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Foreword

This publication is the second in the series on Abstracts of Theses of the Fellow Programme in Management. The first one contained abstracts of 14 theses submitted from the inception of the Programme from 1971 to 1977. The present one contains the abstracts of six theses accepted in 1978.

The main objective of the Fellow Programme is to contribute to the improvement of management education and research. The Programme has been recognized as equivalent to a Ph.D. Degree in Management by the Association of Indian Universities and by the Union Ministry of Education for recruitment to the government.

This publication, like the previous one, is intended for wide circulation so that those interested may take a look at the theses of the Fellows. These theses are available for use at the Vikram Sarabhai Library of the Institute and at the Social Science Documentation Centre of the Indian Council of Social Science Research, New Delhi.

K.R. Srinivasa Murthy
Chairman, Fellow Programme

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The first name in the Thesis Advisory Committee is that of Chairman.

Size, Profitability and Growth of Some of the Indian Manufacturing Industries

V. K. Aggarwal

What are the causes of growth of an industrial undertaking? One important cause, widely discussed in the economic literature, is the reduction in cost due to increase in size — economies of scale. Businessmen need the estimates of economic size to determine the optimum combination of the factors of production. Developing countries need the estimates to decide on the number of units to set up, what investments to plan in each sector of industry, and for policy decisions on monopolies, mergers, and incentives. Studies on economies of scale are, therefore, of wide interest.

Economies of scale were studied for seven Indian manufacturing industries. Data for 1963–72 on 500 companies for seven industries, cotton spinning and weaving, cotton spinning, jute textiles, paper and pulp, sugar. cement, and aluminium were collected from the companies listed in the Bombay Stock Exchange Directory which accounts for about 83 per cent of the total paid up capital of government and non-government public limited companies incorporated in India.

The relative ability of the firms to expand was examined to explain growth. It was hypothesized that larger the size of the firm greater was its ability to expand. Size distribution of the firms was examined over time to study the growth or the decline of individual firms. Future size distributions were also obtained based on the past distributions.

Economies of scale and least-cost size were estimated for each industry using three methods:

(a) Survivorship techniques: In this method, firms which survive and contribute increasing proportions of an industry's output are considered as the least-cost size. Firms with a declining share of output are deemed either too large or too small.

(b) Long-run cost curve method: In this method, the lone-run cost curve is estimated. Using least squares, a linear or non-linear cost-output relationship is determined. Additional variables, such as the extent of vertical integration, are taken into account.

(c) Size Profitability method: In this method, the profitability-output relationship is estimated using least squares. The size of the most profitable unit is taken as the least cost size. Profitability was defined in the study, as 'profit after tax/net assets' or 'profit after tax/net worth', where size was defined as output in rupees.

In five industries, the average cost curve line was 'L' shaped. Costs declined as the output increased, fast initially but slowly later, as the shape of an 'L'. Firms studied had not expanded to uneconomic sizes. If they had, a 'U' shaped average cost curve would have been formed.

Least-cost sizes obtained from various methods were compared. For example, for jute textile industry the least-cost sizes, in output value at 1963 prices, from different methods are: Survivorship technique — between Rs. 9.5 crores and Rs. 13 crores; long-run cost curve: Rs. 6 crores or more; and size profitability: from Rs. 6 crores to Rs. 10 crores.

Vertical integration, measured as 'values added/output', was an important factor in reducing the cost as size increased. In jute textile industry an increase in Vertical Integration from 0.60 to 0.75 led to a five per cent reduction in the average cost at Rs. 6 crores output level at 1963 prices.

Ability of the firms to expand was assessed from the

distribution of profitability in each group in the industry. Those size classes which had the highest profit rate were most likely to grow from retained earnings. In all the industries studied the hypothesis that larger the size, the ability to expand was greater, was confirmed. That means there was a likelihood of further concentration in these industries, subject, however, to government constraints.

This tendency of concentration was brought into focus by determining the long-term size patterns. If past patterns of growth continue, what will be the stable pattern? Modelling changes in the size distribution over time, i.e., assuming a Markov process, showed that a stable size distribution would have the greatest concentration in the highest size class. For example, for cotton spinning, jute textiles, sugar, cement, and paper and pulp, a maximum number of firms concentrated in the highest size class of Rs. 6.40 crores or above of output.

