

## CHAPTER IX INDIAN STATISTICAL INSTITUTE

9.1 In early thirties, realising the necessity for advancement of theoretical and applied Statistics in India, the Indian Statistical Institute came into being with the pioneering initiative and efforts of Professor P.C. Mahalanobis. The Indian Statistical Institute was registered on 28 April, 1932 as a non-profit distributing learned society under the societies Registration Act 1860. From the beginning, the Institute started showing its excellence in its own way. As the Institute expanded its research, teaching, training and project activities it started earning national/international recognition. For its Substantial contribution to the quality of theoretical and applied statistical work, the Institute has been recognised as an "Institute of National Importance" by an Act of Parliament, known as "Indian Statistical Institute Act No.57 of 1959". The Act has conferred on the Institute the right to hold examinations and award degrees/diplomas in Statistics. Significantly, none other than Pandit Jawaharlal Nehru, the then Prime Minister himself piloted the Bill in the Parliament in 1959. As a result, degree courses leading to Bachelor of Statistics (B.Stat.) and Master of Statistics (M.Stat.) and post graduate diplomas in SQC & OR and Computer Science were started from June 1960. The Institute was also empowered to award Ph.D./D.Sc. Degree from the same year. Subsequently, Master of Technology courses in Computer Science and in Quality, Reliability & Operations Research were also started. Scope was further enlarged as the Institute was empowered to award degrees/diplomas in Statistics, Mathematics, Quantitative Economics, Computer Science and such other subjects related to Statistics by virtue of "Indian Statistical Institute (Amendment) Act, 1995, No.38 of 1995" by the Parliament effective from 18 September, 1995. Recognition of the Institute by Acts of Parliament, gave a greater encouragement to research activities not only in Statistics/ Mathematics but also in various branches of Natural and Social Sciences, Physics and Earth Sciences, Biological Sciences. Statistical Quality Control & Operations Research, Library and Information Sciences in a broader way.

9.2 Over the years, the Institute has been playing a key role in the development of statistical theory and methods in promoting research and practical applications in different areas of natural and social sciences. Sankhya - The Indian Journal of Statistics, being published by the Institute since 1933, is still considered as one of the leading Statistical journals of the world. Research in economics was greatly stimulated when in 1954 Prime Minister Jawaharlal Nehru entrusted the preparation of the draft Second Five-Year Plan of the country to Professor Mahalanobis and the Institute. The "Draft" submitted by Professor Mahalanobis and the planning models formulated by him in that connection have since been regarded as major contributions to economic planning in India. In the field of Computer Science, the Institute has a rich tradition. In 1953, a small analog computer was designed and built in the Institute. In 1956, the Institute acquired a HEC-2M machine from the UK which was the first digital computer in India. In early sixties, the Institute, in collaboration with the Jadavpur University, undertook the design, development and fabrication of a fully transistorised digital computer, called ISIJU-1 which was commissioned in 1966 by Shri M.C. Chagla, the then Minister of Education, Government of India. High quality research and development in the field of computer science is being carried out by the internationally acclaimed scientists of the Institute. The ISI also played a pioneering role in starting the Statistical Quality Control (SQC) movement in India by organising a visit of Professor W.A. Shewhart, the father of SQC, to India in 1948 and later by inviting other experts like W.E. Deming, Genichi Taguchi etc. for the same purpose. SQC promotional work of the Institute then gradually spread all over the industrial centres in India under a comprehensive programme covering education and training, applied research and consultancy services. Considering its meaningful contributions, over the years, Govt. of India has made ISI a permanent member of "Quality-Council" in August, 1998. With a view to developing innovative methodologies for collection and analysis of quality survey data, interacting and collaborating with organisations like NSSO, CSO, Planning Commission, RBI, etc., promoting the growth of inter-disciplinary research in statistics and data analysis in the Institute, and disseminating the methodologies (old and new) to the scientific, academic and research organisations, a Survey Research and Data Analysis Centre (SURDAC) has been established at the Institute in February 1997. Such a Centre would benefit the planning processes and national development of the country. In 1995, the Plan and policy Research Unit (PPRU) was established under the Planning Unit at Delhi Centre which has already undertaken several projects of national and international importance. Thus, the Institute has been maintaining a very high standard as a centre of excellence and earning national/international recognitions true to its tradition.

