PERFORMANCE, COMPETITIVENESS, AND STRUCTURE OF PHILIPPINE MANUFACTURING INDUSTRIES: A RESEARCH DESIGN

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WORKING PAPER SERIES NO. 92-02

April 1992

Philippine Institute for Development Studies

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PERFORMANCE, COMPETITIVENESS, AND STRUCTURE OF PHILIPPINE MANUFACTURING INDUSTRIES: A RESEARCH DESIGN

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I. INTRODUCTION

The performance of the country's manufacturing sector is a perennial source of frustration to economic analysts and planners alike. With an industrial sector that was rated second to that of Japan in the early 1950s, the Philippines is now ranked close to the least successful economic performers of the region such as Bangladesh. Among ASEAN countries, the Philippines has the lowest record of industrial growth (Table 1) and structural change has hardly taken place. For instance, the share of light consumer industries (food, beverages, tobacco, textiles, wearing apparel, and leather products) has since lingered at its 40 percent share of manufacturing value added in 1963, while the share of metal products, machinery, and equipment has even declined from its relative position more than two decades ago. Industry's share of GDP itself show none of the marked changes that has characterized other ASEAN countries' industrial sectors since 1970.

In an intercountry comparison of (total) factor productivity growth in 16 developed and developing countries (Page 1990), the Philippines is one of the two countries (India being the other) which registered negative productivity during its postwar economic history. The country lost its competitiveness in the world market, as evidenced by her declining share of world exports vis-a-vis other ASEAN countries like Thailand and Malaysia (Table 2). Even the top performers in the country's export sector, namely apparel and electronic products, succumbed to the pittfalls of import dependency. Unwittingly, some of these import-substituting, infant-industries of the past regime failed to be competitive even in domestic markets.

Like attempts in the past to examine the situation, this study will review the performance, competitiveness and structure of the country's manufacturing industries and will offer some suggestions. It will seek to isolate the price and non-price factors such as market structure and technology. These factors explain the success or failure of specific industries in achieving satisfactory levels of efficiency and competitiveness. It will also evaluate the major policy reforms (e.g., exchange rate adjustments,

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*Final report submitted to the Philippine Institute for Development Studies (PIDS) under the Development Incentives Assistance (DIA) Research Program.

This study is part of a larger research effort under the DIA project being coordinated by Dr. Erlinda M. Medalla, Research Fellow, PIDS.

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Table 1
COMPARATIVE GROWTH RATE OF VALUE ADDED IN INDUSTRY AND INDUSTRY'S SHARE OF GDP IN ASEAN
(in percent)

Growth rate of industrial value added	*Indonesia*	*Malaysia*	*Philippines*	*Singapore*	*Thailand*
1971-'80 (average)	12.5	9.1	8.3	9.8	12.0
1981-'90 (average)	5.8	7.2	-0.2	5.1	9.7
Industry's share of GDP					
1970	20.9	24.7	29.4	29.8	25.7
1980	41.3	35.8	36.2	38.8	30.8
1990	40.6	41.7	33.0	35.9	35.3

Source: Tables A4 and A6, Asian Development Outlook 1991.

Table 2
ASEAN MEMBER COUNTRIES' SHARES OF WORLD EXPORTS, 1985-'90
(in percent)

Country	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Indonesia	1.014	0.736	0.717	0.706	0.737	0.731
Malaysia	0.841	0.694	0.749	0.769	0.841	0.862
Philippines	0.252	0.239	0.238	0.256	0.260	0.242
Singapore	1.244	1.118	1.198	1.432	1.503	1.519
Thailand	0.389	0.440	0.483	0.581	0.673	0.704

Source: Table A15, Asian Development Outlook, 1991.

import liberalization, tariff reform) by examining the responses of various sectors in the country to such reforms, and will explain inter-sectoral (industry/firm level) differences in speed and quality of response. In other words, the study will help in formulating appropriate policies and reform existing ones to enhance the manufacturing sector's performance and competitiveness. Finally, it will identify industries with which the country has potential comparative advantage.

