Brain drain and information packaging—lessons from the British experience

In many ways science in Britain under Margaret Thatcher's government shares the same concerns and problems as science in India. However, there are differences in the responses evoked by these concerns in the two societies.

For one, brain drain in Britain has attained such acute proportions that many leading British scientists believe that unless remedial action is taken immediately British science and British industry will slide further and continue to lose their competitive edge. The president of an American university is on record that Britain, with her 'many big brains on small salaries', is a happy hunting ground for American universities and research laboratories recruiting scientists and engineers. Unlike in India, where the bulk of the exodus to the United States is made up of students going on doctoral and postdoctoral fellowships, in Britain it is the established researchers—professors, lecturers and scientists in the civil service—who desert their home country to take up permanent jobs in the US and western Europe. A recent study has shown that it is the more productive and better-cited British scientists who leave the country. All this is well known. What is significant is that, unlike in India, where we do not seem to have a clear idea as to whether the large-scale migration of talented young scientists and engineers constitutes a 'brain drain' or a 'brain bank'-which can be tapped by us through programmes such as TOKTEN (transfer of knowhow through expatriate nationals) and TIES (talented Indian engineers and scientists) and through special schemes of giving incentives to non-resident Indians to establish high-tech industries in India—, in Britain the implications of brain drain seem to have been better understood. In a welcome move, over 1600 expatriate British scientists—some of them Nobel laureates, and most of them working in the United States and the rest in Europe—have signed a petition urging the British government to invest more on science and technology and to improve working conditions in British science. And four of them came all the way to London at their own expense to present the petition in person at 10 Downing Street on 7 February 1990. The event was covered by almost all the leading British dailies.

Another area where India can do well to imitate Britain pertains to provision of information, an area in which Britain excels. The way the British government acted, when confronted with a challenge in the area of materials information, is indeed commendable.

Introduction of new materials and processes has until recently been concentrated in the aerospace, defence and electronics sectors of the manufacturing industry. In Britain it was noticed that many of the advances made in these high-tech industries were either not picked up by other sectors at all or they were picked up rather slowly. The Department of Trade and Industry in the United Kingdom commissioned a private consultancy firm to prepare a report on the development and use of new materials in the UK. The firm approached more than 4000 companies and interviewed representatives of 612 companies over the telephone. About 70 companies gave more detailed face-to-face interviews.

For the purpose of the report, new materials were defined as materials developed recently, materials known already but with improved properties and materials known already but used in new applications. Similar broad definitions were adopted for new processes as well.

The British study revealed that most of the firms interviewed were not using recently developed materials and processes. The study found that it was not due to lack of support to R&D, but due to reluctance on the part of design engineers to try new materials, constraints on investments and lack of skills. A detailed analysis revealed that design engineers were not well informed about the basic properties of the new materials and they had insufficient knowledge of performance data for materials in particular applications. Although lack of collaborative efforts, especially between industries and universities, and the less than optimal use made by industry of expertise available in the universities were also some of the reasons for the low levels of adoption of new materials in British industries. The report felt that the key blocking element was the low level of information awareness of design engineers. What was more, in some cases where the engineers opted to go in for new materials, the high level management was unwilling to go along. The report did not mince words: 'Many non-technical (and often technical) senior managers are unaware of the commercial benefits to be gained through the exploitation of new materials; or indeed, of the potential threat to their business if competing companies make use of them first. In addition, UK industry as a whole is characterized by a short-term view of investment and distinctive risk averse practices. Clearly, these cultural attitudes are incompatible with features of materials innovation.'

The report was submitted in July 1989. And the Department of Trade and Industry went into swift action. Concerned that designers should make the most of new materials, DTI initiated a three-year 'Materials matter' campaign. Under this campaign, DTI provides practical information and advice to British manufacturers about modern materials and their processing methods. The programme consists of booklets, videos, a demonstration unit and company visits.

Several videos are available on loan; these include *Materials matter: an overview*, *Composites*, *Ceramics*, *Surface technologies*, *Polymers*, *New metals technology*, *Near-net shape forming*, and *Cutting and joining*.

