Introduction

In recent years, there has been an increasing appreciation of the vital role of information in the national development of the country. The thought and attention given by the Department of Science and Technology towards evolving a national information system (NISSAT) and the planning for the setting up of the National Informatics Centre are clear evidences of this appreciation. While this is most welcome and certainly a step in the right direction, the task of designing, organising and operating a national information system is indeed challenging that calls for great ingenuity, imagination and expertise. The different type of specialised skills that are required for the development of a national information system, are not readily available in the country at present except in a rudimentary form. Manpower development, is therefore, an immediate task, on which lies the success of the programmes that are being chalked out presently in the country.

The National Plan for an Information System

The structure envisaged for a national information system comprises of a few coordinating national bodies at the apex, with a number of branch information centres, specialising in a specific field — discipline/mission/product oriented — and other local units devoting entirely to particular institutional activities. Thus the complete national information system will constitute a total network, interacting with each other and providing appropriate services at various focal points. The national information system is expected to meet the diverse requirements of planners, policy-makers and those that are involved at the implementation stages in the government, R&D personnel, business and industry, academicians, scientists, engineers, managers and others working at different positions and organisations. The institutions that will singly and collectively meet the demands are likely to be libraries, documentation/information centres, information analysis centres, data bases and banks, clearing houses, deposit centres, translation centres, etc. These organisations and their services will be backed up and supported by planned developments in computer and telecommunication networks and reprographic facilities.
Quality of Services to be Expected

The deployment of a sizeable financial outlay, manpower and time would naturally have to be geared up to meet adequately the pressures for information. The main pressures will be for the provision of more accessible, faster, more comprehensive and more standardized statistical information systems, coordinated on interdisciplinary and international bases. The systems will be required to operate Selective Dissemination of Information (SDI) services, carry out retrospective searches, and if required, process the data stored (for example, carry out statistical tests, compute correlations and carry out various other analysis). The need for complex techno-economic-social analyses will require the linking of some of the existing systems in science, technology, and the social sciences, with the statistical systems. Sub-systems will be required for planners at the local and regional levels.

Specialised data banks will increasingly be introduced in a wide variety of institutions and in support of different aims, not only for research and development, but also for production, marketing, and other service functions. Examples of such systems are those that are already serving pharmaceutical research, preventive medicine, crime prevention and detection, ionosphere and weather forecasting, insurance, patent and legal work, etc.

Required Manpower

Keeping in view all the demands that are very briefly sketched above, a wide variety of specialists are to be trained to constitute the manpower force for the national information systems. Taking into account the experience obtained thus far in our country and other countries wherein information systems have been well developed, the types of personnel required may be stated as follows: Information scientists, Librarians, Computer specialists, System analysts and Manager, Technical writers and editors, Translators, Reprographic specialists, Subject specialists with an orientation in information science.

Information Scientists includes senior professional personnel with high academic degrees, who will bear major responsibilities in the information systems.

Librarians with library science degrees responsible for building the libraries and organising services therein.

Computer specialists include personnel for the handling and operation of mechanised and automated processing equipment such as programming personnel, operating staff, computer service specialists and others directly involved in the maintenance of computers and auxiliary equipment.

Systems analysts and Managers are to be associated in situations where advanced data processing systems are maintained including coordinating automated data processing activities.

Technical writers and editors include specialists who could reprocess and repackage information suitable to different types of needs and also prepare technical reports and reviews.
Translators are language specialists skilled in translation work. Subject specialists who contribute to the different types of analysis of information required in an information analysis centres.

The categories of work for which these types of personnel are to employed are: 

1. Production and Operation; 
2. Design and Development; 
3. Applied Research; and 
4. Background Research.

The production and operation category will perhaps take the largest share of the total manpower required for production operation and maintenance of the information systems. Closer to this category, is the design and development personnel who will play a key role in all but the smallest operational units.

Applied research is required both to back-up the development and design effort and to provide the means of bringing the findings of the background research to the stage when these can be used in design. The applied research worker will need to comprehend the background research findings and analyse and synthesise these for the benefit of the design workers.

The background research, while fairly remote from the problems of day-to-day operation of information units, is required to provide the scientific basis for the development of new methods, and means in information science and technology. It will necessarily be closely linked with work in related fields, such as psychology, linguistics, communication studies and engineering science.

The quantitative requirement of manpower for the national information system will have to be assessed only after a full survey of the existing turnover of candidates available for information work and other related problems.

**Education and Training**

Education and training for information science are very basic to the proper development of manpower resource planning. What constitute information science has been a subject of debate throughout the world today. Generally speaking the field of activity of the information specialists may perhaps, be described operationally as that represented by, and in, such publications as the Annual review of information science and technology, Journal of documentation, Information storage and retrieval, Journal of the American Society for Information science and abstracting publications such as the Library and Information Science Abstracts, Information Science Abstracts (USA) and Referativnyi Zhurnal: Informatica together with areas in some neighbouring fields such as human communication, psychology, and linguistics. Very large areas of modern librarianship and areas in data processing are included in the field.