The findings highlight the dilemma of government policy of more efficient larger firms vis-a-vis concentration of power. Since most of the industries had an 'L' shaped average cost curve, allowing larger firms to expand would lead to lower costs per unit of output and, hopefully, products at lower prices. On the other hand, expansion of the firms would lead to fewer firms controlling a considerable share of the market or increased concentration in product markets.

Least-cost sizes can be used as guidelines to establish new plants. Assuming existing technology, for example, the least-cost size of a firm in jute textile industry would be Rs. 6 crores of output at 1963 price or Rs. 11.6 crores of output at 1972 price.

The study was based on published financial data forcing us to define size in value terms rather than as physical units. Each single-product firm consists of several distinct activities. The lowest average cost will be for an output equal to the lowest common multiple of these capacities of each distinct activity. These capacities can be found by studying the

engineering production function. Engineering production functions are more precise in estimating the least-cost size of an industry. Studies could be done using the engineering approach. However, the data required for engineering studies are hard to collect and tend to be confidential.

Money, Finance and Economic Development : The Case of India

Tushaar Shah

Contemporary macrotheory has taken a peculiar stand on the role of the institution of money and the financial system in the economic processes of a market economy. Though it has paid a great deal of attention to the functioning of the money and the financial markets and also its implications to the short run stabilisation policies, it has divorced the problems of economic growth and development from the analysis of the problems of the monetary and financial development of a society. This is probably why the growth models are cast in physical terms and the growth path is shown to be neutral to the changes in the monetary and financial structure.

Attempts are being made to generalise the theory of economic growth and development and overcome these drawbacks. Tobin and other economists have tried to accommodate real money balances in the neo-classical and Keynesian growth models. Gurley and Shaw and others have emphasized the importance of financial intermediaries in the saving investment process.

This thesis integrates and expands the theoretical approaches developed by these economists and empirically tests them for the Indian economy by constructing a macro-econometric model with five equations and three identities.

Three hypotheses have been proposed. The first hypothesis, based on the importance of money in clearing the payments matrix, of the society, says that the absorption and use of the real balances by the economic actors saves productive resources of labour and capital that would be spent in effecting exchange in a barter world. Money, in this sense, like labour and

capital, has a marginal productivity which is positive and which decreases as the intensity of the use of money increases.

The second hypothesis states that in the absence of a financial system, the savers, the surplus units, will invest bulk of their savings themselves and the professional investors who can perceive and explore productive investment opportunities will be starved of investible resources. The evolution of a financial system results in the separation of the functions of saving and investment and helps to channel the savings to the most productive investment opportunities. As a result, the productivity of the aggregate capital stock increases at the margin.

The third hypothesis is that the provision of financial assets with varied risk–return–liquidity characteristics may lead to a higher proportion of income saved in a developing economy.

The macroeconometric model, which highlights these relationships, has been estimated by two–stage Least Squares using 1951–71 data of the Indian economy.

Real balances were introduced directly as a factor of production in the aggregate production function. A variable representing the efficiency of investment allocation was included in the production function. Financial development was represented by an index defined as the ratio of the change in the stock of financial assets in a year to the trend value of nominal Net National Product in that year. This index explained a large part of the changes in the efficiency variable and savings. All the financial development variables were found to be statistically significant and increase the expanatory power of the equation to which they belonged.

The structural model was solved for the reduced form and the reduced form coefficients were used to analyse the contribution made by monetary and financial development to the changes in the real Net Domestic Product. Also, the forecasting ability of the model was tested by partial as well as total analysis.

It was found that next to labour and capital, financial development was the most important contributor to the changes in real income during the sample period. The marginal productivity of real balances was found to be as high as 2.043 and the income elasticity of the demand for real balances was .845. The money supply elasticity of the general price level was nearly unity. Also, a one per cent rate of interest paid on real balances increased their demand by Rs. 46 crores and real income by Rs. 146.35 crores. A one-point increase in the index of financial development led to a Rs. 94-crore increase in real income mainly via a Rs. 34.7-crore increase in the private savings and a 9.42 point increase in the efficiency of investment allocation. Inflationary expectations adversely affect private savings and the absorption of real balances and through them the real income.

The major implications are:

1. Indiscriminate increases in the nominal money stock retard the pace of monetisation and financial development and adversely affect savings.

