced technology foundation on energy; full cost recovery 2. Full integration with the world economy but able to live up with the commitments (domestic and international) 3. Competitive centers of excellence in each advanced areas, etc. 4. RD intensive flexible manufacturing system; Human resources are "knowledge workers" 5. SMEs are doing high value added product and services 6. Sustained increase of Green strategic industries 7. Clustered Industry

The future direction the industry is expected to trod was planned by the concerned BOI using the SWOT Analysis³¹ (see Table 43 for the summary of BOI-DTI Plan).

³¹ However, due to the scope and limitation of the study only the textile and garments products, copper product, electronics, fertilizer, iron and steel (metal products), marine products, oleochemicals, petrochemicals and processed food had been selected for the analysis. All of these are identified by the BOI as strategic industries (Food, Electronics, Metals, Textiles and Garments and Chemicals are the major clusters) of the country.

Table 43. THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

INDUSTRY GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
A. FOOD 1. Processed	<ol style="list-style-type: none"> 1. Availability of raw materials for processing: <ol style="list-style-type: none"> a. Suitable climate b. Soil fertility 2. Vast potential for agricultural production 	<ol style="list-style-type: none"> 1. Inadequate infrastructure facilities, transport and telecommunications facilities/network 2. High cost of trade oriented banking facilities/collateral; conscious banks 3. Inadequate information service for supply-market interaction 4. Seasonality of agricultural produce 5. Input and production technology deficiencies 6. High cost of packaging materials domestic sugar, stabilizers, preservatives 7. Inadequate transport facilities 8. High cost of machinery/equipment and outdated technology 9. Stiff competition in the world market 	<p>***identified as weaknesses,also***</p>	<ol style="list-style-type: none"> 1. Technical assistance on marketing and improved packaging through distributorship 2. Sub-contracting arrangements through the provision of high yielding inputs and tested technologies 3. Emerging global and regional emphasis on open trade through the WTO 4. Liberalized trading arrangements in the regional and global market place 5. Increasing demand for exotic, ethnic and tropical fruits and vegetables 6. Government thrust towards agricultural industrialization 	<ol style="list-style-type: none"> 1. Focus assistance on best selling products in terms of: <ol style="list-style-type: none"> a. Exports value b. Growth rate 2. Strengthen and sustain activities already started in line with identified strategies 3. Private sector led: <ol style="list-style-type: none"> a. Accreditation program for food products in three stages: <ol style="list-style-type: none"> 1. Good manufacturing practice (GMP) 2. Hazard Analysis Critical Control Point (HACCP) 3. Use of quality seal b. ISO accreditation c. Develop and promote Philippine brand mango in export market d. Link with various agencies that render support services on packaging: DOST Packaging Center <p>ACTION PLANS</p> <ol style="list-style-type: none"> 1. Implement the Processed Food Development Program 2. Develop and promote the Philippine brand of fresh/processed mango 3. Strengthen linkage with the private and other government sectors

THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND. GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
A. FOOD b. Marine Products	1. Wide area of water resources 2. Product quality 3. Contribution to countryside development 4. Big contribution to the country's economy 5. Skilled workforce for fish processing/canning 6. Availability of processing to absorb increase in production 7. Proximity to major Asian markets for fresh, frozen and chilled marine products 8. Availability of technology for aquaculture	1. High cost of finished feeds, feed ingredients and packaging materials 2. Deteriorating environmental conditions 3. Unstable supply of fish for processing due to natural calamities, over fishing, pollution and disease 4. Inadequate infrastructure on support facilities	1. Non-tariff barriers 2. Emergence of ASEAN/ Asian competitors, i.e. India and Indonesia on shrimps and prawns, etc.	1. Liberalization on marine products importation in major Asian markets 2. Increasing demand for health cost 3. Emerging global and regional trade through GATT/WTO	1. Tuna <ul style="list-style-type: none"> a. Modernization and upgrade fishing vessels b. Continuous representation in EU for accreditation c. Access to financial assistance for commercial fishery 2. Shrimps and prawn <ul style="list-style-type: none"> a. Fast track programs to eradicate prawn disease b. Apply the Biological Technology Approach c. Formulate the National Sustainable Program d. Advocate for tariff reduction for feeds and packaging materials

THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND. GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
CHEMICALS <i>Fertilizer</i>	<ol style="list-style-type: none"> 1. "A necessary industry" - fertilizer is a vital component in the development of the agricultural economy 2. "Big demand for the product" <ol style="list-style-type: none"> a. 55% of local requirement imported (about 1 million MT) b. Average 7-10% annual growth rate for the past 25 years c. With the Department of Agriculture's (DA) "Gintong Ani" program, usage is estimated to grow by 20-30% over the next 2 years 	<ol style="list-style-type: none"> 1. Non-use, imbalanced fertilizer application/low fertilizer user efficiency 2. Trading malpractice 3. Non-availability of low interest farm credit 4. Inadequate extension service for small farmers 5. Inadequate transport and distribution facilities <p style="text-align: center;">Needs of Filipino Farmers</p> <ol style="list-style-type: none"> 1. Easy and affordable credit finance farm inputs 2. Adequate water source for paddies 3. Sufficient post harvest facilities such as dryer and warehouses 4. More mechanized farm implement and tools <p style="text-align: center;">Needs and Concerns</p> <ol style="list-style-type: none"> 1. Competitive cost of imported raw materials 2. Development and maintenance of irrigation infrastructures 3. Construction of farm-to-market roads 4. Improvement of existing port facilities and construction of new ports in strategic areas 5. Incentives to fertilizer manufacturers 	<ol style="list-style-type: none"> 1. The international fertilizer, particularly in the Asian region is heading towards severe competition within the next 2 years 2. Indonesia, Thailand and Vietnam are putting up new NPK plants with combined additional capacities of 3,330,000MTPY 3. More phosphate fertilizer will be constructed in Australia, India, China, Pakistan and Bangladesh 4. Projected slow growth of phosphate consumption, placed at 2.2% 	<ol style="list-style-type: none"> 1. Increase and sustain domestic grain production through productivity enhancing measures 2. Optimize the use of fertilizers by farmers along with balanced fertilization through application of recommended dosage rate and right kind of fertilizers at the right time in the right area 3. Enhance farmer's income and stabilize prices of palay and rice at level equitable to producers and consumers through adequate supply and competitive cost of fertilizers 4. Develop products and new market niches 	<ol style="list-style-type: none"> 1. Launching by the DA of the Gintong Ani Food Security Program to sustain and increase domestic grain production 2. Creation of conducive environment that encourages farmers to increase production through the adoption of appropriate use of fertilizers and balanced fertilization 3. Ensure adequate and stable supply of fertilizers during cropping season 4. Expand and intensify infrastructure development 5. Increase in government investments in post harvest and market-related infrastructure 6. Commercialization of post harvest technologies, facilities and equipment 7. Expand distribution outlets as needed 8. Extend credit funds through various credit conduits like LBP, cooperative banks and credit cooperatives 9. Invest in R&D programs and capital equipment.

THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND GRP	STRENGTH	WEAKNESSES		OPPORTUNITIES	STRATEGIES
B. CHEMICALS 2. <i>Petrochemicals</i>	1. Potentially large domestic consumption 2. Availability of investors willing to finance Petrochemical projects	1. Poor infrastructure 2. No indigenous feedstock position 3. Relatively a newcomer	1. Rapid build up of capabilities in ASEAN, notably in Indonesia, Thailand and Malaysia 2. Huge capacities in place in Korea, Japan and Taiwan as well as western economies	1. Fast growing economy will create higher demand 2. Relatively low current per capita consumption vis-à-vis Asian neighbours and developed economies	1. Government Level a. Support local plastic fabricators (mostly SMEs converter) 1. Technology assistance 2. Modernization programs 3. Easy financing terms at concessional rates b. Review of tariff situation vs. neighbouring competitor c. Comprehensive and accurate statistical data bank 2. Company Level a. Development of a strong domestic base b. Productivity/Quality Enhancement initiatives to reduce costs c. R&D on new products d. Existing R&D Projects being undertaken by ITDI are: polymer blending, i.e., PP with SBR, researches on recycling of plastic wastes and biodegradable plastics e. Establishment of a Petrochemical Foundation f. Assist in funding R&D activities g. Manpower development

					<ul style="list-style-type: none"> h. Invite experts in material science to provide training seminars will also be conducted by experts from Tokten I. Upgrading of R&D institution j. Procurement of equipment should be a part of project proposaks that will be prepared by the R&D institut k. Expansion and improvement of existing fabricators l. Establishment of a Petrochemical R&D Center
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THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
B. CHEMICALS 3. <i>Oleochemicals</i>	1. Wide range market and application 2. 12 firms are existing 3. Largely export-orientes 4. EO 259 mandate (See appendix "D")		1. Competition from synthetic-based fatty acid, fatty alcohol, glycerine and derivatives sold at cheaper prices due to the lower cost of ethylene compared to CNO 2. Disparity between the domestic and export prices of CNO 3. Extreme level of CNO prices in the last three years 4. Absence of infrastructure support like piers, storage tanks, power and water lead to higher investment cost and uncompetitiveness 5. Lower quality of CNO compared to PKO 6. Possible repeal of EO 259	1. Higher export earnings for Coco chemicals vis-à-vis CNO 2. Broadening and diversification of the market for coconuts 3. Self reliance on chemical inputs to various industrial and consumer products 4. Various applications for coco-chemicals, both in the domestic and international markets 5. Locally available raw materials 6. Increasing demand for environment friendly products such as oleochemicals 7. Increasing local demand for oleochemicals due to economic growth and better consumer buying power 8. Availability of low-priced managerial-talent compared to Malaysia and Indonesia	1. Strengthening of R&D activities for derivatives through National Coconut Research Institute 2. Encourage joint ventures with companies who have the application know-how for downstream derivatives **Programs** 1. Actively seek joint venture partnerships to secure market and technology 2. Support government programs to improve coconut production 3. Enhance the current knowledge of downstream oleochemical derivatives through the hiring of experienced consultants ***Objectives*** 1. To ensure adequate supply of coco oil for manufacturers 2. To ensure the quality of coco oil 3. To develop downstream Oleochem. 4. To reduce cost of packaging ***Strategies*** 1. Varietal improvement and mass production of selected planting materials for the coco replanting

