

**CHAPTER VII**  
**INDIAN STATISTICAL INSTITUTE**

- 7.1 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<sup>th</sup> 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 postgraduate 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 and 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<sup>th</sup> 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.
- 7.2 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 ISIU-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 November, 1947 and later by inviting other experts like W.E. Deming, Dr. Ellis R Ott, Dr. H.C. Tippet and Genichi Taguchi 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.
- 7.3 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.
- 7.4 Dr. 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. Prof. K.B. Sinha Distinguished scientist has taken over charges from Prof. S.B. Rao as director of ISI w.e.f. August 01, 2000.

7.5 During the academic session 2000-2001, 9160 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, Demography, Geology, Sociology, Psychometry, Biochemistry; Agricultural Sciences, Embryology and one year part time course in Statistical Methods and Applications. Admission tests were conducted at 24 different Centres all over the country. A total of 6997 candidates finally appeared at the admission tests and a total of 482 candidates who qualified in the written tests were called for interview. Based on the performance in the written tests, the interview and the academic record, 221 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 in the year 1996 to meet some of the needs of the country for development of Human Resources and Research. The Institute also introduced a new course on B. Math. (Hons.) This year in it's Bangalore Centre. The annual examinations for all the regular courses were held in May/June, 2000. The 2000-2001 academic session commenced on 1<sup>st</sup> August, 2000. The Division has undertaken a project to develop multimedia based course material for an introductory course in Statistics at the 10+2 level. The Multimedia Laboratory was set up in 1999. The first of five proposed modules was developed during the previous academic session. The second and third modules would be completed during 2000-2001. Several students from ISI and other Institution/Universities received training in the Multimedia Laboratory.

#### Professional Examinations in Statistics

7.6 During the period, the Examination Committee of the Institute conducted professional examinations for the Junior Diploma in Statistics, which were held at Bangalore, Calcutta, Delhi, Mumbai, Hyderabad, and Chennai 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 285. 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)

7.7 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 (54<sup>th</sup> term) commenced on 1st June, 2000 with 26 trainees from eleven countries comprising Sri Lanka, Maldives, Bangladesh, Myanmar, Uganda, Kenya, LAO PDR, Thailand, Seychelles, Bhutan and Zambia. One officer from Bhutan has undergone a special training course in Sample Surveys. The Golden Jubilee celebrations of the International Statistical Education Centre (ISEC) was successfully organized from 13<sup>th</sup> to 18<sup>th</sup> October, 2000 by the International Statistical Institute, the Indian Statistical Institute and the Government of India. Dr. Arun Shourie (Minister of State, Statistics and Programme Implementation) was the Chief Guest and delivered Key Note address. Prof. M.G.K. Menon (President, ISI) presided over the meeting and delivered the welcome address. Prof. J.L.Bodin (President, International Statistical Institute), Prof. B. Phillips (President, International Association for Statistical Education), Prof. I. Yoshimura (Former Visiting Professor to ISEC from Japan) and Prof. K.B. Sinha (Director, ISI) addressed the gathering in the Inauguration Ceremony. The Inauguration Ceremony was followed by a Conference on "Policy Issues in Demography, Health and Education, and Economics" from 13<sup>th</sup> to 14<sup>th</sup> October, 2000. Another Conference on "Contemporary Issues in Statistical Education" was held from 17<sup>th</sup> to 18<sup>th</sup> October, 2000. Several distinguished delegates from India and abroad participated in the above conferences.

#### Research Work

7.8 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 and Operations Research; and Library, Documentation and Information Sciences. In addition, the Computer and Statistical Services Centre (CSSC) have 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

7.9 The Statistical Quality Control (SQC) and Operations Research (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. The basic objective of the Division is to propagate the use of SQC & OR and allied management techniques for improving quality, enhancing productivity, reduce manufacturing cost and losses in industries. This is realized through academic programmes, consultancy services, inplant and general training course for industrial personnel, systems and software development, organizing conference, seminars and research in the methods and procedures of quality control, operational research and allied techniques. The Institute which was made a permanent member of the Quality Council of India in recognition of its pioneering role and rich contributions in country wide quality movement is also representing in the National Accreditation Board for Auditing and Training (NABAT).

The Division is running a two-year professional programme like M.Tech. (QC and OR), at ISI, Calcutta and Part-time certificate course in SQC at Bangalore, Hyderabad and Chennai; Part-time evening course in Statistical Methods and Applications at New Delhi and Calcutta and training programme conducted by International Statistical Education Centre. The Division also offers a Specialist Development Programme (SDP) to provide career in industry through on the job training and guided development.

