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MANAGEMENT, PRODUCTIVITY, AND GROWTH

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I

During the past two decades, economic development has probably received more attention from both the policy and scholarly communities than any other subject, with the possible exception of Vietnam. Some things have been learned, and much is still not well understood. Myrdal's three-volume study provides ample illustration on both counts. Let me start with some things we know, or think we know, about the development process that bear directly on the subject of this Symposium.

It seems to be generally true that rapidly growing economies are characterized by substantially higher growth than can be accounted for by increases in capital and labor inputs alone. Hence, increases in total factor productivity seem to be essential characteristics of rapid growth. Conversely, in slowly growing economies, growth seems to be almost entirely accounted for by increases in factor inputs, rather than by increases in total productivity.

We don't really know whether this increase in productivity operates as cause or effect in the growth process; nor, to the extent

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\* Any views expressed in this paper are those of the author. They should not be interpreted as reflecting the views of The RAND Corporation or the official opinion or policy of any of its governmental or private research sponsors.

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that it is a cause, do we know the underlying explanations. There are various theories concerning these explanations; improvement in the skill and quality of inputs, particularly human inputs; movement of capital and labor from lower to higher productivity uses (for instance, migration from rural agriculture to urban industrial employment); development of new methods, products and industries; and realization of increased returns from larger-scale operations. All of these explanations certainly play an important part, and often they seem to reinforce one another.

Nevertheless, while there is still much that we don't know about this process, the basic result seems clear. Moreover, it seems to apply to rapid growth in more developed countries, as well as less developed countries. In work done at the Asian Productivity Organization several years ago, it was found that, of the increases in GNP occurring over a ten-year period in both Japan and Taiwan, nearly 60 percent seemed to be attributable to increases in total factor productivity, as distinct from augmentation of inputs. In contrast, over the same period only 10 percent of the growth in India's GNP was accounted for by productivity increases, while 90 percent was accounted for by factor augmentation.\* During the 1950s, with which that study was concerned, Japan and Taiwan were rapidly growing economies (their GNP growth rates in constant prices were above 9 percent and 8 percent, respectively), while India's annual growth rate was only 3.5 percent.

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\* See Charles Wolf, Jr., R. Gangadharan, and Kee Chun Han, Industrial Productivity and Economic Growth, Asian Productivity Organization, Tokyo, 1964, pp. 28, 32. The results cited are derived from Tables V-1 and V-5.

Similar results have been obtained from work on certain Latin American economies, as well as on the economies of the United States, Canada, and Western Europe.

These results do not mean that factor augmentation, and in particular substantial growth in capital investment, is not important. It certainly is. Instead, what the results suggest is that factor augmentation is not enough, and that it has to be accompanied by, or to embody, substantial increases in productivity of inputs if growth is to be rapid and genuine development is to occur.

A second characteristic that most students of the development process associate with rapid growth is a vigorous market mechanism, operating in wide sectors of the economy with sufficient freedom that prices reflect scarcities and costs, that active competition exists for products and factors of production, and that there are strong incentives for innovation and increased productivity. Where these conditions don't apply, the resultant misallocation of resources seems very likely to offset apparent increases in total resource mobilization that may be aimed for. There is thus a close connection between the discipline imposed by the market, and the previous point about productivity increases.

This is not a matter of ideology, but rather of efficiency. Of the relatively few less developed countries experiencing high growth rates in recent years, all have been countries in which market influences have played an active role in influencing allocation of resources -- e.g., Korea, Taiwan, Mexico, Thailand, Venezuela. In some comparisons I made several years ago among six Asian countries

(Thailand, Korea, India, Malaysia, Burma, and the Philippines), a mildly positive relation was found between the size of the private sector, as measured by its proportion of total capital formation, and GNP growth rate.\*

Again, this does not mean that the public sector is not important. Certainly it is, especially where public investments may involve large externalities so that private rates of return differ substantially from social rates of return (as in education and certain social services), or where market imperfections are serious enough to make prices a poor guide to relative scarcities and costs. But it does mean that rapid development is likely to be promoted by a vigorous and extensive private market sector.

