PN-ABX-014

Synthetic Resin and Plastic Industries:
Impact of Trade Policy Reforms on Performance, Competitiveness and Structure

Cesar P. Banzon

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

This is part of the Development Incentives Assessment (DIA) Project of the PIDS, funded by the United States Agency for International Development (USAID), through the NEDA-Technical Resources Project (TRP).

The author is a Senior Research Specialist at PIDS. Invaluable support and guidance of Dr. Erlinda Medalla, Dr. Gwendolyn Tecson, Dr. Romeo Bautista and Dr. John Power and research assistance by Nico Martin and Maribel Salunga are gratefully acknowledged.

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RESEARCH PAPER SERIES NO. 94-03

Philippine Institute for Development Studies

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The publication of this study is made possible by a financial grant from the United States Agency for International Development through the Technical Resources Project of the National Economic and Development Authority.

Please address all inquiries to the:

Philippine Institute for Development Studies
4th Floor, NEDA sa Makati Building
106 Amorsolo Street, Legaspi Village
1229 Makati, Metro Manila, Philippines
Fax No. (632) 816-1091
Tel. Nos. 893-5705 and 892-4059

ISBN 971-564-004-4
RP - 9 - 94 - 500

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Abbreviations

AFTA	Asean Free Trade Area
ASEAN	Association of Southeast Asian Nations
BMW	Bonded manufacturing warehouse
BOP	Balance of Payments
CVA	Census Value Added
DRC	Domestic Resource Cost
DRCM	Domestic Resource Cost at Market Price
DVA	Domestic Value Added
EPR	Effective Protection Rate
FTVA	Free-Trade Value Added
ILP	Import Liberalization Program
MIRDC	Metal Industry Research and Development Center
MTPY	Metric Tons Per Year
NAUM	National Autonomous University of Mexico
NCR	National Capital Region
NEPR	Net Effective Protection Rate
NSO	National Statistics Office
OER	Official Exchange Rate
PCM	Price-Cost Margin
PDCP	Private Development Corporation of the Philippines
PSIC	Philippine Standard Industrial Classification
RA	Republic Act
SER	Shadow Exchange Rate
SGV	Sycip, Gorres and Velayo
TE	Technical Efficiency
TRP	Tariff Reform Program
UN	United Nations
UNIDO	United Nations Industrial Development Organization
VACR	Value-added concentration ratio

1

Introduction

SINCE the post-war decades, Philippine industrial sector performance, guided by an import-substitution strategy, has been disappointing. In contrast, other ASEAN countries, such as Thailand, Indonesia, and Malaysia, are moving toward newly industrializing country (NIC) status with their dynamic outward-oriented industries. The challenge to achieve rapid industrial sector growth becomes ever more urgent.

In order to stimulate industrial efficiency and achieve competitiveness in domestic and external markets, the government instituted major trade policy reforms in the early eighties. These were the Tariff Reform Program (TRP) and the Import Liberalization Program (ILP). These reforms were designed to eliminate the biases against efficiency produced by a protective regime, and to expose industries to the challenge of foreign competition.

This study aims to evaluate the performance and competitiveness of the resin and plastic industries in the light of the ongoing trade policy reform. These industries were chosen to represent the intermediate-product category of manufacturing goods which received high protection and underwent a major trade policy reform.

This study also attempts to describe the structure of the resin and plastic industries. It looks into how market structure affected the performance and competitiveness of these industries. It is a common belief that industrial structure influences performance because of the existence of intra-industry trade arising from economies of scale and not from comparative advantage (Krugman 1979). This study also aims to identify factors affecting inter-firm and inter-industry differences in performance and competitiveness.

For analytical purposes, the year 1983 is chosen as the pre-trade reform period and 1988 as the transition toward the post-trade reform period. Data constraints dictated the selection of these years. The Census of Establishments (CE) by the National Statistics Office (NSO) were available for 1983 and 1988. Along with the census, the survey of firms in these industries for the years 1986 and 1991 formed the data base for this study.

To measure protection, the effective protection rate (EPR) is employed along with nominal tariff rates, import regulations, and the implicit tariff rate. To measure efficiency, the domestic resource criterion (DRC) is utilized as compared to the shadow exchange rate (SER), the ratio of which denotes competitiveness and comparative advantage. Conventional seller concentration measures such as the Herfindahl index, four-firm value-added concentration (VACR4), etc., are utilized to determine industrial concentration and market power. DRC measures are compared to EPR and plant sizes in order to obtain a relationship between efficiency protection and structure in these industries in the pre-transition and transition periods of trade reform.

Review of Literature

Literature on trade openness-productivity nexus advances the following beneficial impacts on industrial performance and efficiency (Tybout 1992; Rodrik 1992; Grossman and Helpman 1989, 1990; Helpman 1990):

1. Efficient allocation of resources (i.e., allocative efficiency) within the economy and/or industry. This is achieved through the elimination of distortions in output and factor markets produced by a protective trade regime which lead to resource misallocation and waste. The reduction or elimination of such distortions through trade liberalization will bring about a more efficient allocation of resources toward their most productive uses.
2. The achievement of technical efficiency or x-efficiency arising from the adoption of the 'best practice' production technique

among firms as they are compelled by exposure to foreign competition.

3. The achievement of dynamic technological progress arising from innovation and technological diffusion in the presence of foreign competition.

Empirical studies on trade openness-productivity nexus point out these positive effects as in the case of Bautista, Power and Associates (1979) on allocative efficiency and Nishimizu and Page (1982) and Tybout *et al.* (1990) on technical efficiency. Empirical literature on the dynamic efficiency effects, however, express ambiguity as in the case of the NBER studies (Tsao 1985; Krueger and Tuncer 1982; Nishimizu and Page 1982).

Literature on trade openness-structure-efficiency nexus advances the following possible outcomes:

1. Industry rationalization — a situation whereby the entry of foreign competition induces a shake-out where the inefficient firms are eliminated and the remaining firms operate at higher output levels down their lower average cost curves to match the new lowered domestic price and hence, achieve higher productivity levels (Rodrik 1988, 1992). It is assumed here that there is freedom of entry and exit, and production is characterized by economies of scale.
2. Import discipline — a situation whereby competition from imports reduces the market power of firms, and affects their pricing and production decisions. Technical efficiency improves with the shift of domestic firms to a lower cost curve. Local firms that fail to compete by reducing costs are displaced by imports. It is assumed here that market access is relatively difficult due to entry and exit barriers (Kirkpatrick and Maharaj 1992).

Empirical work on trade openness-structure-productivity nexus point to these outcomes in the case of Liu (1991) on industry rationalization and de Melo and Urata (1986) on import-discipline.

2

Theoretical Framework and Methodology

Protection

The structure of protection involves nominal tariffs, import restrictions, indirect and export taxes (subsidies), and fiscal incentives. The concept of effective protection rate (EPR) is an attempt to measure the net level of protection provided by nominal tariffs, indirect and export taxes, and import restrictions on both input and output (Mercado 1986).[1] It is thus a broader measure of protection compared to nominal and implicit tariffs.[2]

The EPR is defined as the percentage excess of domestic value-added (DVA) at protected prices (as made possible by protective devices like tariffs, taxes and import restrictions) over free-trade value-added (FTVA) prices (i.e., without protection). This is expressed in the formula:

$$EPR = \frac{DVA - FTVA}{FTVA} * 100$$

1. The EPR measure here does not include the impact of quantitative restrictions due to data constraints.

2. The implicit tariff measures tariff on output and inputs inclusive of indirect taxes. Its estimation assumes that the difference between domestic and international prices is due to nominal tariff and indirect taxes (Tan 1986). For details, see Methodology, DIA Project Paper 1994.

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Considering the domestic value-added and the free trade value-added at greater detail, the formula is

$$EPR = \left[\frac{DVTP - DVMI}{BVTP - BVMI} - 1 \right] * 100$$

where $DVTP$ = domestic value of total production;
$DVMI$ = domestic value of material inputs cost;
$BVTP$ = border value of total production;
$BVMI$ = border value of material inputs cost.

The concept of **net effective protection rate (NEPR)** involves adjusting the EPR by the overvaluation in domestic currency. An overvalued domestic currency cheapens imports and hence, reduces the protection on tradable goods (i.e., importable and exportable goods). In developing countries where trade distortions exist and the Balance of Payments (BOP) is in disequilibrium, the market exchange rate is lower than the shadow or true price of foreign exchange. That is, the domestic currency is overvalued in terms of the foreign currency. The NEPR is an attempt to measure the EPR adjusted to domestic currency overvaluation, measured by the ratio SER/OER. In formula form, this is

$$NEPR = \frac{OER * (1 + EPR)}{SER} - 1$$

where OER = official exchange rate;
SER = shadow exchange rate.

The NEPR is thus expected to yield a lower level of protection than the EPR.[3] Estimates of the EPR and NEPR were done at the plant, firm, industry, and subsectoral levels.

3. For details on the NEPR, see Methodology, DIA Project Paper 1994.

Exposure to Foreign Competition

The degree of **exposure to foreign competition** is indicated by the import penetration index, the share of exports to production, and the index of intra-industry trade. The import penetration index measures the share of imports to total demand. In formula form, this is

$$\text{MPX} = \frac{M}{(Q + M - X)}$$

where MPX = import penetration index;
M = the level of imports;
Q = total domestic production;
X = the level of exports.

The share of exports to total production is given as X/Q, where X and Q are as previously defined.

The index of intra-industry trade denotes the degree of trade among industries. A high intra-industry trade index implies buoyant trading among industries. In formula form, this is

$$1 - [abs\ (X-M)/(X+M)]$$

where X and M are as previously defined;
abs means absolute value.

Data on the level of imports, M, total domestic production, Q, and the level of exports, X, were obtained from NSO's input-output tables.

Performance, Efficiency, and Competitiveness

Industrial performance is typically measured using real output, value-added, employment, exports, and the like. The concept of performance extends to efficiency. Efficiency gains can be divided into static and dynamic. Static efficiency refers to allocative and technical efficiency. Dynamic efficiency refers to technological progress.[4]

The measurement of static efficiency consists of the domestic resource cost (DRC) at shadow and market prices, the technical efficiency index, and partial factor productivities.

The achievement of allocative efficiency in an industry refers to the allocation of resources towards 'low-cost' firms (those which require relatively less domestic resources for production) from 'high-cost' firms (those which require more domestic resources for production). Allocative efficiency is typically measured using the DRC.

DRC is a cost-benefit ratio, which measures the cost of domestic resources used per unit of net foreign exchange earned (saved) to the production of an exportable (importable) commodity. A relatively high DRC implies allocative inefficiency (i.e., high-cost activity) and otherwise. The DRC also captures technical efficiency since it includes the quality of factors employed in producing a tradable commodity.

Ex post, it also shows the cost and benefit to society of promoting an export commodity or protecting an import substitute under an existing policy regime. Firm, industry, or sectoral DRC information can therefore be utilized in analyzing and formulating industrial promotion policies, specifically in the context of efficient resource allocation and social costs of promotion or protection of a specific production activity (Bautista, Power, and Associates 1979).

