

CHAPTER VII

INDIAN STATISTICAL INSTITUTE

7.1 In the 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 recognitions. For its substantial contributions of the Institute to the quality of theoretical and applied statistical work culminated in the recognition of the Institute as an “Institute of National Importance” by an Act of Parliament, known as “Indian Statistical Institute Act No.57 of 1959”, which was conferred 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 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 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. Pioneering research activities were carried out in many areas of statistical theory, especially in the core areas of multivariate analysis, sampling surveys and design of experiments. Such activities were strengthened and new directions were opened up by Professor C.R. Rao and many others who joined the Institute in the forties 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 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

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Pranab Mukherjee, Hon'ble Minister of Defence, Government of India attending his first meeting as Chairman of the Indian Statistical Institute Council for the term 2004-2006 held at ISI, Kolkata on 29 October, 2004



Prof. N.R. Madhava Menon, Director, National Law Academy, Bhopal attending his last meeting as chairman of Indian Statistical Institute Council for the term 2002-2004 held at ISI, Kolkata on 15 September, 2004

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 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 then 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 several months or even longer. 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 longer 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. Dr. N.R. Madhava Menon completed his tenure as Chairman of the Institute and in his place Shri Pranab Mukherjee, Hon'ble Defence Minister of India was elected as Chairman of the Institute.

Teaching and Training

7.4 During the academic session 2004-2005, 10,859 candidates applied for admission and were called for written selection tests for the various courses offered by the Institute viz. B.Stat. (Hons.), B. Math (Hons.), M.Stat (S-Stream), M.Math, M.S. in Quantitative Economics, M.Tech. in Computer Science, M.Tech. in Quality, Reliability and Operations Research, Associateship in Documentation & Information Science; Research Fellowships in Statistics, Mathematics, Economics, Computer & Communication Sciences, Physics and Applied Mathematics, Anthropology, Demography, Geology, Sociology, Agriculture and Library and Information Science. A total of 8149 candidates finally appeared for admission tests and a total of 501 candidates were qualified in the written tests, and called for interviews. Based on the performance in the written tests, interview and the academic records, 195 candidates were offered admission to various courses during the academic session under review. The annual examinations for all the regular courses were held in April-May 2004. The 2004-2005 academic session commenced on 19th July, 2004.

Professional Examinations in Statistics

7.5 Examination Committee of the Institute conduct 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 month of April/May and November/December respectively. During the period under review, the cumulative total number of students who have qualified for award of the Diplomas in the professional examinations in statistics are 303. The Govt. of India recognise the Junior Diploma in Statistics as equivalent to Bachelor's Degree in Statistics while Senior Diploma in Statistics to a Master's Degree in Statistics.

International Statistical Education Centre (ISEC)

7.6 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 Director. 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 duration are also organised. This year (58th) 13 trainees from Srilanka, Myanmar, Iran, Tonga, Papua New Guinea, Ivory Coast and Thailand joined the course. The trainees will get "Statistical Training Diploma" at the end of March 2005 after successful completion of the ISEC Regular course.

Research

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 & 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. A brief account of research activities done by different units of each Division of the Institute during the period are highlighted below :

Statistical Quality Control and Operations Research

7.8 The SQC and OR division set up in 1953, now operates with 10 units located at Bangalore, Baroda, Kolkata (2 units), Hyderabad, New Delhi, Mumbai, Coimbatore, Chennai, 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 & 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 runs a Post graduate two year programme, M.Tech (Quality Reliability and Operation Research) from 1989 onwards. The theoretical research activities carried out during the year in the areas like Reliability: consecutive K-out-of-n: F system; Linear Complementarity Problem; Semidefinite Linear Complimentarity Problems; Cone complementarity over Jordan Algebra; Non co-operative Games; Stochastic Games; Evolutionary Games; Linear Models; Regression Analysis and

Regression Diagnostics; Multivariate Statistical Process Control; Matrix Partial Orders; Six Sigma Methodology for Software Industry; A New Black and White Causal Cryptographic Scheme for General Access structure; Quality Adjusted Lifetime; Tolerance interval for life distribution of 2-out-of-3 distribution; Estimation of reliability of k-unit parallel system based on progressively Type-II censored data; On estimation of reliability of hot standby redundant system for dependent model based on random censored data; Economic design of control chart under logarithmic series distribution as process failure mechanism; Distribution of profile and process capability analysis for profile; Developing optimisation tool for allocation of cubicle to New Employees; Benchmarking the performance of different optimisation software; Evaluation of effectivity of training programs; Evaluation of Customer Satisfaction level of different projects; Robust Economic Sampling Plan.

Library, Documentation and Information Sciences Division

(a) Central Library

7.9 The Institute maintains a central research Library at Kolkata 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 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. 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. To provide information support and increase efficiency of library services, the Central Library at Kolkata has started the process of providing computerised library services. Apart from Central Library at Kolkata, Library at Delhi and Bangalore also cater similar 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.

(b) Documentation Research and Training Centre (DRTC)

7.10 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 Internet Technology and its Applications; 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 for Library house keeping operations, such as, circulation control service and acquisition control.

Computer and Statistical Services Centre (CSSC)

7.11 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 inhouse 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.E-mail,



Shri Oscar Fernandes, Hon'ble Minister of State, Ministry of Statistics & P.I., Govt. of India along with his wife in the inaugural session of the Tenth Course/Workshop on Sample Design for Household and Establishment Surveys held during 18 October – 12 November, 2004 at ISI, Kolkata organized by Central Statistical Organisation, Ministry of Statistics & P.I., Govt. of India and United Nations Statistical Institute for Asia & the Pacific.