Let me summarize the two main points:

1. Increases in total factor productivity represent a major part of economic development.
2. In the development process, the market mechanism plays a vital, and perhaps crucial, role -- one that may be ignored or suppressed at a high cost in efficiency.

## II

Still, there is much we don't know about the development process. As suggested earlier, we don't know to what extent increases in productivity operate as cause, and to what extent as effect, of development and of other associated changes. Of course, many causal agents

\*"National Priorities and Development Strategies in Southeast Asia," The Philippine Economic Journal, 1965, Vol. 4, No. 2.

contribute to increased productivity: improvements in the quality of human resources; education and training; attitudinal and institutional changes; new technology; factor mobility; access to information on production techniques and on market opportunities; foreign trade and foreign investment.

Thus, it often seems to be the case that the process of economic development has many components, that it is the result of an accumulation of "bits and pieces" rather than any single cause or prime mover, and that it can follow many paths. There seems to be no single route, no single leading sector or critical input. The crucial role of top management arises precisely because of the need to select and adapt from numerous candidates those most suitable for the specific circumstances of the enterprise's own operations. The diversity of possible means for raising productivity and advancing development means that a single answer cannot be relied upon. Micro decisions by top management are likely to be better, than those of centralized planners, because they are more flexible and more likely to be grounded in reliable information.

Let me cite a specific example to illustrate the point. It seems to be the case that rates of utilization of productive capacity in less developed countries are no higher, and often tend to be lower, than comparable rates in more developed countries. Admittedly, the measurement of capacity runs into many difficulties. Nevertheless, the phenomenon seems to apply fairly widely.\* This is at variance

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\* See, for example, Almarin Phillips, Measuring Industrial Capacity in Less-Developed Countries, Discussion Paper 170, University of Pennsylvania, Department of Economics, 1969.

with what economic theory would lead us to expect: namely, that less developed countries -- as capital-scarce economies -- would tend to use capital intensively, because other factors of production are relatively plentiful and less expensive. Perhaps the Leontief paradox has some relevance to the utilization phenomenon, although the explanations usually cited tend to be quite different: for example, shortages of foreign exchange or of necessary raw materials, lack of export markets or of cooperant factors supposedly provided by the public sector, such as electric power and transportation. For various reasons, I think none of these explanations is satisfactory.

In my judgment, one of the main explanations for this pervasive and costly phenomenon lies in a different direction: namely, the connection between maintenance costs and utilization rates. I suspect that maintenance costs in less developed countries rise much more rapidly as utilization rates increase than in the more developed countries, because preventive as well as operating maintenance and repair practices in LDCs are drastically inferior.\* Hence, it may pay to keep utilization rates down -- buying additional equipment, if necessary -- in order to avoid sharply increased maintenance costs.

This hypothesis is only based on impressions. But if it is right, it provides a good example of the point I want to make.

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\* The hypothesis can be formalized in the following simple model:

- (1) Conditional probability of breakdown increases with rate of utilization (due to the impact of stress on the weakest component or coupling in the system -- a "weakest-link" phenomenon);
- (2) Total probability of breakdown depends on preventive maintenance standards and practices, as well as on (1);
- (3) Costs of repair, and the opportunity costs of factors of production which are idle during down-time.

Maintenance practices will tend to be inferior, and costs (and time) of repair higher in LDCs than MDCs.

Utilization rates and maintenance problems represent the kind of micro economic problem which, while having enormous consequences with respect to potential economic development and increased productivity, requires the perceptions and remedial decisions of top management for this potential to be realized. The remedies lie, for example, in improved information that can contribute to preventive maintenance, in job training, and probably in personnel incentive systems to provide higher rewards for better performance in maintenance practices -- all measures properly within the domain of management.

