



INSTITUTE OF SOUTHEAST ASIAN STUDIES

**SMALL AND MEDIUM
BUSINESS IMPROVEMENT
IN THE ASEAN REGION**
Production Management

Edited by

KENNETH JAMES
and
NARONGCHAI AKRASANEE

Field Report Series No. 21

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Development policies in the countries of the ASEAN region have in recent years reflected an increasing awareness of the significance of the small and medium-sized business enterprise in economic development. This has manifested in official action, initially hesitant but now increasingly vigorous, to develop and support small and medium businesses (SMBs), financially and otherwise.

The ASEAN Small and Medium Business Improvement Project seeks to contribute to this awareness of the significance of SMBs in a direct and practical manner: through the examination of SMBs at ground level, and the dissemination of findings for policy action. The project is the collaborative effort of research teams in each of the ASEAN countries (except Brunei; the project was formulated before that country joined ASEAN), co-ordinated centrally at the Institute of Southeast Asian Studies (ISEAS). The general objectives of the project are:

- (1) to collect, develop and organize information relating to the role and potential of small and medium-scale enterprises in GNP formation, employment creation and industrial growth;
- (2) through overall analysis of problems involved, as determined through primary (field surveys and case studies) and secondary research, to identify and recommend economic policies and measures (institutional, educational, commercial) geared to the improvement of the small and medium business sector in ASEAN countries; and
- (3) to disseminate the findings and recommendations of the project in a readable and easily comprehensible form.

The first phase of the project focused on financial (including fiscal) factors affecting the improvement of ASEAN SMBs, while the second phase studied issues and problems relating to the marketing of SMB products. The third and final phase examined the remaining major aspect of SMB operation, namely, production, and focused on

problems relating to *production management*. As with the first and second phases, the research teams in each country obtained primary data from surveys they carried out. Furthermore, secondary data was also used by some teams for estimates of technical efficiency within and between industries.

Early drafts of the country studies were revised in the light of valuable feedback from several experts in SMB marketing, from both the public and private sectors. This interaction between academicians and practitioners helped ensure that recommendations were as realistic as they were innovative.

The present volume is the distillation of the substantial output from the third phase. (Readers interested in the original papers should contact the respective writers.) The country studies are preceded by an Overview chapter which places the problems of production management in the context of technical efficiency, describes the analytical approaches followed by the research teams, looks at similarities and differences in findings, and summarizes the conclusions and recommendations. We hope that this publication, and its companion volumes on Financial Factors and Marketing, will contribute to an increased understanding of SMBs and their potentially powerful role in the economic development of the region.

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Kenneth James
Narongchai Akrasanee

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I PRODUCTION MANAGEMENT IN SMALL AND MEDIUM BUSINESSES IN THE ASEAN REGION: AN OVERVIEW

Kenneth James

Introduction

Among the major constraints facing small and medium-sized businesses (SMBs), problems related to finance and marketing are mentioned most often. Recognizing this the ASEAN Small and Medium Business Improvement (SMBI) Project, co-ordinated by the Institute of Southeast Asian Studies, focused on financial factors in the first phase of the SMBI project, and on marketing matters in the second.

As Narongchai Akrasanee's schematic analysis shows (James and Akrasanee, 1986), there remained one other major area of SMB activity still to be examined: production. Accordingly, production -- specifically, the management of production -- was the subject of the third and final phase of the project. The present paper draws on the research of that phase.

The major empirical contribution of the research comes from sample surveys conducted by research teams in Indonesia, Malaysia, the Philippines, Singapore and Thailand. Over a period from mid-1986 to early 1987, each of the research teams surveyed SMBs in at least five industries in their respective countries. By agreement, three of the industries were common to all: metalworking, food processing and garments manufacturing. (The appendix gives a list of industries surveyed in the respective countries.) The sample surveys focused on aspects of production management, seeking to identify the way they

affected efficiency of production. The surveys actually formed the second part of the study; the first, where data permitted, attempted various estimates of technical efficiency, both of specific industries as well as relative to other industries.

Outline of Paper

The research problem is considered more fully in the next section, which explains the relationship of production management to technical efficiency. A methodology section follows, which discusses analytical approaches to the estimation of technical efficiency for the first part of the study, and then looks at certain features of the sample surveys that made up the second part. Conclusions arising from the findings of these two parts are then presented, and some recommendations offered.

Nature of the Problem

A theoretical concept that will be useful in coming to grips with the notions of efficiency and production management is that of the *production function*. A production function defines the relationship between the inputs of a firm (e.g., capital, labour, management) and its output(s).

Intuitively, the efficiency of a given firm has to do with achieving maximum output from the available resources; the greater the output relative to a given combination of inputs, the greater its efficiency (Yotopoulos and Nugent, 1976: 71). For a given level of technology the set of maximum outputs from the various input possibilities (or alternatively, from different firms using different levels and combinations of the given inputs) is the *production possibility frontier*. By definition, therefore, any firm

operating below its production possibility frontier is less than fully efficient.

Thus one way of estimating the (technical) efficiency of firms in a given industry would be to determine how close the level of production is to the frontier. Rather sophisticated econometric techniques have been developed to apply the concept in an empirically meaningful way. Their use, however, demands adherence to a relatively stringent set of empirical conditions.

It is also useful, and empirically less demanding, to estimate relative efficiencies, as for instance between industries, or large and small businesses, or urban- and rural-based enterprises. This is the approach taken by most of the country research teams.

