

Information Requirements of Scientific and Technical Personnel*

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Science means knowledge and the function and objective of a scientist is to acquire knowledge. A student acquires knowledge on subjects on which knowledge is already available but a scientist aspires to acquire knowledge on subjects hitherto unknown. The basic knowledge acquired by the scientist is applied by the technologist for practical purposes. The needs of technologists and scientists are common in that they both wish to resolve a problem. The scientist needs to elucidate basic phenomena whereas the technologist uses this elucidation in practice.

Therefore a scientist needs to have all the background information that might be available and which may be of relevance in achieving a solution to his specific problem. Library facilities must be in a position to provide such information. This information will come in various forms:

(a) Textbooks

Textbooks introduce the reader to basic collated information on a particular subject. They are often simplified and omit many details. The collation itself takes time particularly in fields which are intensively researched into. Textbooks are therefore often somewhat outdated as they are published. They are behind the front line of information. They are, however, invaluable in providing the background required by scientists.

(b) Periodicals

The frequency of appearance of periodicals is subject to much variation. The less frequent the appearance of the periodical the more out-of-date it would generally be. For example, the annual reviews on such subjects as Plant Physiology, Applied Entomology, Biochemistry, etc., collate information on selected subjects considered to be of importance at a particular time. Other periodicals do not attempt collation but merely report recent research. In the case of annual reviews although they are less outdated than textbooks, they are nevertheless at least 2 years old at the time of publication. First-hand information is therefore required in the form of periodicals more frequently published than annually. Even in monthly periodicals, the information may be about one year old at the time of publication.

(c) Reprints

A scientist requires reprints of his own, of some articles which are of special interest so that he could

refer to them whenever he so desires. This is particularly true of articles where there are many experimental details or tables which cannot be remembered or easily copied. The acquisition of reprints is sometimes somewhat difficult as large numbers of reprints of any article, particularly of the older ones, are not always available. He therefore has to resort to photo-copying, a service that is vitally necessary. When articles needed for continuous reference are voluminous, photo-copying may be prohibitively expensive. He would therefore need to resort to microfilming such articles.

(d) Abstracts

In order to cater to scientists interested in fields in which large numbers of papers are published there are many abstracting facilities such as the Biological or Chemical Abstracts. These are expensive publications and are not within financial reach of many of our libraries. It is necessary therefore that these be made available to scientists if they are not available in their libraries.

(e) Thesis

A thesis differs from a normal research publication in that it represents a concentrated effort on the part of a young researcher working on a particular subject for up to five years.

Usually, extracts from theses are published in appropriate journals. Theses are voluminous and are not normally published in their entirety. They are usually available in the libraries of the University which awards the degree. As only a very few copies of a thesis are produced it is necessary to have a complete list of theses and where they are available, so that scientists could have access to them.

(f) Personal contact

Scientists require personal contact with other scientists in order to exchange information and in order to short circuit the delays which are necessarily encountered in the process of publication. A scientist would therefore need to know who is working on projects further to what he is interested in.

Having obtained the background information from publications and other sources a scientist will now develop and consolidate his ideas. He will need to fit his ideas into a hypothesis congenial with all the known facts. This is the objective of scientific experimentation.

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Let us assume that the experimentation has been successful and that positive results have been obtained. These results will have to be evaluated in the light of his own and other people's criticisms. Here again, he has to recourse to the literature in order to present his results together with a logical discussion in the paper that he may be preparing for publication.

Finally, he has to make his results available in a published form and will need to present his paper to publishers, or orally to learned societies, with appropriate photographs, drawings and graphs of his own and perhaps reproductions from other people's work. He may need photographic reproductions or photostat copies of material from elsewhere. He would also need to conform to the requirements of a specific journal in which he intends to publish his paper, and would need recourse to such documents as the World List of Periodicals.

So far, I have been referring to scientific research and its application to technology in a general sense. In general, it would be correct to say that the needs of scientists everywhere are common. Science recognizes no national barriers and science is independent of the variations inherent in different human societies.

A doctor in any country would like to know the cause of cancer and an engineer in any country would like to know the latest development in solar heating. However, a doctor in Sweden may be less interested in Malaria control than a doctor in the tropics. There is therefore a difference in the type of research conducted in different countries and our country is no exception. For instance, in agriculture our major research institutions work on rice, tea, rubber, coconut, etc., whereas agricultural scientists in many countries would do no research at all on these crops. I will briefly attempt to list the types of scientific research which are undertaken in our country although this is perhaps already well known to you.

(a) Medical Research

Substantial research is done in this country on preventive and curative medicine. Our doctors work under extremely difficult conditions where equipment, drugs and medical facilities particularly in research institutions are in short supply. There has been much interest in indigenous forms of medicine with great emphasis on medicinal plants which are locally available and for the use of which there appears to be great potential.

(b) Agriculture

Hundreds of crops are grown in this country but only a few are backed up with adequate scientific research. Research is at present in progress on our major agricultural import rice and our major exports tea, rubber and coconut. In addition there is substantial research

on cereals, root crops, tree species, spices, beverages, etc. Considerable effort is being expended on essential oil crops, sugar cane and medicinal plants.

