

CHAPTER VII

INDIAN STATISTICAL INSTITUTE

7.1. In the early thirties, the need for advancement of theoretical and applied statistics in India was keenly felt and the Indian Statistical Institute (ISI) came into being, thanks to the pioneering initiative and efforts of Professor P. C. Mahalanobis. The ISI was registered on 28.4.1932 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 recognitions. For its substantial contributions to the theoretical and applied statistical work, the Institute was recognized as an “Institute of National Importance” by an Act of Parliament, known as “Indian Statistical Institute Act No.57 of 1959”. This Act conferred the right to hold examinations and award degrees/ diplomas in Statistics on the Institute. 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 Statistical Quality Control and Operations Research (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. The Institute was authorised to award degrees/ diplomas in Statistics, Mathematics, Quantitative Economics, Computer Science and such other subjects related to Statistics by the “Indian Statistical Institute (Amendment) Act, 1995, No.38 of 1995 effective from 18.9.1995. The recognition of the Institute by Acts of Parliament gave a great encouragement to research activities, not only in Statistics and Mathematics, but also in various branches of Natural and Social Sciences, Physics and Earth Sciences, Biological Sciences, Statistical Quality Control and Operations Research, Library and Information Sciences.

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. Pioneering research activities were carried out in many areas of statistical theory, especially in the core areas of multivariate analysis, sample surveys and design of experiments. Such activities were strengthened and Professor C.R. Rao and many others who joined the Institute in the 1940s opened up new directions and the tradition continues. 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 U.K., 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 transistorized digital computer, called ISIJU-1, which was commissioned in 1966 by Shri M.C. Chagla, Minister of Education, Government of India. The internationally acclaimed scientists of the Institute are carrying out high quality research and development in the field of computer science. 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 Dr. W.E. Deming, Dr. Ellis R. Ott, Dr. H.C. Tippet and Genichi Taguchi for the same purpose. SQC promotional work of the Institute gradually spread all over the industrial centres in India under a comprehensive programme covering education and training, applied research and consultancy services. From the early days, the Institute has been interacting with many internationally reputed scientists in different disciplines from the world over. Some of these scientists have worked in the Institute for long. Sir Ronald A. Fisher, a pioneer of modern statistics, was a regular visitor to the Institute and lent considerable support to its organization and development. Professor J.B.S. Haldane, a geneticist of international repute, was a member of the faculty for several years beginning from 1957. The celebrated mathematician, Norbert Wiener visited the Institute twice in 1954 and again in 1955-56 when he stayed for seven months and gave a course of 60 lectures. The other academic personalities whose extended visits influenced the development of the Institute include the statisticians Harold Hotelling, Frank Yeats, Herman Wold, Edwin Harper (Jr.) and H. Cramer, the mathematicians A.N. Kolmogorov, Yu. V. Linnik, J.L. Doob and more recently Vaughan F.R. Jones, the experts in Statistical Quality Control Walter Shewhart and G. Taguchi, the Economists Simon Kuznets, Paul A. Baran, Joan Robinson, Jan Tinbergen, Nicholas Kaldor, R.M. Goodwin, David and Ruth Glass and J.K. Galbriath; the geologist Pamela Robinson; the biochemist N.W. Pirie and the linguist D. Kostic. All along, the Institute has tried to live up to Ronald Fisher’s dictum that Statistics is a “Key Technology” of the century, in view of its intimate relevance to all scientific endeavours, which involve experimentation, measurement and inference from sample to aggregate.

7.3. Prof. M.G.K. Menon, FRS and Prof. K.B. Sinha, Distinguished Scientist continued to act as the President and the Director of the Institute, respectively during the year. Prof. N Madhava Menon replaced Dr. Bimal Jalan, Governor, RBI, as the Chairman of the Council of the Institute.

7.4. During the academic session 2002-2003, 9708 candidates applied for admission and were called for written selection tests for the various courses offered by the Institute, namely, B.Stat. (Hons.), B.Math (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 and 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 and course on Computer Programming and Applications. Admission tests were conducted at 24 different centres all over the country. Based on the performance in the written tests, the interview and the academic record, 191 candidates were offered admission to various courses during the current academic session. The annual examinations for all the regular courses were held in May/ June 2002. The 2002-2003 academic session commenced on 5th August 2002. The Institute 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. Several students from ISI and other Institution/ Universities received training in the Multimedia Laboratory.