II. PAST STUDIES ON INDUSTRIES AND INDUSTRIAL POLICY

There have been numerous studies on specific industries and the industrial sector in general that contain a wealth of data at the industry or even firm-level. They detail the industries' strengths, weaknesses and problems and propose policy-oriented solutions. The more recent examples are the series of industry studies done by the Japanese International Cooperative Agency (JICA) for the Board of Investments (BOI). These studies cover metalworking, die-casting, furniture-making and software development.

The Development Bank of the Philippines (DBP) has also commissioned a series of studies on industrial restructuring which includes cement, pulp and paper, textiles, shipping and shipbuilding, among others. While these studies focus on current problems affecting the viability of industries, many of them give little or no attention to social costs and benefits. Luckily, the literature offers information on industrial policies and strategies [cf. Power and Sicat (1970); Ranis et al. (1974); Baldwin (1975); Bautista, Power and Associates (1979); Tariff Commission-PIDS Working Papers (1986)]. These studies focus on industrial and trade policies and the incentive system they breed, as well as on the economic performance of industries and firms. As such, they contribute to a greater understanding of the effects of the policy regime on industrial efficiency that has led to the rethinking and formulation of more appropriate policies for industrial development. Notwithstanding these contributions, not much is known about the real impact of such policy reforms on particular industries and firms, and whether the expected results have been achieved.

The series of Tariff Commission-PIDS case studies of industries and firms' responses to the tariff reform and import liberalization program provides an exception. However, these studies were conducted at a time when the policy reforms were just beginning to take effect. Consequently, they are unable to capture the medium and long-term adjustments undertaken in response to the policy changes. They also give little attention to the specific factors behind the inter-industry, inter-firm, and intra-industry differences in adjustment responses. What the studies show, however, is that although effective protective rates decline and firms tend to become more socially efficient (as seen from the decline in their domestic resource cost-shadow exchange rate [DRC-SER] ratios), there are different responses in terms of factor productivities, factor intensities, output growth, etc. (Tan 1986).

A number of firms in the samples from different industries remained inefficient while the efficient ones did not necessarily become competitive enough to venture into world markets. Recognizing this difficulty, the researchers recommended that, in addition to more tariff reforms and further import liberalization, government assistance to industry should concentrate on factors that stand in the way of better industrial performance such as: (1) the dismantling of the monopoly on the input side for the textile industry (Mercado 1986); (2) granting of incentives to research and development (R&D) and investment

in new machinery and equipment in the manufacture of electronic parts and components (Tan 1986); and (3) rationalization of the paper industry to achieve economies of scale (Pineda 1986). As Pineda noted:

> "The long term solution does not depend on the issue of protection but on the industry itself... (to) derive its strength from within, and build its own capability to compete, through finding ways to minimize costs..."

Thus, these studies suggest the hypothesis that the move towards a more liberal and neutral policy environment may be a necessary but not a sufficient condition for industries and firms to attain satisfactory economic performance and competitiveness in the world market.

III. NEW AND CHANGING VIEWS ON INDUSTRIAL POLICY

The continuing thrust of the country's trade and industrial policy reform is to provide an environment conducive to industrial growth and productivity by eliminating policy-induced distortions to resource allocation. This thrust is the spirit behind the tariff and import liberalization policies of recent years.