4. Dynamic efficiency gains were not measured in this study because of data constraints.

The DRC formula is

$$DRC = \frac{\textit{domestic cost per unit of product}}{\textit{world price - foreign cost per unit}}$$

The numerator/denominator is expressed in domestic or foreign currency. World price is value of output plus change in inventories converted to border price. The domestic and foreign costs per product are evaluated at their shadow and border prices respectively to reflect the actual cost to society. Essentially, domestic costs are adjusted by the sales tax on output and inputs, and the border value of costs by the implicit tariff on output and input. The DRC formula with its cost components in greater detail is[5]

$$DRC = \frac{TSW + TDCFA + DICWC + TDCRM + TODC}{BVTP - (TFCFA + FICWC + TFCRM)}$$

where
TSW = the total labor cost (domestic) in shadow price;
$TDCFA$ = total domestic cost of fixed assets;
$DICWC$ = domestic interest cost of working capital;
$TDCRM$ = total domestic raw material cost;
$TODC$ = total other domestic costs;
$BVTP$ = value of output into border prices
$TFCFA$ = total foreign cost of fixed assets;
$FICWC$ = foreign interest cost of working capital;
$TFCRM$ = total foreign cost of raw materials.

The costs and their allocation to domestic and foreign components are broken down as follows:[6]

5. For a more detailed explanation of the DRC, see DIA Project Paper 1994. For DRC, as applied to the resin and plastic industries, see "Trade Policy Reform, Structure, and Competitiveness: the Philippine Synthetic Resin and Plastic Industries," masteral thesis, UP School of Economics, May 1994 by this author.

6. The cost component of land was not included due to data constraints on the Census of Establishments.

Exhibit 1

Cost Component	*Allocation Ratio* Domestic	Foreign
1. Labor	1.00	0.00
2. Fixed Assets		
a. Fixed capital depreciation		
i. Buildings and structures	1.00	0.00
ii. Production machinery	0.00	1.00
iii. Transport equipment	0.20	0.80
iv. Other fixed assets	0.15	0.85
b. Interest cost on fixed assets		
i. Buildings and structures	0.85	0.15
ii. Production machinery	0.85	0.15
iii. Transport equipment	0.85	0.15
iv. Other fixed assets	1.00	0.00
3. Interest Cost on Working Capital	0.15	0.85
4. Raw Material Costs		
a. Major and minor raw materials	0.15	0.85
b. Packaging materials	0.10	0.90
c. Office supplies	0.15	0.85
d. Fuels and lubricants		
e. Electricity, water, utilities	1.00	0.00
5. Other Domestic Costs	1.00	0.00

The ratio of DRC to the shadow exchange rate (SER) or DRC/SER shows whether society benefits or not from the trade commodity production. Since the DRC is the local resource cost in producing a tradable good, and since the SER is the price of foreign exchange or the price at which to buy a foreign good, the ratio DRC/SER indicates whether it costs less or more to produce an importable or an exportable commodity than importing or producing it. Specifically, the ratio DRC/SER less than or equal to 1.2 denotes a 'low-cost' or efficient trade commodity production. Otherwise, it is high-cost or inefficient. In the same regard, this ratio also denotes comparative advantage or disadvantage.[7]

DRC at market prices or DRCM is computed using the same formula as DRC at shadow prices.[8] The main difference with DRCM is that the domestic cost components (numerator components) were not deflated by the sales taxes and converted into domestic ex-factory terms.

The DRCM is used to denote international competitiveness, essentially defined as the ability of an industry or firm to compete within domestic markets having imports and external markets with other exporters (including the local producers in the destination market) (Tecson 1992). This is because, from the point of view of the firm, DRCM measures the average cost, valued in market prices of having earned or saved a unit of foreign exchange. For that matter, it indicates the firm's competitiveness vis-a-vis local and international competitors from its own point of view. It also indicates the firm's

7. Instead of DRC/SER less than or equal to 1, the ratio DRC/SER less than or equal to 1.2 is utilized in this study to provide a 20 percent margin of error in determining efficiency and comparative advantage.

8. Due to policy-induced distortions to the market mechanism and the scarcity of foreign exchange, market prices do not reflect the real costs to society of inputs and the real benefits of output. The concept of shadow prices incorporates these distortions in measuring the cost of inputs and benefits of output. Shadow price is different from market price as the former measures prices from a social accounting viewpoint (i.e., to the whole society) while the latter from the private or individual firm's viewpoint.

private profitability. Thus, the ratio between DRCM and the official exchange rate (OER) indicates whether an activity has a competitive advantage. In this study, DRCM/OER less than or equal to 1.2 implies competitive advantage.[9]

Estimates of the DRC, DRC/SER and DRCM, DRCM/OER were done at the plant, firm, industry, and subsectoral levels.

Technical efficiency is defined as the ability of a firm or industry to produce the maximum attainable output from a given set of inputs under a specific technology. To measure the technical efficiency of a firm or industry, the common approach utilized is the estimation of the production frontier or the efficient production function which represents the maximum attainable output from a given mix of inputs. When the maximum output is known, the technical efficiency of a firm or industry is measured using the ratio between the actual and the maximum or potential output. The two most common measurements of the frontier production function are the deterministic and stochastic types. The deterministic model attributes the difference between actual and potential output wholly to symmetric disturbances. It does not isolate the proportion of the gap between actual and potential output due to inefficiency from other random disturbances. The stochastic model isolates the proportion of the gap between actual and potential output due to the efficiency component from random disturbances by explicitly incorporating an efficiency component in its error term. Thus, estimates using the stochastic model are considered more correct than those using the deterministic model. However, the statistical package using the stochastic model is not able to run on available data. Thus, this study utilized the deterministic approach in the measurement of technical efficiency.

The model utilized was based on Page (1980) which minimizes the deviations of actual output from the maximum potential output, subject to a number of constraints. It sets out a translog production

9. The same rationale applies in using the ratio DRCM/OER less than or equal to 1.2 instead of DRCM/OER less than or equal to 1, to provide a 20 percent margin of error in determining competitive advantage.

function which represents the 'best practice frontier.' The model utilizes a linear programming problem which is set up as follows:

$$Min\ Ye - Y$$

where
$$Ye = ao + aL \ln L + aK \ln K + aM \ln M + aLK \ln L \ln K + aLM \ln L \ln M + aKM \ln K \ln M + 1/2\ aLL (\ln L)2 + 1/2\ aKK (\ln K)2 + 1/2\ aMM (\ln M)2$$

subject to the following constraints:

(i) $aL + aK + aM = 1$

(ii) $aLK + aLM + aLL = 0$

$aKL + aKM + aKK = 0$

$aML + aMK + aMM = 0$

(iv) $aLL \leq 0$

$aKK \leq 0$

$aMM \leq 0$

where Ye = estimated maximum potential output;
Y = value of actual output, computed as in the DRC;
L = total man-hours;
K = user cost of capital;
M = cost of raw materials.

The above problem produces a set of coefficients which describes the frontier production function. According to the same model, technical efficiency (TE) is measured as follows:

$$TE = \frac{Y}{Ye}$$

where the variables are as earlier defined.

A firm (or an industry) is deemed technically efficient if its TE is at least 75 percent (Hill and Kalirajan 1991). Estimates of technical efficiency are done at the plant, industry, and subsectoral levels.

Measures of *partial factor productivity* include labor and capital productivity. Labor productivity is estimated as census value-added at constant price over the number of total employed persons. Capital productivity is estimated as census value-added at constant price over capital at replacement cost in constant terms. The replacement cost figure is obtained from the replacement cost computed in the DRC calculation. In formula form, these are

$$\textit{Labor Productivity} = \frac{\textit{CVA at constant prices}}{\textit{Total employment}}$$

$$\textit{Capital Productivity} = \frac{\textit{CVA at constant prices}}{\textit{Capital at Replacement Cost}}$$

where CVA = census value added.

Capital-labor (K/L) ratio is measured as the capital at replacement cost over total employment.

Industrial Concentration and Market Power

The measures of seller concentration utilized in this study are the Herfindahl index and the four-firm concentration ratio based on value-added (VACR4). The index of market power used is the price-cost margin (PCM).

Herfindahl index is a measure which indicates the level of size dispersion between plants in an industry. It reaches its lowest value when all plants are of the same size. Its measurement here is based on the revenues on major products. In formula form, this is

$$H_j = \Sigma X_{ij}^2$$

where X_{ij} = the share of the revenues of the establishment i.e., plant $_i$ to the total output of industry $_j$.

VACR4 measures the percentage share of the four largest plants in terms of the census value-added in an industry or subsector.

Between the Herfindahl index and the VACR4, the former is considered better in measuring the degree of seller concentration since it takes into account the share of each plant in an industry, and it magnifies the share of the large plants and minimizes the share of the small plants.

Price-Cost Margin (PCM) is a measure of the market power of firms to earn profits. The standard measure of the price-cost margin uses marginal cost as the cost variable. Since data constraints preclude such measure, an alternative measure of the PCM is used instead. This is based on Lindsey (1977). Its measurement is as follows:

$$PCM = \frac{CVA - Compensation}{Value\ of\ Output}$$

The difference between CVA and compensation represents the payments to factors other than labor. This roughly reflects the profitability of the establishments in an industry. A high PCM indicates excess market power of plants in an industry.

Vertical integration was measured using the ratio between census value-added and sales. A higher CVA/Sales indicates plants in an industry generate more value-added per output sold and implies that plants in an industry have a high degree of vertical integration.

3

Industry Background

A. Synthetic Resin Industry

Product

The products of the synthetic resin industry fall under two types: thermoplastic and thermosetting. Thermoplastic resin softens repeatedly by heating. Thermosetting resin, on the other hand, hardens only once when heated. Thermoplastics produced by the local industry include Polystyrene (PS), Polyvinyl Chloride (PVC), Alkyds and Polyester Fiber, while those of thermosetting resins include Phthalic Anhydride, Aluminum Paste Resin, Adhesive Resin, Acrylic Resin Urea- and Phenol-Formaldehyde, and Colored Pellets. The two thermoplastics in greatest demand, Polyethylene (PE) and Polypropylene (PP), are not produced locally because of a lack of an integrated petrochemical plant to supply their raw materials.

Thermosetting and thermoplastic resins respectively fall under two broad industrial categories. Thermosetting resins fall under the surface coating branch of the chemicals industry. Thermoplastic resins fall under plastic and plastic-based products. The surface coating chemicals branch includes the manufacture of paint, adhesives, printing ink, and specialty resins of the thermosetting type. Firms often manufacture these products at the same time, as in the case of paint manufacturers, Borden, International and Pacific Products, Inc.