With this example as background, I would like to shift to talk more generally about the role of top management in innovating and guiding the numerous potential sources of increased productivity, and how this role can be more effectively exercised. These comments will range over a number of the topics that will be dealt with in more detail in the other Symposia. They represent ideas and suggestions for further discussion in these meetings, rather than firmly researched conclusions. In presenting them, I will try to move from issues and techniques that concern the firm's internal operation to matters that extend outside, including international economic cooperation and regional arrangements.

I will touch on five issues: (1) improved management practices; (2) information systems to serve top management; (3) research and development; (4) corporate structure; and (5) economic cooperation and regionalism. I want to consider each of these issues from the standpoint of its bearing on the central theme of this Symposium: the contribution that top management can make to increased productivity and accelerated development.

III

1. Improved Management Practices

Major advances have been made in recent years in the development of improved analysis and decisionmaking through operations research, program planning and budgeting, and systems analysis. These techniques have in common a problem-solving approach that emphasizes certain principles: explicit formulation and comparison of alternative courses of action; careful estimates of costs and benefits associated with each; and as accurate an identification as possible of the uncertainties attendant to estimates of both costs and effectiveness. While these techniques have been chiefly developed to improve decisionmaking in the public sector, they have relevance to private management decisions as well -- for example, to product development, quality control, selection of production processes, maintenance, and marketing. In a highly competitive market, this problem-solving approach may already exist. In conditions of partial monopoly -- the more common case for industrial firms in LDCs -- its existence depends on conscious decisions by top management.

I am not proposing anything unduly fancy or sophisticated. All I wish to suggest is that the fundamental precepts underlying these techniques can also be useful to private firms in improving management practices and raising productivity. I would also emphasize one of the major lessons learned in work with these techniques in the public sector. The lesson is that implementation is frequently as important as, or more important than, the analytical question of which decision to make. The way things are carried out frequently matters more

than what the prior decision was, and this is certainly as true in private as in public enterprise.

For implementation to be effective, the structure of incentives affecting individuals and subgroups within the organization must motivate behavior in desired directions. In particular, the attention of top management needs to be focused on three primary instruments of leadership and guidance if improved analysis and decision-making are to be implemented effectively: the structure of rewards (so that promotions and salaries are tied to performance); the way in which budgets within the firm are formulated and allocated; and the flow of information among individuals and subgroups within the organization. These are the things that most strongly motivate behavior, so they necessarily become the principal instruments for effective implementation.

## 2. Management Information Systems

Closely connected with the questions I have raised about improved analytical and decisionmaking techniques are the management information systems on which implementation depends. Tremendous advances have been made in this field in recent years with respect to both computer hardware and software. With the development of computers possessing vastly increased storage capacity, of time-sharing systems that permit capital costs to be spread over many users, and of flexible programs and programming languages, computerized information systems have been substantially lowered in cost and brought within a range that can be useful to firms of even limited size. Consequently, it becomes important for top management to decide

what information it wants to have recorded, stored, and retrieved with respect both to internal operations and to external matters, relating to product and factor markets abroad as well as at home.

Again, I do not mean to suggest anything fancy or elaborate. The design of an appropriate information system will depend on the enterprise itself, its scale, the diversity of its product line, the competitiveness of the market that it operates in, and numerous other matters. The point is simply that top management has access to a range of powerful tools for guiding the enterprise and improving its operations that were not available a half-dozen years ago. The potential increases in productivity from use of these techniques are substantial. They are worth investigating further.

### 3. Research and Development

A third subject warranting the attention of this Symposium, and more generally of top management concerned with expanding productivity, sales and profits, is research and development. In the past two decades, scientific research and development in the advanced countries has grown tremendously -- in the case of the United States by nearly 14 percent per year from 1.5 billion dollars in 1946 to nearly 24 billion dollars in 1968. Most of this growth has been in high-technology fields, sometimes related to military spinoff. In many cases it has created wholly new industries (e.g., lasers, cryogenics, xerography), as well as thousands of new products in existing industries (e.g., plastics, synthetic fibers, electronic equipment).