In this context, it would be worthwhile to draw attention to a useful publication of Herbert Schur, a member of the Faculty of the Post-graduate school of Librarianship and Information Science University of Sheffield. This work was a study of educational programmes for information specialists, done for the Organisation for Economic Co-operation and Development (OECD). The objectives were the construction of sample curricula for information specialists as well as the identification of gaps in existing curricula. After an elaborate survey, the sample curricula constructed by Schur are identified in terms of the following three facts: category of work (operation, design and
development, applied research and background research); level of work (technical assistant, first professional, second professional and advanced professional); and branch of specialization (programme for information specialists to be concerned with substantially natural-language-based systems, programme for information specialists with symbol-, graph or similar-based systems, and "matching section" programmes for specialists in other fields for specialised information system work). Topics to be taught in each of the proposed curricula are grouped into the following six broad areas: generation and use of data bases; data bases and their characteristics; organisation and dissemination of data; information storage and retrieval systems; theoretical and technical tools; and special topics e.g. advanced computer programming and organisation. More specific topics are listed under each of the broad area. For example, under organisation and dissemination of data, the following more specific topics are listed; data acquisition, description, compression; taxonomies, classification of data, indexes and indexing; file structures and organisation for retrieval; data transmission, communication, dissemination. This report provides a useful framework for describing the work performed by different types of information specialists and also a offers a specimen curricula for various types of information specialists.

Existing Manpower Resources in India

Of the different types of personnel required for manning the national information system, one segment viz., supply of librarians, has been fairly well taken care of, thanks to Dr. S. R. Ranganathan who laid the firm foundations for education for librarianship. There are forty universities in India today offering courses in library science at the first professional degree level and ten are offering courses at Master’s degree level. Some of these universities have provisions for research, leading to doctor of philosophy. Besides a few state library associations conduct courses at semi-professional levels and a few polytechnics for women train girls in library science at undergraduate levels. The annual turnover approximately works out to 1250 professionals and semiprofessionals.

Training for documentation/information commenced with the establishment of the Documentation Research and Training Centre (DRTC) at Bangalore in 1962 under the auspices of the Indian Statistical Institute, again a contribution of Dr. Ranganathan. In 1964 the Indian National Scientific Documentation Centre (INSDOC) started the training course in documentation and reprography. These two institutions turnover on an average about twenty students every year. These two courses have kept the country's requirements constantly in view in framing the syllabi and compare very favourably with any international course. Research organisations, public undertakings, academic and technological institutions have taken advantage of these courses. Besides the training facilities, DRTC have been engaged in basic and applied research making significant contributions to the field. Most of the university library schools have provided a paper in documentation at their master degree level courses.

Although there are no computer course specifically oriented towards information, the Indian institutes of technology have been offering computer courses which have been utilised by quite a few librarians and documentalists, for information and library work.

Some of the management training institutes in the country have been conducting short term course in systems analysis and management information systems.
For the training of scientific and technical translators Insdoc was conducting a full time course for four years beginning from 1964, for Russian language. This has been suspended temporarily. Some of the foreign language departments of universities provide training in technical translation. The Indian Scientific Translators Association have programmes for instituting full time courses for technical translation in different languages.

There are no courses in reprography for technicians. Insdoc's training course offers a full paper in reprography. A paper in technical writing has also been introduced since 1974 in this course, a formal training in technical writing being offered for the first time in the country. The expertise available at the Publications and Information Directorate of the CSIR and the Indian Standards Institution has been made use of, for this purpose.

Short Term Courses

Short term programmes in information services extending over two to three weeks have been organized by the Small Industries Extension and Training Institute (SLET) for the last two years. The Department of Science and Technology have sponsored a crash programme for grafting scientists and engineers into information work and two eight-week courses have been jointly conducted by DRTC and Insdoc this year. These two courses have been very well received.

Future Requirements

Notwithstanding the efforts taken by the various institutions in the country in building up the manpower resources for information work, this touches only the fringe of the problem. While augmenting support for the existing institutions who supply the manpower now, every attempt should be made to attract the right type of persons into the profession. Unless there are good career opportunities available in the information field, it would be difficult to attract engineers, technologists and scientists into the field. It has been our experience that those working as engineers and scientists at different levels, who are inclined towards making a contribution to the information field, are not prepared to drift to information work, because the opportunities here are not as bright as in the other field. In this context, it may be mentioned that the recent decision of CSIR to put information scientists on a par with research scientists is a very healthy trend and would certainly go a long way to retain and attract the right type of people.

Apart from courses for turning out professionals in the information field, short term courses for computer specialist, systems analysts, subject specialists and others to get a proper perspective of the information field is necessary.

Conclusions

In the foregoing rather cursory account, an attempt has been made to highlight some of the problems relating to manpower development for information in the country. A more systematic qualitative and quantitative study and follow-up action for building up an information cadre are absolutely necessary as we develop an information system for the country.
References


Appendix I

Relation between information institutions, Types of personnel and Training

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