					<div>development program</div> <div>2. Rehabilitation of low yielding coconut trees that are nutritionally deficient</div> <div>3. Development and technology transfer of selected production technologies</div> <div>4. Strengthening of research capabilities of concerned agencies to generate information on industry and technology packaging</div> <div>5. Enhancement and upgrade of technical and technology transfer capabilities of development staff/offices</div>
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THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
C. GARMENTS AND TEXTILES (see annex "E")	<ol style="list-style-type: none"> 1. Highly skilled manpower 2. Competent senior managers 3. General satisfaction with the quality of Philippine made goods 4. Competitive prices for higher end apparel but not basics 	<ol style="list-style-type: none"> 1. Import dependence 2. Quota market dependence 3. Moderate turn around time but transport of goods ius by air 4. Non investment in technology by most Filipino manufacturers 		<ol style="list-style-type: none"> 1. Improve productivity <ol style="list-style-type: none"> a. Upgrade technology, design and skills b. Increase plant efficiency and reduce lead time c. Adopt productivity based wage increase 2. Manage raw material supply chain <ol style="list-style-type: none"> a. Investments in dyeing, finishing and printing b. Develop Philippine Tropical Fabric 3. Harness design capability <ol style="list-style-type: none"> a. Conduct seminars on design and fashion b. Establish Fashion design Institute 4. Expand market <ol style="list-style-type: none"> a. Move towards high value added products b. Develop own designs/brands hiring foreign designers/ consultants c. Open local market to garment exporters 	

THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
D. METALS	<ol style="list-style-type: none"> 1. Large unutilized capacities 2. Ability to produce internationally accepted quality standards 3. Open up tie-ups and joint venture 4. Proximity to major markets 5. Eligibility to preferential tariff schemes in US and Europe 6. Flexibility to produce various types of products 7. Highly skilled workers 8. High qualified technical staff 9. Competitive labour costs and support services 10. Ability to localize machinery parts bringing about conservation of foreign exchange through import substitution 	<ol style="list-style-type: none"> 1. International marketing capabilities 2. Finance 3. Production 		<ol style="list-style-type: none"> 1. Philippine metal products are tariff free in the US market 2. Casting forging are sunset industries in developed countries due to environmental regulations 3. Closure of many foundries, metal fabricating firms in the US 4. Recovery of US economy expected to result in increase of imports of expanded valve and pipe fittings showing strongest growth 5. Japan's difficulty in sourcing labourers in their foundries and forging plants will open up doors for Filipino workers 6. Joint ventures with foreign firms relocating from developed economies 7. Currency devaluation and appreciation of US\$ 8. Acceptance of global sourcing for Western countries as a tool for competitiveness 9. High level of industry interest in export markets due to the instability of the domestic market 	<ol style="list-style-type: none"> 1. Pursue a marketing approach in target markets on the industry and firm level 2. Modernization of production process to achieve world class status 3. Implementation of quality and productivity improvement programs 4. Establish industry database 5. Strengthen linkage between metal sector and other priority export sectors

THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
D. METALS 1. <i>Copper</i>	1. One of the export industry winners 2. Competitive position	1. Need for upgrade of old machinery and equipment 2. Misdeclaration/technical smuggling 3. Undue competition from sub standard products 4. High interest rates and lack of long term financing 5. High tariff of some inputs 6. High power cost 7. High freight cost and handling charges compared to international standards 8. Tax and duty free importation of finished products by utility firms (NPC, MERALCO, NEA and TELECOM) 9. PASAR's long delayed financial rehabilitation/recapitalization		1. Available copper resources 2. Substantial economic value for the country if industry direction is to manufacture as many finished products will grow in proportion to GDP growth 3. Expected substantial growth in regional demand for copper products 4. Full development of the local copper industry has the potential to export/reduce Philippine trade deficit by US\$ 1,200 million by the year 2005	1. Over all a. Financial rehabilitation and recapitalization of PASAR to become a financially strong core company for the copper industry b. Make PASAR the linchpin of the strategy to develop a world class local copper industry 2. Market expansion/investments a. Acquisition of joint ventures and/or foreign direct investment for export b. Encourage local companies to integrate operations and go into high value added products c. Encourage local foundries and producers to go into export market d. Extend full support to the industry's promotional activities 3. Technology transfer/modernization a. Encourage modern technology acquisition

					b. Provide assistance to the industry in sourcing cost effective packaging materials
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THE STATUS AND PROSPECTS FOR THE MANUFACTURING SECTOR: SWOT ANALYSIS (BOI)

IND GRP	STRENGTH	WEAKNESSES	THREATS	OPPORTUNITIES	STRATEGIES
E. ELECTRONICS	1. Competitive labour pool 2. GSP privilege status 3. Presence of MNCs with long history of unhampered operations 4. World class production quality of production and workmanship	1. Generally labour-intensive and low value added activity 2. Underdeveloped components and support facilities 3. Weak PR program	1. Peso appreciation 2. Perceived political instability and government bureaucracy 3. Inconsistent environmental changes 4. Rapid technological changes 5. Rise of other low labour cost areas 6. Legislated wage adjustments independent of productivity gains	1. Opening up of Japanese market 2. Establishment of offshore facilities by MNCs due to cost pressures 3. AFTA and Asia's increasing for electronic good 4. Increasing local demand for electronic good	1. Increase local value added from 10% in 1995 to 40% by 2000 2. Production of own brand products 3. Establishment of electronics enterprises outside Metro Manila 4. President to continue being the Market Man 5. Implementation of EDC incentives 6. Operationalization of new investments

CHAPTER V

THE INCENTIVE SCHEME FOR R&D

“How Effective is the Scheme?”

THE BOI INCENTIVES ON RESEARCH AND DEVELOPMENT

To encourage private sector's engagement in R and D, government grants R&D incentives to investors who will comply the guidelines set by BOI. The following incentives are listed below;

Fiscal Incentives

1. Income tax holiday
2. Deduction for labour expenses
3. Tax and duty exemption on imported capital equipment
4. Tax credit on domestic capital equipment
5. Exemption on breeding stocks and genetic materials
6. Tax credit on domestic breeding stocks and genetic materials

Non Fiscal Incentives

1. Simplification of customs procedure
2. Unrestricted use of consignment equipment
3. Employment of foreign nationals

THE PROMOTIONAL ASPECT OF THE SCHEME

One of the sources of success of any program or activity is anchored in its promotional strategies targetting a specific group. R&D is a relatively new priority area that the IPP places much emphasis. The BOI made use of the two avenues in promoting R&D and the incentives related to the scheme. The first one is through disseminating the IPP and related campaign materials, which the marketing section manages; and secondly, the establishment of

information center which the One Stop Action Center of BOI is directly in charge.

Result of the Participatory Observation (PO). To test whether these two avenues are effective in promoting R&D and the incentives related to it, several investigations were conducted³². Results were as follows:

1. IPP could only reach a limited number of people and industry firms constrained by the following factors: limited production of IPP materials and the type of accommodation that potential applicants receive from the person-in-charge of IPP dissemination.
2. Uncoordinated units of the BOI. Most of the department units do not have any idea³³ where to refer a potential R&D applicant. In fact, some do not know that this was outlined as a priority area in the IPP.

Generally, there are six major procedures in approving an R&D application; although this does not mean that within each identified process only a sub procedure is conducted.

The first procedure (A) involves applicant-firm completion and submission of all needed requirements³⁴. These are to be forwarded to the concerned industry department of the BOI. The company or institution, serving as the applicant, may pass these anytime.

The second procedure (B) is bound by the concerned BOI staff's time. In this very phase, the fluidity of the process is determined by the efficiency of the said individual or group. This is the stage where most of the R&D applicants had expressed their impatience, uneasiness and complaints. Inconveniences due to repetitive submission of the same requirements to the BOI were experienced by R&D applicants³⁵ for which they accounted to poor

³²Considered BOI branch- Main Office, Makati City. Exemption on Corporate Income Tax, one of the incentives for R&D has taken effect last January 1998.

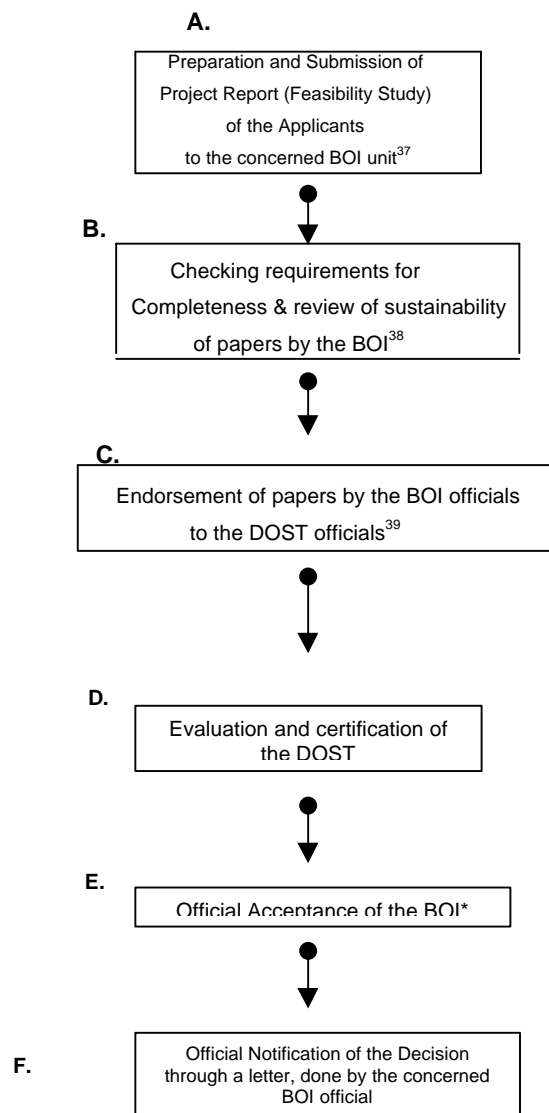
³³Application query was done over the phone

³⁴Filled out application forms and feasibility study.

³⁵Applicant firms that availed of R&D Incentives were considered.

**Revisiting the Guidelines for
R and D Registration of Activities**

**Chart 1: FLOW OF ACTIVITIES IN REGISTERING
FOR R&D INCENTIVES³⁶**



file or data management. Applicants also complained of the poor accommodation of workforces, on the following occasions:

- Unwillingness to accommodate applicants when nearing lunch time, breaktime and off-office hours. There was even absence of a skeleton force during breaktime.

³⁶Modified Presentation. Based on BOI R&D Guidelines in Applying for R&D.

³⁷Prepared by the applicants

³⁸Submitted to the One Stop Action Center

³⁹Conducted by the Undersecretary of R and D of the DOST. Should act upon in not more than 15 days after the receipt.

*The approval will be finalized in not more than 20 working days. Undertaken by the R&D BOARD (BOI).

- Bureaucratic hassles. Avoiding responsibility in directing, approving or even taking initial actions on the application, especially during the time the concerned officer (directly in-charge of the said papers) was out of town, or elsewhere outside the realm of the office.

And these procedural constraints and inefficiencies were imputed to the following foul practices:

- political clout, “*palakasan system*” and red tape;
- consequently, “*paramihan ng malalagay na pera*”

These imply:

- that government is coddling a specific industry player or so;
- that efforts to promote R&D is not sincere.