Professional Examinations in Statistics

7.5. The Examination Committee of the Institute conducts professional examinations for the Junior Diploma in Statistics and Senior Diploma in Statistics at Bangalore, Kolkata, Delhi, Mumbai, Hyderabad, Chennai twice in a year, usually in the months of April/ May and November/ December, respectively. During the period, the cumulative total number of students who have qualified for award of the Diplomas in the professional examinations in Statistics is 291.

International Statistical Education Centre

7.6. The International Statistical Education Centre (ISEC), which was opened in 1950, is operated jointly by the International Statistical Institute and the Indian Statistical Institute, under the auspices of the United Nations Educational Scientific and Cultural Organization (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 the International Statistical Institute, the Indian Statistical Institute and the Government 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 and Applied Statistics at various levels for selected participants from the Middle-East, South and South-East Asia, the Far East

and the Commonwealth countries of Africa, sponsored by their Governments. The major training programme of the Centre is a 10-month regular course. In addition, special courses of varying duration are also organized. During the year, the 10-month regular course (56th term) commenced on 1.6.2002 with 21 trainees from Sri Lanka, Maldives, Myanmar, Seychelles, Oman, Vietnam, Mauritius, Bangladesh, Fiji, Cambodia, Mongolia, Ethiopia and Thailand.

Research Work

7.7. The research activities of the Institute are grouped in 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) 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

7.8. The Statistical Quality Control and Operations Research (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 and Pune. Since its inception, the Division has been very active in dissemination of statistical based knowledge to industries and applied research in the areas of SQC and OR. The Division has been in the forefront in the Quality movement in India for over five decades and its significant contribution has made the Institute a permanent member of Quality Council of India. The Division also offers a specialist development programme (SDP) to provide career in industry through on-the-job training and guided development. The Division has been running a Postgraduate two-year programme, M.Tech (Quality Reliability and Operation Research) from 1989 onwards.

7.9. The theoretical research activities carried out during the year are in the areas like Reliability (shock models, consecutive K out of N: F system), Linear Complementarity Problem (almost N_0 and N bar matrix classes), Semi definite Linear Complementarity Problems (equivalence property for multiplication transformation), Non co-operative games and stochastic games, regression diagnostics, development of suitable univariate and multivariate statistical process capability indices. Interesting applied research has also been carried out on:

- (i) Modeling number of defects per unit time for a software development process.
- (ii) Modeling of the measurement processes.

- (iii) Development of suitable testing methods for equality of efficacy of a new drug with a standard drug.

7.10. The Division has conducted several seminars, symposium, training, workshop on Green Belt, Black Belt, SPC, Top Management Programme, International Auditors training programme, Reliability, Quality with statistics, Statistical techniques for quality, Statistical techniques for executives, FMEA etc.

Library, Documentation and Information Sciences Division, Central Library

7.11. The Institute maintains a central research Library at Kolkata with about 2 lakh 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 also has a well equipped Reprography and Photography Unit with facilities for all modern copying arrangement.

7.12. The reading rooms of the Library have 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.

7.13. The Library maintains contacts with research Libraries of the country through inter-library loan transactions. The Library also has 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, Department of Atomic Energy, Government of India. To provide information support and increase efficiency of library services, the Central Library at Kolkata has started the process of providing computerised library services. The Libraries at Delhi and Bangalore also provide similar services. The National Board of Higher Mathematics, Department of Atomic Energy, Government of India has recognised the Delhi Centre Library as the Regional Library to serve the Northern Region.

Documentation Research and Training Centre

7.14. The Documentation Research and Training Centre (DRTC) conducts different types of studies such as study of various methods of knowledge representation, such as semantic nets, frames and predicate calculus etc.; application of modern scientific management techniques to the planning and management of information system, centers and services; study of Internet Technology and its applications; the development of bibliometric and scientometric measures for evaluating the use of Library and information services and scientific output development of guidelines and software for

Library house keeping operations, such as circulation control service and acquisition control.

