

DEVELOPMENT OF SCIENTIFIC INFORMATION RESOURCES AND SERVICES

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Abstract: S & T organizations are expected to take appropriate actions for developing information resources to support research and development activities. Libraries and information centres are created by these organizations to satisfy the information needs of its R & D personnel. A national plan should be drawn up to identify the strengths and weaknesses of the resources and needs of the scientific community and to formulate a national policy for development of information collections.

In the late 1960s, provision of scientific information was confined to a few special and university libraries which were available only to the institutional staff. Cooperation among the libraries was limited to personal contacts. Due to inadequate financial resources, lack of cooperation among the libraries, lack of a national collection development plan, lack of scientific library professionals, absence of national scientific documentation service, information development progress was slow.

The National Science Council of Ceylon (NSC), which was established in 1968, had a main responsibility to select and disseminate scientific and technical information. NSC set up the Sri Lanka Scientific and Technical Information Centre (SLSTIC) in 1977. SLSTIC contributed towards development of national science information infrastructure by creating a national network of scientific libraries; organizing resource sharing programmes; operating bureau services; conducting library education programmes; engaging in scientific documentation. SLSTIC had made a significant impact on library automation, library development, library education, bibliographical standardization, library research and library cooperation.

Keywords: Information centres, information policy, science information.

SCIENTIFIC INFORMATION

Information is widely recognized as a resource that should be captured, organized and developed with the objective of satisfying the current as well as the future needs of the users. Like other types of resources, a collection of information, which is stagnant and static is considered not worth retaining. Value of information depends not only on its accuracy, comprehensiveness and currency, but also on its extent of use. Development of information to make it a useful, easily accessible and readily available resource is hindered by the

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misconceptions associated with it. Many planners, policy makers, and administrators believe that information collections would grow naturally without professional intervention and that no special managerial skills or techniques are required to handle them. On the other hand, they undoubtedly accept the fact that research and development work cannot be performed effectively without appropriate information and that lack of such information would lead to delays, duplication and wastage.

Although philosophically and theoretically the impact on and the role of, information in development activities is accepted, it is rarely reflected in national plans, development programmes, performance evaluations and governance papers. In most instances, these policy and strategic documents hardly show any provision for planning and development of information resources. Low priority and attention given to information has led to the creation of obsolete, irrelevant, scattered and unutilized information resources which do not have any impact on the socio-economic development of the country.

In contrast to this situation, a rapidly developing country like Singapore, firmly accepts the importance of information resource development and the role that it should play in building the nation. The national development plan of Singapore clearly states "*...the future belongs to countries where people make most productive use of information, knowledge and technology..., knowledge and information will be the engines that drive the economy in the 21st century*".

The above mentioned facts are more relevant to science and technology. S&T organizations are expected to take appropriate actions for developing information resources to support research and development activities. Scientific information (including technical information), differs from other branches of information in the method of acquisition, analysis, organization and utilization.

These methods are guided by three special characteristics of scientific information, namely, objectiveness, authority and universality. It is important that planners and developers of scientific information systems take these characteristics into consideration. Scientific information is the objective information of the universe and its phenomena, generated by scientific method of inquiry and validated to conform to empirical observations of natural phenomena. Every new addition to the store of objective information is an extension to the existing information resources. New information will replace previous information and makes the knowledge based on such information obsolete. Hence scientific information resources should be updated regularly. Universality of information makes it adaptable and applicable throughout the world, disregarding its origin, language and form of presentation. Scientific information is not considered valid unless it is evaluated and accepted by the scientific community. Scientists are careful in guaranteeing the high standard

of scholarship and quality of work reported in scientific literature. Research results submitted by scientists for publication in scholarly journals are refereed by a panel of experts to ensure accuracy and quality. Any information resource which has been developed disregarding the above mentioned characteristics would not be accepted by scientific information users.

Scientific organizations that are engaged in R&D, develop information resources mainly to support their own activities. Libraries and information centres are created by these organizations to satisfy the information needs of R&D personnel. It is practically impossible for any organization to develop information systems to satisfy all its information needs using only its own resources. Hence, it is necessary to establish links with external organizations so that their information resources too could be accessed. The Information resources scattered throughout the country could be put to optimum use of the scientific community by linking them to a national system. A national plan should be drawn up to identify the strengths and weaknesses of the resources and needs of the scientific community and to formulate a policy for developing information collections.

