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ROLE OF INDUSTRIAL RESEARCH IN
INDUSTRIAL AND ECONOMIC DEVELOPMENT 1/

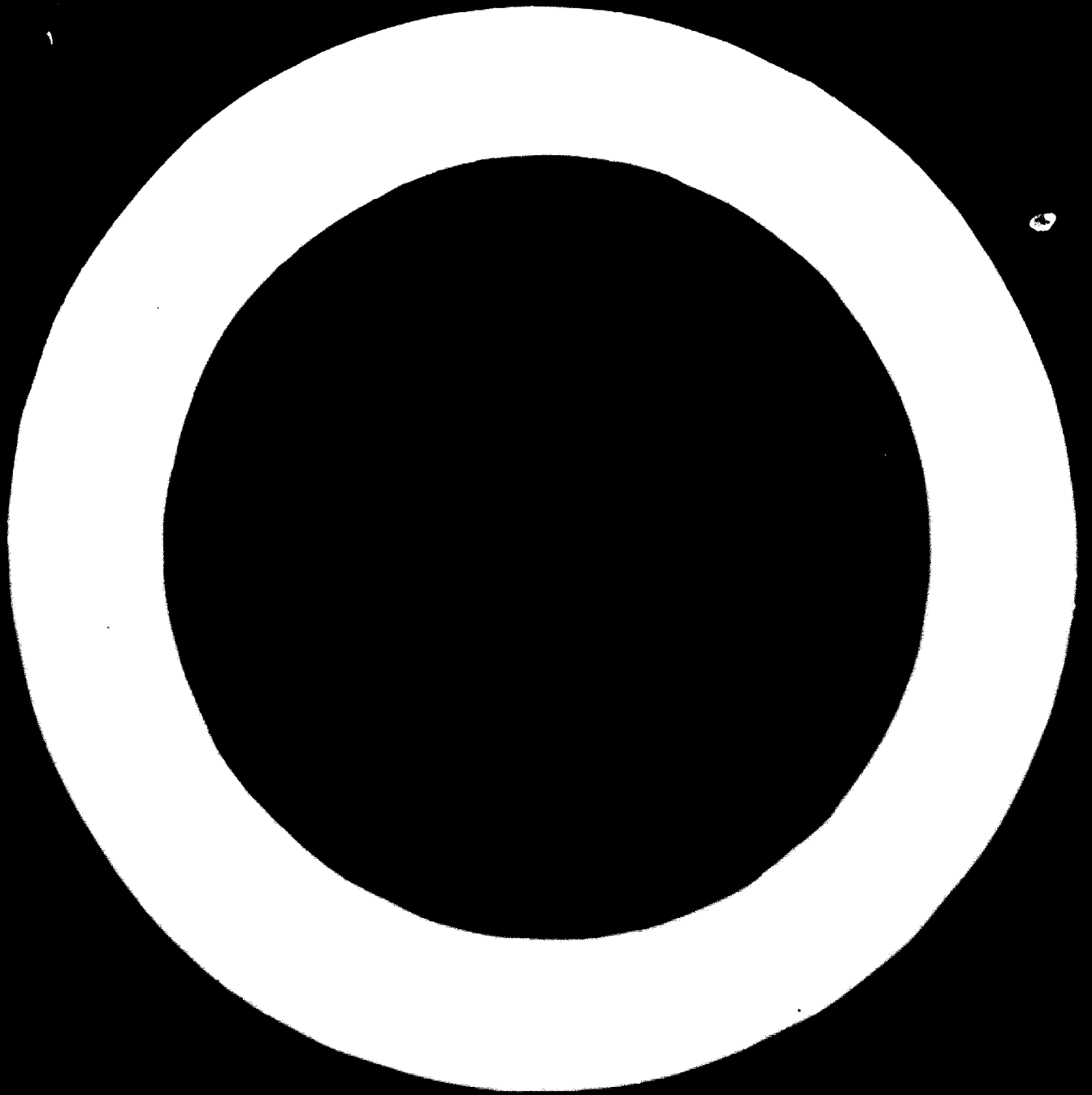
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1. Background

According to World Bank statistics annual economic growth during the last decade was as follows:

	<u>Agri- culture per cent</u>	<u>Industry per cent</u>	<u>Total GDP per cent</u>
<u>Developing countries</u>			
1961-66	2.4	8.3	5.1
1967-71	3.4	7.9 ¹⁾	6.5
1961-71	2.9	8.1	5.8
<u>Industrialised countries</u>			
1961-66	1.9	6.3	5.3
1967-71	2.9	4.1 ¹⁾	4.1
1961-71	2.4	5.5	4.7

Industry, then, is growing faster in the developing countries as a group than in the industrialised countries and much faster than agriculture. It is subject to fluctuations but on the whole probably less so than in the rich countries.

There are, however, different types of industry in most developing countries. We can - with some oversimplification - distinguish between large-scale industry and small-scale industry.

Large-scale industry is often organized in subsidiaries of foreign firms, usually in towns and cities. It may be working for the local market but rather often it (also) works for exports. It will as a rule apply techniques transferred from the developed countries with rather little attention to local conditions and managers and technicians will often, at least partly, be foreigners.