The present system of investment and export promotion incentives is based on the premise that the prevailing economic environment is not conducive to efficiency, investment and export growth due to the presence of policy-induced distortions (usually assumed to be the result of trade or exchange rate policy) that cannot be completely eliminated at the source. Consequently, incentives are needed to neutralize such effects. While this move is essential to industrial restructuring, it is **not enough** to propel industries to be efficient and competitive. Japan and South Korea, for instance, recognized this early in their industrialization processes. Both countries evolved successful industrial promotion programs which harmonized the general and the industry-specific policy approaches. The general approach consisted of currency undervaluation, interest rate subsidies, and tax breaks, among others. On the other hand, the industry-specific approach was carefully developed from the specific needs of individual industries. These needs ranged from input-acquisition to the rationalization of market structure. For example, a set of incentives was granted to develop Japan's iron and steel industry (Tecson 1985). While this approach was criticized as "industry-targetting" or "winner-picking," the approach undeniably helped the industries to achieve international competitiveness. At the very least, this combination of policy-environment reforms and the industry-specific approach is believed to have achieved satisfactory results far more swiftly than if the country relied solely on the general approach. In addition, Pack and Westphal (1984) pointed out that such a "Japanese" strategy seem to have worked also for South Korea, where policies for established industries closely approximate neutrality except for a few, carefully selected infant industries. Following their cue, other middle-income countries such as Turkey and Mexico initiated industrial restructuring programs focused on the importance of firm- and industry-level information by introducing --

> "a combination of reforms in the policy environment, designed to promote competitive behavior by firms and enhance cost discipline, with firm- and product-specific studies to provide information to both industry and the financial markets on viable programmes of market penetration, product upgrading, plant organization, and technological innovation or mastery." (Page 1990)

Moreover, recent research indicates that the Taiwanese government might not have been completely neutral in the matter of industrial incentive policy, as what was generally believed before. Reflecting on the experience of South Korea, Pack and Westphal (1984) challenged the "neoclassical" position (as espoused by such authors as Balassa, Corden, Krueger, and Little) by asserting that "a neutral policy regime may not generally be a sufficient condition for rapid industrialization." Their contention is based on what they consider "new elements" that have entered the debate, namely:

(1) an empirical finding that market forces alone are not responsible for the purported "market successes" of economies like Japan or Korea; and

(2) a distinct, empirically-based concept that puts indigenous dynamic phenomena involving technological change at the center of industrialization.

After discussing the principal mechanisms behind the Korean government's practice of selective intervention, and given Korea's remarkably successful industrial performance, the authors assert that the Korean experience, as a whole, demonstrates that selective intervention is not inimical to successful industrialization (p.99). Among the essential elements of the Korean approach are the following:

(1) a two-pronged strategy of industrialization consistently practised by the government:

   (a) reliance on market forces responding to mostly neutral policies to allocate resources in well-established industries; and
   (b) a strict selective intervention on industries judged to be in Korea's dynamic comparative advantage;

(2) an extensive consultation of the government with the private sector in deciding which industries to promote and how to do it.

The authors are also quick to note that a selectively interventionist approach is successful **only when the government decides on the basis of an overriding objective of dynamic efficiency. Export performance** is still the practical measure of a selected industry's progress towards achieving world-class competitiveness. In certain instances when the selectivity rule was relaxed, however, Korea's industrial performance deteriorated. A recent example is when government promoted too many infant industries in the heavy and chemical sectors during the 1970s. As a result, technical and entrepreneurial talent was thinly spread over too many promoted industries and excess capacity became a major problem. Since international competitiveness was not given importance in the monitoring process of industrial performance, there was an "unprecedented reluctance to abandon or radically revise its detailed strategy on the basis of information and experience accumulated during implementation" (p. 101). Such mistakes merely underscore the importance of **dynamic efficiency** in providing the litmus test in the selection of industries to be promoted. They also offer lessons to other developing countries looking for models of industrial policymaking, such that they highlight the costs of failing to understand the underlying principles of the East Asian model. These costs warn against an impulsive adoption of a rehash of the old interventionist approach under the import-substituting trade regimes of the past.

The role of technology in achieving or maintaining international competitiveness is another element to be considered. In this case, Pack and Westphal argued that selective intervention in technology acquisition by industries may be superior to free trade in technology. This argument provides the basis for the East Asian governments' focus of selective intervention on technological change. This includes technical skill and knowledge of institutional, organizational, and marketing arrangements to achieve international competitiveness.