Foreseeing the need of a national plan for the development of scientific information resources and services, the Government of Sri Lanka in 1967 sought assistance of UNESCO to design a national information system.

SCIENTIFIC INFORMATION PROVISION IN 1960s

In the late 1960s, at the time the National Science Council (NSC) was established, provision of scientific information was confined to a few special and university libraries. These libraries were operating on individual basis without being concerned with the services and needs of the other libraries. Coordination among the libraries was restricted to personal contacts of librarians. This led to creation of specialized and small collections of scientific literature which were available, accessible and known to the scientists attached to the institution concerned.

There were only a few scientific libraries in the country. Department of Agriculture had a central library with over 50,000 monographs and 2000 journals, at the Central Agricultural Research Institute (CARI) in Gannoruwa to serve an island-wide network of agricultural research centres. Like other libraries in the country, due to financial constraints, the CARI library encountered difficulties in acquiring current literature. Acquisition of journals was confined to exchanges. The services of the library were available only to the departmental staff. The library had no extension service to serve the outstation staff in the agricultural sector. The crop research institutes had libraries which catered to their own needs. The oldest and biggest was the Library attached to

the Tea Research Institute (TRI) in Talawakelle which had 20000 monographs in its collection. Being isolated in location and specialized in collection, TRI had given special attention to develop its library. Coconut and Rubber Research Institutes too had well-organized libraries with specialized collections. There was an unwritten agreement among the crop research libraries for the exchange of material and for inter-library lending. The technical library attached to the Ceylon Institute of Scientific & Industrial Research (CISIR) had a collection of over 20000 monographs. This was the largest science library in Colombo and it was the only reliable source of information accessible to the scientists attached to institutions which had no organized libraries. The library covered a wide range of scientific and technical subjects, possessed a strong collection of reference material and was open to external users as well. These characteristics of the library prompted scientists to consider the CISIR library as the main source of scientific information. In fact, it was the de facto national science library of the country. In the university sector, the University of Ceylon had a network of campus and faculty libraries with fairly large collections of scientific literature. The Universities of Vidyodaya and Vidyalankara had relatively small collections of scientific literature. Apart from the above mentioned, there were no more than 10 scientific libraries which had substantial collections. The British Council and the United States Information Service (USIS) operated libraries in Colombo and Kandy, which were mainly catering to the needs of the general public and students.

Scientific information provision in Sri Lanka was confined to a few institutional collections, which were available only to the institutional staff. Cooperation among the libraries was limited to personal contacts. Analysis of above scenario reveals that the inefficient and ineffective provision of scientific information in late 1960s could be attributed to five main problems:

- a) *inadequate financial resources*: Total annual budget allocated for the purchase of books and journals by scientific libraries was below US \$ 250000. Libraries were given low priority in budget allocations. Often library funds were transferred to other headings to offset unexpected expenditure. This practice adversely affected the collection development work of libraries.
- b) *lack of cooperation among the libraries*: Scientific libraries were operating individually attempting to become self sufficient in information. This is an impossible task even for a library with rich financial and human resources. No national plan for library cooperation existed for sharing and exchange of library resources. As photocopying facilities were not available in most libraries, inter-library lending which was operated on personal contacts was the only possible resource sharing activity.

- c) *lack of a national collection development plan*: scientific libraries developed their collections without taking national requirements into consideration. As a result of this, the national collection had gaps and there was duplication. Resources available to the libraries could have been utilized rationally if there had been consensus in library acquisitions. There were several leading scientific organizations without organized libraries. A national programme for the development of information infrastructure would have immensely helped these organizations.
- d) *Lack of scientific library professionals*: Scientific librarianship was a specialized profession which required both professional skill and subject knowledge. Salaries and benefits offered to science librarians were not attractive to draw the best talent. Science libraries, except for a few, were managed by non-scientific personnel. They had not been able to compile analytical catalogues to provide specialized and personalized information services. A national programme to produce science librarians was not available.
- e) *Absence of a national scientific documentation service*: The National Library Services Board and the National Archives acquired books and serials published in the country under the legal deposit law. There had been no programme to collect unpublished documents. In provision of scientific information, gray literature or unpublished documents play an important role. It is recognized that technical reports, research papers, conference documents, etc. carry valuable and highly specialized information that are often not available in published sources. A national programme to collect and preserve unpublished scientific documents was not available.