- 7.15. The DRTC also conducts a course of 24 months duration leading to the award of Associateship in Documentation and Information Science (ADIS) under the 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

7.16. 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 55 PCs. BMDP, NAG, SAS, IMSL, SHAZAM softwares are available on VAX 8650. SAS and MATLAB-Base, and Mathematica. The Centre maintains e-mail, Internet and Fax facilities of the Institute. Statistical and computational consultancy services are also provided by CSSC. The staff members of CSSC also served as faculty in various courses of the Institute and guided projects carried out by students. They also conduct research in the areas of Database and knowledge base, Image Processing, Computational geometry, Data Mining, VLSI and Cryptology.

Externally Funded Project

- 7.17. Apart from theoretical and experimental plan research, the Institute also undertook a variety of 65 externally funded projects from different Government and non-Government organisations like Ministry of Defence, Ministry of Information Technology, Ministry of Welfare, Department of Science & Technology, Department of Atomic Energy, Defence Research Development Organisation, Deptt. of Bio-technology, Doordarshan Kendra, Kolkata, Food Corporation of India, Oil & Natural Gas Commission, Indian National Science Academy, C-DAC, Reserve Bank of India, Central Scientific & Industrial Research, Rabindra Bharati University, International Rice Research Institute, Indian Council of Agricultural Research, Indian Council of Medical Research, Calcutta University, Govt. of West Bengal, Labour Department, Govt. of West Bengal, West Bengal Women's Commission, European Commission, UNU/IAS, Tokyo, ORG NARG Research Ltd, VS Ltd, Indo-French Centre for the Promotion of Advanced Research, New Delhi, Intel Corporation, USA, R Systems International Ltd, Larsen & Toubro Ltd, Reliance India Ltd., Mahindra & Mahindra Ltd, Star Right Industries, Jaihind Engineering, ITC, Sky Tech Solutions, Robert Bosch, Balmer Lowrie, East India Pharmaceuticals Ltd, Britannia Industries Ltd, Coats of India.

Seminars, Workshops, Conferences, Symposia etc.

7.18. A number of Seminars, Workshops, Conferences, Symposia, Summer Schools, Winter Schools, Training Programmes etc. were organised by the Institute during the period at Kolkata, Delhi, Pune, Manipur and Mizoram.

Publications

7.19. Founded and edited by Professor P.C. Mahalanobis in 1933, *Sankhya*, the Indian Journal of Statistics and the Official organ of the ISI 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*. Details regarding *Sankhya* are available on the Website: www.isical.ac.in/~sankhya

7.20. The following issues were published during the year:

- (i) *Sankhya* Sr.A: Volume 64, part 2 and 3
- (ii) *Sankhya* Sr.B: Volume 64, part 1, 2 and 3
- (iii) *Sankhya* Sr.A: Volume 65, part 1

Scientific Papers and Publications

7.21. During the year about 200 scientific papers were published and about 100 papers were accepted for publication in different journals of national and international importance.

Scientific Assignments Abroad

7.22. About seventy 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 Australia, Belgium, Berlin, Brazil, Canada, China, Denmark, France, Germany, Italy, Japan, Korea, Nepal, Netherlands, Norway, Peru, Philippines, Poland, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, UK, USA, Vietnam, etc.

Visiting Scientists

7.23. About fifty distinguished scientists from Bangladesh, Canada, France, Germany, Italy, Japan, New Zealand, Paris, U.K., U.S.A., etc. visited the Institute to attend various Workshop, 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

In appreciation and recognition of the high standard of research and scientific excellence maintained by the researchers of the Institute, several faculty members received laurels in the forms of Awards, Fellowship from organizations of national and international importance like ISCA, IEEE, INSA, etc. Several faculty members served as visiting scientist, honorary professor and 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.



professor prabhat Patnaik of Jawaharlal Nehru University delivering his speech on the occasion of 109th birth anniversary of late Professor P. C. Mahalanobis, the founder of the Institute on June 29,2002, Others are (L to R)
: Shri Ajay Ghosh, President of ISIWO; prof. S. C. Bagchi , Acting Director, Prof. Sunit Basu, Vice Chancellor of Visva Bharati University and Prof. Atis Dasgupta, Head, Sociological Research Unit.