ADAPTATION OF TECHNOLOGY

The subject of industrial technology has received significant attention in various international dialogue on economic development issues. This has been due largely to the gradual understanding of the vital role of industry in economic growth and the recognition of the role of technology in the process of industrial development.

Technology

Technology may be described as a matrix consisting of a set of techniques, each of which is associated with a vector of characteristics. These characteristics include the nature and specifications of the product, the input use, the scale of production, associated managerial techniques etc. The characteristics are designed to fit in with the economic, institutional and technical circumstances of the economy for which they were designed.

In a general sense, technology includes choice of material, methods, machinery including equipment and tools, money (amount of sources), for a market (given or potential) appropriate to a country depending on its raw materials resources, availability of labour (level of skills and numbers), climate conditions, other human factors and level of social economic development at any given point of time.

The technical know – how is not static, but is a continuous process of growth. For any country, developed or developing, it is not possible to remain in complete isolation. There is a prevailing lead – between developed countries which in some areas like electronics is quite high. Developing countries cannot afford to reduce this lead – time by indulging in own R & D programmes starting from the basics. Any disproportionate effort and money spent on grass root research with a view to catch up with developed countries will only increase the existing lead – time. This lead time can be shortened only by importing the technology initially and then using adaptive research to modify the performance. Even developed countries import technical know-how backed up by an intensive follow up Research and Development activity.

Choice and acquisition of technology

Choice of technology is a very important factor for the planned and balanced development of any sector of the economy. The investments made in an obsolete or old technology which may look very cheap and attractive to begin with, would prove very costly in the long – run due to high cost of production and non-availability of spare parts.

On the other hand, the input of very high and sophisticated technology would be costly and would also require a very large scale of production to be economically viable. A phased programme of indigenous manufacture with increasing self-reliance and based primarily on domestic market needs is considered essential.

Obsolescence of technology

Obsolescence occurs with economic development and technical change, and is the

product of the interaction between the two. There are many sources of obsolescence: generally speaking, the relevance of the source of obsolescence varies according to the nature of the economy. Some sources of obsolescence tend to make the technique obsolete in any society while others only apply in so far as other changes are occurring and may be applicable to developed countries and not to developing or underdeveloped countries.

Obsolescence may be one of the methods of production to produce a given product. This is called product obsolescence associated with changes in the economic structure – obsolescence which would not occur without such changes; and obsolescence associated with increase in efficiency that makes previous technique obsolete irrespective of economic changes. In addition there is obsolescence independent of economic changes and of changes in the efficiency of substitute techniques, such as occurs with changes in the technology used in use in the rest of the system.

Transfer and development of technology

The process of assimilation of new techniques of industrial production and their adaptation to the condition prevailing in a particular country entails far more than the introduction of new equipment and the training of staff to operate it. The country's technological capability is developed to other sectors of the economy and to society as a whole. The benefits are maximized if technology is transferred in such a way that the recipient country develops a capacity to modify and improve the technology in the future.

The government of a developing country faces two main policy issues in connection with the transfer and development to technology for industrialization. The first is the extent to which policies and institutional arrangements are needed to ensure that the technology of modern manufacturing processes used in industrially advanced countries is adapted to the special needs and circumstances of developing countries using those processes. The second is the extent to which the Government should rely on imported technical know-how and, the nation's technological capability.

Insufficient attention has in the past been paid to the development of new types of technology for use by industrial enterprises in developing countries. Each developing country has different resource endowments and it is therefore usually worthwhile creating a national industrial research institution to tackle this and other problems encountered in adapting technological processes originally developed in industrial advanced countries with different resources endowments.

In the industrially advanced countries, many branches of industry have formed research organizations on their own initiative and at their own expenses. It is difficult to say at what stage of the development of a branch of industry this form of organization will be appropriate in a developing country. However in those branches of industry where a government is especially desirous of developing a national and self-supporting process of technological development, some initial financial support from government might be considered.

Role of engineering education in generation & transfer of technology

It has been argued that one of the major sources of bias in the generation and choice of technologies used in developing countries is the character of the education received by their engineers. Many of the engineers from developing world still receive their education in the universities of industrialized countries, because resources for their training and the technical assistance received for their establishment are often strongly influenced by the intellectual patterns of the industrialized countries. It is claimed, therefore, that engineers from developing countries trained in the molds receive "inappropriate education".

Absorption and adaption of technology

The absorption and adaptation of technology can be described as a three-stage process after a foreign collaboration agreement has been entered into. Depending on the type of collaboration agreement and management decision, these three stages may start simultaneously or they can follow in a sequence. During the first stage, the emphasis is on setting up plants and facilities and leaving to manufacture the given product for which the collaborator supplies the complete set of drawings and manufacturing technology. Initially some of the components requiring complex production processing or proprietary technology may be imported from the collaborator, but the complete assembly is carried out at the local plant.

The second stage of technology absorption starts when the local firm learns to design either new products or carry out alterations in the basic product design supplied by the collaborator following the design know-how and principles supplied by the collaborator. During the final stage of technology absorption, the local firm generates its own design know-how and principles based on indigenous research and development in the product areas, as well as in the basic sciences or engineering applicable to the product.

If developing countries are to be able to choose and adapt technology, they must have available range of choices. First and foremost developing countries' priority problem has been to find employment for large reserves of manpower by investing in industries which were sometimes of doubtful profitability and often based on the wrong choices of technology. In addition the engineering farms commissioned to make the techno-economic studies are often connected with plant manufacturers and slant their reports towards the choice of certain processes and types of plant.

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