Procedures C, D and E are decided upon, in consideration of the following criteria:

Table 44: CRITERIA IN APPROVING R&D APPLICATION: DOST AND BOI

BOI		DOST
● →	<ul style="list-style-type: none"> • contributory to national development placing the country, not just the industry in a competitive position • encouragement of technology transfers to local manpower • impact on productivity and efficiency • economic and technical viability of the product/process (esp. product commercialization) 	← ◆
● →	<ul style="list-style-type: none"> ➤ promotive of sustainable development • applicability of technological advances to local conditions • sound environmental impact • utilization of indigenous materials in the final production 	← ●
● →	<ul style="list-style-type: none"> • Expertise of the applicant company/corporation to undertake R&D 	← ●

Source: DOST and BOI. Details were modified and re-groups for the purposes of the study

Although the BOI and DOST have a very consistent set of criteria, this generally leaves an impression (on the part of the applicants) that BOI-endorsement means it is an approved phase; and that, DOST decision is just a matter of formality. Thus, this is deemed to have caused other companies to believe and place much conviction that DOST should be left unconsulted, and to some extent, better be abolished.

The Scope of R&D and Extent of Support

The Scope

The R&D activities considered by the BOI are classified as follows:

Table 45: R&D Scope

	DESCRIPTION
By form of result	<ol style="list-style-type: none"> 1. adaptation or improvement of an existing technology 2. new technology or manufacturing/inventing/discovering new and untried technology on a commercial scale in the country 3. reformulation or redesigning of technology
With emphasis on	<ol style="list-style-type: none"> 1. (increased) productivity of the concerned user and of the firm 2. (better) product quality, equipment and materials 3. (extensive) utilization of indigenous material vis-à-vis imported materials
Project Sites	<ol style="list-style-type: none"> 1. In-house R and D, R&D activities conducted within the said institution for its own use/purpose 2. Commissioned R&D, researches contracted to an institution by other institution/office for the latter use
Concerned sector	<ol style="list-style-type: none"> 1. agricultural, industrial and health

Details were sourced from BOI R&D Guidelines. Modified presentation.

R&D activities are not merely focused on developing a new product or product line. The end form result could either be an innovation/ formulation or enhancement/reformulation.

However, zealous and extensive dissemination of information regarding R&D is lacking. Awailees claimed of having known the said package due to:

1. constant communication with the BOI officials; and,
2. their demanding behaviour to secure an IPP material

They emphasized that if R&D incentives are to be promoted in a very traditional manner, the smallest firms would not even benefit from the scheme. The nature of the promotional activities, according to them is designed exclusively for a specific firm size and is very much restricted within the confines of the concerned building. Naturally, smaller firms (small and micro scale) would have a little knowledge about these things.

One of the BOI-R&D registered firm management, the new and present administration has no idea of the R&D incentives availment of the old management. The problem observed here is not about communication gap between the old and new management, but how the BOI is luring back, following up and nurturing the firms and activities or projects that had been given or granted with incentives⁴⁰. The value and system of incentive-giving/granting are more of free-for-some (selective) dole-out rather than progressive-for-all grants. Awailees retorted that right from the very start of the application and end phase of the R&D project, the concerned government agencies are no longer visible.

Is it encompassing? The IPP incentive scheme is wholly concerned with techniques or creation, of new or modification of existing product lines. Hence, this incentive package scheme in R&D (IPSRD) gravitates awailees to engage in experimental/laboratory/manipulative R&D activities. Talking about

⁴⁰In fact, the present management have known only of these incentives due to the researcher's insistence that there is such a provision in the IPP, and that BOI has specific guidelines for R&D application.

the different dimensions of R&D, there exist marketing technology, human resources development and management technology, which are imperative facets needing further re-direction and promotion that should be done concomitantly with the former.

Why is the latter a “must”? Companies⁴¹ are expressing discontent over the government’s inability to provide technical assistance. This technical assistance⁴² unequivocally pertains to the: 1) strategic marketing or identification of market niches; 2) a market push, or the creation of product demands and markets for new products; and, 3) market expansion or widening of market share, which the present administration could not assist in supplying the Philippine manufacturing sector. Only previous statistics are predominantly available in its databases and profiles⁴³. Furthermore, the government is urged to be familiar and updated with the latest technology since this core is promoting R&D. With such government technology awareness lag, these firms: 1) are not being extended assistance as to where to buy existing spare parts suited for their R&D, especially in cases of shortages in supply; and 2) R&D outputs, like a design or an innovation, are not immediately and warmly welcomed and promoted by the concerned government offices, leading to the players’ disappointment with the system.

The Support: The Incentives Scheme

Normally, companies need to apply for incentives upon the approval of their R&D applications. The incentives are written in the certification issued by the concerned BOI staff.

Incentives given by the BOI are double-edged⁴⁴. The first edge refers to firm-availees by type of capital equipment (CE) needed and used: heavy import-dependent or domestic CE dependent; 2) firms by type of R&D outputs market-orientation: immediately for exports and for domestic/local consumption.

⁴¹Only interviewed firms are considered.

⁴²The least will be giving bits of information.

⁴³It is true in some aspects. Some industry profiles (1995 and 1996) are being updated last February 1998, for some other industry units of the BOI.

The benefits of the first stage has been attested by the import dependent firm as it enables the company to save 10% of the total cost of operation⁴⁵ and 20% of R&D budget. However, the National Economic Development Authority (NEDA) and the Department of Finance (DOF) expressed their hardline campaign in removing the above incentive as this yields revenue losses (government) summing up to PhP 11 billion in 1997 alone. This subtends the incentive system. Naturally, given that this will affect production cost, R&D will generally be an unattractive business venture.

As for the second type, the other Filipino-owned firm has only availed of deduction for labour expenses incentive. It was granted with Income Tax Holiday (ITH) incentive and did not apply for a tax credit on domestic CE (TCDCE). As for the first case, the Omnibus Investment Code (OIC) of 1997 does not allow a firm to avail of both incentives: ITH and TCDCE. ITH could only be granted to a firm if its R&D outputs are to be exported⁴⁶(see related study on: *A Cost or Investment?*).

The case on tax credit exemplifies best the level of intensity of the BOI R&D promotion. According to one of the incentive grantees, the TCDCE are given to the local raw material producer. But in re-examining the OIC of 1987, the grantees of tax credit are the registered companies themselves (R&D undertakers). With these two inconsistent claims, different IPPs were reviewed and the last two investment incentives codes were re-examined, and found out that company claim indeed was present in the Third IPP. The question here is, “what led her to think of the former when in fact the Third IPP saw its last effectivity in 1970 and did not anymore transpire beyond then?” There was an earlier assumption that there could have been a plain communication gap (between the informer and the applicant). However, to validate the claim, the participatory observation was again used. Observation showed that some staffs⁴⁷ really gave inaccurate description of the incentive provisions. Others who were unsure or had no idea of the said guidelines addressed the concerns to a higher authority.

⁴⁴Findings if the researcher.

⁴⁵Equivalent to \$3 million.

⁴⁶includes other list of priority area (LOPA).

⁴⁷BOI staff. This was conducted over the phone.

The incentives offered to the firms relying on imported materials for production and know-how have unequal yardstick-privilege content with those who rely heavily on domestically produced materials.

Table 46: Yardstick Countering of Incentives

Incentives availed of Firms dependent on Imported Resources for Production	Incentives availed of Firms dependent on Domestically Sourced Resources for Production
<p><i>Fiscal Incentives:</i></p> <ul style="list-style-type: none"> * ITH * Tax Duty * Exemption of genetic breeding stock <p><i>Non Fiscal Incentives</i></p> <ul style="list-style-type: none"> * Simplification of custom procedure * Employment of foreign nationals * Unrestricted use of consigned equipment 	<p><i>Fiscal Incentives</i></p> <ul style="list-style-type: none"> *Deduction on Labour Expenses *Tax Credit <ul style="list-style-type: none"> a. CE b. genetic breeding stock <p><i>Non Fiscal Incentives</i></p> <ul style="list-style-type: none"> * Unrestricted use of consigned equipment

This backdrop by nature is a disincentive. In cases where non-fiscal incentives are given by virtue of employing a foreign national, there are no equivalent non-fiscal incentive given to a firm, employing a local scientist considering that the impact of the latter is greater than the former, where indigenous R&D culture is being promoted.

Exemption on imported CE is not a problem that BOI incentives should be criticized for. But impinged upon the process is the difficulty in procuring these in the Customs, considering that it is a non-fiscal incentive. As disclosed by some of the respondents, the procedural constraints in resources procurement in Customs delay on the firm operations.⁴⁸

The second stage. BOI has a set of guidelines which could not pronounce categorically the objective or rationale or the expectations of the

⁴⁸IDC-BOI. *IDPP, 1988 to the 21st Century: A Preliminary Report*. Paper submitted by Dr. Jose A. Magpantay, p.12).

R&D activities of a firm (See table 62). For instance, ITH is fostering or intensifying export-oriented R&D outputs, while the tax deduction is for the intensification of domestic R&D output production, yet the guidelines nor the IPP could not directly lay down. This kind of down toning disappointed an avalee for being able to avail of only two out of eight available incentives.

As a general observation, the guideline is so loose as this contains concerns which are not clearly defined; flat, because these incentives do not operate within the principle of incentives that is reinforcing a behaviour instrumental in attaining the highest state of development or maturity of the country.

The graph depicts R&D, as a private undertaking progress. The first stage is self contained. However, from the second stage down to the third stage, there exists some difficulties.

Stage 2 requires both financial, technical and technological readiness in order to realize the desired result of the project. A provision in the IPP requires R&D applicants a brand new quality control laboratory and testing equipment before incentives are granted (*IPP 1998*, p. 22). To pool the house with complete machinery, manpower (more than five people) should be absorbed by the company. Materials and supplies should be procured in bulks for the trial period, reconditioning and commissioning. Imagine how much the company will expend in creating a single output without assured immediate returns. Thus from here, R&D activities are initially a cost shouldered by firm in venture⁴⁹ (See table 48: Expenses).

R&D entails a large amount of money to carry out serious operations where error in procedure should be limited or be tolerated at a minimum recurrence.

⁴⁹ Actually, what seems to have emanated from the responses is that R&D is more of a risk. R&D can not be considered by the respondents a form of investment for supposing that R&D will yield greater profits in the long run (whether in a pecuniary or qualitative manifestation). However, as they pointed out, success stories vary from time to time and from one company setting to another, or that may be non-existent at all.

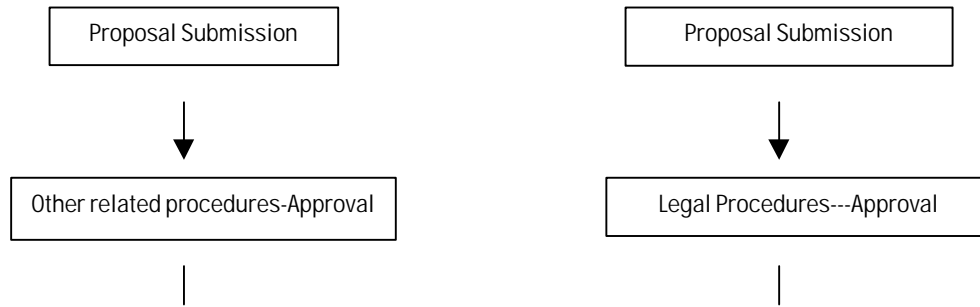
The Perception: A Cost or Investment?