2. The best way to stimulate the absorption of real balances and other financial assets is to increase the real yield on them by rationalising the structure of interest rates so that they reflect the true opportunity cost of savings in the society. In any case, high and highly variable rates of inflation reduce this yield and discourage the holding of real balances as well as fixed income yielding securities.

3. In underdeveloped countries finding investible resources is more important than finding investment opportunities. So a reallocation of the resources of the financial system in favour of savings mobilisation would increase the productivity of these resources and the effectiveness of the role of the financial system in economic development.

Economic Performance of the Ancillary Industry in India: Managerial and Policy Implications

K. R. Shaligram

Ancillary units are small firms that manufacture and supply intermediate goods to large firms or master units. In India, the official definitions of a small scale unit and an ancillary unit, for registration, imply that both could produce a mix of intermediate goods and end-products. As this mix varies from firm to firm and over time, reliable data on the output of the ancillary sector are not available. One estimate is that the ancillary industry contributes barely 0.5 per cent to the total output, while in Japan the corresponding figure is 30 per cent. Several policy measures are being considered to stimulate the growth of the ancillary industry and step up its contribution to 15 per cent by 1985.

This thesis inquires into the economic behaviour of the ancillary industry. To carry out this research, primary data for the period 1971–75 were collected from 43 firms classified as follows:

Small-scale Unit: A small firm that manufactures and markets only end-products. (A sample of 11 firms manufacturing industrial machinery was used as a control group.)

Unsponsored Ancillary Unit: A small firm that manufactures and supplies only intermediate goods to many master units and is not located within an industrial estate. (A sample of 11 firms manufacturing components for the electrical/electronic industry was selected.)

Sponsored Ancillary Unit Type I: A small firm that

manufactures and supplies only intermediate goods and is located within an industrial estate and has the advantage of sharing the facility of joint procurement of raw materials with other units in the estate. (A sample of 10 firms manufacturing components for the industrial machinery industry was chosen.)

Sponsored Ancillary Unit Type II: A small firm that manufactures and supplies only intermediate goods and is located in an industrial estate but does not have the advantage of sharing the facility of joint purchase of raw materials. (A sample of 11 firms manufacturing components for the electronic industry was selected.)

The samples were drawn on a non-random basis. The sample small-scale units were located in one city while all other sample firms were located in another city.

The concerns of this research were:

Do Type I ancillary units perform better than small-scale units? Did Type II ancillary units perform better than unsponsored ancillary units? What problems would a small-scale unit face if it manufactures and markets intermediate goods? Would an ancillary unit's performance improve if it increased its dependence for sales on a particular master unit?

The research findings were as follows:

The mean performance of the sample of Type I ancillary units and small-scale units was not significantly different (T-test and Mann-Shitney test on the performance measures gross profits/total assets, gross profits/total fixed assets, and gross profits/sales). If sponsored ancillary units had received payments on time, perhaps their performance might have been superior. Employing the same tests on the variables, gross profits/total assets, and gross profits/total fixed assets, unsponsored ancillary units were observed to be superior performers than Type II ancillary units. The unsponsored ancillary units received payments

more promptly. Employing multiple discriminant analysis, output quality and accounts receivable were identified to be the key areas that small-scale units would have to manage if thely were to start manufacturing intermediate goods. In the early life of a sponsored ancillary unit, increasing dependence on the master unit for sales was found to improve performance (gross profits/total assets, ratio). Later, when the unit had become a well-known producer of quality intermediate goods, reducing this dependence improved the performance. This result was outcome of multiple regression analysis.

Policy recommendations are: the proposed legislation to ensure prompt payments to ancillary units be expedited, long-term contract mode of purchase be promoted, and, an autonomous agency to mediate on disputes on pricing be established. In addition, ocering of special incentives to a consortia of mature ancillary units that plan to manufacture and market end-products might be tried. Ancillary relationships with more than one master unit would also help improve a unit's performance.

Managing Diversification : The General Management Process

Ranjan Das

The objective of this thesis is to understand and conceptualize the general management process of managing a diversification move during the transition phase. The research question investigated was: What is the process of managing transition from a single product or vertically integrated company to a diversified one? It was divided into three sub–areas:

i) What are the major tasks of general management in managing a diversifications move and how are these tasks managed? What characterizes the process of managing these tasks?

ii) How does a strategic change like diversification influence the operations of existing businesses?

iii) How does the role of corporate general management change during the transition stage?

