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Intermediate Technology Required

by A. B. Gosalia, Mannheim

If the modern industrial projects and plants with their fully automatic technology could be used as monuments, the developing countries would have enough tourist attractions to present. Since the achievement of political freedom all developing countries have installed heavy industrial plants and projects with financial and technical aid from the developed countries. With the help of up-to-date automatic technology they wanted to produce goods and services in bulk to satisfy the needs of the masses, thereby raising their standard of living. But the imported fully automatic equipment has failed to achieve its expected target of mass production, and whatever mass production has been brought forth in the market has failed to satisfy the needs of the people. Instead they have brought to these countries foreign financial debt and technical as well as economic dependency.

Failure of Present-day Mass Production System

This system with the help of fully automatic equipments¹ requires:

- ☐ Standardisation of materials, manufacture, fabrication and products at all stages (apart from quality of final product).
- ☐ Highly qualified technical personnel to commission, run, maintain and repair fully automatic equipments.
- ☐ Sufficient purchasing power of the masses to consume the goods and services.

Standardisation in its broadest sense includes standardising not only the technical materials of machines but also the methods of fabrication, packing, weighing, transport, etc., for all capital and consumer goods as well. For example, different sizes of paper bags to pack one kilogram of sugar will require two attachments on the packing machine, different size of containers, etc. Even correspondence letters of different sizes would require envelopes of different sizes to be manufactured. This always increases manufacturing costs of mass production. Furthermore, substitution through alternative products is also not possible, which undermines the prime sense of the term "mass production".

The fully automatic equipments, mostly imported from the developed countries are costly and also demand efficient and skilled technical service personnel. The import of machines and equipments,

service of foreign technicians, special spares, etc., cost foreign exchange which makes the products costlier.

Speaking in economic terms, the mass production of consumer goods is for satisfying the demands of people at cheaper costs. The products, however, can be sold competitively at cheaper rates only, if the markets are practically overflowed with goods and simultaneously there is enough purchasing power. In other words there should be enough effective demand with higher employment. All developing countries are, however, far from this ideal situation necessary for the satisfactory working of a mass production system. These countries have a very high percentage of unemployed human labour and as such without any purchasing power (with a very low per capita income).

On the other hand, goods coming out of some scattered mass production factories are not enough to saturate the market. As a result the goods are always rare and disappear in the black market to satisfy the needs of few only.

Intermediate Technology

Thus the present mass production system employing fully automatic technology and discarding human labour is not properly suited for the developing countries. In order to employ useful human capital i.e. labour without missing the benefits of mass production, some intermediate technology—a compromise between the extreme ends of total manual work and fully automatic technical operation—is needed. This technology as the term signifies, should be a system of technical operation of equipments making simultaneous use of mechanical means and human labour, wherein both these forces work complementary to each other. Under this system various machines of the fully automatic equipment, which are at present being imported shall be replaced either by indigenous machines, human labour or a suitable combination thereof, the precondition, however, being that neither quantity nor quality of the end product will suffer. The system using such an intermediate technology may, for the sake of simplicity, be designated as „semi-automatic equipment“.

Such semi-automatic equipments can easily be introduced for heavy industries and small-scale and medium sized industries as well, because of its characteristics of variability and interchangeability, caused by the live factor of human labour, adjustable

¹ The term "Fully automatic equipment" denotes all automatic plants, projects, industries, machines, finished products, services, know-how, etc., imported from developed countries.

in quality, quantity and time. These characteristics make the whole system so flexible that without taking care of standardisation it can be introduced and applied for mass production.

Application of Semi-automatic Equipment

In order to obtain the benefits of mass production with this system, machines shall have to be employed for such functions or processes, which cannot be carried out by manual human labour. Such processes are mostly of high speed, high temperature, electricity, high pressure, transport of liquids and gases, chemical reactions, etc. Various other functions such as of cutting, breaking, pressing, transport, weighing, packing, etc., shall be carried out by human labour or by means of indigenous equipments.

The industry of canning and preservation of vegetables and fruits is the best suited example of this type of medium-sized industries because food is the burning problem of all developing countries. For canning fruits and vegetables fully automatic equipments are available. However, these foods can be canned preserved also by simple house-hold method.

In heavy industries, too, human labour can be employed for various partial functions and processes. In a soda-ash factory tons of lime-stone and coke are required as raw materials. Before charging these into the furnace, they have to be broken into pieces. Instead of installing a mechanical crusher driven by an electric motor, these can be broken to pieces by hand i.e. by manual labour.

It is not always necessary to make direct use of human labour. In many mechanical workshops simple manually operated machines for cutting, pressing, bending, welding, etc., can be employed.

Many problems of transport and packing can be solved by manual labour instead of using complicated automatic equipment.

Efficiency of Production

Before employing this mixed technology, its efficiency with respect to the other system should be investigated. The obvious reasons against the introduction of semi-automatic equipment are:

- ☐ Nonstandardised and underrated quality.
- ☐ Intermittent process and reduced productivity.
- ☐ Higher costs because of low production.
- ☐ Social problems of human labour.

It is obvious that a human being cannot work like an automatic machine. Rate and quality of production are therefore bound to go down. If the proper organisation and labour control are lacking, the natural tendency would be to work less and inefficiently. To maintain a standard quality of the final product, all low graded intermediate materials might have to be scrapped. In case of less work at a manual

stage of a process, the following mechanical stage might have to stand idle for a while. All those and other factors would increase the cost of production in case of semi-automatic equipment.

A fully automatic equipment, on the other hand, is also not fully automatic in a theoretical sense. Such an equipment, if not properly operated and maintained, may produce less and the products may also be of inferior quality. Storage facilities at all intermediate stages of a process have to be provided for the emergency situation of stoppage of any machine.

In these respects both systems are identical and demand proper technical coordination to give full production. The imported fully automatic equipment costs more, demands efficient technical attention and is rigid. The semi-automatic equipment is flexible, easy to handle and costs less.

A further advantage of semi-automatic equipment lies in its competitiveness. Because of low capital investment, smaller requirement of foreign exchange, use of indigenous machines and simplicity of operation, many local manufacturers and industrialists will be encouraged to install such equipments. This will induce competitive production among producers, thereby reducing the monopolistic and capitalistic tendency of the few big industrialists owning fully automatic equipment. On the other side the per capita income of labourers will increase through higher percentage of employment. The respective rise and fall in income of labour and industrialists will help in narrowing down the gap of social and economic disparity between these two income groups.

However, it is difficult to judge and estimate the efficiency of either of the systems in theoretical terms. The engineers and economists shall have to actually investigate and decide this problem for individual equipments before their acceptance and introduction.

Future Progress through Intermediate Technology

The above analysis shows that the intermediate technology should freely be advocated for developing countries, although these countries would psychologically feel themselves some twenty years thrown back against the developed countries. But this is not the final step to be reached. The final step is and still remains cheap mass production through the implementation of fully automatic technology. But this goal can be achieved only through multiplied use of intermediate technology with consistent use of labour. All developed countries had to pass through these intermediate stages before they could achieve the present-day standard of living. The proposed intermediate technology therefore represents only a transitional step on the ladder of development process—a step, which, when missed, would cause one to fall back. The developing countries have tried to omit this step, but—as experience shows—without success.