Chart 2. THE R&D PROCESS AT THE FIRM LEVEL

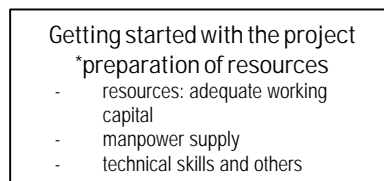
Non BOI-Registered R&D Activity

BOI Registered R&D Activity

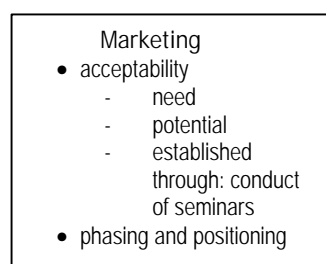
Stage 1: Inception



Stage 2: R&D Product in the Making



Stage 3: Product Marketing



The graph depicts R&D, as a private undertaking progress. The first stage is self-contained. However, from the second stage down to the third stage, there exist some difficulties.

Stage 2 requires both financial, technical and technological readiness in order to realize the desired result of the project. A provision in the IPP requires R&D applicants a brand new quality control laboratory and testing equipment before incentives are granted (*IPP 1998*, p. 22). To pool the house with complete machinery, manpower (more than five people) should be absorbed by the company. Materials and supplies should be procured in bulks for the trial period, reconditioning and commissioning. Imagine how much the company will expend in creating a single output without assured immediate returns. Thus from here, R&D activities are initially a cost shouldered by firm in venture⁵⁰ (See table 48: Expenses).

R&D entails a large amount of money to carry out serious operations where error in procedure should be limited or be tolerated at a minimum recurrence.

The fear of other companies are glaringly evident from Company C where R&D expenditures do not automatically read as increase in sales⁵¹. In fact, R&D activities are being subsidized by the revenues incurred from other product lines to cope with the said operation.

⁵⁰Actually, what seems to have emanated from the responses is that R&D is more of a risk. R&D can not be considered by the respondents a form of investment for supposing that R&D will yield greater profits in the long run (whether in a pecuniary or qualitative manifestation). However, as they pointed out, success stories vary from time to time and from one company setting to another, or that may be non-existent at all.

⁵¹Net sales are smaller than gross sales.

Table 47: Coping Mechanism

Company in Joint Venture	Wholly Filipino-owned
<ul style="list-style-type: none"> collaborate with mother company to facilitate sourcing of available but cheaper materials, at least to facilitate ease up concerns and minimize expense Augmentation Measures <ul style="list-style-type: none"> get people who can, as much as possible, handle 3-5 tasks at a time technical servicing consultancy services programming softwares for office purposes 	<ul style="list-style-type: none"> Sourcing of funds, et. al. *Source assistance from private and public institutions (for financial support) subsidizing R&D through the revenues derived from salable and competitive product lines subcontracting

Source: Respondents.

Table 48: EXPENSES OF INTERVIEWED FIRMS IN CONDUCTING R&D

Company Code	Industry Group	Year	Expenses (PhP)			Budget (in million PhP)		Gross Sales
			Fixed	Variable	Total	Est. Total	Share (%)	
A	Electronics	1996	327,500	88,200	415,700	19.4	2.14	n.r.
		1997	369,600	215,800	585,400	23.7	2.5	n.r.
B*	Consumers	1993	n.r.	n.r.	8	n.r.	-	3
		1994	n.r.	n.r.	4	n.r.	-	-
C*	Electronics	1990	n.r.	n.r.	3	n.r.	n.r.	7.5
		1991	n.r.	n.r.	2.15	n.r.	n.r.	1.5
		1992	n.r.	n.r.	6.6	n.r.	n.r.	3.5
		1993	n.r.	n.r.	8	n.r.	n.r.	1.1
		1994	n.r.	n.r.	10.4	n.r.	n.r.	1.1
		1995	n.r.	n.r.	10.7	n.r.	n.r.	2
		1996	n.r.	n.r.	11	n.r.	n.r.	1.6
		1997	n.r.	n.r.	11.3	n.r.	n.r.	1.2

/_ B. Consumers. Amount of expenses and gross sales are in million Pesos; Gross Sales, company sales inclusive of the other product line.

/_ C. Electronics, Gross Sales, inclusive of the revenues from the other product lines. /_ A. Electronics, total Company Budget.

/_ Figures based on the information that the respondents shared

For this matter, companies with foreign mother companies (FMCs) are relatively flexible because: 1) FMCs could succor subsidiaries in search of potential markets and cheaper resources; 2) they have relatively more diversified operations as compared to the wholly owned Filipino firm which need both technical assistance and financial support.

“Those who are in need of R&D are those who need to upgrade and make their products very competitive,” This postulate however, can be craned to the lowest stratum of the industry. Micro, small and medium scale (MSMEs) firms are adversely affected by the dichotomous structure of the manufacturing sector; and in that, could hardly move forward. Large firms have the capability to focus on producing and exporting products. R&D is indeed useful to their operations. UNCTAD (1994), as a matter of fact, explained that MSMEs are better off in terms of technological innovation than the large firms. But because of the cost involved, the latter could not easily take the risk of expending. Moreover, these firms are not assured of receiving remunerations, in cases of revenue losses. This scenario explains why MSMEs could handle an R&D project, but no guarantee that exists that they will be able to sustain operations⁵². Further, the incentive availment is dominated by large firms in the metropolis and is biased against the labour intensive firms. With a small space left for MSME, how would there be a necessary shift of interest to R&D?

Stage 3 difficulties. According to those who are undertaking R&D, the fruits of their company burden is still far from over, although a design is already finalized. Sourcing of materials and other related processes are the major problems of production. For electronics, the foundation material of all circuits, printed boards, are not even available in the country. Based on the experience of a BOI-registered firm (R&D), it took them several steps before being able to identify a manufacturing company abroad whose board designs suit their R&D activity. Those who are in joint venture, on the other hand, could source R&D materials from their partner companies or from the countries of their mother companies.

⁵²Definition of investment follows the definition observed in the responses of interviewees: the means to produce profitable yields in a specific operation.

On marketing. The actual R&D output marketing is tantamount to starting from nil. Marketing products entail immense amount of promotional and strategic activities. This means that there will still be an additional outflow⁵³ aside from what had been expended for Stage 2. Series of seminars about the new products are fundamental but imperative for acceptance.

Consumer-end products or industry has a little problem over consumption, but those into machineries and ware designing and development⁵⁴ are pressed with difficulties in competition.

In gaining portion of the ground, phasing in and positioning of R&D products are inevitable steps. However in grabbing a market share, market and industry databases should be updated, loaded with prospective course of actions and trends, and be made accessible to entrants and old players of the industry. These are item-problems that R&D undertakers face. With a head-to-head, neck-to-neck competition⁵⁵ with the foreign products (shipped and made from foreign countries) and big expenses incurred from R&D operations, firms into R&D (BOI registered) need a more strategic foothold in the market in the process of marketing their R&D outputs; however as earlier pointed out, databases of the government are inadequate and outdated for the industry use. The subsidiaries, on the other hand, admitted that they resorted to: soliciting assistance from their mother companies in search of markets abroad. But a query could be asked, “where will the wholly-Filipino companies owned lean on to?”

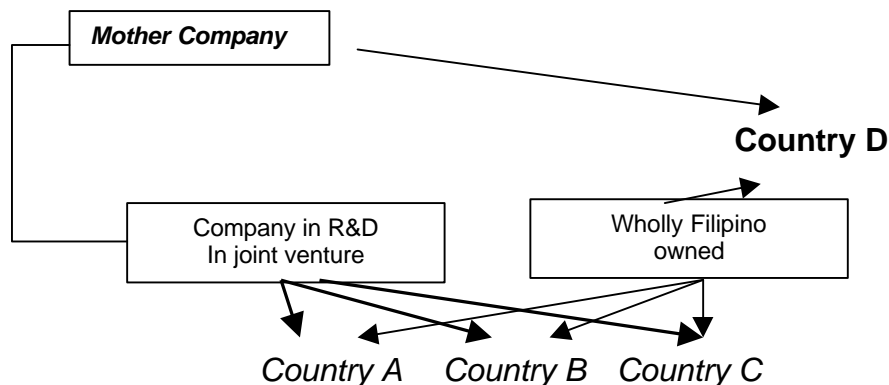
Product casing is another problem encountered by the firms in R and D. This adds up to the production cost, for only foreign countries have an industry of this kind, like Taiwan.

The ITH, an incentive given to R&D undertakers, is a contained conflict in marketing difficulties. In the Omnibus Investment Code of 1987, there

⁵³Money expended for the said purpose.

⁵⁴Prospective clients carefully grade the production process and the outputs of firms in this line of business.

⁵⁵Because they could set prices lower than what the local firms could actually offer or set.



**Chart 3. Schematic presentation: Disadvantage of Filipino Cos. in R&D:
In Sourcing materials and other processes**

stipulated that the ITH could only be granted to firms who could export 50% of their outputs. R&D scheme follows this export guideline for ITH granting. The difficulty in positioning products in both international and domestic markets is a serious problem that the government needs to address.

R&D outputs on the average will reap returns to a company in three to five years time. Matsushita, disclosed that its rates of returns for investing in R&D is 20% ; as for Mitech, 23%.

External Factors Affecting R&D and the Scheme

Table 49: Effects of Devaluation on R&D: A Punnett Square Presentation

DEVALUATION (*)	(A) JOINT VENTURE	(B) FILIPINO-OWNED	RESULT
Predominantly local resources dependent	<ul style="list-style-type: none"> no problem since rates of domestic materials are stable 	<ul style="list-style-type: none"> no problem, materials used are internally sourced, have stable prices 	<ul style="list-style-type: none"> can manipulate pricing
Import dependent	<ul style="list-style-type: none"> no problem since its affects unfavourably operational costs prices remain high because materials remain high, but prices could not be jacked up 	<ul style="list-style-type: none"> prices remain high problem in sourcing less expensive materials, within the budget 	<ul style="list-style-type: none"> breakeven in R&D produced other lined-up activities for technical and manpower development are being set aside, due to cost cutting measures

The peso devaluation that occurred nearly five to seven months ago, which had further intensified in January 1998, had produced bi-facetted effects to those undertaking R&D.

Peso devaluation and serious fluctuations in dollar exchange rate produce adverse effect on import dependent R&D undertakers, on the other end, place an advantageous hold for domestic producers and the (A&B)*(1). (A&B)*(2)'s related R&D activities were counter offended.