Such estimates, whether given in absolute or relative terms, satisfy the first part of the investigation: they give an indication of the efficiency or inefficiency of a relatively homogeneous group of business enterprises. The second part would then be to identify those factors, positive and negative, that make a particular firm, or set of firms, efficient or inefficient. The main research tool here is the more familiar sample survey, focusing on aspects of production management in SMBs.

Analytical Approaches

Measures of Mean Technical Efficiency

The estimation process that was made available to the research teams is based on a model of a stochastic frontier production function (i.e., incorporating random disturbances) developed by Aigner, Lovell and Schmidt (1977), and refined by Lee and Tyler (1978), and Lee and Pitt (1978).

In econometric estimation, a functional form is first

defined. In a production function, for instance, output (the dependent variable) is defined as a function of specified inputs such as labour, capital and land (the independent variables). Sample data on these variables are then fitted onto the function using econometric estimation techniques, and the "best fit" is determined. The extent to which the sample data does not correspond to the estimated best fit is explained by an omnibus "error" or "disturbance" term which in theory includes all factors not explicitly incorporated into the model as independent variables. In a production function this would certainly include technical inefficiency, as reflected in poor management skills, labour dissatisfaction, stock bottlenecks, etc.; but it would also include other random and non-random factors such as weather, unexpected variations in machine or worker performance, even political climate.

The contribution of Aigner, Lovell and Schmidt (1977) was that they were able to separate the effects of technical efficiency factors from the other random effects, by splitting the error term in their model into two components, one of which could be clearly linked to technical efficiency. Lee and Tyler (1978) went further by deriving from this model a measure of *mean technical efficiency* for a given sample of firms. This measure was an estimate of the average level of technical efficiency for these firms relative to the maximum output level as represented by the production frontier.

Several empirical conditions have to be satisfied for the estimates to be valid. Of the five research teams, only the Thai team obtained secondary data in sufficient quantity and quality to give their estimates empirical significance. Details of the estimation methods, and a comprehensive discussion of their validity and limitations, is given in the Thai paper (Chapter VI) and its appendices.

Relative Estimates of Efficiency

Other teams chose to develop alternative approaches more appropriate to their economic environment, and which satisfied their respective data and operational constraints.

The Malaysian team, for example, compared findings from their sample set of SMBs with an "industry average" based on another sample which included large as well as small and medium businesses. They estimated performance and efficiency, based on certain indicators: level of capacity utilization, gross margin and manufacturing cost structure as indicators for performance; and labour and capital productivity as indicators for efficiency.

The Philippines took a similar approach: they compared SMBs in selected industries in the Greater Manila area with a corresponding sample of SMBs in the same industries based in the provinces. Estimates of technical efficiency were based on an equation relating output, expressed in terms of material yield and capacity utilization, and inputs in the form of raw material, capital, direct labour and manufacturing overhead. Also, on the assumption that profitability is a measure of performance, they made estimates of performance based on return on investment (ROI).

One problem, that of non-homogeneity, is worth mentioning. A production function, for instance, assumes that all firms subsumed under it are homogeneous, that is, of the same size and using the same technology. We make a similar grand assumption whenever we talk about "X industry" or "Y industry". This of course is not necessarily so. The point is brought home forcefully in the Indonesian study, which combined simple quantitative analysis with qualitative observation based on case studies. The study found that in most of the six industries observed, there existed two distinct technologies: an older, more traditional technology well suited to the cottage and very small enterprise; and a

more modern, mass-production type technology which required a medium-sized or large work-force. Furthermore, it appeared that applying sophisticated production management techniques to the small enterprise would bring only marginal gains, if any; whereas the medium-sized enterprise using the newer technology was generally inefficient, so that proper production management was likely to produce significant results.

Factors Affecting the Efficiency of SMBs: The Sample Surveys

Having determined estimates of efficiency for the various industries, we would then want to identify the factors conducive to, and factors hindering, the efficient management of production in SMBs. This was achieved through the collection of primary data from sample surveys of SMBs in the selected industries. The subject matter of the survey questionnaire would be in the nature of an operations review of the firms in the respective samples.

Inevitably, portions of the survey were technical in nature. Two such areas of investigation, on system development and production, included questions on the following aspects:

System Development:

- Capacity Planning
- Plant Layout and List of Machinery
- Process Engineering
- Work Measurement
- Organization

Production:

- Forecasting
- Production Planning and Scheduling System
- Supervision

- Production Control System
- Inventory Control System
- Quality Control System
- Maintenance Programme
- Waste Treatment System

Since the research teams were primarily conversant in economics and business management, an important challenge of the surveys was to place these technical aspects of production management in the overall human and economic context. In order to do this, the teams took care to consult engineering experts at the various levels of the primary research.

Another important aspect of production management is information management. Questions asked on this aspect related to data gathering, information flows, data processing and bookkeeping.

Efficiency and Productivity

Where quantitative estimates were made, the unanimous finding was that, in general, the efficiency level of SMBs is low; very low, in many cases. In other words, SMBs should be producing far more than they are doing with the equipment and other resources that they have.

The Indonesian team's analysis of macro-economic data indicated that large firms were growing larger in both size of work-force and gross revenue over time. In general, the greater efficiency of large firms appeared to be almost a truism.

The Malaysian study found, interestingly, that in capacity utilization SMBs matched and even bettered the industry average which included large firms. Nevertheless, when comparing performance as measured by gross margins, for