IV. ISSUES AND PERSPECTIVES

The present study does not implicitly prescribe either the Japanese or the South Korean industry-specific approach in its pure form. It should be recognized that selective intervention requires preconditions that may not necessarily be present in the Philippines. The most critical of the preconditions is **the ability of the government to selectively intervene in the pursuit of dynamic efficiency.** Otherwise, as Pack and Westphal warned, a government may probably be better off adhering closely to the 'strict neoclassical prescription for a neutral policy regime.' This study therefore proposes two fundamental ideas from the Japanese and South Korean approach on industrial policy formulation that have largely been ignored in policy debates in the country, namely:

(1) the need to consider certain industry- or sector-specific factors that prevent efficiency and competitiveness, in addition to ensuring a neutral policy environment; and

(2) the overriding objective of policy intervention which should be the attainment of 'dynamic efficiency,' defined in terms of achieving 'international competitiveness' within an explicit time horizon.

This study also seeks to identify industry- or sector-specific factors which make industries and firms perform below expectations. In particular, there is a need to determine how far policies have been responsible in barring efficiency. Three factors on industry and industrial incentice system which have not been given sufficient attention in past studies are discussed below.

A. *Market contestability and competition*

There are few research done on market structure, concentration, barriers to entry, and other areas of industrial organization in Philippine manufacturing. Thus, very little empirical information is available on their impact to inter-firm competition and productivity, most especially after the appropriate policy environment is put in place. Nor is there any idea on the speed and extent with which industries and firms respond to policy changes, and how inter-industry or inter-firm differences in adjustment responses are related to market structures (Caves 1985). Moreover, there is little, if any, information available on how the industrial policy regime and the protective system are responsible for the creation of existing market structures.

A recent study on *Barriers to Entry* (SGV 1992) identifies laws and policies in the country which restrict entry and insulate incumbents from competition. Some investment incentives laws, for example, promote infant industries but limit entry into certain industries that are considered "over-crowded" under the "measured capacity rule." On the other hand, incentives that are time-bound (such

as those under the present Omnibus Investments Code) give an edge to the incumbents over potential entrants which do not receive preferential treatment after the incentives are terminated. The new Foreign Investments Act which delineates areas under the "negative list" limits foreign ownership to 40 percent of equity capital. A forthcoming list of "strategic industries" may further restrict foreign capitalization. Similarly, various programs of the government such as the "progressive manufacturing programs" for cars, trucks, and motorcycles restrict entry to predetermined participants. Other laws and regulations which prohibit entry are patent laws, price controls, and those on insolvency and bankruptcy, labor (also bar exit since they restrict resource transfers or their transformation to other forms), and zoning and licensing (SGV 1992).

In a capital-scarce country like the Philippines, there are inherent biases against the small and medium enterprises (SMEs), particularly with respect to their access to financial capital. To what extent do legal, institutional, and structural factors serve as effective barriers to entry of firms in certain industries? Do such limitations to entry contribute to the reduction of competition among firms and, hence, to the achievement of efficiency? Does the protective system encourage inefficiencies in firms and industries and ultimately discourage exports? In the same vein, does the exchange rate policy discourage exports and prevent industries/firms from achieving lower costs through longer production runs?

In a rare study linking productivity and the trade policy regime in a number of developing countries and Japan, Nishimizu and Robinson (1984) found that export expansion leads to higher total factor productivity (TFP) growth through economies of scale and/or through competitive incentives. This observation is consistent with Hooley's finding (1984) that in Philippine manufacturing industries, tariff protection is negatively associated and export expansion is positively associated with superior industry TFP performance. Hooley also found a significant relationship between inter-industry differences in TFP and economies of scale. Lack of specialization that results to excessive short production runs in the textile industry or the proliferation of brands and models in the car industry was cited as a major reason for the inefficiencies (Pack 1987). Will product specialization result if local industries are allowed to compete with foreign ones? Was this goal achieved after trade liberalization was effected in industries previously protected by quantitative barriers? Or will specialization be better achieved by inducing local industries to specialize (through mergers, product assignments to plants, etc.) while exposing them to greater competition from imports to prevent exploitation by monopolies?