Table 50: A Cross Sectional View: The Most Affected Firm

Cost Cutting		A	B
Conditions Of R&D Operations	1	- generally manageable ↓	- generally manageable
		*mother companies are supportive	
Conditions of R&D-related Operations	2	↑ - generally manageable	- generally affected • almost all resources are sourced from outside • even trainings are being set aside

The most affected as stated above is the (B)*(2), since almost all sources are externally purchased while internal linkages are poor.

To quantify (based from A*2) these incidences inflicted an incremental change of 70% in the R&D operational cost (to a grantee-availee), whilst 29% in total budget.

Another problem is the less productive forces that the universities are producing. The intellectual forces are assessed by the firm (R&D) to have so limited stock of knowledge about the recent trends, especially on programming, being dependents on DOS-based processes for instance because these are the things that their schools offer⁵⁶. Due to this, two options are resorted to by them: 1) to train these people, but these are so

⁵⁶Having the same content of curriculum on computer programming five years ago.

impractical and time-consuming; or, 2) contract out consultants than rely on those starters because: a) the productivity level of these consultants are higher; b) cost or fee is lower compared to the training cost; and, 3) time-efficiency, because training objectives are not met within three months time.

Chapter VI

R&D IN RETROSPECT

The need to set up the best climate, conducive for technological innovation, progress and development for the country is deeply membered in the global village. It does not mean, however, that this must be twined in the R&D bandwagon without properly envisioning the type of nation that is desired to be established in different phases of time. In fact, UNCTAD (September 1990) likewise emphasized the development in R&D in many countries remained until now, without significant social impact. This resulted from the impulsive drive towards R&D adoption without directing, connecting and integrating efforts of the important players: government and the manufacturing sector. Industrial basic production needs⁵⁷ still await of serious course of actions to answer them. And in this very case, we can situate where our R&D currently nests on.

R&D, in its most pristine state in the country, is traceable to have started after the era of world war. It was brought to a craggy situation from 1970-80⁵⁸ due to re-direction of economic policies⁵⁹ and overhauling of the industry in favour of crony capitalism. Dr. Little stressed that this R&D stagnation (regression) transformed and brought down the level of productivity of the manufacturing sector into a practically zilch state (See table 51).

It took the country two more generation of leaders to change the course of R&D. It was only in 1990 that R&D has been given a relative importance by the government, not just an academic endeavour, but also as an industrial concern (Table 52). It is essential to: 1) define and identify who are the stakeholders of this activity; and 2) know the stakeholders' impression on R&D: is it just a phenomenon merely seeking for a worldwide acceptance

⁵⁷ Maintenance, standardization, testing, quality control and trouble shooting.

⁵⁸ Martial Law regime.

⁵⁹ Export-oriented drive and feminization of labour.

or a real need to be addressed? If R&D is perceived as the former case, then planning for the future with R&D can be discarded; however, if the latter is considered, it is important to account rational planning to obviate from the R&D's present state-of-affairs.

Table 51. IPP : Tracing the Beginning of R&D

<i>List of Areas</i>	68	70	75	77	80	81	85	88	89	90	91	92	93	94	95	96	97	98	REMARKS
Export Oriented Industries	↓	↓	↓	↓	↓		↓				✓	✓	✓	✓	✓		p/np		1968: A- within the schedule of agricultural products; B, mining; C, manufacturing 1970 Included are footwears in the schedule 1975 Included were the wood products; crop prod'n; soybeans, nuts, rubber and other chemicals; IV.B refers to equipment. Utilities a\were also included 1977 Included were the wood V.C., treeplanting, lumber plywood, veneer and pulp III.E: bicycles, heavy vehicles and ship, engineering productsI; other agricultural prod's 1980 dairy, cattle, poultry; Agriculture based products minerals
Catalytic Industries																			
A. Manufacturing																			
1. Composite Board	-	-	-	-	-	-	-	-	✓		-	-	-	✓	✓		p/np		
2. Drug and Medicine	c	-	✓	-	-	✓	✓	✓			✓	✓	✓	✓	✓				
3. Shipbuilding/ repair	-	✓	-	✓	-	-	✓	✓			✓	-	-	✓	✓				
4. Processed Foods	c	-	✓	✓	✓	✓	✓	✓			-	-	-						
5. Cements	-	-	-	-	-	-	-	-			✓	✓	✓	✓	✓		p		
B. Agri, Food and Forestry																			
1. Production Planting	-	-	-	-	-	-	-	-			-	-	✓	✓	✓		p/np		
2. Pulp and Paper	A	-	✓	✓	✓	-	✓	-			-	-	-	-			p/np		
III. Industries																			

Undergoing Industrial Adjustments																			III.E. Included engineering Products, utilities/energy foodings; nets; leather products
A. Textiles	C	-	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	p/np		
B. Chemical Products	C	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	p/np		1981 rootcrops; II.A.2. herbal and medical and pharmaceutical chemicals & drugs other processed foods, minerals, metals and professional and scientific equipment, utilities and conservation processes
C. Sugarcane	-	-	-	-	-	-	-	-			✓	-	-	✓	✓	✓	p/np		
D. Packaging	-	-	-	-	-	✓	✓	-			-	-	-	-			P		
E. Machineries	C	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	p/np		
F. Coconut	C	-	-	✓	-	✓	-	-			✓	-	-	-	-	-	p/np		1985 fooding; wood; footwear; leather; electronics; oil Rehab'n and modelling of plants and miscellaneous; storages
G. Fishery	A	-	✓	✓	✓	-	-	✓			✓	✓	✓	✓	✓		p/np		
H. Feeds	-	-	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		p/np		
IV. Support																			1986 leather, agro-based minerals and metals rehabilitation of industrial plants; public utilities and conservation; IV.D. hazardous and industrial waste management; Industries supporting exporters; service exporters
A. Infrastructure	C	✓	✓	-	✓	✓	✓	✓			✓	✓	✓	✓	✓		P/NP		
B. Common Carners	C	✓	✓	-	✓	✓	✓	✓			✓	✓	✓	✓	✓		P/NP *		
C. Agri-Services (livestock, fish prod'n...)	-	✓	✓	-	-	-	-	✓			✓	✓	✓	✓	✓		NP*		
D. Environmental	-	-	-	-	✓	✓	✓	✓			✓	✓	✓	✓	✓		P/NP		
E. R&D	-	-	-	-	-	-	-	-			✓	✓	✓	✓	✓		P		

F. Support to other Government Projects																		
1. Rice and Corn Production	A	-	✓	✓	✓	✓	✓	-			-	-	-	-	-		NP	
2. Livestock /Poultry Production	A	-	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		NP	
3. Housing	-	-	-	-	-	-	-	-			-	-	-	✓	✓		P/NP	
4. Motor Vehicles parts, etc.	C	-	✓	✓	✓	-	-	✓			✓	✓	-	-	-		P/NP *	
5. Social Services	-	-	-	-	-	-	-	-			-	-	-	-	-		P/NP *	
6. Tourism	-	-	-	-	-	-	-	✓			✓	✓	✓	✓	✓			

--- Contents of the List of Priority Areas (LOPA) are patterned after the 1997 LOPA as indicated in the IPP-BOI./_ Notice that from 1968-1985, Export Oriented Industries have the schedule for each sector. A-agriculture; B-mining and C-manufacturing. /-l. With checks (from 1988-1995) covers different priority areas unlike the former (1968-1985) suggesting that incentives were heavily geared to their activities. /- For the year 1968, A,B, and C mean

Table 52: R&D Expenditure in Selected Asian Countries in US\$

COUNTRY & YEAR	GNP AT CURRENT PRICE	R&D EXPENDITURE	% OF GNP	TREND
Philippines				
1979	29552	76.3	.26	↓ Moving to \< .10
1980	35219	91.9	.26	
1981	38434	33.9	.17	
1982	39278	60.3	.15	
1983	34081	46.3	.14	
1984	31580	36.7	.12	
Sri Lanka				
1974	3656	5.4	.15	↑ Moving to >/ .2
1975	3852	6.4	.17	
1984	4	9.2	.19	
1987	932	10.1	.18	
	5659			
Indonesia				
1978	49495	187.2	.38	↓ Move to \< .2
1980	69275	256.0	.37	
1984	81261	271.9	.33	
1985	83190	218.0	.26	
1986	82695	188.5	.23	
South Korea				
1970		26.5	-	↑ Move to \> .2
1975	20795	88.1	.42	
1980	60373	348.6	.58	
1985	83733	1327.7	1.59	
1986	87961	1728.2	1.96	

Source: STMP-DOST quoted in Carino, Virginia S. *Philippine S&T: time for Bold Moves*. (Diliman, Quezon City: UPCIDS-UP Press, 1993), p. 39.

The stakeholders

Many planners suggest that R&D in the country should have the largest base support coming from the manufacturing; secondary only are the other sectors of the economy including the government. Noticeable from this suggestion is a prototype of the modernization and expansionary plans (R&D) of the industrialized countries. Reviewing our initial observation, the country is just starting to learn its way on R&D for nation building, thus setting the

limitation for the planners.

In the earliest R&D of the United States, federal expenditures in the early 1900's were placed at \$3.5 million and valued at \$100 million in 1940⁶⁰ (Dupree, 1964). National spending in 1954 was scaled at 9% but drastically increased to 36% in 1956. R&D intensification spilled over to employment, in a positive light (*Ibid.*) Notice also that a big portion of the cost of research was channeled to the industry sector.

**Table 53: SOURCES OF FUNDS FOR R&D IN THE UNITED STATES
BY SECTOR, 1953-1960**

YEAR	TOTAL FUNDS FOR R&D	R&D FINANCED BY (In Million US\$)			
		Federal Government	Industry	Colleges/ Universities	Other Non- profit Institutions
1960	13890	9010	4550	210	120
1959	12680	8320	4060	200	100
1958	11130	7170	3680	190	90
1957	10100	6390	3450	190	70
1956	8670	5095	3325	180	70
1955	6390	3670	2510	155	55
1954	5620	3070	2365	140	45
1953	5150	2740	2240	130	40

Source: National Science Foundation, Reviews on Data on Research and Development, #33, Data Sheet, p.2. (Terleckyj, p105)

⁶⁰ Excluding the cost of censuses.

**Table 54: PERFORMANCE COST OF RESEARCH AND DEVELOPMENT
IN THE UNITED STATES**

YEAR	TOTAL COST FOR R&D	COST OF R&D PERFORMED BY (In Million US\$)			
		Industry	Federal Government Industry	Colleges/ Universities	Other Non- profit Institutions
1960	13890	10510	1900	1200	280
1959	12680	9610	1830	1000	240
1958	11130	8360	1730	840	200
1957	10100	7730	1440	780	150
1956	8670	6600	1280	650	140
1955	6390	4640	1090	530	130
1954	5620	4070	950	480	120
1953	5150	3630	970	450	100
1951	3160	2150	660		350
1946	1570	1050	410		110
1940	570	390	120		70
1931	300	210	40		50
1921	150	90	n.a.		n.a.