To answer these questions, the researcher studied the Consumer Products (India) Limited (CPIL), (disguised name), an Indian subsidiary of a multinational corporation, manufacturing and selling various kinds of food products. In the late 60s, due to changes in the Indian social, political, and regulatory environment the company began diversifying into other busisesses. As of 1977, the company had several unrelated businesses, including garments and shipping.

The methodology adopted was clinical and process oriented. The data for the thesis was collected by interviewing nearly a hundred CPIL executives at various levels of management. Another source of data was

documentary evidence, including corporate records, memoranda, procedures, and minutes of meetings. As the research objective was to develop a 'language system' that would facilitate conceptualization of the general management process of managing diversification, this methodology was considered appropriate.

A major finding of the thesis is that managing diversification during the transition phase is more than building plants and facilities for new businesses or developing functional policies for the same. It encompasses the entire organization and consists of four sub-processes, viz., i) managing relationships with key members of the environment, ii) acquiring and learning new competences, iii) building organization and management systems, and iv) developing an integrated organization and preparing for further growth.

In the CPIL case it was found that there had to be a link between the initial strategy formulation processes and the political and administrative processes in the government. This involved an understanding of the structure of decision making and the distribution of effective power within the government. Government's approval of the diversification strategy could be obtained only by meeting high standards of economic performance, establishing an image of efficiency of management, and proving that CPIL intended to cooperate with government and regulatory bodies. The parent company approved the choice of strategy after it was educated about the attitude of the government and regulatory bodies and was assured that its financial objective would not be sacrificed.

To manage its diversification strategies, CPIL had to acquire three basic competences — technical, general management for new businessses, and general management for a multibusiness firm. While acquiring these competences, administrative problems arose which necessitated a change in the knowledge, skills and orientations of general managers. The process of learning a new technology had to be initiated by the corporate general management so that the basic

fundamentals and ethos for the new businesses were set for each business at the initial stage itself.

Once the new businesses grew fairly well, the top management took up developing an integrated organization. This involved the assessment of the existing internal environment and creating a new one which was conducive to the growth of the diversified organization.

A second major finding of the thesis is that the four sub–processes occur over three major phases. The three phases are: initiation, operationalization, and consolidation.

During the initiation phase, CPIL general managers were busy negotiating with government, the regulatory bodies and the parent company, besides acquiring the competence to manage new technology.

During the operationalization phase, corporate office was set up and the chief executive withdrew himself from the operating details of the existing business but kept a close watch on matters relating to new businesses.

During the consolidation phase, attention was given to building a multibusiness organization. Management structures were rationalized and formal systems and procedures introduced to effect better planning, evaluation and decision making. During this phase, the general managers developed the capabilities to manage a multibusiness firm.

A 4 x 3 "process model" was developed to describe the process and phases of managing diversification. The model shows how the content and basic characteristics of general management tasks change with the progress made in implementing new projects.

Organizational Characteristics and Unit Performance: The Case of Bank Branches

V. Anand Ram

This dissertation studies organizational performance and identification of managerial and organizational characteristics associated with high and low performing organizations. The units studied here are the branches of a leading public sector bank.

The identification and measurement of variables relevant to organizational performance and the determination of inter-relationships among the variables was conceptualized as the research problem. A model of organizational performance was used as a framework for examining the relationships between variables. Its components were contextual, strategic, behavioural and performance variables.

The objective of the study was to identify some commonly utilised styles of management in bank branches and specify the environmental and contextual conditions in which these styles were found. The association of styles with performance was also to be examined.

Bank branches are spatially separated work units with the Head Office located far away. Since each branch has a great deal of leeway in deciding the strategy by which it improves its functioning, a study of management styles at the branch level provided a good context for the study.

The study used the questionnaire method for data collection. Scales used to measure the variables were constructed on the basis of interviews with senior officers of the bank and examination of audit reports. The questionnaire was modified

after a pilot test was conducted on a sample of 35 branches. Responses to this modified questionnaire from 70 branches formed the data base.

A cluster analysis of the data on the basis of five style dimensions yielded five management styles. Professional management and entrepreneurial professional styles were associated with high performance. The traditional bureaucratic and conservative mechanistic styles were associated with low organizational performance.