A travelling unit presents multimedia programmes lasting for two-and-a-half hours at selected venues to show the importance of integrating materials selection and processing with product design. Also included in these mobile units are hands-on demonstration of materials databases on computers and an exhibition of products incorporating modern materials technology.

In one of its early successes, the DTI initiative resulted in the development of a new glass–ceramic material, Kertalloy, for use in heat-resistant applications in the aerospace, automobile and domestic appliances industries.

The efforts of DTI are matched by equally significant efforts by several other agencies who have developed on-line services and software packages to bring computer-aided materials selection within the reach of designers.

The Engineering Information Company provides the Matus Materials User Service, an on-line materials selection databank giving access to tradenames, suppliers, and properties of engineering materials. In this service, materials can be searched for by composition, application, supplier name or the required combination of properties. Continually updated to include new materials as they become commercially available, Matus is not biased to any particular class of materials. The system covers about 150 engineering properties and divides its materials into three groups: metals occupy 38% of the databank, polymers 43% and others including glass and ceramics 18%. Composites are listed under the category of their matrix material.

Peritus from Matsel Systems, Liverpool, covers more than 1300 materials and holds more than 60,000 materials and processing characteristics. Using this system, a user can compare the performance of different materials.

There is also an European Materials Information Service Network. Soon Information on this network can be accessed by even those who have no special skills or knowledge of computers and telecommunication. The network brings together many European databanks and services: Matus, Peritus and the Metals Data File from the UK; Infos (machining properties of metals), Solma (ferrous and non-ferrous metals for design of pressure vessels) and Polymat (plastics) from West Germany; HTM-DB (high-temperature materials) from the Netherlands; Cometa (metals) from Italy; and H-Data (interaction of metals with hydrogen), Cetim-Materiaux (properties of metals, plastics, composites, adhesives and lubricants) and Thermodata (thermodynamic properties of materials) from France.

Using a telephone connection and a computer terminal attached with appropriate models, one can access most of these services and get both textual information and graphic images.

Many materials-related information services such as RAPRA Technology's Plascams (for plastics information) and CDMS (compound data management system for rubber products) are searchable on IBM-compatible PCs.

British researchers and manufacturers interested in any of these services and several other databases can get more information from Materials Information Centre at the Design Council in London, which acts as a clearinghouse. Today, thanks to all these computerized services, access to materials information is truly at the fingertips of Britain's design engineers and researchers.

Faced with a need for reliable information on materials—be it ceramics, plastics, composites or process-related information—where can an Indian researcher or design engineer get it? Are organizations such as INSDOC, NISSAT, TIFAC and other information centres geared to such tasks? Looking from another angle, how many scientists and design engineers in India are looking for such information? Answers to these questions will determine how soon India will join the ranks of the scientifically advanced nations.

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Panjab University defends itself in Gupta affair

In a circular released by its vice-chancellor's office, Panjab University, Chandigarh, has countered allegations of tardiness in mounting an investigation into charges of fraud against Professor V. J. Gupta of the university's Centre of Advanced Study in Geology. Gupta has been charged with 'recycling' the same fossils in different scientific papers, giving vague and misleading information about the location of the reported fossil sites, and polluting the Himalayan palaeontology data base (see *Current Science*, **59**, 13).

Panjab University says in the circular that, unprepared as it was for the 'suddenness and vehemence' of the controversy, it wrote to the heads of seven national organizations, informing them of the dispute and conveying Gupta's offer of co-operation with any enquiry. The organizations were the University Grants Commission, the Indian Council of Medical Research (whose director-general heads an independent society for investigation of scientific fraud), the Indian National Science Academy, the Council of Scientific and Industrial Research, the Wadia Institute of Himalayan Geology, the Department of Science and Technology and the Geological Survey of India.

The Indian National Science Academy sent two respected geologists to Chandigarh to investigate the matter. The investigation concluded that an expedition under Gupta's leadership to the fossil localities was appropriate.

The university has announced plans for such an expedition, but says it can take place only in summer. It says that it is 'interested not in brushing the controversy under the carpet, but in arriving at the truth'.