Source: Terleck, p. 104.

On the other hand, South Korea's innovatory program⁶¹ (Posadas, 1995), although elicited for "broad and active participation of the private sector," still maintained a big share of public sector's cooperation.

**Table 55: South Korea: Investments in National R&D Projects Sponsored
by the MOST (in million US\$)⁶²**

SECTOR	YEA									
	1992-1991		1992		1993		1994		TOTAL	
	AMOUNT	%	AMOUNT	%	AMOUNT	%	AMOUNT	%	AMOUNT	%
Government	716.3	59	162.5	62	127.8	41	182.6	51	1189.2	56
Industry	489.1	41	100	38	180.6	51	179	49	179	49
Total	1205.4	100	262.5	100	308.4	100	361	100	361	100

Source: S&T in Korea, MOST, Republic of Korea, from Posadas, p. 7. Modified presentation./_*Computed by the researcher.

⁶¹ By the Ministry of Science and Technology.

⁶² South Korea's R&D was picked out as a country-situationer on the basis of its historical similarities with the Philippines.

These two examples suggest that: 1) powerful countries still relies on governmental support and assistance in the earliest phase of R&D promotion; and 2) it took R&D years to reach the maturing phase.

Passing on responsibilities to a particular sector entails timely delegation. The South Korean experience again in 1988 proved this to be true. The ROK government decided to invest only 0.4 of its GNP in R&D. Furthermore, it lost guidance in the industries and neglected investments in new technologies and new product development. It ventured jointly with the chaebol, also using the R&D funds, in investing in land, luxury and golf courses.

The Partnership

It should be viewed that the government is a major producer actions and positive externalities (benefits). Accordingly, this is the entity that should recompense for the market failure through a "big push" (Wolf, 1988). In a similar vein, the industry, particularly the manufacturing sector has a big risk. The market is its realm, from where all needs and wants confluence. Hence, while the government levels the ground for a conducive R&D, the other hoists the banner of acceptance and development of R&D and its yields.

R&D in Actuality

But it should be emphatically claimed that budget allocation for R&D must necessarily lead to efficient and productive market operation and well-developed market technologies since government could only spend a little over this concern. Fernandez (1973), p. 109) specified inclusion factors to attain these objectives: 1) a clear-cut priority; and 2) identified the national goals. As what could be viewed, R&D dwells in the priorities and plans of the government.

Table 56. The Inclusion Factors

MAJOR FACTORS AFFECTING THE REALIZATION OF OBJECTIVES ACCORDING TO FERNANDEZ	FINDING ABOUT R&D AS AN OBJECTIVE OF THE GOVERNMENT
<ol style="list-style-type: none"> 1. Organization and people 2. Beneficiaries or target population 3. Geographical factor 4. Time horizon 5. Types of problems to be attacked 	<ul style="list-style-type: none"> • Identified in the IDPP and IPP of DTI and BOI • Involved sectors are the government and the manufacturing sector, other sectors and other institutions • Industry, government and the nation • Nationwide concern and those in the IPP list of priority of areas • Short term, medium term and long term • Towards sustainable development • Identified in the IDPP, MTPDP and STMP

Revisiting the industry needs. The ultimate goal of IDPP for each manufacturing industry sector is to be competitive in the world market; hence, strengthening the position of the industry on export. However, in attaining IDPP goals, some vital factors are not given much of an attention,⁶³ which happen to be the basic needs of the industry. It could be recalled that Rostow qualified that the drive to maturity are accompanied by the basic economic needs of the country such as establishing social overhead capitals, and support institutions and services. Otherwise, an economic debacle might be induced to happen (Rostow, *Stages of Growth*) (see the Counter SWOT Analysis in the succeeding page).

⁶³ Some industry plan may contain one or two of these but not whole.

Table 57: ISSUES TACKLED
<ul style="list-style-type: none"> • The Residual Counter SWOT bridging IDPP SWOT Analysis: What the Industry is missing <ul style="list-style-type: none"> • Absence of basic support services • Absence of basic support facilities and infrastructure • Absence of technical support and inability to provide information and assist in creating and developing market niches and promoting products • Inadequate financial support, esp. on SMEs • Inability to assist in sourcing materials for production • Limited trainings • Sufficiency and sustainability of resources and plans, respectively

Thus, affecting the incentive scheme on R&D, attracting greatly the well developed firms and not the financially incapable, sluggish and starting smaller firms.

Table 58: INCENTIVES SCHEME ISSUES
<ul style="list-style-type: none"> • Transparency of partnership and coordination among government agencies • Bureaucratic hassles and inefficiencies • Limited scope of incentives and pro-export, pro well established firms guidelines • Non-extensive program promotion • Absence of financial support (sourcing) other than fiscal incentives • Absence of marketing incentives, related to R&D

To resolve these incentive related issues, the gaps identified should foremostly be settled.

**Table 59: CHECKLIST OF GAPS RELATED
TO THE R&D INCENTIVES SCHEME**

GAPS	GOVERNMENT	PRIVATE
	(1)	(2)
A) Perception on R&D	/	/
B) Integration/Linkages	/	/
C) R&D Financial Sourcing	/	/
D) Facilities and Services	/	/
E) R&D and Technology Updates		
F) Communication/ Promotion & Reception	/	/
G) Level and Scope of Incentives Target on R&D	/	/

GAP A. The government deems that firms engaged in R&D will reap immediate gains from the said activity. The concerned sector answered that R&D will only have gains when marketed and are made available in the market. R&D thus, is more than a risk considered than an investment for it is possible that profits will not be realized at all.

GAP B. The departmental backdrop is always loose and chaotic, in the sense that sectors are prioritized and unaligned goals are pursued by these entries. NEDA has different set of strategic sectors. BOI and DTI have different concerns. Other departments have their own. In a certain nook, DFA and NEDA have conflicting interests with the BOI industry planners, in terms of incentives granting. DOE is looking into the possibility of developing wind energy, while DOST is eyeing the solar energy. The backdrop is so parochial, and is losing cadence.

As for the said industry, the dichotomous structure plus the compartmentalized production and unparallel development of the players in this sector severely pain the R&D progress in the country.

GAP C. Government with such limited amount of budget allotted to R&D, still limits the amount of expenditure on R&D.

Table 60*: R&D EXPENDITURE IN THE COUNTRY**

YEAR	GNP	Desired R&D Expenditure 1% of GNP	Estimated Actual R&D Expenditure	GAP	%	GAP vs. GNP in %	Trend
(1)	(2)	(3)	(4)	(3-4)		(5/2)	
1989	914126	9141.26	1638.7	7502.26	17	0.17	
1992	1383518	15079.56	3105.54	11974	21	0.21	
1993*	1507956	13835.18	2940.55	10894.63	21	0.21	
1997	2516878	25168.78	4793.33	20375.45	19	0.19	

Source: NEDA, thru STAED-DOST, Projected through Linear Regression.***Modified for the purpose of this study.

GAP D. Sourcing out institutional financial assistance is being sought for by the R&D incentive grantess. However, this is a major hurdle in their growth since interest rates in financial institutions are so high as a result of the economic crisis that slumped the Asian region.

Support facilities like testing centers, either government-run or government subsidized, standardization institution and support industries like casing and others are lacking or non-existent at all in the country.

GAP F. Avenues for promoting the scheme can reach only handful number of firms, usually the large ones. Furthermore, the staffs and people concerned in the incentives promotion are not even aware of: 1) the content of R&D incentives scheme LOPA; and 2) that R&D has existed for more than six years. Most of those who are familiar with the scheme would only recall R&D being integrated to the IPP LOPA two years ago, when in fact, it was early as 1991 that this has been included.

As for the linkages, government and private sector linkages are so poor. No wonder many planned target companies are not reached by the said plot.

GAP E. Also because of GAPS B, D and F, access even from fancy to state-of-the art technology details are lacking and blocked because of poor databases.

GAP G. Each stage of R&D in the other countries like Korea are given incentives, but in the country, R&D incentive packages are so loose, a vague idea yet biased for some selected firms (see the comparative historical R&D Incentives of South Korea and the Philippines).

So from 1991-1997⁶⁴, only 11 companies or a total of 13⁶⁵ projects were granted with the incentives (see table 61).

⁶⁴ BOI Listing reference date is October 27, 1997.

⁶⁵ The 13th project 9under the consumer manufactures industry) was granted with incentives last 1996 and is not reflected in the BOI listings of October 1997.

Table 61. LIST OF BOI-REGISTERED RESEARCH AND DEVELOPMENT PROJECTS

Name of Firm	Industry Group	Registered Project	Type of Project	Project Cost (^{'000})	Comm'l Opn/Emp't	Ownership
ROHM Electronics Philippines, Inc.	Engineering Electronics and Telecommunications Equipment: Passive and Active Electronic Components	In house research and development integrated circuit design	New R&D Pioneer	7,486	Jan-93 300	Japanese 100%
Golf and Research and Development Corporation	Engineering Electronics and Telecommunications Equipment: Computer Software	Software and Hardware	New R&D Pioneer	4,000	Feb-94 19	Filipino - 0.75% German - 99.25%
TOPMAX Philippines, Inc.	Engineering Electronics and Telecommunications Equipment: Computer Hardware	Computer Hardware and Photocopying	New R&D Pioneer	1,250	Jan-93 24	Filipino - 0.75% Japanese - 100%
ATS Technologies, Inc.	Engineering Electronics and Telecommunications Equipment: Computer Services	Computer Aided Design and Modelling/ Computer- Aided Engineering	New R&D Pioneer	15,000	Jan-93 15	Filipino - 80% Singaporean - 20%
Integral Silicon Solution, Inc.	Engineering Electronics and Telecommunications Equipment: Other Electronics	R&D Design of Integrated Circuits	New R&D Pioneer	40,490	Jun-94 17	Filipino - 99.5% other nations- 0.47%
Mitech Corporation	Engineering Electronics and Telecommunications Equipment: Other Electronics	Microprocessed- based Products	New R&D Pioneer	38,500	May-92 23	Filipino - 100%
Topmax Philippines, Inc.	Engineering Electronics and Telecommunications Equipment: Other Electronics	R&D Software and Hardware	New R&D Pioneer	5,500	Jan-92 40	Please see the earlier part

Astec Custom Power (Phils.) Inc.	Engineering Electronics and Telecommunications Equipment: Other Support	R&D Electronic Products	New R&D Pioneer	2,875	Jan-95 147	Hongkong 100%
Matsushita Electric Philippines, Corp.	Engineering Electronics and Telecommunications Equipment: Consumer Durables	CFC-Free Refrigerators	New R&D Pioneer	30,340	10	Filipino - 20.02% Japanese - 79.94%
MK Screens, Inc.	Engineering Electronics and Telecommunications Equipment: Machinery	Design/dev't of Machinery for the Manufacture of Gabions and Mattresses	New R&D Pioneer	2,750	Sep-93 77	Filipino - 100%
INA Research Philippines, Inc.	Consumer Manufactures Industries Chemical Based Consumer Products	Non-clinical Testing Safety and Efficacy of Chemical Based Products	New R&D Pioneer	106,716	Jun-95 55	Japanese - 100%
Philippine International Trading Corporation	Basic Industries Textile and Leather	Dev't of Tech. For Processing of Manila Hemp and other Philippine Indigenous Fiber into Textile	New R&D Pioneer	15,653	9	Filipino - 100%

*** Source: Management Information System - Board of Investments. [List of Registered Projects in Research and Development](#). Data as of October 21, 1997.