Even the above problems had not been clearly identified, the government felt the need of improving the national scientific information system to support research and development activities of the country.

The first attempt to develop a national plan for scientific information was made in 1967. The Government of Sri Lanka (then Ceylon) through the Department of Foreign Aid requested UNESCO to provide the services of an expert to assist the government in developing a national plan. The expert was expected to conduct a survey of existing resources, design an information infrastructure to link the resources and identify the services that should be available to the scientists. He was further expected to draw up a project proposal to seek funds for implementing his recommendations. Mr L.E. Samarasinghe, a Sri Lankan information scientist attached to UNESCO, was assigned this task.

Samarasinghe submitted his report in March 1969. With the view of coordinating the existing scientific information resources and organizing a national programme for acquisition, exchange and dissemination of scientific literature, he recommended "... *measures be taken as early as possible to set up a national scientific and technical documentation centre which will, in spite of the name, function both as a documentation centre and as a national science library*". The functions of the centre were similar to those of the centres in the region such as India (INSDOC), Pakistan (PANSDOC), Iran (IRANDOC), Iraq (IRAQDOC) and Turkey (TURDOC). The proposed centre was named Ceylon National Scientific and Technical Documentation Centre (Ceynsdoc).

It was recommended to establish Ceynsdoc as an autonomous body under the National Science Council of Ceylon. The centre was to be managed by a director under a governing board appointed by NSC. The report did not clearly define the relationship between NSC and Ceynsdoc.

A project proposal seeking financial support for the establishment of Ceynsdoc was submitted to UNDP in October 1969. This was withdrawn within a few months due to other national priorities.

UNISIST CONCEPT

The National Science Council of Ceylon, which was established in 1968, had a responsibility 'to select and disseminate information relating to scientific and technical matters and to publish reports, periodicals and papers on matters scientific and technical'. This did not give NSC the mandate to serve as the national scientific information provider. However, since NSC had the responsibility to promote scientific research, it undertook the responsibility of setting up a national science information system to support research activities.

In 1972, NSC revised the proposal to establish Ceynsdoc by dropping the idea of its functioning as the national science library. Two factors affected this decision. Firstly, the National Library Services Board was planning to set up a national library which would also cover science and technology. Secondly, it was argued that a virtual national science library could be created rather than physically building a central collection, by coordinating the existing collections of scientific literature. This proposal too was deferred by the Government as information provision received low priority.

UNESCO and the International Council of Scientific Unions, in 1974, launched a programme to improve global scientific information provision by facilitating speedy and systematic exchange and transfer of scientific information. This programme which was known as UNISIST, encouraged the member states to initiate national infrastructure comprising three components:

- a) NATIS: a national scientific and technical information network by linking scientific information resources in the country.
- b) STIC: a national scientific and technical information centre to serve as the coordination centre of the national network.
- c) UNISIST Committee: a national committee to advise STIC on NATIS activities.

UNESCO expected to link the national information infrastructures to create a global information system named UNISIST. UNESCO and ICSU organized conferences, workshops and training programmes to promote the UNISIST programme. Guidelines on various aspects of information provision were prepared.

In the light of the UNISIST concept, NSC revised the project proposal in 1976 and submitted it to the United Nations Development Programme (UNDP) seeking financial support. In the meantime in 1977, NSC set up the Sri Lanka Scientific and Technical Information Centre (SLSTIC) and appointed the Sri Lanka UNISIST Committee. UNDP accepted the project proposal in 1978.

SCIENTIFIC INFORMATION PROVISION BY SLSTIC

SLSTIC started functioning in May 1977 by operating services that could be organized with the available resources. When the UNDP project was started in 1978, these services were expanded and strengthened. The activities of SLSTIC that contributed towards development of national science information infrastructure are enumerated below under five main topics.

Networking

Creation of a national network of scientific libraries (NATIS) was the key task of SLSTIC. Main idea of the network was to integrate the resources of various libraries to provide more useful services to the scientific community. The network was formed at the first meeting of science librarians which was held on 28 June 1977. The network was designated the Sri Lanka Scientific and Technical Information Network (SLSTINET). 40 libraries were in SLSTINET in 1977. The membership increased gradually and by end of 1997 there were 120 member libraries. SLSTINET created a forum for science librarians to discuss common problems, formulate standards and draw up cooperative programmes.