Thermoplastic and thermosetting resins are used in industrial, consumer, and agricultural products. This is depicted in Figure 1 along with its forward and backward linkages. As shown, raw chemicals of synthetic resins are of chemical and petrochemical origins (PDCP 1973), 85 percent of which are sourced abroad. Its allied industries

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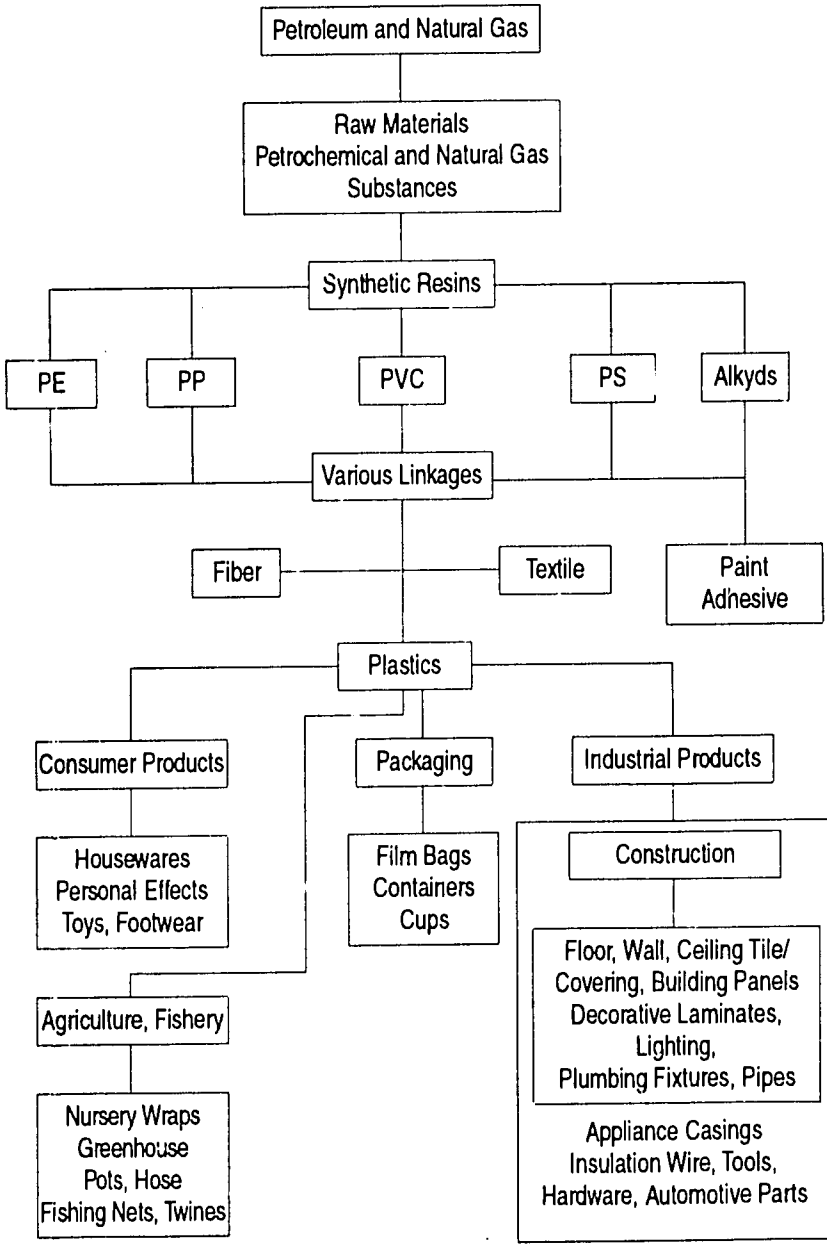
Figure 1
Forward and Backward Linkages of Resin and Plastic



include consumer goods, packaging, agriculture, construction, appliances, and industrial goods.

Capacity

The registered production capacity of resins is shown in Table 1. Polyvinyl Chloride tops the list with 102,500 metric tons per year (MTPY) followed by Alkyd resins with 32,608 MTPY. Average production capacity per firm runs to 11,000 MTPY.[10]

History

The first local synthetic resin was manufactured in 1954 by the Philippine Pigment and Resins Corp. (formerly H.G. Henares & Sons) and Borden Chemicals (formerly Casco Philippines Chemical Co., Inc.).These products were Alkyd resins and Urea Formaldehyde (i.e., Adhesive resins) respectively. Resins', Inc. followed in the late 1950s with adhesive resins. In the 1960s, the following resin manufacturing firms were established: DFE Chemical Corp.; Rohm and Haas, Philippines, Inc.; Advance Resins; and Mabuhay Vinyl Corp. Mabuhay was the first to manufacture the thermoplastic resin Polyvinyl Chloride in the Philippines. Polyvinyl Chloride is used as a raw material for plastic pipes, footwear, packaging, and calendering industries (PDCP 1973).

Firms

As of 1991, there were 17 firms manufacturing resins.The leading firms are presented in Table 2. Mabuhay Vinyl Corp., manufacturer of Polyvinyl Chloride and Resins, Inc., producer of Phthalic Anhydride,

10. Registered capacity is lower than actual capacity. The two producers of Polyvinyl Chloride, Mabuhay Vinyl Corp., and Philippine Vinyl, Inc. are reported to have a combined actual capacity of 25,000 MTPY as opposed to the 102,500 MTPY registered figure. Firms indicate their planned or registered capacity to avail of government incentives.

Table 1

Distribution of Population and Capacity of Resin and Plastic Manufacturing Firms by Product Type

Product Type	No. of Firms*	Registered Capacity (MTPY)
Resin	17	189,378
Polyvinyl Chloride	5	102,500
Polystyrene	4	32,608
Alkyd Resin	4	22,995
Adhesive Resin	1	11
Phthalic Anhydride	1	16,000
Pellets	3	15,000
Acrylics	1	2,264
Plastic Processing	262	3,235,185
Extrusion	147	1,148,673
Film/Plastic Bag	73	146,630
Nettings & Ropes	24	14,000
Pelletized/Recycled	4	8,496
Pipes, Profiles & Sheets	34	959,547
Wires & Cables	2	6,000
Woven/Non-Woven Sacks & Bags	10	14,000
Molding	166	2,054,252
Houseware	35	13,680
Industrial Parts	15	922,580
Packaging	56	1,085,483
Personal Article	12	7,000
Toys & Novelties	39	25,509
Wearables	9	.2 million pieces
Specialty	22	32,260
Adhesive	3	15,000
Calendered Products	1	3,000
Castings, Dip Coated & Laminated Products	1	
Office Products, School & Printed Plastic	14	
Vacuum Formed/Foamed Products	1	14,260

* Other firms produce more than one product type.

Sources: Board of Investments (BOI) Registration as of December 1991; Sycip, Gorres and Velayo (SGV), 1990.

Table 2

Leading Firms in the Resin and Plastic Industries

Name of Firm (000)	Gross Revenue (1969)	Type
Resin		
1. Mabuhay Vinyl Corporation	684,371	Polyvinyl Chloride (PVC)
2. Resins', Inc.	680,149	Phthalic Anhydride, Aminoplasts, Phenoplasts, Alkyd Resins
3. Borden, Int'l.	246,329	Urea-, Phenol-Formaldehyde, PVAc Emulsions, Acrylic Emulsions
4. Philippine Petrochemical Products, Inc.	230,452	Polystyrene
5. Pacific Products	190,695	Alkyds, Acrylic & Polyester Resins
Plastic		
1. Dart Philippines, Inc.	538,378	
2. Plastimer Industrial	236,129	
3. Vassar Industries	200,895	
4. Moldex Products, Inc.	171,666	
5. Handyware Philippines, Inc.	170,864	
6. Topy Industries, Inc.	164,143	
7. Premium Packaging International, Inc.	132,368	
8. Solvic Industrial Corp.	113,362	
9. Formey Plastics, Inc.	52,460	
10. Basic Packaging Corp.	47,345	

Source of data: Top 1000 Corporations, 1990.

dominate the resin industry in terms of gross revenues. All top five firms have consistently ranked in the top 1000 corporations. But as shown later, the industry also includes relatively smaller firms, which were found to be more efficient.

Structure

The structure of the resin industry is distinguished between its thermoplastic and thermosetting branches.

The thermoplastic resin branch, composed of Polyvinyl Chloride, Polystyrene, Alkyds, and Polyester Fiber can be characterized by the presence of a few large oligopolistic firms. The 13 firms manufacturing thermoplastic resin items have an average registered capacity of 17,000 MTPY, which is much higher than the 11,000 MTPY industry average. Oligopolistic firms have two characteristics — high investment requirements and limited range of products. A United Nations estimate (late 1960s) showed capital investment in processing Polyvinyl Chloride (26,000 MTPY capacity) at $8 million; and Polystyrene (24,000 MTPY) at $5 million. Moreover, there is economies of scale involved in thermoplastics production as in a fourfold increase from 6,000 to 26,000 MTPY. Polyvinyl Chloride undertaking will involve a corresponding 3.2 times investment increase from $2.5 to $8 million. According to an industry leader, a world class Polyvinyl Chloride plant requires 60,000 MTPY of actual capacity, fourtimes the 17,000 MTPY average capacity in the local thermoplastic resin branch.

With respect to the limited product range, the Philippines does not produce the two thermoplastic resins in greatest demand, Polyethylene and Polypropylene, due to the absence of an integrated local petrochemical plant to supply raw materials which need high capital investment. The same UN estimate showed that the cost of establishing a Polyethylene or a Polypropylene plant is twice that of establishing a Polyvinyl Chloride or a Polystyrene plant.

However, the thermoplastics Polyethylene and Polypropylene cornered around 80 percent of the P4-billion local thermoplastic resin market in 1985 (SGV 1990) with the remaining 20 percent shared by

Polystyrene and Polyvinyl Chloride. Moreover, imports of PE and PP reached around $134 million in 1988, or 54 percent of total resin imports.

The thermosetting branch is not as oligopolistic as its thermoplastic counterpart. Its average registered capacity runs to 5,500 MTPY, way below the 17,000 MTPY average for thermoplastic branch. It is also less capital-intensive. The UN (late 1960s) estimated that for thermosetting resins, a plant with a capacity of 2,500 MTPY would require $1.5 million in capital investment, which is lower compared to the $1.9 and $2.5 million required in Polyvinyl Chloride or Polystyrene, respectively.

Notwithstanding, capital investment is relatively high compared to other industries. As such, the industry is composed of a few players. The resin industry was composed of 15 establishments in 1978, 17 in 1983, and 14 in 1988.

Specific Factors: Ownership, Location, Technology, Capacity Utilization, Product Quality

All resin manufacturers are under a corporate organization but ownership and management is family-oriented. Foreign participation is seen on five establishments (Table 3). Majority of the establishments are concentrated in Metro-Manila, owing to conveniences in terms of easy access to imported raw materials, market proximity, and infrastructure (Table 4). Plants are relatively mature, eight out of 17 of which are above 20 years old as of 1983 while six are between 16 to 20 years old (Table 5).

Production technology is equipment-based, developed by the equipment manufacturer and raw material supplier. Technology uses automatic operations with an option to shift to manual mode. Design of new products is one of its features (NAUM circa 1960s-1970s).

Table 6 shows resin manufacturing as capital intensive compared to plastic product manufacturing. Average capital-labor ratio in resin production is at least thrice that of plastic in 1983 and 1988.