The previous tax policy such as the tax rate differentials set according to the degree of product processing may have also been partly responsible for the trend towards vertical integration in certain industries. Does such policy-induced integration affect the growth of productivity in these industries or their ability to respond swiftly and appropriately to major policy changes?

B. *Appropriate Technology and Technological Mastery*

Obsolete capital equipment abound in the country's manufacturing industries. This was cited as one important reason why the textile industry in the Philippines has lower TFP than that of Thailand where both machines and technologies are modern (Sanchez 1990). Why do Philippine firms fail to invest adequately in new equiment? Is capital availability the major constraint and if so, why didn't textile firms respond favorably to the offer of structural adjustment loans in the mid-1980s? What will induce them to borrow?

Pack (1987) provides empirical evidence that textile firms in the Philippines are not yet on the international technical frontier, and that they are unaware of this nor able to move there. He is therefore skeptic over the idea that merely subjecting them to competition through liberalization will push them to higher frontier. What is the country's experience in terms of moving manufacturing firms to international-best practice as a result of trade liberalization? What is the role of foreign technicians in introducing Filipino entrepreneurs to international best-practice? Does direct foreign investment make any difference (as in Thailand's and Ghana's textile industries)? If so, what form and degree of foreign participation are most conducive to technology transfer?

It is argued that family ownership of corporations is partly responsible for the lack of inter-firm mobility of management. To the extent that inter-firm mobility of management is partly responsible for the inter-firm differences in adoption of "best practice," family-owned corporations tend to be less technically efficient than those run by professional managers. Is there any empirical evidence that this is true in Philippine manufacturing industries?

Why are there cost differences across firms in an industry? Are they due to the choice of technology? Are capital-labor ratios in the country's manufacturing industries higher than comparable technologies adopted by successful newly industrializing economies (NIEs) or developing countries at similar levels of industrial development? If technology choices matter, what is the role of the industrial incentive system in preventing entrepreneurs from making the right choices acceptable to the country's relative factor prices?

In a developing country like the Philippines, research and development (R&D) is crucial not so much in creating new technologies but in adapting borrowed technology to local conditions and relative factor availabilities. Cost differences therefore may also be due to wrong choices of technique once a technology has been chosen. How can technical efficiency be improved to minimize cost? How much do the country's firms spend for technology adaptation? Does firms' technological effort make any difference in terms of productivity? Why are some firms able to master the technology while others are not? What is the most conducive industrial incentive system to make firms acquire, adapt, and manage technology that would translate into international competitiveness?

How important are managerial factors in determining inter-firm differences in productivity? Does the technical or engineering background of managers matter in the firms' choice of appropriate technology, adoption of best practice and ability to master technology? Finally, do the observed differences across firms in technology-related factors determine the differences in speed and adequacy of firms' response to major policy changes?

C. *Labor Skills and Task-level Productivity*

Apart from the impact of technology and managerial knowledge on the industry/firm, workers' skills and productivity also matter. To what extent do workers' skills explain inter-firm variations in productivity? Do firms engage in sufficient on-the-job training activities to improve workers' skills? Do inter-firm differences in labor-management relations, workers' benefits and other worker-related conditions determine variation in productivity across firms? Are inter-firm differences in response to policy changes in any way determined by variation in worker-related factors such as skill-levels or the availability of training opportunities within firms?

V. PROPOSED METHODOLOGY

A. *Choice of Industries to be Studied*

After almost half a century, Philippine industries are at different stages of the development spectrum. The first set is made up of industries that were implicitly given "infant-industry treatment" at the early stages of industrialization. This set can be subdivided into two groups: (1) those that reached some degree of maturity and hence, international competitiveness; and (2) those that failed to achieve it. Textile industry belongs to the first group while food processing and the apparel industries belong to the second. These are mainly light consumer goods industries, normally referred to as "early industry" (cf. UN 1991) or what Hooley prefers to call "natural import substitution industries."