Despite this record, I very much doubt that it is directly relevant or helpful to the top management of firms in most of the Asian countries. Instead, it would seem wiser to save substantially on R&D costs by drawing on the already-existing inventory of information about processes and products, and by resort to licensing arrangements with foreign enterprises to limit the costs of new product development. Japan itself has made tremendous strides in this direction, managing to combine a very rapid rate of technological innovation with a relatively small proportion of its GNP devoted to R&D (less than one-third the U.S. percentage). In doing so, it has made effective use of licensing arrangements and the available pool of technical information, with internal Japanese R&D expenditures focused on adaptation to local production and marketing requirements.

In most cases, and for most Asian countries, probably the largest payoffs are to be found in improvements in intermediate technology, rather than high technology fields. In this connection I might quote from the study mentioned earlier that was done for APO several years ago. There it was suggested that stress should be placed on how

...unskilled and semiskilled labor can be substituted for capital rather than capital for labor, and how utilization of existing industrial plants and equipment can be increased, rather than on how and why new equipment is needed. Increased attention should be devoted to technological possibilities that are intermediate between those presently in practice in the advanced countries and in the developing countries. Efficiency, rather than prestige or gadgetry, should be the emphasis, and efficiency counsels the substitution of relatively abundant factors of production for those that are scarce. However, one must be clear about what is scarce and what is abundant. Unskilled and semiskilled labor may be relatively abundant

and cheap, whereas skilled labor, supervisory personnel, and qualified management may be even scarcer than capital. Under these circumstances, an efficient technology calls for economizing on the scarce factors, and ... requires that attention be devoted to increasing the available supply of skilled labor and supervisory personnel.\*

However, even if principal reliance is placed on intermediate technology and licensing agreements in order to economize on new R&D expenditures, some internal R&D expenditures will usually be necessary to adapt the technology in question to fit local production and marketing conditions. It would be extremely valuable to explore, at this Symposium and subsequently, Japanese experience with adaptive R&D, and the factors accounting for its extraordinary success.

#### 4. Corporate Structure

A fourth field where attention by top management may yield significant benefits involves changes in the structure and scale of firms through mergers and acquisitions. As you know, the emergence of huge conglomerate corporations through acquisition and merger of firms, frequently producing widely different products and services, has been a striking feature of the economic landscape in the United States as well as in Western Europe in recent years. A question that deserves attention in this Symposium is whether, and to what extent, increased efficiency can be realized by acquiring and merging firms that are relatively small in scale.

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\* Industrial Productivity and Economic Growth, pp. 12-13.

One of the major economies of scale available to huge conglomerates -- such as Litton, Ling-Temco, and Mitsubishi -- is that connected with the functions of management (in planning, programming, budgeting, staffing and organizing), even where the products of the component firms are widely disparate. Smaller acquisitions may yield less of this particular type of benefit: in such cases, major efficiencies may lie instead in lower input costs and in increased division of labor in production and marketing of the same or related products. Nevertheless, I wonder whether there may not still be substantial economies of scale in the acquisition of small and moderate-size firms in similar or adjacent industries, with the effect of raising productivity and enabling more effective competition to take place by Asian manufacturers in world markets.

##### 5. Economic Cooperation and Regionalism

Let me turn, finally, to regionalism and economic cooperation as other approaches to the general problem of increasing productivity and accelerating development. The subject has a long history in Asia, as well as much current interest in the rest of the world. The origins of this interest in regional groupings are numerous: the geopolitics of Haushofer and MacKinder; the related views concerning "natural" spheres of influence, largely geographically based; and the postwar experience of Europe, beginning with the European Recovery Program and going on to the Common Market, the Coal and Steel community, EURATOM, and other regional associations. In the United States, regionalism is an attractive idea around which quite divergent

interests and groups converge: liberals and conservatives; isolationists, neo-isolationists and erstwhile internationalists; supporters of foreign aid and opponents; and so on. As you know, President Nixon wrote an article in Foreign Affairs in 1967, before the last election campaign, in which he came out quite strongly for the regional principle.