When the membership grew, the necessity of dividing the general network into smaller groups to provide specialized and personalized information services arose. Libraries having common subject interest or libraries which served users who were interested in a particular subject, were grouped to form sub-networks. SLSTIC planned four sub-networks for agriculture, medicine, industry and

environment. Agricultural network (AGRINET) was formed in 1983. The medical network was named Health Literature Library and Information Service (HeLLIS) to serve as the Sri Lanka wing of the global health information network created by the World Health Organization. Environmental Library Network (ENLINET) was organized in 1991 by the Central Environmental Authority with the support of SLSTIC. Setting up of an information network for industry was delayed due to logistic problems. The strategy of NSC was to initiate the sub-networks and to assign coordination to an appropriate institution. A steering committee comprising the coordinators of sub-networks was appointed to ensure integrity of the national scientific information infrastructure.

Cooperative programmes

With the view of pooling the resources available in the network of libraries for providing better services to the scientific community, SLSTIC designed two types of joint programmes: a) cooperative databases b) cooperative acquisition plans.

Co-operative databases: Central catalogues were compiled by merging the catalogue entries supplied by the participating libraries on scientific documents available in their libraries. These databases were used for Inter library lending services, rationalization of acquisitions and creation of specialized collections. Two national catalogues were compiled:

UNICAST - union catalogue of scientific and technical books. (More than 40 libraries participated in this programme).

UNILIST - union list of scientific and technical serials. (About 30 libraries participated in this programme).

These catalogues directly affected acquisition policies of libraries and compelled them to consider national requirements too. Gaps and duplicates in the national collection were disclosed by the catalogues.

Cooperative acquisition plans (CAP): A scheme was drawn up by SLSTIC to rationalize acquisition of scientific material. The scheme was started with scientific and technical abstracting journals, as they were the most expensive information sources acquired by a science library. Purpose of CAP was to minimize duplication and use the saved money to purchase new material. 35 S & T abstracting journal titles were distributed among 20 science libraries.

Service Bureau

With the view of supporting the science libraries in their training and promotional services, SLSTIC organized bureau services. Using UNDP funds, it acquired a variety of modern equipment and created several systems to support bureau services. These included an AV pool, a microfilming bureau, a printing press, a computer centre and a photocopying network. AV equipment with technical staff were hired out to libraries. An integrated microfiche system was established to film, duplicate, enlarge and print. Printing of scientific publications was undertaken at the Printing Press. Photocopying machines were placed at leading science libraries to promote document supply services.

Personnel development

Noting that the library education programmes available in the country were inadequate to train science librarians, SLSTIC designed Special Educational and Training Programmes (STEP). Some topics of STEP included scientific journal management, scientific and technical information sources, Science Citation Index, and Renewable Energy Information Services.

Scientific documentation

A national repository of scientific documents was created to deposit scientific documents by Sri Lankans or generated in Sri Lanka or relating to Sri Lanka. An indexing service was organized to retrieve the documents in the repository.

IMPACT OF SLSTIC SERVICES

SLSTIC was established and run by NSC and its successor NARESA, to improve scientific information provision in the country. SLSTIC was expected to play several roles in serving the scientific community as: coordinating centre by pooling the resources of science libraries, referral centre by directing queries to appropriate sources; documentation centre by collecting, analysing and indexing scientific documents; service centre by providing a wide range of reprographic and AV services; information centre by answering scientists' queries using domestic and external sources; training centre by conducting workshops and seminars; science library by offering reader services on selected subjects; distribution centre for library software; national nodal point of global and regional international information networks.

No study has been done to evaluate the impact of SLSTIC on national information development. However, growth of activities and the response of the libraries indicated that SLSTIC had functioned as a change agent in the field of librarianship. Reviewing the history of librarianship in the past two decades, one

would observe that SLSTIC had played a key role in all important events associated with information development.

Main areas of activities of SLSTIC that had affected information development could be identified under five broad topics: library automation, library cooperation, library education, library development and library research.

Library automation

SLSTIC had served as the pioneer in library automation in Sri Lanka. It had installed the first computerized library system in the country and had compiled the first bibliographic database. With the view of motivating other libraries in automation, SLSTIC selected cooperative programmes for computerization. This facilitated library personnel of other libraries to familiarize themselves with computer applications.