Small-scale industry, including handicrafts, is usually more integrated in the national economy. To a large extent it is located in rural areas and linked with agriculture in various ways. It works primarily for the local market and techniques applied will usually represent national traditions.

At the present juncture it is a major problem in many developing countries to develop the traditional sector in particular in the rural areas. Large-scale industry can to a large extent take care of itself, provided the host country has a well-considered policy regarding foreign investment.

It is therefore towards the development of small-scale industry in particular that those responsible for industrial research should direct their efforts.

2. Role of Research

Modern technology has developed in the presently rich countries, which in these respects are radically different from most of the developing countries:

1. They have abundance of capital.
2. They have an increasing shortage of labour which, consequently, is expensive.
3. Their pattern of demand is that of a wealthy population.

This is why modern techniques are capital intensive, labour saving and directed towards the needs of rich people.

The situation of a typical developing country is in all these respects exactly the opposite:

1. They have shortage of capital.
2. They have an increasing abundance of labour which, consequently, is cheap.
3. Their demand pattern is that of a poor population.

It follows that techniques which are appropriate in these countries must be very different from those of the rich societies, especially in the major part of small-scale industry.

In fact, if modern technology had developed in countries with a structure like that of the poorest developing nations, it would have been radically different from what it is to-day.

It follows that there are two tasks to be performed by industrial research for development:

1. Adaptation of existing techniques to local conditions where this is possible.
2. Creation of new techniques, appropriate in the society in question.

There is no sharp distinction between those two tasks. If an existing method of production is changed considerably in order to suit the local situation it has in fact become a new method.

Still, there is reason to emphasize that the task before us is more than one of adaptation. Industrial research should be seen in the context of the situation of the country as a whole and therefore in fact be an integral part of the planning process.

This means that we should ask ourselves questions like these:

1. Which goods will be increasingly in demand in the years to come? (implements for agriculture, simple consumer goods, houses, roads, etc.,).
2. Which are the productive resources available in the country for the production of such goods? (materials to be grown or extracted from the soil, labour with different kinds of skills including artistic capabilities developed through the cultural evolution of the national society, etc.).
3. Where are savings particularly important? (foreign exchange, imported machinery and raw materials, etc.).
4. How can modern scientific and technical knowledge about materials and processes be utilized in the development of the technology suited for our country in the foreseeable future?
5. If there is a lack of particular skills needed for the development of products and processes we need, what are the implications regarding the planning of education and training?

3. Some Conclusions

As already indicated industrial research should be considered as an integral part of the planning process. Research institutes should therefore work in close contact with the planning authorities, get information from them and make suggestions to them.

In the following some indications are made about tasks that might be taken up by research institutes.

1. Evaluation of demand. Looking at the prospects according to national development plans which goods likely to be in demand could be produced in the country instead of being imported? Will the new demand primarily be in rural areas linked to the development of agriculture? This has to do with the location of industries and with the question of reducing the often excessive migration to the cities.

2. Survey of resources. Where in the country are materials to be found that could be useful as raw materials for industry or for housing? How can they best be extracted and prepared for use so as to reduce the need for imports?

What are the human resources available and where are they? What skills do exist and what are the needs for imports of certain skills through foreign experts?

3. Testing of materials. Often one does not know too much about the possibilities that exist for using local materials for house construction, road construction, industrial production and so on, because no testing has been made in the modern sense of this word, taking into account the present state of geology, chemistry and other sciences. Here is much to do for local research.

4. To do such work documentation concerning the state of science and technology is necessary. One should not lose time in making discoveries that have already been made elsewhere.

Only persons with some competence in science and technology are able to find out where information about existing knowledge can be found and how it can be utilized. A documentation centre might therefore be attached to some institute or centre for industrial research.

It will belong to the tasks of such a centre to follow to the extent possible new developments in science and technology relevant for work in the country.

This task may appear overwhelming but there are many possibilities for utilizing the service of UNIDO and other parts of the UN system of organizations.

5. The main task for industrial research is of course the working out of techniques appropriate for industry in the country. It is a question of assisting industry in the development of both new or improved products and new or improved methods of production.

It is nearly a commonplace to say that such techniques will usually have to be labour intensive and capital saving in contrast to what is now usual in the rich countries. The truth is, however, that we are far from having done what is needed in this extraordinarily important field.

It is of course more than a question of the relationship between labour and capital. It is also a question of finding out what local materials can be utilized and taking into account the availability of skills in the country.

This work must be done in close co-operation with industry itself. Parts of it can be undertaken in factories and workshops, other parts in the laboratories of research institutes. Analysis of the markets in question must be combined with technical experiments.

It should be added that in developing countries which are already somewhat advanced in industrial development, techniques appropriate will be closer to those of the rich countries than is the case in poorer countries with predominantly agricultural societies. In no case, however, should one be content with those techniques that were applied in the developed countries 50 or 100 years ago. It is important to make use of the advance in science that has taken place since then.