The second set consists of the second-generation of infant industries generally belonging to the intermediate goods category. A few of these such as certain branches of the chemical industry managed to break into export markets while others (e.g., tires, paints, glass) still manifest lower levels of competitiveness.

The third set is the "late industries" group. Some of the industries in this category received infant-industry protection and, hence, high levels of effective rates of protection, while others have consistently remained underprotected. The former group includes the transport equipment industry, its parts and components, and the electrical and electronics industries. The latter group consists of capital goods from simple tools to office equipment to precision instruments and other branches of the machinery sector that are bypassed by the industrial incentive system. This third set of "late industries" consists of many industries of strong world demand (about 6% annual growth, according to UNIDO) and are generally considered "sunrise" industries even in the developed countries.

Each subset requires a different study treatment, in terms of both analysis and policy approach. A sample from each of the industry group is covered within the time frame and available financial resources of this research. The sample consists of industries that have undergone marked shifts in trade policy regimes, i.e., those that were highly protected and subsequently liberalized. Within this framework and after a review of literature on manufacturing industries, the following list of industries are proposed for study:

1a. The textile and apparel (and possibly including sewing machine) industries represent import-substituting industries that starkly follow different routes in terms of efficiency and competitiveness. A second choice is the jewelry industry with its strong potential comparative advantage but which faces growth-impeding, protectionist policies.

1b. The food-processing industry has strong linkages with the agricultural sector and demonstrates modest gains in total factor productivity and exports. In particular, the meat-processing-dairy-livestock sector looks interesting, especially as the industries within the sector receive different degrees of protection and incentives from government. Another choice is the confectionery sector with linkages to the sugar, coffee, and cacao industries.

2. Secondary import-substituting industries such as the packaging industry (with backward linkage to the pulp and paper and steel industries and forward linkage to a host of consumer goods industries) and the resin industry including toys, pipes, etc.

3a. The parts and components industry in the manufacture of motor vehicles such as cars and motorcycles, electrical and electronics industry, shipbuilding and ship repair industries, andagricultural machinery industry.

3b. Software engineeering industry

B. *Common Features in the Analytical Approach*

Objectives. The objectives of each industry study are as follows:

1. to evaluate the sector's/industry's/firm's competitiveness and performance (social and private profitability; levels and growth of productivity) and their determinants especially policy-determined ones;

2. to evaluate/compare the response of firms within an industry or sector (or groups of firms across industries) to major policy changes (exchange rate adjustments, import liberalization and tariff reform) and to explain inter-firm differences in speed and direction of such response;

3. to offer policy suggestions to improve industry competitiveness and performance and also the effectiveness of policy reform in view of findings on sector/industry/firm -specific factors identified in (1) and (2).

Methodology. Each industry study will try to follow a common methodology for the measurement of competitiveness and performance to ensure consistency and comparability of results across industries. The following describes the elements of this methodology:

1. All of the studies will begin with measures of competitiveness and productivity depending on the particular aspect of sector/industry/firm performance being analyzed.

a. *International competitiveness* refers to the sector's/industry's/ firm's ability to compete in domestic markets with importers and in external markets with other exporters (including the domestic producers in the destination market). There are a number of possible indicators of import competitiveness:

(i) domestic resource cost (DRC) in market prices is the ratio of total domestic cost (in market prices) to the net foreign exchange earned or saved, or:

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

This formula measures the average cost (valued in market prices) of earning or saving a unit of foreign exchange and indicates the market viability of the firm from its owners' point of view.