Survey data gathered from three resin manufacturing firms showed that most resin production equipment are new when

Table 3

Legal Set-Up and Foreign Equity Participation of Resin and Plastic Manufacturing Plants

Industry	No. of Firms*	Legal Set-up						Foreign Equity	
		Corporation	Single Proprietorship	Partnership	Cooperative	Association	Others	No. of Firms**	W/ Foreign Equity
Resin	17	17	0	0	0	0	0	14	5
Plastic Processing	171	19	128	7	4	10	4	300	38
Furniture	2	1	1	0	0	0	0	4	0
Footwear	9	8	0	0	0	0	0	6	1
Industrial Supplies	23	16	1	1	0	1	0	27	2
Fabricated Plastics, n.e.s.	139	113	6	6	6	9	4	263	35

Sources: * 1983, ** 1988 *Census of Establishments*. National Statistics Office.

Table 4

Geographical Location of Resin and Plastic Manufacturing Plants by Product Type

Industry	Total No. of Plants*	Plant Location (Region) NCR	IV	III	X
Resin	17	9	5	1	2
Polyvinyl chloride	5	3	1	0	1
Polystyrene	4	3	1	0	1
Alkyd resin	4	2	2	0	0
Adhesive resin	1	0	1	0	0
Phthalic anhydride	1	1	0	0	0
Pellet resin	3	1	1	1	0
Acrylic resin	1	1	0	0	0
Plastic Processing	262				
Extrusion	125				
Film/Plastic bag	73	72	0	1	0
Nettings and ropes	24	24	0	0	0
Pelletized/recycled	4	2	1	1	0
Pipes, profiles and sheets	34	34	0	0	0
Wires and cables	2	2	0	0	0
Woven/non-woven					
Molding	166				
Houseware	35	35	0	0	0
Industrial parts	15	13	2	0	0
Packaging	56	56	0	0	0
Personal articles	12	12	0	0	0
Toys and novelties	39	39	0	0	0
Wearables	9	9	0	0	0
Specialty	22				
Adhesive	3	3	0	0	0
Calendered products	1	1	0	0	0
Castings, dip coated and laminated	3	3	0	0	0
Office products, sch. and printed plastic	14	14	0	0	0
Vacuum formed/foamed products	1	1	0	0	0

* It was assumed in the plastic processing industry, given the data available per product distribution, that each firm has at least one plant. Thus, the number of plants here (i.e., 262) represents the number of firms. Vertical totals do not match because some firms produce more than one sub-product.

Source: Board of Investments Registration as of December 1991; Sycip, Gorres and Velayo, 1990.

Table 5

Age Distribution of Resin and Plastic Manufacturing Plants

Industry	No. of Plants	Age in Years					
		0-5	6-15	16-20	>20		
Resin	17	3	2	6	8		
		8	9	10	11	12	>12
Plastic Processing	173	4	3	7	2	6	151
Furniture	2	0	0	0	0	0	2
Footwear	9	0	2	1	0	0	6
Industrial Supplies	23	0	0	2	0	0	20
Fabricated Plastics, n.e.s.	139	4	0	4	2	6	123

Sources: For resin industry, Board of Investments' list of registered firms as of December 1991.
For plastic processing industry, 1983 *Census of Establishments* by the National Statistics Office.

Table 6

Capital-Labor Ratio (K/L) of Resin and Plastic Processing Industries: 1983 and 1988

Industry	Capital-Labor Ratio (000)		
	1983	1988	Change(%)
Resin	301	1146	280.7
Plastic	103	188	82.5
Furniture	47	16	-6.6
Footwear	8	51	537.5
Industrial Supplies	80	74	-8.1
Fabricated Plastic	107	105	-1.9

Source: 1983 and 1988 *Census of Establishments*. National Statistics Office.

acquired. Useful life of production equipment usually ranges from 15 to 20 years. Sources of acquisition funds include self-financing and domestic loans with the dominance of local ownership of the industry. The industry imports production equipment. Utilization of production capacity ranges from 60 to 100 percent, with bias towards 60 percent. The 60 percent capacity utilization, however, is considered normal within the industry. Research and development play an important role in improving the quality of the firms' products and developing new ones. Quality standards used include either local (Industry Accepted Standard, Bureau of Product Standards, Philippine National Standards) or foreign (International Standards Organization).

Significance to the Economy

The resin industry accounted for roughly 1/2 percent of the total manufacturing sector's output and value added, and roughly 1/5 percent of total employment in the years 1978, 1983, and 1988 (Table 7).

Problems of the Industry

Industry sources cited technical smuggling as their primary problem, especially since 1981. Smuggling is done through importation via Bonded Manufacturing Warehouse (BMW) for exporting firms wherein goods find their way into the domestic market. They also cited the lack of cheap long term funds to finance modernization of plants. Corollary to this, the high cost of doing business in the past years (i.e., high inflation and interest rates) had adversely affected their business. Other problems in the industry include poor infrastructure; the energy problem; lack of an efficient shipping and local telephone service; delays in customs service; and inefficiency and red tape in duty drawback of imported materials.

Table 7

Significance to the Economy of Resin and Plastic Industries: 1978, 1983 and 1988

(% share to manufacturing sector's output, value-added and employment, at current prices)

Industry	Output			Census Value-Added			Employment		
	1978	1983	1988	1978	1983	1988	1978	1983	1988
Resin	0.45	0.57	0.52	0.52	0.54	0.7	0.08	0.24	0.19
Plastic	1.73	1.45	1.74	1.02	1.6	1.68	2.03	2.39	2.06

Source: 1978, 1983 and 1988 *Census of Establishments* by the National Statistics Office.

B. Plastic Processing Industry

Product

Products under the plastic processing industry, classified by process, are shown in Table 1. These include (1) extrusion, (2) molding, and (3) specialty processes. It can be seen that the range of products are diverse, different in terms of physical properties and usage. Following the Census data, this study used the Philippine Standard Industrial Classification Code (PSIC), established as:

1) Plastic furniture — includes plastic cabinet and case, chairs and furnitures, PSIC 35601;
2) Plastic footwear — includes boots, molded shoe and molded slippers of plastics, PSIC 35602;
3) Plastic industrial supplies — include plastic bolt, plastic parts and accessories of vehicles, ships; also include pipe fitting, part for machinery, wall panelling, radio cabinet, tubing and washer, of plastics, PSIC 35603;
4) Other fabricated plastic products, n.e.s. — include housewares, gifts and novelties, packaging and personal effects, PSIC 35609.

Figure 1 shows the many usages of plastic products with their raw materials — the thermoplastic resins, PE, PP, PVC, and PS. Around 80 percent of its raw materials, or the local demand share of non-produced Polypropylene and Polyethylene, are imported (SGV 1990).

Capacity

Table 1 shows the registered production capacity in this industry. Plastic packaging tops the list with 1.08 million MTPY, followed by pipes, profiles, and sheets, 959,547 MTPY. In terms of process classification, average registered capacity is largest in molding products (12,375 MTPY), followed by extrusion products (7,814 MTPY) and

lastly, specialty products (1,466 MTPY).[11] This implies that firms whose products undergo molding process are more large-scale in nature than those whose products undergo extrusion or specialty processing. Moreover, the molding process itself, specifically plastic packaging, necessitates the achievement of economies of scale for cost advantages.

History

The plastic processing industry is an offshoot of the modern plastic era that began after World War II with the rising popularity of thermoplastic resin-based articles. The first manufacturer of plastic articles was Plastics, Inc., which produced plastic tiles in 1947. In the 1960s, the local manufacturers of thermoplastics, Polyvinyl Chloride and Polystyrene, supplied raw materials for producers of plastic pipes, footwear, packaging, and calendering items. The convenient and durable features of plastics as well as its economic viability hastened the development of the industry.

Firms

As of the end of 1991, there were 262 firms manufacturing various plastics in the country (Table 1). This number represents only those which were involved in plastic processing (i.e., the conversion of thermoplastic resin into various plastic products). The United Nations Industrial Development Organization (UNIDO) put the number of firms in this industry at around 400, with some 200 firms not wholly engaged in plastic processing but merely involved in assembly, cutting, glueing, machine semi-finishing products, or casting polyester resins into glass fibers (SGV 1990).

11. Two large-scale manufacturers of plastic packaging products, San Miguel Corp. and Asia Brewery, Inc., were not included in the list of firms as well as their capacities due to the lack of data on their respective plastic packaging divisions. If they were included, the average firm capacity under molding processed products would significantly increase.

The manufacture of film bags had the largest number of firms (73), followed by packaging (56), toys and novelties (39), and pipes, profiles, and sheets (34).

Table 2 shows the leading firms notably, Dart Philippines, Inc., Plastimer Industrial, and Vassar Industries. Each of these earned at least P200 million in gross revenues in 1989.

Structure

The plastic processing industry can be characterized by the coexistence of large-, medium- and small-scale firms. This includes giant firms such as San Miguel and Asia Brewery with their respective plastic packaging divisions; the medium-sized firms such as in toys and housewares; and small-scale firms in the laminated and printed plastic items.

Overall, plastic processing does not necessitate high capital investments as compared to synthetic resin manufacturing. UNIDO estimates some 100 firms constitute one-machine outfit, mostly producing film bags, and those engaged in the injection molding process.

The relatively lower capital requirements and the diversity of available products to manufacture indicate a relatively freer entry into this industry compared to the resin industry. The number of firms in the plastic processing industry was around 15 times higher than the number of firms in the resin industry in 1991. The number of establishments in the plastic processing industry was almost 26 times bigger than in the resin industry in 1988.

Between 1983 and 1988, entry into the plastic processing industry was relatively freer than in the resin industry. The number of establishments in the plastics industry rose twofold from 143 in 1983 to 300 in 1988, while it declined from 17 to 14 in the resin industry in the same period. The proportion of small establishments rose from 70 to 81 percent in the plastics industry while it fell from 71 to 54 percent in the resin industry. The proportion of large establishments fell from 13 to 5 percent and rose from 7 to 15 percent in the respective industries.

In 1988, the plastic processing subsector with the biggest number of establishments was fabricated plastics, not elsewhere stated (n.e.s.) (263), followed by plastic industrial supplies (27) and plastic footwear (6). Plastic furniture had the smallest number of establishments (4).

Specific Factors: Ownership, Location, Technology, Capacity Utilization, Product Quality

Three-fourths of the industry's establishments fall under the single proprietorship category. In comparison, there are no single proprietorship establishments in the resin industry. Around 11 percent of the plastic processing establishments falls under a corporate set-up, compared to 100 percent in the resin industry in the same year (Table 3).

The predominance of single proprietorship in the plastic processing industry is consistent with the observation that at least 70 percent of its plants are considered small-scale.[12]

Foreign equity participation is quite significant in the plastics industry with 38 out of 300 establishments having foreign equity stake (Table 3).

Eighty-nine percent of the plastic processing plants are located in the National Capital Region (NCR) compared to 43 percent in the resin industry (Table 4). Around 87 percent of plants are above 12 years old as of 1983, with the remaining 13 percent, between four to 12 years old (Table 5).