(c) Horticulture

In Sri Lanka, we are able to grow over 50 different kinds of edible fruits and many vegetable species. Only a very few of them are backed up with adequate research. We have good possibilities of floriculture, particularly in the export market. I need only mention the example of a small country like Singapore which exports orchids and other horticultural plants.

(d) Veterinary Research

Considerable research is being done on pasture and fodder grass production and the improvement of our breeds of livestock. We have had a chronic shortage of milk foods over several years and unless we can improve livestock this shortage is likely to continue.

(e) Physical and Chemical Sciences and Industrial Technology

In order to improve our industries, it is necessary that industrial ventures receive substantial backing from Government and the scientific community. Some of our industries are merely transplants of foreign technology. Such industries which are heavily dependent on foreign exchange are the first to suffer when foreign resources become curtailed. Other industrialists utilise local raw material with only a small imported component. These industries need a lot of research in order to make the best use of our local raw materials. Very little information is available on the nature of many of our raw materials and their suitability in industry. Much attention is being focussed by many of our scientists on this subject and the more information we have on local raw materials the more viable and useful our industries are going to be.

Industrialists would naturally like to make their industries more efficient but they may not be able to do so without scientific and technical backing. They may however have accumulated a lot of technical information regarding their industries. This pool of information might well be tapped and brought within reach of scientists who might sift it further and find something new and thereby contribute much to these industries. There are other industries where our raw materials are being exported. Here again, everybody is keen that our raw materials should be exported in a processed or semi-processed form and not directly as crude products. Information on these lines would be greatly helpful to our scientists.

In industrial research, much of the science is known and it is largely a question of applying suitable technology. We are not a technologically advanced country but it will be possible for us to develop our

own technology further, particularly where raw materials are locally available. In technologically advanced countries, machines replace human beings. What we require are technologies which could utilize our ample human resources rather than be dependent heavily on machinery.

(f) Engineering

The engineering services in this country need a vast amount of technological information to support it. We have made vast progress in irrigation works and the construction of hydroelectric power schemes, etc. Basic knowledge is known but we need technological backing to make the best use of our engineers.

(g) Economic research

Economics abuts all branches of science and technology and it is necessary that information on economic factors be made available to scientists and technologists. Sometimes scientific innovations and technological achievements cannot be made use of because of economic or social factors. The social sciences and economics are important aspects of science and information in these branches of science is always useful to all the other branches of science.

(h) Statistics

Statistical information is often required by our scientists and more so by our technologists. Some attempt at collation of the information is contained in the numerous annual reports of various institutions in Sri Lanka with the objective of making the statistics contained in these reports easily traceable and assimilable by our scientists and technologists.

Research in other countries

It is very necessary that our scientists be aware of the research work going on in other countries. Some of this research is beyond the capacity of this country to indulge in, for example, nuclear research. Nevertheless, there are many branches of science in other countries where their research will be of use to us, if it is suitably adapted to our conditions. The pure forms of research of a more academic or fundamental nature will normally have less relevance to us than the applied or more practical forms, because the benefits can be obtained quicker. Our scientists would like to know who is working in their fields in other countries and would like their research findings made available to them. It is useful to remember that **research done in tropical countries is of great relevance to us**, very much more so than the research, however advanced, that is done in the temperate countries. Our conditions are very similar to those in other tropical countries, particularly in **South and South**

East Asia and we should attempt to come closer to such countries. All of them are poor like ourselves. We can expect to benefit from their research and they from ours.

This brings us to an important consideration and that is the subject of language. Research done in Japan, China, Indonesia, and other countries in our region are slow in coming to us because of the language barrier. Translation services are therefore an important need for all scientists in order to obtain information that is very vital to them. Traditionally, our scientists have been studying French and German as foreign languages in addition to English. In order to benefit from research in tropical countries more languages may have to be studied, but as you can see this poses a problem in itself. If libraries can therefore obtain **translations of scientific literature in foreign languages in an abstracted form** and make these available to our scientists it would be extremely helpful.

In Sri Lanka there are extremely few scientists, the reasons are many, but one of the most important is that we do not seem to produce enough scientists. When scientists are in short supply, the best use must be made of them. This could be achieved by bringing them together whenever possible and providing them with their research needs so that they do not spend much of their time searching their requirements. As far as you are concerned these needs centre on information. If you, were to know who our scientists are, where they work, what work they do, what their objectives are and what success they have achieved, then you may be able to help them save their time and not duplicate work that has already been done or is being done elsewhere. Our small number of scientists must be in communication with one another. This is not too difficult to achieve if we were to have appropriate directories and if these directories are maintained up-to-date.

This applies not only to personnel themselves but also to apparatus and equipment, which is extremely hard to come by and if expensive very difficult to obtain. If our libraries in each research institution were to have lists of expensive equipment which is often maintained by trained personnel, then each institution may help another institution to get its work done quicker. The same is true of library facilities. If up-to-date inventories of library material are available, then scientists would have easy access to such information.

It would always help if librarians were to find out the meaning, the significance and the potential impact their work would have on the well-being of the people of this country. This would encourage them to assist the user further and perhaps inspire them to provide a better, more efficient and even more meaningful service to our scientists.