6. Out of industrial research should come some suggestions regarding education and training. The evolution of industry should be progressive and often somewhat more productive techniques could be applied if workers and technicians had more knowledge and experience in various fields. Valuable contributions to educational planning could therefore be a byproduct of industrial research.

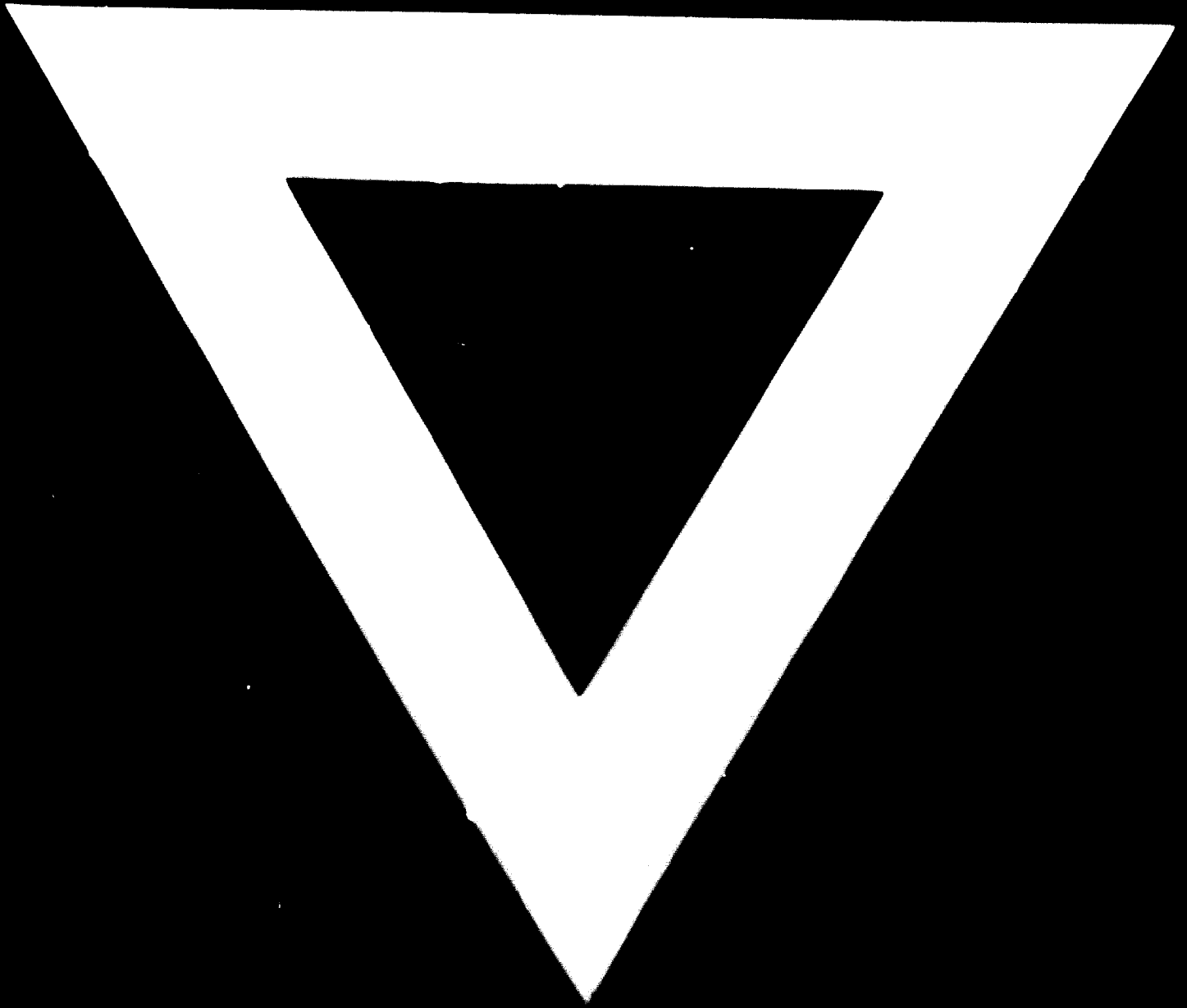
An important aspect of this complex of problems is the establishment of an adequate extension service for industry. The extension officers should be able to impart simple technical and commercial knowledge to craftsmen and factory managers but in order to do so they must have an adequate training themselves. Industrial research institutes have a role to play in the building up of an efficient extension service.

7. Quite many tasks have been listed above and it may be difficult for an institute with limited resources to take care of them all. Through regional co-operation there could be an exchange of experience and a certain division of labour between institutes in countries belonging to a region where natural and other conditions show a reasonable degree of similarity.

It may also be useful to establish links with some similar institutions in one or more industrially developed countries. Some of these institutions in fact are highly interested in establishing such links and it can be of mutual interest to the parties involved.

The above list is not meant to be exhaustive. Its purpose has been to make some suggestions for consideration and discussion. Let it be stressed once more in conclusion that the task ahead of us is more than the transfer of technology from the rich countries with some adaptation. The real task is to prepare for an industrial development which is different from that of the old European countries because a large stock of scientific knowledge is now available. New techniques and new development policies for new and old countries can therefore be worked out.





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