As in the synthetic resin industry, the production technology for plastic processing is also based on the kind of equipment developed by the equipment manufacturer and raw material supplier. Automatic operations can be replaced with manual operations. Design of new products is allowed (NAUM circa 1960s-1970s). In terms of relative factor intensity, plastic processing is, on the average, relatively more labor-intensive than in resin manufacturing based on the capital-labor ratio (K/L) in Table 6. The capital-labor ratio for plastic processing is at most one third of the K/L ratio of resin manufacturing in 1983 and

12. That is, with employment size not greater than 99.

1988. Among the plastic processing subsectors, the most labor-intensive (or the least capital-intensive) is plastic furniture with a K/L ratio of 16,000 in 1988. The most capital- intensive subsector is fabricated plastics, n.e.s. with a K/L ratio of 105,000 in 1988.

New and second-hand machines are used in this industry, based on firm-level observations. Second-hand machines are significant as far as the small-scale plants are concerned.

About two thirds of plastic processing equipment is imported while the rest are sourced locally. Capacity utilization ranges from 70 to 100 percent based on six firms surveyed. Majority of firms sampled do not engage in research and development (R&D) unlike in the resin industry. Four out of six firms sampled do not engage in R&D while two firms do for product development, adaptation of foreign technology, and improved technical efficiency. These two firms utilize their own internal staff for R&D work. One firm stipulated an annual budget for R&D amounting to P200,000 in 1991.

Quality standards used include both local (contractor's or customer's standard) and foreign (Japan Industrial Standard and Korean Industrial Standard).

Significance to the Economy

The plastic processing industry accounted for at least 1.5 percent of output, one percent of census value-added, and two percent of employment in the manufacturing sector in 1978, 1983, and 1988 (Table 7).

Problems of the Industry

Problems of the plastic processing industry include poor infrastructure; delays in customs service; inefficiency and red tape on duty drawback of imported materials; the (previously) high cost of money (i.e., high interest rates); the uncompetitiveness of local labor relative to other ASEAN countries; labor unrest; lagging technology for some product lines, particularly those products under molding process and the relatively high tariffs on resins which are locally produced, i.e., Polyvinyl Chloride and Polystyrene (SGV 1990).

4

Findings of the Study

Resin and Plastic Industries: Structure of Protection

The EPR on resins and plastics declined significantly in 1988 from 1983 (Table 8). The EPR on resins went down to 16 percent in 1988 from 114 in 1983, while it declined to 21 percent from 120 in the plastics industry. It can be seen that from an EPR level higher than the whole manufacturing average of 38 percent in 1983, it dropped to way below this average of 36 percent in 1988. The standard deviation of EPRs also fell substantially, indicating the narrowing of dispersion in protection within these industries.

In the case of the plastic processing subsectors, the EPRs all went down in 1988 from 1983. Among the subsectors, the lowest EPR in 1988 was on plastic furniture at 20 percent. The standard deviation of EPRs in 1988 also declined for all subsectors (Table 8).

Table 8

Effective Protection Rate (EPR) on Resins and Plastics: 1983 and 1988

	1983		1988		1983/1988 EPR
	EPR	SD	E	SD	
Resin	114	133	16	4	7.13
Plastic	120	247	21	5	5.71
Furniture	85	N.A	20	1	4.25
Footwear	87	18	22	0.2	3.95
Plastic industrial	160	226	22	2	7.27
Fabricated n.e.s.	117	261	21	6	5.57

Source: 1983 and 1988 *Census of Establishments*. The National Statistics Office.

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The NEPR went down for resins and plastics, and for all plastic processing subsectors. The NEPR for resins declined to -7 percent in 1988 from 0.71 in 1983, while the NEPR for plastics fell to -3 percent from 0.76 percent. Among the plastic processing subsectors, plastic industrial supplies registered the biggest drop in the NEPR at -3 percent in 1988 from 1.1 in 1983 (Table 9). It is worthy to note that the NEPR on the two industries and all subsectors were negative in 1988. This could indicate that, after adjusting the EPR for domestic currency overvaluation, which effectively reduced protection, these industries were found to be penalized in 1988. Based on the gap between EPR and NEPR in 1988 as well as in 1983, it can be noted that the protection accorded by a distorted foreign exchange rate over and above tariffs and taxes was quite substantial in these industries.

Overall protection. Based on the broad measures of protection, EPR and NEPR, the overall protection in the resin and plastic industries were reduced by the TRP and the ILP. However, it should be noted that trade liberalization in the resin industry was quite delayed compared to that in plastic processing. Specifically, the liberalization of the 22 regulated resin items was completed in 1988, while for 77 regulated plastic items, liberalization was completed in 1987. In the resin industry therefore, there is a case of quantitative restriction-

Table 9

Net Effective Protection Rate (NEPR) on Resins and Plastics: 1983 and 1988

	1983	1988	1983/1988 NEPR
Resin	0.71	-7	-0.10
Plastic	0.76	-3.3	-0.23
Furniture	0.48	-3.8	-0.13
Footwear	0.50	-2.8	-0.18
Plastic industrial	1.08	-2.8	-0.39
Fabricated n.e.s.	0.73	-3.4	-0.21

Source: 1983 and 1988 *Census of Establishments*. The National Statistics Office.

protected (QR) products but declining protection on inputs between 1983 and 1988.

Government policies affecting the industry. The resin and plastic industries are recipients of various fiscal incentives under the following promulgations: (1) Investment Incentives Act (Republic Act or RA 5186); (2) Export Incentives Act (RA 6135); (3) Investment Incentives Policy Act of 1983 (Batas Pambansa or BP 391); and (4) The 1987 Omnibus Investments Code (Executive Order or EO 226). These fiscal incentives include tax exemptions, credit, and deductions. Other laws which affect these industries include the Foreign Business Regulation Act (RA 5455) and the Foreign Investments Act of 1991, both of which encourage the flow of foreign equity into firms within these industries.

Aside from fiscal incentives, the government assists the plastic industry on research and development through the Metal Industry Research and Development Center (MIRDC). MIRDC aims to upgrade plastic mold-making technology in the Philippines (SGV 1990).

Exposure to Foreign Competition

The indices of exposure to foreign competition show that the trade policy reform exposed the resin and plastic industries to more direct foreign competition (Table 10). The share of exports in domestic production doubled in the case of the resin industry and rose eightfold in the plastic processing industry in 1988 from 1983.

The import penetration index of the plastic processing industry went up substantially, indicating that the share of domestic firms to total demand dropped or equivalently, the share of imports to total demand increased. It rose by 1,550 percent to 33 in 1988 from 2 in 1983. It declined in the resin industry, implying that the share of domestic firms in total demand increased. This decline, despite the reduction in both overall protection measures cited above, could mean

Table 10

Exposure to Foreign Competition of Resin and Plastic Industries: 1983 and 1988

	Resin			Plastic		
	1983	0	Change (%)	1983	1988	Change(%)
Import Penetration Index (M/Q+M-X)	70	23	-67.1	2	33	1550.0
% Share of Exports to Production (X/Q)	8	16	100.0	3	24	700.0
Index of Intra-Industry Trade [1-abs (X-M)/(X+M)]	0.07	0.76	985.7	0.85	0.78	-8.2

M = imports
Q = value of production
X = exports

Source: Input-Output Matrix of the National Statistics Office.

three things. One, actual trade restrictions could have been more effective. Two, the industry became more efficient and thus, more able to compete and capture a greater share of the market. And three, there could be some error in the data used to compute this index.[13]

The index of intra-industry trade increased in the case of the resin industry indicating that greater participation in trade resulted in more intra-industry trade. It went down slightly in the case of the plastic processing industry, indicating that greater trade participation resulted in more inter-industry trade rather than greater intra-industry trade. However, its intra-industry indices in 1983 and 1988 were still higher than that of the resin industry.

13. See Methodology, DIA Project Paper 1994, on the data used to compute the import penetration index.

INDUSTRIAL PERFORMANCE, EFFICIENCY, AND COMPETITIVENESS

Performance

Output, Value-Added and Employment. The resin and plastic industries posted a significant growth rate of real output, real census value-added (CVA), and employment during the period from 1978 to 1988 (Tables 11 to 16). At constant 1972 prices, the output of the synthetic resin industry grew by 38 percent from 1978 to P260 million in 1988 while that of the plastic processing industry expanded by 25 percent to P816 million.

Real CVA of the resin industry increased by 38 percent to P115 million while that of the plastic processing industry rose by 68 percent to P276 million in 1988. Total employment in the resin industry increased by 59.7 percent to 1,607 in 1988, while in the plastics industry, it dropped by 28.4 percent to 17,616 in 1988.

Exports. Exports of synthetic resins and plastic products displayed a fluctuating trend during the period from 1980 to 1990 (Tables 17 and 18).

The average annual growth rate of resin exports during the same period was a meager three percent. Compared to other ASEAN countries, the Philippines had the lowest average annual growth rate of resin exports. In terms of the value of exports, the country also performed the least among the ASEAN countries indicated (Table 17).

Exports of plastic products, meanwhile, had a higher growth rate than that of synthetic resins. The average annual growth rate of plastic product exports was 15 percent during the period from 1980 to 1990. However, the country was still the least among the ASEAN countries, both in terms of growth rate and value of plastic product exports (Table 18).

Table 11

Value of Real Output of Resin and Plastic Industries: 1978, 1983 and 1988 (In P million) (1972=100)

	1978	1983	1988
Resin	188	246	260
Plastic	716	629	816

Source: 1978, 1983 and 1988 *Census of Establishments* by the National Statistics Office.

Table 12

Growth Rate of Real Output of Resin and Plastic Industries: 1983 and 1988 (In percent)

	1978-1983	1983-1988	1978-1988
Resin	30.7	5.8	38.2
Plastic	14.1	29.9	25.1

Source: 1978, 1983 and 1988 *Census of Establishments* by the National Statistics Office.

Table 13

Total Employment of Resin and Plastic Industries: 1978, 1983 and 1988 (In P million) (1972=100)

	1978	1983	1988
Resin	1,006	1,663	1,607
Plastic	24,260	16,778	17,616

Table 14

Growth Rate of Total Employment of Resin and Plastic Industries: 1983 and 1988 (In percent)

	1978-1983	1983-1988	1978-1988
Resin	65.3	-3.4	59.7
Plastic	-31.8	5	-28.4

Source: 1978, 1983 and 1988 *Census of Establishments* by the National Statistics Office.

Table 15

Real Census Value Added (CVA) of Resin and Plastic Industries:1978, 1983 and 1988 (In P million) (1972=100)

	1978	1983	1988
Resin	83	95	115
Plastic	164	285	276

Source: 1978, 1983 and 1988 *Census of Establishments* by the National Statistics Office.

Table 16

Growth Rate of Real CVA of Resin and Plastic Industries: 1983 and 1988 (In percent)

	1978-1983	1983-1988	1978-1988
Resin	14.1	20.6	37.7
Plastic	73.7	-3.1	68.4

Source: 1978, 1983 and 1988 Census of *Establishments* by the National Statistics Office.