A cluster analysis of data on the basis of eight contextual variables yielded four clusters. The inter-cluster differences on the four measures of performance were significantly different. The small and young branches (cluster 4) had low scores on all the organizational dimensions and variability within the cluster was large indicating their heterogeneity. In contrast, medium-sized branches of average age (cluster 3) formed a fairly homogeneous cluster.

The cluster analysis of the data did not indicate any strong relationship between context and style. However, medium-sized branches of average age tended to have a concentration of professional management and traditional bureaucratic styles. The professional management style was prevalent in small and young branches.

The relationship between context and performance was fairly weak and did not permit us to draw any definite conclusions in terms of relationship between the two. However, the data indicated that certain styles were more desirable in certain contextual clusters than in others. The professional management and the entrepreneurial professional styles were high performers in large and old branches (cluster 1). Similarly, the quasi-entrepreneurial style was comparatively more successful in small and young branches than in large and old branches.

The hypotheses tested in this study provide some evidence

that managerial orientations associated with high performing branches vary with the properties of the environment of the branch. The task of developing managerial orientations in tune with the demands of the environment is an important task of training and management development departments. The findings of this study emphasize the need for a differential approach to training and development.

Further studies linking up personality attributes with managerial styles would help in achieving a better fit between the person and the task. The probability of high performance would be high if there is a match among the personality traits, the managerial orientations, and the external environment of organizations.

Resource Allocation and Scheduling in Project Networks under Risk

M. R. Gopalan

The objective of this thesis was to study the effects of certain resource availability patterns and the use of certain known scheduling heuristics and certain heuristics developed by adopting line balancing techniques on the project completion time and the extra resources demanded. The study also helped to develop methods for specifying the resource availability that will minimize the extra resources demanded beyond the resource constrained period and also the expected project completion time. A study of the appropriate periods for updating the resource availability pattern was also done, to some extent.

This study was carried out in two major parts. In the first part, the activity durations were assumed to be known in advance, and the scheduling heuristics used were conventional rules such as minimum slack, late finish time and shortest operation first; line balancing rules such as ranked positional weight and ARCUS CAMSOAL; and greatest remaining resource demanded. In the second part, the activity durations were assumed to be random variables, not known in advance, and the scheduling heuristics used were those based on simulation results such as criticality index and RAND rules. Three types of resource availability patterns were used, all with constraints only up to the project PERT mean. These were the early start resource schedule, levelled schedule, and average resource requirement.

The test problem chosen was a hypothetical network containing ten activities, each with known discrete probability distributions and all requiring only one resource type. The Monte Carlo simulation was carried out 200 times for each

pairwise combination of the resource constraints and scheduling heuristics. Tests were administered on the data generated (ANOVA, to infer the effect of resource availability and scheduling heuristics, and DUNCAN's multiple range tests, to identify the best method of specifying resource availability). Results and conclusions as described below were arrived at.

(1) Levelled resource schedules were found to produce schedules with minimum expected project completion time and minimum extra resources demanded, irrespective of the scheduling heuristics employed.

(2) Resource availability were found to be more important for project completion time compared to scheduling heuristics. The study also established that interaction effect between resource availability and scheduling heuristics was not significant at one per cent significance level.

(3) Updating and levelling at later stages of the project was found to minimizes the expected extra resources demanded beyond the resources-constrained period. The methods developed for revising the resource requirements, which also took into account the uncertainty aspects, helped to produce schedules in such a way that the expected extra resources demanded beyond the resource-constrained period was minimized.

The impact of this study on project management is obvious. This study has shown that management should concentrate more on resources management rather than on resolving the conflicts among activities for the resources to be allocated. Often availability of resources is specified as a fixed quantity throughout the project. According to this study, it is advantageous to change-over to a levelled resource availability constraint so that the project can be completed as early as possible.

Frequent updating and levelling of resources are necessary, especially at the later stages of a project, to minimize the unexpected demand on resources. If the project involves a

lot of uncertainty and computer time is not a constraint, scheduling heuristics such as criticality index and random rule can be used in combination with levelled resource availability constraint

By using the methods developed for revising the resource requirements, which also take into consideration the uncertainty aspect, management can plan for the resources in advance so as to minimize the extra resources demanded beyond the resource-constrained period.