9.3 To provide funds to the Institute, Govt. of India constitutes a committee each year under section 8(1) of the Act to prepare a programme of work agreed to be undertaken by the Institute in the following year.

9.4 R. Bimal Jalan, Governor, RBI, Professor M.G.K. Menon and Professor S.B.Rao continued to act as Chairman, President and the Director of the Institute respectively during the year.

9.5 During the academic session 1999-2000, 9952 candidates applied for admission and were called for written selection tests for the various courses offered by the Institute, viz., B.Stat. (Hons.), M.Stat. (Math. and Stat. stream), M.S. in Quantitative Economics, M.Tech. in Computer Science, M.Tech. in Quality, Reliability and Operations Research, Two-year part-time Post-Graduate Diploma in SQC and OR(Chennai); Research Fellowships in Statistics, Mathematics, Economics, Computer & Communication Sciences, Theoretical Physics, and Applied Mathematics, Anthropology, Geology, Sociology, Psychometry, Biochemistry; Agricultural Sciences, Embryology and one year courses on Computer Programming and Application. Admission tests were conducted at 21 different Centres all over the country. A total of 7157 candidates finally appeared at the admission tests and a total of 517 candidates who qualified in the written tests were called for interview. Based on the performance in the written tests and the interview, 199 candidates were offered admission to various courses during the academic session under review. Encouraged by the recent amendment of the ISI Act 1995, the Institute started a M.S. Course on Quantitative Economics to meet some of the needs of the country for development of Human Resources and Research. The first batch of this course, MS(QE) graduated in July 1998. The annual examinations for all the regular courses were held in May/June 1999. The 1999-2000 academic session commenced on 2 July, 1999. One hundred and sixteen candidates received their degrees and diplomas at the Thirtythird Annual Convocation of the Indian Statistical Institute held on 2 February, 1999. 3 Research Fellows were awarded Ph.D. degree of the Indian Statistical Institute.

### Professional Examinations in Statistics

9.6 During the period, the Examination Committee of the Institute conducted professional examinations for the Junior Diploma in Statistics and Senior Diploma in Statistics which were held at Bangalore, Calcutta, Delhi, Mumbai, Hyderabad, Chennai, Lucknow twice in a year usually in the month of April/May and November/December respectively. The cumulative total number of students who have qualified for award of the Diplomas in professional examinations in statistics are 283. The Government of India recognise the Junior Diploma in Statistics as equivalent to a Bachelor's degree in Statistics while Senior Diploma in Statistics to a Master's Degree in Statistics.

### International Statistical Education Centre (ISEC)

9.7 The ISEC, which was opened in 1950, is operated jointly by the International Statistical Institute and the Indian Statistical Institute, under the auspices of the UNESCO and the Government of India. The Centre as an associated body of the Institute functions under a Joint Board of Directors. The Directors represent International Statistical Institute, Indian Statistical Institute and the Govt. of India. Professor P.C. Mahalanobis was the Chairman of the Board of Directors since its inception in 1950 until his death in 1972. Since then, National Professor C.R. Rao, F.R.S., has been the Chairman of the Board. The Centre provides training in Theoretical, Applied Statistics at the various levels for selected participants from the countries in the Middle-East, South and South-East Asia, the Far East and the Commonwealth countries in Africa, sponsored by respective Governments. Major training programme of the Centre is a 10-month regular course. In addition, special courses of varying durations are also organised. During the year the 10-month regular course (53rd term) commenced on 1st June, 1999 with 16 trainees from Sri Lanka, Maldives, Cambodia, Korea, Myanmar, Uganda, Ethiopia LAO PDR, Sudan and Zambia. One officer from Mangolia has undergone a special training course in Sample Surveys.