Table 17

Exports of Synthetic Resins by ASEAN Countries, 1980-1990
(In US $000)

Year	Philippines	Growth Rate	Thailand	Growth Rate	Malaysia	Growth Rate	Indonesia	Growth Rate
1980	12,027		11,635		13,339		N.A.	
1981	21,282	77.0	13,328	14.6	11,227	-15.8	N.A.	
1982	12,276	-42.3	10,764	-19.2	11,789	5.0	70,275	N.A.
1983	11,434	-6.9	10,538	-2.1	15,054	27.7	70,141	-0.2
1984	N.A.	N.A.	26,495	151.4	20,779	38.0	85,874	22.4
1985	17,199	N.A.	N.A.	N.A.	7,919	-61.9	85,044	-1.0
1986	20,395	18.6	N.A.	N.A.	7,787	-1.7	N.A.	N.A.
1987	27,996	37.3	55,945	N.A.	34,387	341.6	N.A.	N.A.
1988	31,508	12.5	70,988	26.9	49,703	44.5		N.A.
1989	27,969	-11.2	N.A.	N.A.	73,022	46.9	N.A.	N.A.
1990	10,512	-62.4	N.A.	N.A.	102,964	41.0	N.A.	N.A.
Total	**192,598**	**2.8**	**199,693**	**17.2**	**347,970**	**46.5**	**311,334**	**6.6**

Source : UN International Trade Statistics.

Table 18

Exports of Plastics, n.e.s. by ASEAN Countries, 1980-1990
(In US $000)

Year	Philippines	Growth Rate	Thailand	Growth Rate	Malaysia	Growth Rate	Indonesia	Growth Rate
1980	10,188		29,810		21,054		N.A.	
1981	10,124	-0.6	31,699	6.3	19,231	-8.7	N.A.	N.A.
1982	12,184	20.3	31,546	-0.5	17,818	-7.3	72,681	N.A.
1983	11,945	-2.0	40,790	29.3	19,119	7.3	80,641	11.0
1984	10,278	-14.0	54,881	34.5	24,975	30.6	82,637	2.5
1985	11,813	14.9	46,510	-15.3	N.A.	N.A.	87,751	6.2
1986	11,764	-0.4	53,571	15.2	N.A.	N.A.	N.A.	N.A.
1987	13,417	14.1	85,666	59.9	43,489	N.A.	N.A.	N.A.
1988	21,369	59.3	146,478	71.0	70,643	62.4	N.A.	N.A.
1989	32,608	52.6	295,767	101.9	N.A.	N.A.	N.A.	N.A.
1990	34,444	5.6	355,735	20.3	N.A.	N.A.	N.A.	N.A.
Total	**180,134**	**15.0**	**1,172,453**	**32.3**	**216,329**	**16.7**	**323,710**	**6.6**

n.e.s. — not elsewhere stated

Source : UN International Trade Statistics.

Efficiency and Competitiveness

Estimates of allocative and technical efficiency using the DRC measure are shown in Table 19. The resin industry became more inefficient in 1988 relative to 1983 as shown by the rise in its DRC. Meanwhile, the plastic processing industry became less inefficient in 1988 (though not yet efficient) as shown by the reduction in its DRC.

Based on the DRC/SER measure, the resin industry was considered a high-cost industry in both 1983 and 1988 with its DRC/SER greater than 1.2. It was also at a comparative disadvantage (Table 19).

The plastic industry was also considered a high-cost activity in both years since its DRC/SER was greater than 1.2. In 1983, its DRC/SER was equal to 2.3. However, in 1988, its DRC/SER fell to 1.3, which was not enough to consider it a low-cost activity or having a comparative advantage.

All subsectors, excluding plastic footwear, were considered high-cost in 1983 as their DRC/SER ratios were greater than 1.2. In 1988, all subsectors, except plastic footwear, improved in terms of the DRC/SER ratio.

Table 19

DRC and DRC/SER of Resin and Plastic Industries: 1983 and 1988

	1983		1988		Change in
	DRC	DRC/SER	DRC	DRC/SER	DRC (%)
Resin	22	1.6	69	2.6	213.6
Plastic	31	2.3	34	1.3	9.7
Furniture	29	2.1	42	1.6	44.8
Footwear	13	0.9	26	1	100.0
Plastic industrial	32	2.3	23	0.9	-28.1
Fabricated, n.e.s.	31	2.2	37	1.4	19.4

Source: 1983 and 1988 *Census of Establishments* by the National Statistics Office.

Based on the DRC/SER ratio, the economy could be said to have lost from the production of resins and plastic products either as import substitutes or exported goods because their DRC/SER ratios were greater than 1.2. That is, it had cost more in domestic resources to produce the importable (exportable) resin or plastic good than what it had saved (earned) in foreign exchange.

The level of international competitiveness of the resin industry worsened as indicated by a substantial rise in its DRCM. In contrast, that of plastic processing industry improved, as shown by the decline in its DRCM (Table 20).

In the resin industry, the DRCM rose by 155.2 percent to 74 in 1988 from 29 in 1983 while in the plastic processing industry, the DRCM fell by 14 percent to 37 from 43.

Within the plastic processing subsectors, the DRCM of the plastic industrial supplies and fabricated plastics, n.e.s. declined while that of the plastic furniture and plastic footwear subsectors rose. Noteworthy

Table 20

DRCM and DRCM/OER of Resin and Plastic Industries: 1983 and 1988

	1983		1988		Change in
	DRC	DRC/SER	DRC	DRC/SER	DRC (%)
Resin	29	2.6	74	3.5	155.2
Plastic	43	3.9	37	1.8	-14.0
Furnitur	47	4.3	48	2.3	2.1
Footwear	10	0.9	29	1.4	190.0
Plastic industrial	44	3.9	24	1.1	-45.5
Fabricated, n.e.s.	43	3.9	40	1.9	-7.0

DRC = Domestic resource cost
SER = Shadow exchange rate
DRCM = Domestic resource cost at market price
OER = Official exchange rate
TE = Technical efficiency

Source: 1983 and 1988 *Census of Establishments* by the National Statistics Office.

was the substantial rise in the DRCM of the plastic footwear subsector by 190 percent from 10 in 1983 to 29 in 1988. It can be noted here that plastic footwear also showed a deterioration in DRC at shadow prices, which increased by 100 percent in 1988 from 1983. This could indicate that the performance of the plastic footwear subsector, in terms of allocative and technical efficiency, and in terms of international competitiveness and private profitability, worsened in the transition period of trade reform compared to the pre-trade reform period.

In summary, while there was a decline in the DRC, DRCM, DRC/SER and DRCM/OER of the plastic processing industry and its subsectors in 1988 from 1983, the reduction was not sufficient to bring the industry at the level of allocative and technical efficiency, international competitiveness, comparative and competitive advantage. This could possibly mean that the positive effects of trade policy reform had already been felt in the plastic industry in 1988 although, admittedly, the reforms were just beginning to take effect that year.

In contrast, the positive effects of trade policy reform were still not felt in the resin industry in 1988 as seen in the deterioration in its DRC, DRCM, DRC/SER and DRCM/OER. Notwithstanding, the reforms are not yet complete. Their effects on the resin industry may not yet be fully realized.

Technical efficiency. In both industries, there was a dramatic shift toward technical efficiency between 1983 and 1988. The technical efficiency (TE) of the resin industry went up to 75 percent in 1988 from 59 percent in 1983. The TE of the plastic processing industry went up to 99 percent from 40 percent in the same years (Table 21).

This shift toward technical efficiency suggests that the trade policy reform could have fostered the adoption of a 'best practice' technique within these industries through exposure to foreign competition among entrepreneurs. It can be noted that the plastic processing industry, which showed a more dramatic shift in technical efficiency, experienced greater foreign competition than the resin industry. The plastic industry was almost at the 'best practice' technique (i.e., 99

Table 21

TE Coefficient of Resin and Plastic Industries: 1983 and 1988 (In percent)

	1983	1988	Change in TE (%)
Resin	59	75	27.1
Plastic	40	99	147.5
Furniture	N.A.	N.A.	N.A.
Footwear	N.A.	N.A.	N.A.
Plastic industrial	75	57	-24
Fabricated, n.e.s	51	99	94.1

N.A. means the computation of the TE coefficient in these subsectors yielded unreliable results due to the very few number of observations (i.e., < 10 observations).

percent) while the resin industry was less near the frontier (i.e., 75 percent).

Factor productivity. Estimates of factor productivity are shown in Table 22. Labor productivity increased in the resin industry, but dropped in the plastic processing industry. Meanwhile, capital productivity declined for both industries. This means that factor productivity in these industries did not register a general improvement in the transition period of trade reform.

At this point, it can be noted that there is a conflict among the results of DRC/SER, TE, and partial factor productivities which do not consistently proclaim technical efficiency and factor productivity.

One tentative explanation for this seeming contradiction could be the adjustment process involved in the trade reform.

In the case of the resin industry, the worsening of its DRC/SER was contradicted by the improvement in its TE, which was then opposed by the fall in its capital productivity. Since the DRC/SER measure is influenced by the size of the different domestic and foreign

Table 22

Partial Factor Productivity of Resin and Plastic Processing Industries: 1983 and 1988

	Labor Productivity (000)			Capital Productivity		
	1983	1988	Change (%)	1983	1988	Change (%)
Resin	50	62	24.0	0.17	0.05	-70.6
Plastic	13	11	-15.4	0.12	0.11	-8.3
Furniture	7	1	-8.6	0.15	0.09	-40
Footwear	3	8	166.7	0.36	0.15	-58.3
Plastic Industrial	11	18	63.6	0.14	0.24	71.4
Fabricated, n.e.s.	13	10	-23.1	0.12	0.1	-16.7

TE = Technical efficiency

Source: 1983 and 1988 *Census of Establishments* by the National Office of Statistics.

cost components, its increase in the resin industry can be attributed in part to the large establishments. As will be seen later, the relatively large establishments showed a worsening of DRC/SER as compared to the relatively small establishments which demonstrated improvements in DRC/SER (Table 27).

On the other hand, since the TE measure is not influenced by the size of constituent plants, the improvement in the performance of the relatively small plants (e.g., in terms of DRC/SER) induced a rise in the overall TE of the industry.

In the case of the plastic processing industry, there was an improvement among the small, medium, and large plant categories in terms of DRC/SER in 1988, particularly a drop in the proportion of high-cost plants and a rise in the proportion of low-cost plants for all plant-size categories (see Table 28). Thus, the improvement in the performance of the plastic processing plants partly supported the rise in the industry's TE.

Moreover, the DRC and TE, while both indicating technical efficiency, have different implications. DRC measures the efficiency in the allocation of resources within an industry or economy from an existing policy regime whereas, TE indicates the efficiency of the

industry or plant in terms of its technology, management, labor, plant organization, and other firm or plant-specific factors. These plant-specific factors may or may not be influenced by a change in trade policy, though a more competitive environment due to trade reform can influence a more efficient choice and use of inputs.

With regards to the fall in factor productivity measures in the resin and plastic industries, this can be explained by the adjustment process of trade reform. It can be noted that as foreign competition is introduced, firms are moved to be more competitive in terms of reducing their costs and adopting more efficient techniques. In this case, the substantial rise in the capital-labor ratio of these industries suggests a step towards improving their technology, especially for the capital-intensive resin industry.