Table 62. COMPARATIVE DEVELOPMENT AND CONTENT OF R&D INCENTIVE PACKAGE: SOUTH KOREA AND THE PHILIPPINES IN A TIMELINE

COUNTRY	GOAL	INCENTIVES	Before 70's	1973	1974	1976	1977	1978	1979	1981	1982	1984	1986	1988	1991	1992	1993	1994	1995	1996
S.Korea	1. Promotion of R&D Investment	1. Technology development reserve funds system																		
		2. Tax credit or special depreciation for investment in equipment to develop technology and human resources																		
		3. Duty abatement or exemption on goods for academic research																		
		4. Tax credit for technology and human resources' development expenses																		
		5. Tax exemption for real estate of firm-affiliated research institute																		
		6. Tax exemptions for research devices & samples																		
		7. Duty abatement or exemption on goods for research devices and samples																		
	2. Promotion of Technology Transfer	1. Deduction and exemption of corporate tax for the foreign investment accompanied by technology requisite																		
		2. Reduction and exemption of the tax amount on technology transfer income																		
		3. Income tax exemption for foreign technologies																		
	3. Promotion of Technology Communication	1. Provisional Special Consumption tax rate for technology leading commodities																		
		2. Deductions and exemptions of tax amount for start-up Small and Medium Venture enterprises																		

Philippines	1. Upgrading of R&D capability through intensified activities in high priority sectors	1. Income tax holidays 2. Duty free importation of capital equipment 3. ***Incentives for infrastructure in less developed areas, access to bonded warehousing system 4. Employment of foreign nationals 5. Deduction for labour expenses 6. Tax credit on domestic capital equipment 7. Simplification of customs procedure 8. Unrestricted use of consigned equipment 9. Exemption on breeding stocks and genetic materials 10. Tax credit on domestic breeding stocks and genetic materials
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*** Identified by DOST in its R&D Strategies, but not with the BOI Incentive Package; South Korea's Incentive Package is from: STEPI, 1995 Reviews of National Science and Technology Policy, ROK, 15 December, 1995, quoted in Dr. Posadas study.

*** Philippine incentives from #1-#10, except for #3, are long in existence, prior to R&D inclusion in the IPP. There have been the incentive s given for the export oriented firms and other establishment identified in the BOI plan.

Chapter VII

THE FINAL SETTLEMENT

It was found out, in this study, that R&D problems are inherently drawn in the system. In a macro perspective, the manufacturing sector that is expected to deliver is not becoming an active performer. On the other hand, the sector's production is left to be heavily staged but not diversified; contained and too specialized, thus the mode of production is in the same way unsatisfactorily distributed among its producers, favouring the big or major players of the industry. This, thereby makes the industry really structured yet stratified and dichotomous; and lastly, virtually adaptive. In the micro setting of the manufacturing industry, productivity levels are backtracking. But though, much has been expected from this industry, especially in maintaining a hold on export leaving the domestic market and needs at times unattended or just partly answered. However in the other offing, the proponent-entity that is expected to complement the aberrations of the industry relegates its pro-active role to passivity by effecting out multifaceted targets which could not reinforce each other. Thus, R&D is in a timely state of coming since productivity level of the said sector is deteriorating; but is in a dismal state by being infused to a wrong system.

However, the present system can still be reformed provided that the identified stakeholders are willing to change so as to make changes. Moreover that R&D will prosper if an effective decision-making process (DCP) is undergone. In the past and present policies and plans on R&D, the basic ABC's of DCP is somewhat at a lost.

If the country is to start to move forward, planners should know where the country, especially the industry presently stands at. Currently, the country is in a serious phase of transformation and as depicted earlier, it is moving into the perch of maturity. Maturity in the sense that the benefits and consequences of undertaking R&D are now being taken into consideration. Hiding the real state and plights of the concerned industry hinders R&D

acceptance. Plans and strategies reflect this. Moreover, directly adding problems in this light, is the delineation and identification of R&D scope⁶⁶. Yet surprisingly, given these jagged edges, there are goals defined for R&D. However again, the process of going-to-there have knotted ends making the set goals a distant reality.

But since there is already an existing system on R&D, how can this be improved, in the real sense of the word? The problems identified earlier can be regrouped into, problem on: definition, promotion and planning.

At present, NSO has a definition of R&D⁶⁷. The manufacturing sector, on the other hand, is asking for incentives not necessarily in a pecuniary form, but in a “seed” support. There exists public policy and strategies in promoting R&D. All that needs to be done is to bridge these three factors or elements to counter the difficulties of the said industry sector and eliminate the problems, especially in promoting R&D.

Possible Strategies

The Incentive Scheme. The Incentive Package Scheme of the BOI must be made comprehensive, progressive and graduated, and open to all firms, by considering the following components:

Table 63: A General Framework for Giving Incentives to BOI registered R&D Activity

Rationale	Component
<ul style="list-style-type: none"> These firms have different sets of needs Large firms have big edges over production, and it will be quite unfair for the other industries to received the same incentives Promote incentives by industry scales is better than prioritizing manufacturing industry sectors since the former will avoid exclusion 	<ul style="list-style-type: none"> Scale of Investment and Firm Size <ol style="list-style-type: none"> large Medium Small Micro
<ul style="list-style-type: none"> Why consider foreign employees or employer? The trends in technology and other innovations usually emanated from the 	<ul style="list-style-type: none"> By type of employee and employers <ol style="list-style-type: none"> Foreign Local

⁶⁶ “Where are we now?” stage, or the first level of DCP. The second level is “Where do we want to go?”. The third process is: “How will we go from here?”

⁶⁷ A system and creative work undertaken to increase stock of knowledge, including knowledge of man, culture and society, and the use of knowledge to devise new applications Activities include basic, research, applied research and experimental development.

<p>outside. The only way to readily absorb trends and styles in technology advancement is through an exogenous technology transfer. Incentives should be given to these people as a sign of goodwill, for its assumed that even a bit of company secret will never be divulged unless given a proper incentives for that matter. However, the enforcer should formulate ways to validate the transfer as genuine and what transpired is not merely a technological subordination or transplantation.</p> <ul style="list-style-type: none"> As for the local employees or Filipino employers, it is a pride that these people are rebuilding the nation and promoting the R&D culture with a local colour. 	
<ul style="list-style-type: none"> Except for #4, these are areas that government could not giveout immediate assistance. Especially for #1, 2, and 3, it should be assured, however, that there will also be information sharing among the industry players. 	<ul style="list-style-type: none"> R&D units and company needs <ol style="list-style-type: none"> Marketing technology Management technology Human resource development Product/procedural development, and others
<ul style="list-style-type: none"> Some industries can only start from the basic R&D, most especially the smaller firms. This should be given credit. By strictly giving incentives for all the R&D levels of progress, companies will likely strive to attain the level where incentives are almost outpouring. Each level of progress reinforces the other level. And with this, it will foster readily industry clustering or integration, both horizontally and vertically. 	<ul style="list-style-type: none"> By Scope and level of progress <ol style="list-style-type: none"> Basic research, trainings, and promotional Establishments of support structures and support industries and services (like casing, etch.) and commercialization of R&D outputs Technology transfer Fabrication, innovation and reverse engineering Invention and creation of new products, and applying existing materials for higher industrial ends
<ul style="list-style-type: none"> Difficulties in conducting R&D in a developed place is different from the risk that a firm will conduct in an underdeveloped area, for there it is assumed that all the support services are entirely lacking. Conducting R&D in underdeveloped area is equally advancing changes to the said place 	<ul style="list-style-type: none"> By Project site and kind <ol style="list-style-type: none"> by proximity <ul style="list-style-type: none"> *In house *Outside the plant By localization <ul style="list-style-type: none"> *Urban <ul style="list-style-type: none"> **developed **underdeveloped *Rural <ul style="list-style-type: none"> **developed **underdeveloped
<ul style="list-style-type: none"> The investments risks involved in exporting is also different from marketing s or producing outputs/ products domestically 	<ul style="list-style-type: none"> Market orientation of R&D outputs (if for commercialized) <ol style="list-style-type: none"> Export

	2. Domestic 3. Internal (plant use)
<ul style="list-style-type: none"> Effects on production cost and indigenous R&D promotion varies depending on the origin of raw materials (imported or domestically sourced). 	<ul style="list-style-type: none"> By the nature of Equipment to use <ol style="list-style-type: none"> Domestically sourced Imported
	<ul style="list-style-type: none"> By nature of impact <ol style="list-style-type: none"> Social impact <ul style="list-style-type: none"> *employment gains *a scientific breakthrough that would figuratively put the country in the global political map Environmental impact

Since the concerns of R&D are wide-ranged just like that of the exports and foreign investments, this should have a separate section in the Omnibus Investments Code or have a separate act (just like the foreign investments act) in order to wholistically promote and advance R&D. This is a legal procedure supported and stipulated in the State Principle of the Philippine Constitution.

Aggressively promote the Incentive scheme. This means that the incentive promotion will likely go beyond in-house promotion. The use of media is also important detailing the package benefits so to attract larger number of target sectors and to reach out to all target sectors.

Back-up Local(ized) Training. However, training of local staff should likewise be an immediate concern of the BOI, in the following areas:

1. R&D, the concept and purpose
2. BOI Incentive Package
 - a. rationale and historical development
 - b. content and benefit
 - c. targets
3. Efficiency in handling data or information
4. Delineation of function of the different departments, especially those concerned with R&D promotion

Monitoring and Evaluation. It should also be noteworthy to take into consideration monitoring and evaluation of BOI-registered R&D activities. This should be made a collaborative effort of the BOI and DTI to:

1. know the conditions of the firms in implementing their R&D projects;
2. serve as baseline data for the BOI, most especially to make reforms, changes or modifications to the existing incentive package scheme; and,
3. determine the overall impact of manufacturing sector's R&D in the country.

Inter-agency coordination and assistance. Government agencies, while inviting investors on R&D, should on the other end create temporary support facilities and provide temporary services, to make the venture an inviting investment at the same time an expedient social obligation⁶⁸.

a. DOST

- Make a back up industry in producing unavailable materials for production. This is a resilient measure to avoid repercussions brought about by shortages in material supply and dollar fluctuations.
- Initiate establishment of testing laboratories for different industry needs, if possible. Testing centers⁶⁹ in the country are so limited and expensive. But allowing the products to be tested abroad will really be burden, on the part of the smaller firms (MSMEs).
- Initiate a move to establish standardization center similar to International Standards Organization (ISO): 1) to encourage the industry to produce quality local and international products: and 2) so

⁶⁸ This is because of the "risk factor" involved therein, as pointed out in the previous chapters.