(ii) share of competitive imports in total domestic demand for the product, or:

Mi / DD where Mi = imports of commodity i;
and DDi = total domestic demand for commodity i
(domestic production net of exports less imports)

On the other hand, for export-oriented industries, competitiveness will be measured in terms of the country's share of the specific export market's imports, relative to that of Third World country competitors (e.g., ASEAN or main developing country exporters). If data are available on total domestic demand for the product of the specific country of destination, for example, the Philippine industry's share of the importing country's total domestic demand (i.e., total production, net of exports, plus total imports from all sources) can be computed. The result measures the country's competitiveness with all foreign competitors, including the domestic producers in the country of destination.

b. *Performance in terms of economic and technical efficiency.* To evaluate the performance and competitiveness of sectors (or industries), changes in the sector's/industry's efficiency and productivity will be measured over time. This determines sensitivity to the changes in the policy environment, and explains inter-firm differences in such estimates in terms of factors specific to the sector/ industry/firm.

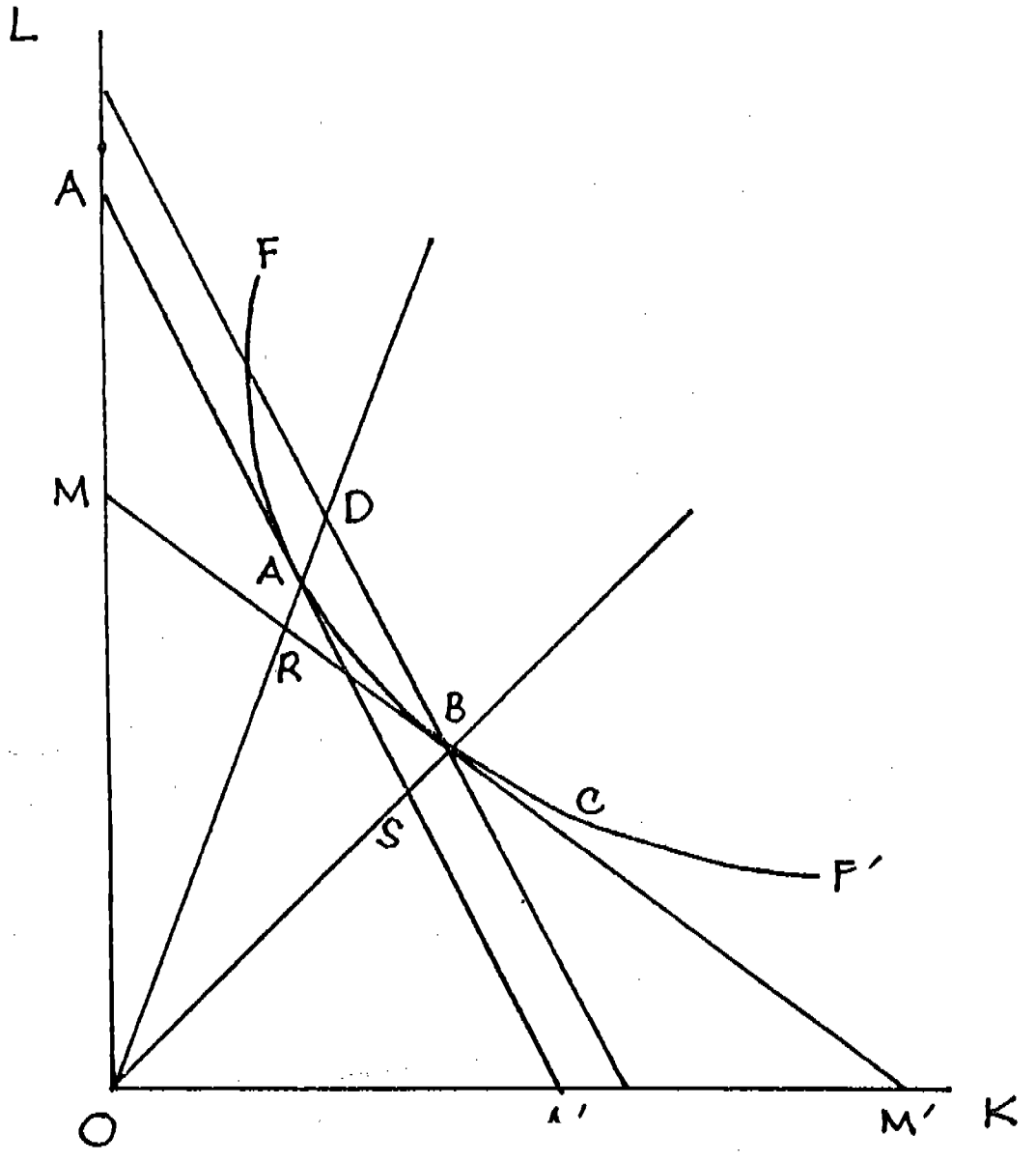
(i) Some conceptual distinctions

Recent literature distinguishes between economic efficiency, choice of technique, and technical efficiency. Following Page (1980), a unit isoquant such as FF' on Figure 1 represents the "frontier" which gives the minimum quantities of inputs required per unit of output given the available technology. Thus plants A, B, and C are all on the frontier so that they can all be said to be technically efficient, while plant D is not. According to Farrell (1957), OA/OD measures plant D's technical inefficiency since using plant A's technique instead would reduce the use of inputs by that proportion without reducing output.

Assume that MM' represents the relative factor price line which is faced by all the firms in the industry. Even though plants A, B, C are all technically efficient, only B is price efficient since its optimum input combination lies along ray OB. This means that plants A and C are using inappropriate techniques at the given market prices.

However, suppose that in a restrictive policy regime, market prices of products and factors diverge from their social accounting prices. Assume that relative social accounting (shadow) prices are given by the slope of AA, plant A becomes both technically and price efficient at accounting prices while B becomes price inefficient while remaining technically efficient.

Figure 1
TECHNICAL, PRICE AND SOCIAL EFFICIENCY



(ii) Measures of efficiency