As a basis for later discussion by the Symposium, it may be useful to open the subject by looking at two fundamental questions: (1) what are the gains or advantages that are expected from regional groupings -- or what I would prefer to call multicountry associations (MCA's) -- with respect to raising productivity and accelerating economic development?; and (2) what are the criteria for association -- that is, for determining who is to be inside and who outside a particular grouping?

On the first question, two special gains can be anticipated. One again relates to economies of scale. Based on Adam Smith's precept that division of labor is limited by the size of the market, an expansion of market scale can result in increased efficiency in both production and marketing. The other gain lies in a more perfect functioning of markets. If capital and labor are freer to move from lower to higher productivity uses, and if technology is freer to flow across national lines, improvement in resource allocation should result all around.

Both of these points have potential merit, although some technical questions can be raised about each. For example, one should consider whether the anticipated economies of scale require formal

multicountry associations, or whether they can be obtained more conveniently by economic cooperation and licensing arrangements between corporations in different countries, or by the formation of transnational corporations. And there is also a question whether the improved allocation of resources, that is sought within more perfectly functioning markets, may not be acquired -- if there are political preferences for some countries and discrimination against others -- at the expense of a misallocation of resources between the countries that are inside and those that are outside the MCA. In other words, trade-diverting effects must be weighed against trade-creating effects, as Viner pointed out a long time ago.

But the second question, of criteria for choosing members of MCA's, is still more crucial. The usual answer given relates, explicitly or implicitly, to geographic proximity. Countries in a prospective regional association are presumed to be those in the same geographic area, and preferably even contiguously located with respect to other members. Underlying this geographical criterion is the notion that linear distance is a reasonable proxy for transportation costs, and hence that the gains sought through regional groupings can be obtained at lower real cost if the distances between members are less.

Yet this argument runs into real difficulty in the light of changes in transport technology currently under way. For example, if we let 100 represent an index of cost per ton mile for air freight using present air transport technology, the new generation of transport aircraft, due to go into extensive operation in the next couple

of years, will have an index of about 40, a reduction of 60 percent. As a function of distance, transportation costs are declining dramatically. Similarly, if one thinks of communications costs in relation to the new technology embodied in communications satellites, linear distance is virtually irrelevant as an index of cost.

The result is that geographic proximity is not necessarily the best criterion of association in order to realize the potential gains that I referred to earlier. In cases where such gains from increased scale and more perfectly functioning markets can be furthered by larger groupings, it may be worthwhile to look for other criteria beside geographic proximity, such as technological and marketing affinities or complementarities. Economic cooperation across national lines indeed looks promising, but I would urge simply that its potential scope be extended, rather than confined geographically. The Japanese view of a Pacific Basin community including the United States, Canada, Australia, and New Zealand, as well as Japan, and potentially perhaps Mexico and Peru as well, is an example of such a potentially fruitful extension.

The role that top management can play in such an extension of economic cooperation, through exchanges of information and through an awareness of ideas, needs and potentialities for cooperative endeavor, can be substantial. Closer contacts among firms in different countries, possible changes in corporate structure transcending national lines, and licensing arrangements of the sort mentioned earlier, are areas of economic cooperation that may all warrant more attention in the future. Opportunities for economic cooperation among the

countries of Asia and between them and the countries outside ~~for~~  
example, in Latin America and elsewhere -- are much greater than  
narrow geographical considerations alone would suggest. The Asian  
Productivity Organization can play a valuable role in promoting this  
wider view of the problem.