### RESEARCH WORK

9.8 The research activities of the Institute are grouped into the following Divisions : Theoretical Statistics and Mathematics; Applied Statistics; Physics and Earth Sciences; Computer and Communication Sciences; Biological Sciences; Social Sciences; Statistical Quality Control & Operations Research; and Library, Documentation & Information Sciences. In addition, the Computer & Statistical Services Centre (CSSC) has the responsibilities of the management of in-house computer system of the Institute and providing computing and statistical services to scientific workers.

### STATISTICAL QUALITY CONTROL AND OPERATIONS RESEARCH

9.9 The SQC and OR Division set up in 1953, now operates with 10 units located at Bangalore, Baroda, Calcutta (2 Units), Hyderabad, New Delhi, Mumbai, Coimbatore, Chennai, Pune. During the last four decades of its existence, the Division provided consultancy on the application of Quality Management system, concepts and tools to over one thousand establishments. These activities included designing and implementing ISO 9000 quality system to more than 60 organisations leading to certification and training over one million engineers/supervisors and operators in various aspects of quality related topics. Besides these, the division organised Indian and International conferences, pioneered large scale application of Design of experiments, conducted professional programmes like M.Tech. (SQC & OR), Post Graduate Diploma in SQC & OR, Part-time certificate course in SQC; carried out Quality Mission Programme aimed at imparting intensive training for trainers in the area of Quality Management application and training in industries and undertaken applied research and advancement of application knowledge and skill.

9.10 The SQC movement in India dates back to 1948 when Prof. Walter Shewhart, father of SQC, visited India at the invitation of Prof. P. C. Mahalanobis and conducted a large number of training programmes in industry and top management awareness programmes throughout India. Significantly ISI was made a permanent member of the "Quality Council" by Government of India in August, 1998. To commemorate the 50th anniversary of the movement, a national conference on "50 years of SQC & OR in India under the theme 'Business Competitiveness and Growth Through Quantitative Methods' was organised during August 06-08, 1998 at Chennai. The objectives of the conference was: (i) to review the development and application of SQC & OR in India since the visit of Prof. Walter Shewhart during November 1947- March 1948, (ii) to have a look at the current scenario in the development and application of SQC & OR in Indian Organisations, and (iii) to discuss the possibility of an interface between Industry & Academia and chart out future directions for the Division. Sixteen parallel technical sessions were arranged covering topics like Business process Improvement, Operations Research, Quality Management, Taguchi Methods among others. Significantly ISI was made a permanent member of the "Quality Council" by Govt. of India in August, 1998.

9.11 During the current period the Division is associated with more than 100 organisations including manufacturing organisations like HMT, BEML, TVS Suzuki, Hical Magnetics India Meeters Ltd., Bharat Heavy Electricals Ltd., Ashok Leyland Ltd., Satyam Computers, Shasun Chemicals & Drugs Ltd., Indian Natural Medical Products, Hydraulics Ltd., TVS Electronics Ltd., Hindustan Motors, Larsen & Toubro Ltd., RPG Cables Ltd., Gabriel Indian Ltd., Ordnance factory, Tata SSL Ltd., Whirlpool of India Ltd., GDP Hinoday Industries Ltd., CEAT Ltd., ITI, MICO, TAFE, WIPRO FLUID POWER, SPICER (INDIA), AUTOLIV, STUMPP, SCHUELE & SOMAPPA, IFB, RHW INDIA, HEWLETT PACKARD, BPL LIMITED, BHEL, RITES, HAL (Aircraft Division), KEC, Tumkur, KEC, (Unit V), Gabriel India Ltd., Triton Valves, Mysore, Tungabhadra Steel Products Ltd., Hospet, Aspect Development Pvt. Ltd., Tata Refractories Ltd., Steelco Gujarat Ltd., Asea Brown Boveri, Aspect Development (India) Ltd., Institute of Research in Wood Science, SRMT, Kakinada, Kinetic Engineering Ltd., Ahmednagar, Balmer-Lawrie, ICI Ltd., Coats of India, Larsen and Toubro, Tribeni Tissues, Kirlosker Electric, Motorela, ABB, HMV, Tata Tea, Mahindra & Mahindra Ltd. (Traeter Division), Reliance Industries Ltd., Tata SSL Limited, Godrej & Boyee Mfg. Co., DCL Polyester Ltd., Technova Imaging systems Ltd.,

9.12 Besides conducting the academic and professional programmes more than 100 training programmes in the area of quality management, ISO 9000 and QS 9000 and SQC, FMEA, APQP, DOE Quality in Design & Engineering, Statistical Techniques were organised for individual as well as for industry groups.