Library automation work of SLSTIC prompted UNESCO to designate SLSTIC as the national distributing agency of its library software. UNESCO software named 'micro CDS/ISIS' was popular among the libraries in the developing countries. SLSTIC promoted the software which was distributed free of charge by conducting training and consultation services. In addition to these, a simplified manual on CDS/ISIS in English and Sinhala, and an integrated library system were made available to assist libraries in using the software. The impact of SLSTIC on library automation is evident from the rapid growth of the CDS/ISIS-based computerized library systems in the country.

In 1996, with SAREC funds, SLSTIC established a Local Area Network (LAN) with 15 workstations. It was linked to Lanka Educational Academic and Research Network (LEARN) and to the Internet. These facilities allowed science libraries to communicate with SLSTIC by e-mail. A library can request a photocopy or an inter-library loan by e-mail and receive the photocopy by fax and search results by e-mail. In the near future, it would be possible for SLSTIC to provide Internet dial-up links to science libraries. Web sites of local libraries were linked to NARESA home page providing easy access to local information sources. Plans were being drawn up to expand the NARESA LAN by linking the research institutes in the vicinity using fiber optic lines.

Library cooperation

Prior to the establishment of SLSTIC, cooperation among libraries took place on a personal basis. A librarian had to contact a colleague librarian personally to obtain a document or to arrange a service. SLSTIC by organizing library consortia, formalized library cooperation. Cooperative programmes such as union catalogues, central bibliographies, rationalized acquisition, enhanced inter library cooperation.

Library networks and cooperative programmes designed by SLSTIC had been used as models by other libraries. Network meetings created forums for librarians to discuss their problems, share experiences and demonstrate their systems. These meetings were used to formulate procedures, standards, and common guidelines. SLSTIC had been a meeting place for science librarians.

Library education

Science librarians needed a special training as they had to handle special material and special types of services. Since there was no suitable training in the country, SLSTIC had to design training programmes for this purpose. Since it had complete systems of photocopying, microfilming, printing, AV and computers, SLSTIC was recognized as a key training agency. Library professionals from both local and regional institutions visited SLSTIC to observe its activities. SLSTIC staff had to participate in external training programmes to share their experiences and knowledge.

Library development

Necessity of strengthening the local science libraries was recognized by SLSTIC. It served as a clearing house for foreign funds. Foreign donors who wished to support research libraries in collection development were happy to appoint NARESA/SLSTIC to distribute their grants. Most of the bureau services of SLSTIC were provided at cost or sometimes free of charge. Some equipment received from the UNDP project were donated to libraries to improve their services. SLSTIC staff provided consultation services to libraries in library automation, microforms, audio visuals etc.

Library Research

Information science has been identified by NARESA as one of the subject areas for research grants. SLSTIC with the advice of the Steering Committee on Scientific and Technical Information monitored the information research projects. Research grants had been awarded for conducting surveys of information sources, compiling bibliographies, creation of databases etc.

CONCLUSION

The scenario of scientific information provision underwent rapid changes during the past two decades. Introduction of new information media and services made the existing systems obsolete. Online services, multimedia databases, internet connectivity have changed the philosophy, ethics and standards of librarianship. The library personnel need re-training and library systems need re-engineering. SLSTIC should lead the science libraries in facing the challenges of information

and communication technologies without lagging behind. SLSTIC should recognize the needs of the changing information society, should assess the existing systems to identify their weaknesses and strengths, should evaluate applicability of new media and should redesign information systems to get the maximum benefits of the new information technology.

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Kumar N.S., Hewavitharanage P. & Adikaram N.K.B. (1998). Histology and fungal flora of shot-hole borer beetle (*Xyleborus fornicatus*) galleries in tea (*Camelia sinensis*). *Journal of the National Science Council of Sri Lanka* **26**(3): 195-207

(2) Corporate author

Scandinavian Society for Clinical Chemistry and Clinical Physiology Committee on Enzymes (1976). Recommended method for the determination of gamma-glutamyltransferase in blood. *Scandinavian Journal of Clinical & laboratory Investigation* 36:119-125.

Books and other monographs

(3) Chapter in book

Webber M.D. (1991). Resource recovery through unconventional uses of sludge. In: *Alternative uses for sewage sludge*. (Ed. J.E. Hall) pp. 343-358. Pergamon Press, Oxford.

(4) Agency publication

Geological Survey & Mines Bureau of Sri Lanka (1995). *Geology of the country around Battulu Oya & Puttalam*. Geological Survey & Mines Bureau, Colombo.

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