The conflicting results may also have been due to the influence of entry and exit of new and old establishments, and improvement or deterioration in efficiency of existing establishments which cannot be determined because of the nature of the data. Or, it could also be due to deficiencies in computations (e.g., assumptions in the coefficients, aggregations)

Efficiency and EPR estimates are compared in Tables 23 and 24. There seems to be a positive relationship between the drop in the EPR and the rise in efficiency. In particular, the drop in the EPR was accompanied by a rise in the proportion of low-cost establishments (i.e., those whose DRC/SER is less than or equal to 1.2) and a fall in the proportion of high-cost establishments (i.e., those whose DRC/SER is greater than 1.2).

The occurence of high EPR, *vis-a-vis* low DRC, which connotes 'rents,' and high EPR with high DRC are observed to have signficantly declined in 1988.

Based on Tables 23 and 24, the proportion of plants with high EPR and low DRC (DRC/SER less than or equal to 1.2) dropped to zero in 1988 from 21.43 percent in the resin industry and 19.47 in the plastic processing industry. Based on this, it can be said that substantial 'rents' accrued to firms in these industries in 1983. But in 1988, these rents had virtually disappeared.

Table 23

Distribution of Establishments by DRC/SER and EPR, Synthetic Resin Industry: 1983 and 1988

DRC/SER	1983 Effective Protection 38.01-76.00	1983 Effective Protection > 76.01	1983 Total Observations	1988 Effective Protection Rate 0-35.50	1988 Total Observations
Forex Dissaving	0 (0.0)	1 (7.14)	1 (7.14)	0 (0.00)	0 (0.00)
Low-Cost	1 (7.14)	2 (14.29)	3 (21.43)	5 (38.46)	5 (38.46)
Mildly High-Cost	1 (7.14)	2 (14.29)	3 (21.43)	2 (15.38)	2 (15.38)
Very High-Cost	1 (7.14)	6 (42.86)	7 (50.00)	6 (46.15)	6 (46.15)
Total	**3 (21.43)**	**11 (78.57)**	**14 (100.00)**	**13 (100.00)**	**13 (100.00)**

1) The ratio, DRC/SER indicates: Forex Dissaving, if DRC/SER < 0; Low-Cost, if DRC/SER > 0 ≤ 1.2; Mildly High-Cost, if DRC/SER > 1.2 ≤ 1.5; Very High-Cost, if DRC/SER > 1.5.

2) Figures in ( ) indicate the percentage of establishments relative to the total number of establishments.

DRC = Domestic resource cost
SER = Shadow exchange rate
EPR = Effective protection rate

Source: 1983 and 1988 *Census of Establishments* by the National Statistics Office.

Table 24

Distribution of Establishments by DRC/SER and EPR, Plastic Processing Industry: 1983 and 1988

DRC/SER	1983 Effective Protection Rate			Total	1988 Effective Protection Rate			Total
	Less than 0	38.01-76.00	> 76.00	Observations	0.01-35.5	35.51-71	> 71.00	Observations
Forex Dissaving	1 (0.88)	1 (0.88)	3 (2.65)	5 (4.42)	18 (6.98)	0 (0.00)	0 (0.00)	18 (6.98)
Low-Cost	0 (0.00)	9 (7.96)	13 (11.50)	22 (19.47)	105 (40.70)	0 (0.00)	0 (0.00)	105 (40.70)
Mildly High-Cost	0 (0.00)	1 (0.88)	19 (16.81)	20 (17.70)	41 (15.89)	0 (0.00)	0 (0.00)	41 (15.89)
Very High-Cost	1 (0.88)	6 (5.31)	59 (52.21)	66 (58.41)	91 (35.27)	2 (0.78)	1 (0.39)	94 (36.43)
Total	2 (1.77)	17 (15.04)	94 (83.19)	113 (100.00)	255 (98.84)	2 (0.78)	1 (0.39)	258 (100.00)

1) The ratio, DRC/SER indicates: Forex Dissaving, if DRC/SER < 0; Low-Cost, if DRC/SER > 0 ≤ 1.2; Mildly High-Cost, if DRC/SER > 1.2 ≤ 1.5; Very High-Cost, if DRC/SER > 1.5

2) Figures in ( ) indicate the percentage of establishments relative to the total number of establishments.

DRC = Domestic resource cost
SER = Shadow exchange rate
EPR = Effective protection rate

Source: 1983 and 1988 *Census of Establishments* by the National Statistics Office.

There was also a drop in the proportion of plants with high EPR and high DRC (which indicates the inefficient plants' need for protection). In particular, it dropped to zero in the resin industry from 78.57 percent and to 1.17 from 78.47 percent in the plastic processing industry.

These two cases suggest that the reduction in protection led to a decline in the proportion of plants possessing rents and those being inefficient and highly-protected.

Firm-level DRC: Factors Affecting Inter-Firm, Inter-Industry Differences in Response to Trade Reform

Firm level DRC are shown in Table 25 for four resin manufacturing firms and five plastic processing firms for the years 1986 and 1991.

In the synthetic resin industry, all except one firm (firm no. 3) achieved allocative and technical efficiency and comparative advantage in 1991 since their DRC/SER ratios were less than one. Available firm-level data on management and labor, and their relationship suggest that these factors contributed positively to the achievement of efficiency in firm nos. 4 and 2. The other two firms lack data on these factors.

Firm nos. 2 and 4 are large-scale, mature corporations under professional management and a three-level organization. In the case of firm no. 4, the composition of the labor force is at least 55 percent skilled, its production is 80 to 90 percent automated. It uses 75 percent of capacity, with first-hand (new) machineries and undertakes research and development. Firm no. 2 lack data on these factors.

In the plastic processing industry, all five firms did not achieve efficiency and comparative advantage in 1991, since their DRC/SER ratios were greater than 1.2. Two firms, firm nos. 1 and 5 qualified as mildly high-cost firms, while the other two, firm nos. 3 and 4 were outright inefficient. The remaining, firm no. 2, was a foreign exchange dissaver.

Table 25

DRC, EPR of Resin and Plastic Manufacturing Firms: 1986 and 1991

Firm	DRC		DRC/SER		EPR	
	1986	1991	1986	1991	1986	1991
Resin						
1	*	8.6	*	0.26	-251.5	50.1
2	N.A.	27.2	N.A.	0.83	N.A.	98.3
3	44.9	54.7	1.68	1.67	77	116.8
4	N A.	30.7	N.A.	0.94	N.A.	126.2
Plastic						
1	229.4	45.5	11.2	1.39	124.6	65.3
2	*	*	*	*	-17.8	93.4
3	*	183.5	*	5.59	-397.6	616.1
4	N.A.	52.8	N.A.	1.61	N.A.	126.9
5	N.A.	47.3	N.A.	1.44	N.A.	133.5

*Foreign exchange dissaving
DRC = Domestic resource cost
SER = Shadow exchange rate
EPR = Effective protection rate

Source: Financial statements submitted to the Securities and Exchange Commission (SEC) supplemented by firm-level survey.

It can be noted that the FPR of firms in the plastics industry was higher than those in the resin industry in 1986 and 1991. This implies that the absence of an efficient firm, *vis-a-vis* the high EPR in this industry, could indicate a positive relationship between high protection and inefficiency for these firms. Noteworthy, however, is the improvement in efficiency of firm no. 1 corresponding to the drop in its EPR. This could indicate a positive relationship between the achievement of efficiency and a reduction in protection. In other firms, however, the results did not suggest this relationship. Firm no. 1, however, did not indicate data on its specific factors.

Industrial Concentration and Market Power

Seller concentration. Estimates of seller concentration and market power are shown in Table 26.

It can be observed here that there was a positive relationship between seller concentration and profitability. Firms with dominant market position were enjoying excess market power (i.e., excess profits) (Kirkpatrick, Lee, and Nixon 1984).

In the resin industry, the rise in its VACR4 and Herfindahl index was accompanied by a rise in its PCM, while in the plastic processing industry, the fall in its Herfindahl index was accompanied by a fall in its PCM.

It is worthy to note that profitability in the resin industry was much higher after trade reform. Its PCM went up to 33 percent in 1988 from 20 in 1983. This could be due to import regulations still in force on three resin items in 1987, which were only liberalized in 1988, and which had effectively limited import competition. In this regard, the import-discipline hypothesis may not apply to the resin industry. In the first place, its import penetration index declined in 1988 instead of increasing from 1983. Moreover, the rise in its profitability could be due to the large firms holding on to their dominant positions in the market even in the transition period of trade reform. This was indicated by both the rise in the Herfindahl and the VACR4 indices in the resin industry.

In the case of the plastic processing industry, the fall in its PCM in 1988 could be attributed to earlier liberalization of the last regulated item in 1987. For that matter, in 1988, its import penetration index rose in contrast with the decline in the resin industry. In this regard, the import-discipline hypothesis may apply in the plastic processing industry.

In the plastic processing subsectors, profitability declined in the furniture and footwear subsectors but rose in the plastic industrial and fabricated plastic subsectors. The substantial fall in the profitability of the plastic footwear subsectors (i.e., from 30 percent in 1983 to 2 in 1988) partly accounted for the fall in the profitability of the plastic processing industry (Table 26).

Table 26

Indices of Industrial Structure and Market Power, Resin and Plastic Processing Industries: 1983 and 1988

	Herfindahl		VACR4 (%)		PCM (%)		Vertical Integration (%)	
	1983	1988	1983	1988	1983	1988	1983	1988
Resin	0.15	0.18	54	69	20	33	25	38
Plastic	0.04	0.03	20	24	20	15	23	28
Furniture	1	0.54	100	100	30	2	30	17
Footwear	0.17	0.7	71	94	29	22	29	41
Plastic industrial	0.17	0.2	50	62	11	22	11	34
Fabricated, n.e.s.	0.04	0.03	22	22	14	15	14	23

VACR4 = four-form value-added concentration ratio
PCM = Price-cost margin
n.e.s. = not elsewhere stated

Source of raw data: 1983 and 1988 *Census of Establishments* by the National Statistics Office.

DRC/SER by employment size. There seems to be a relationship between the improvement in efficiency and the size of plants (based on employment size) in the resin and plastic industries (Tables 27 and 28). Specifically, small and medium-sized plants improved more in terms of efficiency than large plants. The proportion of low-cost small plants and of high-cost large plants rose in the resin industry. Meanwhile, the proportion of low-cost plants rose across all plant sizes in the plastics industry. Both cases suggest that large plants are not necessarily more efficient than small and medium plants in the resin and plastic processing industries.

Size-structure Adjustments. Based on the seller concentration measures and the proportion of plant-size categories, it can be seen that the resin industry approached a relatively more concentrated structure in 1988 from 1983 while the plastic processing industry did not.

In particular, in the resin industry, the proportion of medium plants rose to 31 from 21 percent and that of large plants increased to 15 from 7 percent. The proportion of small plants dropped to 54 from 71 percent.

In the plastics industry, the proportion of small plants increased to 81 from 70 percent while the proportion of medium plants declined to 13 from 17 percent with large plants, to 5 from 13 percent.

The resulting greater concentration in the resin industry in the transition period of trade reform can be connected to the drop in its efficiency and the rise in its profitability.