⁶⁹ Then later on, these could be privatized.

the players of the sector could readily be assisted in getting an ISO accreditation.

b. DTI

- Assist in strategic marketing and forecasting availability of materials used by the local and foreign manufacturers of the Philippine manufacturing industry from different segments of time. This will support to DOST's move to create back up industries.
- Look for new trends in and alternative production processes.
- Search for markets where the new trends and available quality but affordable materials could be sourced from
- Initiate in designing or formulating marketing strategies
- Collaborate with DOST in establishing an industrial casing industry in the country
- Help improve performance of the Design Center of the Philippines, especially in undertaking product promotion and coordination of all design activities and programs.

c. Other concerned government agencies

- To help the MSMEs open credit facilities or gain access to loan lines (with lower interest rates) (into R&D), thru initiating talks with the financial institutional heads.

Engaging in R&D is a way to place the country's competitiveness at par with the worldwide standards. But the way to get there is not just simply making a step. Valuing the forwardness of the course of actions necessary to effect out changes is of greater importance. Steps should progress to leaps with grace, postured in the strategies and plans which should be consistent with each other. And lastly, should transcend to aggression (in promoting and adopting R&D), but in any way must be tempered with prudence, so that the industry and concerned agencies can move with resilience amidst both the foreseen and undetected difficulties and circumvention they may encounter in pushing for a relevant R&D in the country.

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Appendix “A”

INTERVIEW SCHEDULE: FIRST PHASE

“A STUDY ON THE PUBLIC AND PRIVATE EXPENDITURES ON RESEARCH AND DEVELOPMENT”

Philippine Institute for Development Studies-Department of Budget and Management

1. Kindly state your name and designation in the office?
2. How long have you been in your office and designation?

Questions:

1. What is the nature of your business operation?
2. How do you view investments in your company/office/business/our country, generally?
 - a. Where do you usually invest your business resources into?
 - b. Do you engage in Research and Development (R&D) related activities?
 - b.1 Human Resource Development
 - b.2 Marketing Technology
 - b.3 product development
 - b.4 othersIf yes, what could be the reason for this?
If not anymore, what are the constraints/problems seen, for your office/institution to disfavour engaging in R&D?
3. If yes for #2, who funds your R&D?
If no for # 2, does your company/office feel the need to invest in R&D again, in time?
4. If yes for #3, who are engaged in your R&D? How many are in the R&D team? Are they local or foreign?
5. How does R&D contribute to your company/business/etc. growth/retardation?
6. Do you think, not investing in R&D is beneficial to your operation? Why do you think so?
7. Are there problems with your company engaging in R&D?
If yes, what are they?
8. What do you think can be a good role of the concerned government agency in promoting R&D in the country?
 - a. What nature of support that this concerned government agency should provide in promoting a better investment climate in R&D by companies like yours?

9. How can the manufacturing sector facilitate the promotion of R&D in the country?
10. How much have your office invested in R&D, in the following years?

Area/s of Concentration	Year	Amount of Money Invested in R & D	Gross Sales per Year
	1989		
	1990		
	1991		
	1992		
	1993		
	1994		
	1995		
	1996		
	1997		

Appendix “B”

INTERVIEW SCHEDULE: SECOND PHASE

“A STUDY ON THE PUBLIC AND PRIVATE EXPENDITURES ON RESEARCH AND DEVELOPMENT”

Philippine Institute for Development Studies-Department of Budget and Management

Interview Proper

1. When did your company start your R&D activity?
2. How were you able to apply or enlist your R&D activity/program?
3. What processes did your company undertake to enlist/apply for the said program?
4. Were you've been informed before you had availed of an incentive/s by enlisting your R&D activity with the Board of Investments (BOI)?
5. What difficulties did your company encounter in applying for/enlisting your R&D activity/program?
6. What were/are the incentives that your company has availed of?
7. Which of these have been beneficial to your operation, so far? And why? Which of these have been insignificant to your operation? Why?
8. What other incentives could you think of, that your office/company should be allowed to avail of? Why?
9. Have your company experienced changing Incentives policies from the government (in company/office operation)?
10. Kindly furnish the following questions with pertinent information:

Incentives Availed by the Company through R&D activity	AMOUNT	
	1996	1997
Tax exemptions on capital equipment such as (if itemized details are available)		
Income tax holiday		
Deduction for labour expenses		
Non fiscal incentives 1. Simplification of Custom procedure 2. Unrestricted use of consigned equipment 3. Employment of foreign nations		
Others: _____ _____		

Thank you very much

APPENDIX C

FOOD MANUFACTURING INDUSTRY

AVAILABLE TECHNOLOGY

A. Flour Milling

1. Involves various operations per stage. These include the major operations like:
 - Cleaning – wheat is subjected to specialized types of cleaning machines
 - Tempering – application of heat and moisture to prepare wheat to various milling operations
 - Grinding – wheat is put into the series of pairs of corrugated rollers, undergoing the following stages:
 - Sifting
 - Purifying
 - Reducing
 - Bleaching
 - Flavouring and enriching – adding leavening agents and salt before the wheat is packed

2. Materials/Tools

- Cleaning machines
- Heater-moisturizer machines
- Corrugated rollers
- Bleaching and maturing device

B. Tuna Canning

1. Involves production process such as:
 - Separation of fish meat from the skin
 - Cooking of fish with the ingredients and preservatives
 - Canning

2. Materials/tools

- Thermal heater

C. Meat Processing

1. Methods of preservation
 - Cold storage – chilling of meat at 0-4° C or freezing it below the freezing temperature

- Drying – reduction of water content in the meat through exposure to the sun
- Salting – addition of salt content in the meat
- Curing – application of salt, sugar, nitrate and other preservatives
- Smoking – subjection of meat to smoke
- Canning – undergoes thermal processes, either through:
 - Pasteurization
 - Sterilization

2. Materials

- Paper
- Plastic – polyethylene, polypropylene
- Aluminum foil, laminate
- Tin or aluminum cans

3. Packaging

- Shrink packaging: products are bagged and air-evacuated
- Vacuum packaging: meat is bagged in a relatively impermeable plastic bag with a minimum volume of air

D. Coffee and Cocoa Industry

1. Processes for Coffee

- Field processing
- Instant coffee processing, involving:
 - Removal of seed covering of beans
 - Drying and sorting of grains according to weight and size
 - Roasting
 - Grinding percolation
 - Evaporation
 - Aromatization

2. Processes for cocoa

- Cleaning and removal of contaminants
- Roasting to develop flavour and to support the first stage
- Alkalizing (before or after roasting) for neutralizing cocoa acids to mellow the flavours
- Grinding to produce the cocoa liquor or cocoa mass
- Separation of the mass into cocoa fat and cocoa cake, for which the latter;
- Will undergo Pulverization, to become cocoa powder (base for cocoa processing)
- Conching, flavour developing procedure to reach consistency

INNOVATIONS AND OTHER TECHNOLOGIES

1. Extrusion cooking. Involves introduction of raw materials from hoppers into a crew-cooker in which the food is cooked while it is transformed along the thread of the barrel. The innovation results in fully automatic, continuous, and faster operations. It also reduces labour requirements particularly by replacing skilled operators (bakers) with a few that monitor the machine. Applicable to manufacturing of snack foods, biscuits, confections, baby foods, cereals and soups.
2. Membrane Separation and Ultrafiltration. Separates fine mixtures and results in better yields than conventional separation techniques. Replaces energy-intensive evaporation process and applicable to the production of juices, dairy products and confections.
3. Micro-electronics and Biotechnology. Caused cost-efficiency due to lowering of storage cost, improved product quality, and brought time saving manufacturing methods and more extensive utilization of agricultural raw materials.

TEXTILES AND GARMENTS

- Automation
- Computerization
- Spinning (looming), weaving, dyeing

*Source: Sanchez, 1997.

ANNEX D

SUMMARY CONTENT OF E.O. 259

“An Act to Rationalize the Soap and Detergent Surfactant Industry and Thereby Promote and Expand the Utilization of Chemicals Derived from Coconut Oil and for Other Purposes”

Objectives:

1. to position the use of indigenous raw materials
2. to extensively utilize coco oil ensuring greater profits to coco farmers

Promotional Strategy/content:

1. Amending P.D. 1863, eradicating monopoly of United Coco Chemicals, Inc. (UNICHEM)
2. Shifting of coco to mixed surfactant but in the ff: phases/extent:

1989 April 15	=	20%
1990 April 15	=	40%
1991 April 15 thereafter		60% minimum

Cocochemical content
3. Restriction to imported cocochemicals unless in the event of actual shortages
4. Penalizing violators, whether local manufacturer and importers if found to have violated the said order.

ANNEX E

From the Study of Ordonez, Ma. Theresa P. and others on "*The Effects of Exchange Rate Fluctuation on the Philippine Garment Export Industry.*" An Undergraduate Thesis of the School of Economics, University of the Philippines-Diliman, March 1995.

RECOMMENDATION

Our Studies have shown that the REER in particular, and the foreign exchange rate in general do have statistically significant effects on our level of garment exports. We on the group believe that the performance of our currency has a sat in the performance of garment exports, thus, the devaluation of our currency to a more competitive level will definitely aid the garment export industry.

While the effectivity of devaluation as a tool for helping our exports is not in doubt, what the industry needs more is a stable and competitive exchange rate. One exporter whom we interviewed cited the case that while a devaluation of our currency may help the export sector in the short-run, in the long run, what the industry truly needs is a competitive but stable exchange rate. He mentioned that there are a lot of things that the government can do, including maintaining a stable and competitive exchange rate, if needed it wants to come to the aid of the garment exporter.

The first problem that has to be tackled deals with the shortage of raw materials, in order for is to meet the growing demands of the garment industry. More than 90% of our raw materials are imported, and if ever the quality of the local materials is comparable with imported raw materials, prices are more expensive. Thus, it would be more preferable to import.

Next is the much ballyhooed issue regarding bureaucratic red tape. In the Philippines, 36 signatures are needed to process imports and exports. In other ASEAN countries like Thailand, only five signatures are necessary. There is a need to simplify import/export procedures so that we can reduce the lead time of our deliveries.

There is also a need to improve worker productivity for is to compete on the international market. It could be helpful if the passage of a productivity based wage policy could be undertaken.

Finally, we must diversify into other untapped markets. In the case of our garment exports, 80% go to countries that impose quotas on their imports or garment products. Thus, exporters like us cannot maximize profits because of the extent of our trade with these countries is limited by these quotas. We must try to gain greater access to markets like Japan and the United Arab Emirates, countries that do not impose quota restrictions on its trading partners.