7.10 The SQC movement in India dates back to November, 1947 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.

The research activities of the Division covered areas like Linear Complementarity Problem (LCP) and its Generalisation; Non-smooth optimisation; Study and Development of some special classes of Matrices useful in LCP and Game Theory; Cooperative Games, Non-cooperative Games and Stochastic Games; Integer Programming and associate matrix Classes; Generalised Convexity; Symmetrical Travelling Salesman Problem; Component importance in a consecutive k-out-of-n system; Scheduling - variance Minimisation; Software Reliability; and Construction and Combinatorial Problems in designing of Experimentation and Taguchi Methods. The division has earned a reputation for providing consultancy services to 136 organisations throughout the country in all areas of Quality Management and Productivity. Besides, the division has assisted a good number of organizations in developing and implementing quality system based on ISO 9000 series and ISO 9000 management standard and ISO 4000 environmental management standard. The division has embarked on promoting Quality Management and related activities in SAARK and other countries. A cell of Export for Consultancy has been formed at Calcutta. The Cell carried out a project in a transport organization in OMAN. The division is continuing with QS 9000 Surveillance Audit for organizations in Malaysia, Philippines and Thailand.

#### 7.11 Millennium Measure

The division has identified the following focus areas for the new millennium:

- to expand its activities in the Software and IT Industries. A research project on 'Developing a measure for overall performance quality of a software industry' is already on.
- to apply modern management techniques in service sector for measuring and improving its performance.
- to popularize the use of statistical concepts of design of experiments in CSIR laboratories for conducting laboratory and plant scale experiments.
- to extend the activities of the Institute in relatively neglected North Eastern regions and to conduct collaborative studies with different universities and agencies in the region.

Library, Documentation and Information Sciences Division, Central Library

7.12 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 photo films. 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.

7.13 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.

7.14 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. 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.

#### Documentation Research and Training Centre (DRTC)

7.15 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 development of guidelines and software and application 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.

7.16 DRTC also conducts a course of 24 months duration leading to the award of "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)

7.17 The Centre manages the central computing facility of the Institute at Calcutta. It serves about 600 users-students, research scholars and scientific workers - with the in-house computer system consisting of SUN Enterprise 3000 server, Six SUN ULTRA 30 workstations, DEC Alpha 4100 server and IBM AS-400 server and BMDP, NAG, SAS, IMSL, SHAZAM softwares are available on VAX 8650. SAS and MATLAB-Base and Mathematics, E-mail, Internet and Fax facilities of the Institute are maintained by the Centre. Statistical and computational consultancy services are also provided by CSSC.

7.18 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 base, Image Processing, Computational geometry, Data Mining, VLSI and Cryptology.

#### Project Work

7.19 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); National Statistical Commission (NSC); Reserve Bank of India (RBI); Defence Research Development Organisation (DRDO); Government of West Bengal (GoWB); Indo-French Centre for the Promotion of Advanced Research, New Delhi; Intel Corporation, USA; Ministry of Information & Technology, Government of India; ISRO, Bangalore; National Information System for Science & Technology (NISSAT); Indian National Science Academy (INSA); National Board for Higher Mathematics (NBHM); Central Scientific and Industrial Research (CSIR); Ministry of Environment and Forests, Government of India (aided by World Bank); European Commission; Eleventh Finance Commission; Rabindra Bharati University; Finance Department of West Bengal; Hindustan Fertilizer Corp. Ltd. (HFCL); Paschim Banga Rajya Prathamic Siksha Unnayan Sanstha, Government of West Bengal; Indian Council of Social Sciences Research (ICSSR), New Delhi; Ministry of Welfare, Government of India; University of East Anglia, U.K; DFID India, British High Commission; International Rice Research Institute (IRRI); Department of Biotechnology (DBT); Indian Council of Medical Research Institute; Birla Industrial and Technological Museum (BITM); Planning and Policy Research Unit (PPRU).

#### Seminars, Workshops, Conferences, Symposia etc.

7.20 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, Mysore etc.

#### Publications

7.21 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 journals. Sankhya office takes care of publication of Sankhya (A&B) with the assistance of Publication and Printing Unit. Details regarding Sankhya are also available on the Website: [www.isical.ac.in/sankhya](http://www.isical.ac.in/sankhya)

The following issues were published during the year:  
Sankhya Sr.A: Volume 62, part 2 & 3 and Volume 63, Part 1.  
Sankhya Sr.B: Volume 62, part 1, 2 and 3.

#### Scientific Papers and Publication

7.22 During the year about 200 scientific papers were published and about 150 papers were accepted for publication in different journals of national and international importance.

#### Scientific Assignments Abroad

7.23 About sixty 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, Brazil, Italy, France, Germany, Poland, Paris, Greece, Barcelona, Hong Kong, Japan, Munich, U.K., Canada, Singapore, Netherlands, Tajwan, Belgium, Santa Barbara, Finland, Mexico, Thailand, Switzerland, Austria, Slovenia, Sweden, Great Britain, Turkey, and Belgium etc.

#### Visiting Scientists

7.24 About fifty distinguished scientists from U.S.A., U.K., Portugal, Bangladesh, Germany, Italy, Canada, Japan, China, Belgium, Israel, France, Philippines, etc. visited the Institute to attend various Workshops, Conferences, Seminars etc. and also to participate in collaborative research, teaching, 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

7.25 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 organisation of national and international importance like CSIR, NASA, IEEE, INSA, etc. Several faculty members served as visiting scientist, honorary professor, visiting professor, C.V. Raman Professor of INSA, Visiting Professor in various universities in US and Europe, 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.