The trade reform has induced an adjustment to greater foreign competition, whereby the larger plants demonstrated a fall in the allocative and technical efficiencies measured by DRC/SER and DRCM/OER. Meanwhile, the smaller plants demonstrated a rise in their efficiency level. With the more dominant firms holding on to their market share, this resulted in higher profitability and a rise in seller concentration.

Regarding technical efficiency, it can only be surmised that with foreign competition, both large and small plants underwent respective adjustments in terms of improving non-price plant-specific factors

Table 27

Distribution of Establishments by DRC/SER and Employment, Resin Industry:1983 and 1988

DRC/SER	1983				1988			
	Size of Employment			Total	Size of Employment			Total
	Small	Medium	Large	Observations	Small	Medium	Large	Observations
Forex Dissaving	1	0	0	1	0	0	0	0
	(7.14)	(0.00)	(0.00)	(7.14)	(0.00)	(0.00)	(0.00)	(0.00)
Low-Cost	3	0	0	3	4	1	0	5
	(21.43)	(0.00)	(0.00)	(21.43)	(30.77)	(7.69)	(0.00)	(38.46)
Mildly High-Cost	2	1	0	3	1	1	0	2
	(14.29)	(7.14)	(0.00)	(21.43)	(7.69)	(7.69)	(0.00)	(15.38)
Very High-Cost	4	2	1	7	2	2	2	6
	(28.57)	(14.29)	(7.14)	(50.00)	(15.38)	(15.38)	(15.38)	(46.15)
Total	**10**	**3**	**1**	**14**	**7**	**4**	**2**	**13**
	(71.43)	**(21.43)**	**(7.14)**	**(100.00)**	**(53.85)**	**(30.77)**	**(15.38)**	**(100.00)**

1) The ratio, DRC/SER indicates:
Forex Dissaving, if DRC/SER < 0; Low-Cost, if DRC/SER > 0 ≤ 1.2; Mildly High-Cost, if DRC/SER > 1.2 ≤ 1.5; Very High-Cost, if DRC/SER > 1.5
2) Size of Employment is categorized as follows:
Small, if size of employment is ≥ 5 ≤ 99; Medium, if size of employment is ≥ 100 ≤ 199; Large, if size of employment is ≥ 200;
3) Figures in ( ) indicate the percentage of establishments relative to the total number of establishments.

Source: 1983 and 1988 *Census of Establishments* by the National Statistics Office.

Table 28

Distribution of Establishments by DRC/SER and Employment, Plastic Processing Industry: 1983 and 1988

DRC/SER	1983				1988			
	Size of Employment			Total	Size of Employment			Total
	Small	Medium	Large	Observations	Small	Medium	Large	Observations
Forex Dissaving	3	1	1	5	16	2	0	18
	(2.65)	(0.88)	(0.88)	(4.42)	6.26)	0.78)	(0.00)	(6.98)
Low-Cost	19	1	2	22	83	15	8	106
	(16.81)	(0.88)	(1.77)	(19.47)	(32.17)	(5.82)	(3.10)	(41.09)
Mildly High-Cost	13	2	5	20	37	3	1	41
	(11.50)	(1.77)	(4.42)	(17.70)	(14.34)	(1.16)	(0.39)	(15.89)
Very High-Cost	44	15	7	66	74	14	5	93
	(38.94)	(13.27)	(6.19)	(58.41)	(28.68)	(5.43)	(1.94)	(36.05)
Total	**79**	**19**	**15**	**113**	**210**	**34**	**14**	**258**
	(69.91)	**(16.81)**	**(13.27)**	**(100.00)**	**(81.40)**	**(13.18)**	**(5.43)**	**(100.00)**

1) The ratio, DRC/SER indicates:
Forex Dissaving, if DRC/SER < 0; Low-Cost, if DRC/SER > 0 ≤ 1.2; Mildly High-Cost, if DRC/SER > 1.2 ≤ 1.5; Very High-Cost, if DRC/SER > 1.5

2) Size of Employment is categorized as follows:
Small, if size of employment is ≥ 5 ≤ 99; Medium, if size of employment is ≥ 100 ≤ 199; Large, if size of employment is ≥ 200;

3) Figures in ( ) indicate the percentage of establishments relative to the total number of establishments.

Source: 1983 and 1988 *Census of Establishments* by the National Statistics Office.

such as management and labor expertise, and plant organization. This could partly explain the increasingly large organizational set-up of the resin industry as other big chemical companies in rich countries.

Meanwhile, the resulting lower concentration in the plastic industry can be connected to the improvement in its efficiency and the fall in its profitability. The improvement in terms of its allocative and technical efficiency had been seen across all plant categories even when there was a decline in the proportion of the medium and large plants and a rise in the proportion of small plants. In this case, a lower concentration and the higher efficiency among plants have combined to move the whole industry to a relatively less inefficient path. Meanwhile, greater foreign competition and the market dispersion combined to narrow the price-cost gap.

The higher path of technical efficiency can be primarily attributed to the more numerous smaller-scale plants adjusting to efficient management and production techniques.

5

Summary, Conclusions, and Recommendations

THIS study evaluated the efficiency and competitiveness of the resin and plastic industries in the light of the trade policy reform, market structure, and specific factors.

The findings generally indicate that overall protection in these industries had been successfully reduced by the TRP and the ILP. The efficiency and competitiveness of the resin industry worsened in 1988 compared to 1983 while that of the plastic processing industry improved. Among the plastic processing subsectors, improvements were seen in the plastic furniture, plastic industrial supplies, and fabricated plastics, n.e.s. subsectors and a worsening in the plastic footwear subsector.

This improvement in the plastic processing industry was not enough to bring it to the level of allocative and technical efficiency, international competitiveness, comparative and competitive advantage. This could mean that the positive effects of trade reform have already been felt in this industry in 1988, although, admittedly, the reforms were just beginning to take effect that year.

The adjustments, in terms of performance, efficiency, and competitiveness, on the part of the resin and plastic industries, could not be credited alone to trade policy reform. The period from 1983 to 1988 was one of macroeconomic and microeconomic policy reforms. Thus, other policies, aside from trade policies, could have exerted their influence on these adjustments. Moreover, the time frame considered (1983 to 1988) represented only a transition period and as such, the effects of trade reform were not yet fully realized. Conclusions have to be tempered by this factor.

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The reduction in protection and the achievement of efficiency appeared to be positively related in both industries, more so for the plastic industry. Reduction in protection led to a decline in the proportion of plants possessing rents and of inefficient highly-protected plants, implying an adjustment to greater efficiency with competitive market players.

Improvement in efficiency and the size of plants seemed to be related. Small and medium-sized plants improved more in terms of efficiency than large plants, suggesting that large plants were not necessarily more efficient than small and medium plants in these industries.

The dispersed market structure of the plastics industry could have played a positive role in the achievement of efficiency during the reform's transition period, as the majority of its plants achieving efficiency in 1988 were small-scale ones. The more concentrated structure of the resin industry could have a negative effect on efficiency among the larger firms in the face of trade reform. Inefficient plants in the resin industry were medium and large scale ones, while the small-scale ones were efficient. This could be due to the relatively slower adjustment among larger firms to trade reform.

With this study showing, albeit sketchily, the positive effects of trade reform on efficiency of these industries, the focus now must be on non-price factors as the reforms are bound to conclude in 1995.

One non-price factor believed to contribute to the resin industry's inefficient position is the demand for locally-made resins. For example, demand for locally-produced thermoplastics Polyvinyl Chloride and Polystyrene versus the imported non-produced thermoplastics Polyethylene and Polypropylene compounds is heavily tilted towards the latter.

Given an inherently low local demand, *vis-a-vis* the substantial capacity, high investment and economies of scale, efficiency and competitiveness for these local manufacturers can only be achieved through greater export orientation.

To bolster the needed capacity for greater export orientation, it is recommended that the government either invites joint projects with local or foreign investors, or provides long-term loans at affordable

rates to existing local manufacturers. An industry leader once cited that the lack of long-term funds is the principal obstacle to their drive to be internationally competitive.

Though the relatively small plants were found efficient and competitive, they do not possess the capacity to borrow in proportion to the magnitude of required investments under the credit market situation where large firms have the edge. While a government subsidy on private lending or direct loans through its financial or lending institutions seems ideal, current realities on government finances and the competing uses for its resources warrant a more realistic solution.

The solution can be to encourage partnerships or joint ventures among existing manufacturers or among new local or foreign investors with existing ones. At present, the resin industry is divided into the large firms and the smaller ones. There is only a limited range of local products and encouraging the merging of capacity of similar product lines can serve as an alternative to outright expansion through large additional investments. This can be in the case of thermoplastics, such as Polyvinyl Chloride and Polystyrene, and the thermosetting resins, such as Alkyds, Adhesive, and Acrylic resins, which are each produced by various firms under fairly similar properties using standardized equipments.

While the legalities of the matter and the cooperation of the parties may pose problems, the government is faced with little alternative (given its financial capacity) in fulfilling its duty of promoting a competitive private enterprise by laying the foundation for such a partnership or joint venture scheme. More so, the arrival of AFTA, which covers resin products, will expose local firms to intense foreign competition. Exposing local industries to these established foreign competitors without any preparations will virtually negate the positive trend on efficiency by inducing the closing down of these small efficient firms unable to compete evenly.

Regarding the larger firms, the adjustment process of trade reform is not yet over. As the small firms have shown efficiency improvements, the larger firms, by virtue of their size, may be taking a longer time to adjust.

While it may be desirable for the country to embark on a local production of Polyethylene and Polypropylene compounds to exploit its market position, the very large investment it entails, and stiff competition from established foreign manufacturers may not justify, at this moment, the country to spend huge domestic resources for such a petrochemical project (i.e., an indispensable part of a Polyethylene and Polypropylene undertaking). As an alternative, inviting foreign investors, as has been done in the past, can only be justifiable if the foreign partner infuses substantial capital and technological know-how without inflicting unreasonable environmental hazards known in a petrochemical venture. Notwithstanding, in the past, foreign investment in this venture were stifled by politics and controversies, as in the case of the Taiwanese Luzon Petrochemical Plant.

One other problem in the resin industry is the technical smuggling of locally-produced resins. Implementation of the bonded manufacturing warehouse (BMW) facility for exporters, which industry people cite as one area where technical smuggling is made possible, must be carried out to the letter.

In the plastic processing industry, it is recommended that there must be a provision for skills upgrading and technical assistance on plastic mold-making technology either by the government or through foreign-assisted projects. As trade reform exposed the local plastic industry to foreign competition, so must the local firms catch up through improved product quality, among other aspects. Already, the Philippines is lagging behind its Association of Southeast Asian Nations (ASEAN) counterparts in both value and growth rate of plastic product exports, not to mention quality. These two aspects, skills upgrading and technical assistance on mold-making, which they have cited as important concerns, can pose as significant contributors to their efficiency and competitiveness. The functions of the MIRDC must be utilized and enhanced to attain the objective of improving the mold-making technology of plastic processing.

Finally, this paper ends by underscoring the government's role in providing adequate and reliable infrastructure — roads, telecommunications, ports, railways, water systems, and most important of all, a stable and sufficient supply of energy. These

infrastructures are indispensable to better industrial performance, efficiency, and competitiveness.

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