The study will be limited to providing measures of economic and technical efficiency. Data will be gathered at the firm level with the use of a survey questionnaire.

To measure economic efficiency, the familiar DRC (domestic resource cost) measure using firm-level data and shadow prices (NEDA-PIDS estimates) will be used. This measure is also practical since firm-level DRCs already exist from previous surveys (notably the PIDS-Tariff Commission studies on textile, pulp and paper, electrical machinery). Total factor productivity (TFP) estimates will also be employed to shed light on other factors relating to productivity which are not captured by DRC estimates. In particular, TFP estimates help explain the changes in DRCs which measure comparative advantage in an environment where distortions prevail (Nishimizu and Page 1986).

Technical efficiency will be measured using the estimation techniques developed by Aigner and Chu (1968); Aigner, Lovell, and Schmidt (1977); and applied by Page (1980) for Ghana; and by Lecraw (1979) for Thailand.

2. Each sector/industry study will require previous knowledge of the production process and available technologies to be able to interpret the above measures, particularly on technical efficiency. The survey questionnaire will inquire into relevant factors that can theoretically explain inter-firm differences in economic performance, in addition to the quantitative data needed for the DRC and TFP measures. A number of hypotheses can be derived from the issues raised earlier regarding market structure, appropriate technology, and labor skills. While there are common factors that could be explored, each industry study will inquire into other factors that are specific to the industry.

3. Each industry study will describe the policies that affect the firms in the industry, especially those on tariffs, import controls, structure of domestic taxes, investment and export incentives, etc. An evaluation of how such policies are responsible for the industry-specific factors identified in (2) will be undertaken. Given major changes in the policies that affect the industry (e.g., exchange rate adjustments, tariff reform, import liberalization, tax reform), changes in firms' economic performance (social profitability and technical efficiency) in response to policy changes will be observed. Inter-firm differences in response (direction, degree, and speed of change) will then be correlated with firm-level differences in the specific factors identified in (2) above. Insofar as possible, industry researchers will pay attention to qualitative changes and even anecdotal accounts of responses of firms to policy changes.

4. On the basis of its findings, each industry study will identify and recommend appropriate policies that will enhance the sector's/industry's/firm's performance, competitiveness, and structure.

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