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planning in the STPI countries

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Science and Technology for Development:

Planning in the STPI Countries

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Contents

8. Integrating Science and Technology Planning with Economic Development Planning

Kyu Bok Whang

The emergence of S&T planning has created the question of how it is integrated into the economic development planning. Such integration is considered inevitable because industrial production requires technological input in addition to labour and raw materials. Modern production systems require a labour force with specific skills, capital that includes S&T knowledge, and raw materials that are preprocessed by related suppliers. S&T planning is intended to influence the productive capacity of an economy through promotion of S&T activities, which therefore require enhanced funding.

Since the establishment of the Ministry of Science and Technology in South Korea the S&T policy has been oriented to fostering the technical capacity of the nation and directing the S&T activities toward the set goal. Specific technological needs of industry have been delineated, and technology has been supplied through research institutes in the country, but the supply of technology has not been adequate for the industrial needs.

It is traditional for the establishing of an S&T policy to lag behind that of an economic policy. The result seems to be underachievement with the economic development plan owing to lack of technical input. This is partially due to the lack of analysis and of a translation of economic development into specific technological needs. More appropriate timing of S&T planning can provide better integration of the S&T plan with the economic development plan.

Framework of the Integration

Information about the economic development plan can be fed to an S&T planning group for review. This group can, in turn, feed its own information to the economic development planning group. This exchange of information can be repeated to perfect a workable plan.

The economic planning group has traditionally been composed of economists, mathematicians, statisticians, and planners in various disciplines, whereas the S&T planning group is largely composed of scientists and engineers within the government. S&T planning is less extensive than economic planning and can be independent from the latter, but in view of the consequences of S&T planning and the resources required for research, it seems advisable to have the two types of planning coordinated.

For the preparation of South Korea's fourth 5-year economic development plan, the Economic Planning Board formed 21 sectorial planning groups, each of which was expected to draw up a preliminary plan and submit it to a coordinating group. The sectorial groups reflected the existing ministerial organization, so that the top planners at the ministries had to participate in the planning. The participation of planners from research organizations, trade associations, and academic communities was also expected. Intense involvement was expected of S&T planners in the sectors of heavy and chemical industries, light industries, transportation, natural resources, energy, and employment and personnel. Although S&T planning may be extended beyond these six sectors, the current involvement of S&T planners was, for practical reasons, to be contained in the sectors predominantly oriented toward "hardware" technology. At least in these six sectors, interaction between economic planners and S&T planners was ensured for the period of that economic development plan.

All sectorial planners were to be versed in the goals of the economic development plan: development of agricultural and energy resources; enhancement of domestic earnings through exports; a proper structure for development of heavy and chemical industries; development of science and management of business, and of personnel; development of land resources and maximum expansion of employment opportunities; price stabilization, improvement of the taxation situation, and amelioration of banking conditions; dispersion of population and industries to nonurban areas; enhancement of investment for social development; improvement of working conditions; expansion of cultural facilities and of housing, welfare, and social security systems; and improvement of efficiency in the administration of development planning.

The participation of S&T planners in the sectorial groups ensured the integration of S&T planning with economic development planning. At the time this chapter was written the S&T planning group was subdivided into metals, shipbuilding, textile, machinery, electronics, petrochemicals, and energy groups. Each subgroup was expected to design a project to be evaluated in terms of technology constraints, technology alternatives, and required resources for the development and importation of technology.

The economist in each planning sector was to estimate a feasible output of the sector on the basis of overall growth, investment, resources, employment, and other discernible economic variables. The S&T planners would then be able to determine the technical requirements for meeting the output: the current capacity of production (capital goods and labour), the current requirement for raw materials, the technical requirement for skilled labour, the investment requirement for a new product, the investment requirement for additional capacity, the extent of importation of technology, a plan for domestic technology, and alternatives for a better mixture of products.

The output requirements of each industrial sector are critical information for the S&T group. The figures can be tentative until technical feasibility is ascertained. The feasible output of each sector can be adjusted across the other industrial sectors by the coordinating group.

The Product–Technology Matrix

The product–technology matrix, which was published in 1969 by the Korean Ministry of Science and Technology, is used to assess the value of technology in relation to specific products in each of 16 industrial sectors. On the matrix form, the products are listed vertically and classified in one of three levels; 100 products, on the average, are listed for each sector. The required technologies are listed horizontally and also classified in three levels; 70 technologies, on the average, are listed for each sector. In each cell of the matrix the technology required to produce each product is identified and classified as to whether it is minor, major, or not available in the country. The matrix form also has space for indicating the priority of a technology's development and the feasibility of producing a specific product.

Because of the difficulties in assessing the monetary value of a technology, or of an element of the technology, one has to resort to the monetary value of the equipment or production facilities containing the technology to estimate the relative monetary value of each technology or element and its availability. The relative importance of technologies or their elements can be assessed by applying the value of capital goods to each product and the volume of output.

This index will show not only the relative value of the technical element but also the total effect on other products. However, the index is not particularly applicable to a technology developed by a corporation for the exclusive use of that corporation. When the development of a technology is funded by a public organization, such as the government or an industrial association, the index is more applicable.

Even though the priority of technology development has been established, a strategy for the process has yet to be developed. Advanced countries have a large reservoir of primary sources of technology. Importation of technology from such countries must be treated by discriminatory principles.

Concluding Remarks

The integration of S&T planning with economic development planning in South Korea is expected to permit both the systematic integration of S&T activities with industrial production and the enhancement of S&T funding.

Planners in South Korea appear to be ready to accept the systematic treatment of S&T. However, owing to the complexity of and difficulties in evaluating technology, and the vast requirement of personnel for S&T activities, deliberate efforts are required to find a workable practice. This needs to be done soon to minimize subjective judgment of the planning.

The product–technology matrix is to be used in the systematic assessment of S&T requirements for promoting economic activities. This tool has limited value in that it deals with current requirements and existing knowledge. Problems such as the need for energy technology for the future cannot possibly be solved or even guided by the current static product–technology relation. Likewise, we have to seek a supplementary method dealing with the dynamic nature of technology.