### LIBRARY, DOCUMENTATION AND INFORMATION SCIENCES DIVISION

9.13 The Institute maintains a central research Library at Calcutta with a holding of above 2 lakhs volumes of books and bound periodicals. It has a good collection of microfiches, microfilms and photofilms. It renders regular documentation service to the Institute Scientists. It has also a well equipped Reprography and Photography Unit with facilities for all modern copying arrangement. The unit provided 1,70,000 xerox prints, 38,120 offsets, 98 frames of scientific photographs and 771 prints of photographic enlargement for the users during the period.

9.14 The reading room of the Library has accommodation for about 200 readers. The services of the Library are extended to bonafide students, scholars and academic staff members of educational and scientific Institutions of the city and its neighbouring regions.

9.15 The Library maintains contacts with research Libraries of the country through inter-library loan transactions. The Library has also an excellent collection of rare and out of print books, official reports and data books of various governments and international agencies and Russian language publications. A separate collection of books and journals is being developed for a Regional Library for Eastern Zone as "NBHM collection" funded by National Board of Higher Mathematics, Dept. of Atomic Energy, Govt. of India. To provide information support and increase efficiency of library services, the Central Library at Calcutta has started the process of providing computerised library services. Projects undertaken by the library are : "Development of Computerised Catalogue in ISI Library Calcutta". National Board of Higher Mathematics, Department of Atomic Energy, Govt. of India has recognised Indian Statistical Institute, Delhi Centre Library as the Regional Library to serve the Northern Region since 1.4.1994.

### DOCUMENTATION RESEARCH AND TRAINING CENTRE (DRTC)

9.16 The Study of various methods of knowledge representation, such as semantic nets, frames and predicate calculus etc.; The application of the modern scientific management techniques to the planning and management of information system, centers and services; The Study of methodologies of information analysis and consolidation; The development of bibliometric and scientometric measures for evaluating the use of Library and information services and scientific output respectively; The preparation of guidelines and actual development of software and application packages for Library house keeping operations, such as, circulation control service and acquisition control; Manpower development programme in the Area of computer applications to Library and Information field.

9.17 DRTC also conducts a course of 24 months duration leading to the award "Associateship in Documentation and Information Science" under "Education and Training Programme" which is recognized by Government of India as equivalent to a Master's Degree in Library and Information Science.

### COMPUTER AND STATISTICAL SERVICES CENTRE (CSSC)

9.18 The Centre manages the central computing facility of the Institute at Calcutta. It serves about 500 users-students, research scholars and scientific workers - with the inhouse computer system VAX 8650 and SUN Enterprise 3000 server, Six SUN ULTRA 30 workstations, DEC Alpha 4100 server and IBM AS-400 server. BMDP, NAG, SPSS, IMSL, SHAZAM softwares are available on VAX 8650. SAS and MATLAB- Base, compiler, C/C++ Match Library have been acquired and installed on SUN E 3000 server. E-mail, Internet and Fax facilities of the Institute are maintained by the Centre. Statistical and computational consultancy services are also provided by CSSC. Installation of Campuswide Networking has been completed during the year. Four SUN Ultra-10 and two SUN ULTRA-60 workstations have been acquired and installed in different units. CSSC are actively involved in the implementation of accounting softwares at ISI. Training programme for the Administrative workers of the Institute has been organised CSSC during the year.

9.19 The staff members of CSSC also served as faculty in various courses of the Institute and guided projects carried out by students. They also conducted research in the areas of Database and knowledge bases, Image Processing, Computational geometry and Cryptology.