Dr. K. Kasturirangan, Hon'ble Member of Parliament (Rajya Sabha) and Director, National Institute of Advanced Studies delivering his inaugural speech at the 4 days 11th International Conference on Neural Information Processing organized jointly by Indian Statistical Institute and Jadavpur University held at Science City on 22 November, 2004

Internet and Fax facilities of the Institute are maintained by the Centre. 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 conducted research in the areas of Database and knowledge base, Image Processing, Computational geometry, Data Mining, VLSI and Cryptology.

Externally Funded Project

7.12 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); Council of Scientific and Industrial Research (CSIR); Indian National Science Academy (INSA); Indo-French Centre for the Promotion of Advanced Research IFCPAR); Food Corporation of India (FCI); Indian Jute Industries Research Association, Calcutta; Bhava Atomic Research Centre, Mumbai; VS Ltd.; Dept. of Atomic Energy, Govt. of India (NBHM); Govt. of West Bengal; Ministry of Defence, Govt. of India; Ministry of Information Technology; The INSEAD, France; Indian Council of Medical Research (ICMR); National Literacy Mission (NLM), Ministry of HRD, Govt. of India; Dept. of Adult Education, Govt. of Mizoram; Finance Dept., Govt. of West Bengal; International Rice Research Institute (IRRI), DFID; Indian Software Group (ISG), New Delhi; CLRI, Chennai; Reliance Infocom Ltd., Mumbai; Amaraja batteries Ltd, Tirupati; Satyam Ventures Ltd, Hyderabad; TVS Rubber, Madurai; ICICI Securities Ltd., Mumbai; Oil and Natural Gas Commission (ONGC); Integra Hindustan Control Ltd., Baroda;

Seminars, Workshops, Conferences, Symposiums Etc. Organised

7.13 More than 49 seminars and workshops were conducted by ISI during 2003-04 on statistical themes.

Publications

7.14 The internationally renowned journal Sankhya was founded by P.C. Mahalanobis in 1933 and began publication under his editorship. From 2003, Sankhya is published in one combined series, four times a year in February, May, August and November. The recent issues of the journal are available on the website <http://sankhya.isical.ac.in>. The website also has other features such as searching and online submission. The following issues have been published during April 2004 to March 2005 :

May, 2004	: Volume 66, Part 2
August, 2004	: Volume 66, Part 3
November, 2004	: Volume 66, Part 4
February, 2005	: Volume 67, Part 1 (scheduled)

Scientific Papers and Publication

7.15 During the year about 225 scientific papers were published and about 125 papers were accepted for publication in different journals of national and international importance.

Scientific Assignments Abroad

7.16 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 USA, Mexico, Singapore, UK, Switzerland, France, Portugal, Taiwan, Korea, Italy, Germany, Canada, Thailand, Australia, Nepal, China, Spain, Japan, South Africa, Brazil, Netherlands, Poland etc.

Visiting Scientists

7.17 About fifty distinguished scientists from U.S.A., Germany, New Zealand, U.K., Japan, France, Paris, Canada, Italy, Belgium, Mexico, Turkey, Switzerland, Spain 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

7.18 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 organisations of national and international importance like ISCA, IEEE, INSA, etc. Several faculty members served as visiting scientist, honorary professor, visiting professor, Visiting Professors 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 board etc. Among those, some of the notable recognitions earned by the faculty members are indicated below :

- * Professor Arup Bose has been selected for the S.S. Bhatnagar prize 2004 and won the Young Researcher award 2003 of the India International Statistical Association.
- * Dr. Mahua Datta has received the Regular Associateship of ICTP, Trieste, Italy for the period 2004-2009.
- * Dr. Debashish Goswami has been selected to receive the INSA Medal for Young Scientists.
- * Professor A. Sitaram has been appointed Editor of the Proceedings of the Indian Academy of Sciences and member of the Council of the Indian Academy of Sciences.
- * Professor G.Misra and B. Bagchi have been elected Members of the Editorial Board of the Proceedings of the Indian Academy of Sciences.
- * Professor M. Delampady and S. Ramasubramanian has been appointed Co-editors of Sankhya.
- * Professor B.P. Sinha has been elected a Fellow of the West Bengal Academy of Science and Technology.

- * Professor B.B. Bhattacharya has been serving on the editorial board of the Journal Circuits, Systems and Computers and the Journal of Electronic Testing- Theory and Applications.
- * Professor J. Duttagupta acted as a Guest Editor of special issue on 'Resource management in Wireless and Mobile ad-hoc network'.
- * Professor N. Das acted as a Co-guest Editor of special issue on 'Resour management in Wireless and Mobile ad-hoc network'.
- * Professor Dwijesh Dutta Majumder received Life Time Contribution Award in Engineering from Indian National Academy of Engineering.
- * Prof. Bhabatosh Chanda has been elected Fellow of the Indian National Academy of Engineering (INAE).
- * Professor B.N. Mandal has been elected Fellow of Wessex Institute of Great Britain.
- * Professor R. Gupta served as Member, P.D committee in Anthropology, Vidyasagar University and PG Board of Studies in Ecology, Assam University, Silchar.
- * Dr. Ashis Sengupta has been elected President of International Indian Statistical Association, India Chapter, Editor-in-chief, Journal of Indian Society for Probability and Statistics and Academic Secretary, Forum for Interdisciplinary Mathematics.