THE NEED OF A STANDARD TERMINOLOGY FOR CLASSIFICATION OF DIFFERENT TYPES OF RESEARCH

P. C. MAHALANOBIS, F.R.S.

There is urgent need of adopting a standard terminology for the classification of different types of research. Dr. W. C. F. Hessenberg has contributed a most useful and stimulating discussion on this subject in his article on "The Language of Research Policy" in the *New Scientist* of 6 December 1962. He points out that there is much vagueness about the meaning of such words as *pure, fundamental, basic, background, objective* or *applied* research. "It is not unusual for a piece of research that a university man would call applied to be described as basic or fundamental by some one working in industry." He mentions that in two important recent British reports on national research policy (by the Gibb-Zuckerman Committee on the Management and Control of Research and Development in Government Laboratories and by the Federation of British Industries) the above words are used in a different way. Hessenberg suggests the use of two other words, *scientific* and *technological* :—

> "There is undoubtedly a major distinction to be made between research whose purpose is to increase our knowledge and understanding of the world we live in and research that is done to find new and better ways of doing the things we want to do. With the one we try to discover the laws of nature; with the other we look for ways of exploiting or circumventing them. Though the two activities often overlap, that does not prevent us from identifying them as quite distinct fields of endeavour. The words scientific (Lat. *scientia* = knowledge) and technological (Gr. *tekhne* = skill) respectively seem to be the appropriate adjectives for them." (p. 567)

2. Hessenberg also uses two other key words, namely, *pioneering* and *marginal*, in respect of research.

> "Research may also be described as *marginal* when it aims to achieve its purpose by successive small advances from a well established position. In scientific research it may take the form of the steady accumulation of new facts or the further refinement of a theory. In technological research it may mean the gradual pushing up of temperature, pressure or speed in some process, or a marginal improvement in the properties or performance of a product.
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> "By contrast, there is research that ranges a long way forward and if successful breaks into quite new ground. Semi-conductor theory, genetic code cracking, liquid and gas chromatography are examples from scientific research. Fibre reinforced plastics, oxygen steel-making and the hovercraft are examples from technological research. Because it attempts to break fresh ground, such research may be appropriately called *pioneering*." (p. 567)

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3. Hessenberg points out that what he calls marginal research is by no means without value and is often the only way to make any advance, and that "all but the newest industrial processes have been subjected to a period of gradual improvement by deliberate experiment and modification or by the steady acquisition of skill in carrying them out." Marginal scientific research has also been of the greatest importance in the advancement of science.

4. The distinction made by Hessenberg between *pioneering* and *marginal* research is useful. There may be, however, some advantages in substituting the word *incremental* for *marginal*, as the word incremental may convey more effectively the idea of a step by step advance.

5. It may be also useful to add a third word, *survey*, as an addition to *scientific* and *technological* research. The surveys carried out by the Discovery supplied Charles Darwin with much material for his pioneering scientific advance in the theory of evolution. Recent surveys by space satelites are of a pioneering type. Systematic collection of observations is also proceeding on an increasing scale in many fields which may be called surveys of an incremental type. Surveys are of great importance in earth and field sciences, and are of great value in other fields of science and technology, particularly in an underdeveloped country like India.

6. For reasons explained above, it may be advisable to adopt the following terminology for general adoption in India.

Scientific research, the purpose of which is to extend the knowledge and understanding of nature.

Technological research, which seeks to find new and better ways of doing things with the help of the knowledge of nature gained by scientific research.

Surveys, which seek to collect new facts and observations either in a pioneering or a preliminary way or in a systematic and planned manner.

7. Each of these three kinds of research (*scientific*, *technological*, and *surveys*) may be sub-divided into two types :

pioneering, which attempts a break-through to new ground or in the way of a new method; and

incremental, for step by step advance by experimentation, or by collection of facts and observations in a systematic way.

8. It is also possible to add a dimensional or size factor by using a descriptive phrase, *small scale*, *medium scale*, or *large scale* (or a number of size grades) on the basis of an agreed scale depending on the number of persons engaged in the project.

9. There would be no doubt often overlap between the different types of research, but in many or most cases it should be possible to use the six-category terminology given above to classify each project or endeavour by its dominant type.