### PROJECT WORK

9.20 Apart from theoretical and experimental plan research, the Institute also undertook a variety of 50 externally funded projects from different Government and non-Government organisations like Dept. of Science and Technology (DST); Central Scientific and Industrial Research (CSIR), University Grants Commission (UGC), Defence Electronics Applications Laboratory (DEAL); National Information System for Science & Technology (NISSAT); Deptt. of Biotechnology (DBT), Govt. of India; Central Silk Board, Govt. of India; Defence Research Development Organisation (DRDO); Calcutta Metropolitan Development Authority (CMDA); Ministry of Environment and Forests, Govt. of India (aided by World Bank); Directorate General of Employment and Training, Ministry of Labour, Govt. of India; Dept. of Electronics, Govt. of India; Motorola India Electronics Ltd.; University of East Anglia, UK; International Rice Research Institute (IRRI), Philippines; United Nations Child Education Fund ( UNICEF); Calcutta Municipal Corporation; Gramophone Company of India (HMV); Ministry of Welfare, Govt. of India; Rabindra Bharati University; Paschim Banga Rajya Prathamik Siksha Unnayan Sanstha, Govt. of India; Hindustan Fertilizer Corporation Ltd.(HFCL) etc.

### SEMINARS, WORKSHOPS, CONFERENCES, SYMPOSIA ETC.

9.21 A number of Seminars, Workshops, Conferences, Symposia, Summer Schools, Winter Schools, Training Programmes etc. were organised by the Institute during the period at Calcutta, Delhi, Bangalore etc. with the participation of distinguished scientists from India and abroad.

### PUBLICATIONS

9.22 Founded and edited by Professor P.C. Mahalanobis in 1933, 'Sankhya', the Indian Journal of Statistics and the official organ of the Indian Statistical Institute is now published bi-monthly in two series - Sr. A on Probability and Mathematical Statistics, and Sr. B on Statistical Methodology and Applications including Sample Surveys and Quantitative Economics. Since its inception, eminent scholars all over the World have been contributing research articles for publication in Sankhya, one of the most prestigious and internationally renowned journal.

The following issues were published during the year :

Sankhya Sr.A : Volume 60, part 2 & 3 and Volume 61, Part 1.

Sankhya Sr.B : Volume 60, part 1, 2 and 3.

### SCIENTIFIC ASSIGNMENTS ABROAD

9.23 About fifty scientists of the Institute visited a number of foreign countries either on invitation or under cultural exchange programme to attend International Seminars and Conferences. Most of them presented scientific papers and delivered lectures in those Seminars and Conferences. Countries visited by ISI faculty members were USA, UK, Hungary, Japan, Italy, France, Canada, Australia, Germany, Finland, Iran, Turkey, Thailand, Bangladesh, Indonesia, Tokyo, Sweden, South Africa, Hong Kong, Geneva, Slovenia, Singapore, Kuwait, Netherlands, Brazil, Poland, Philippines, Paris, Mexico, etc.

### VISITING SCIENTISTS

9.24 About fifty distinguished scientists from USA, UK, Italy, Canada, Japan, China, Belgium, Israel, France, Philippines etc. visited the Institute to attend various Workshops, Conferences, Seminars etc. and also to participate in the research, teaching, training and other scientific activities of the Institute. Several scientists from Indian Academic Institutions also visited the Institute in connection with the same.

### RECOGNITION TO ISI SCIENTISTS

9.25 In appreciation and recognition of the high standards of research and scientific excellence maintained by the researchers of the Institute, several faculty members received laurels in the forms of Awards, Fellowship from Institute/organisation of national and international importance like CSIR, NASA, IEEE, INSA, IAPRS, FNAE, etc. As usual, several faculty members served as visiting scientist, honorary professor, visiting professor, C.V. Raman Professor of INSA, Visiting Professor in the Purdue University, USA, University of Washington, USA; Institute of La Ricerca Di Base, Italy; Indian Council of Social Sciences Research (ICSSR); Indian National Science Academy etc. Besides, many faculty members were invited by national and international Institute/bodies to act as Chairman, member, chief editor, editor for their several committees/editorial boards etc.