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Observasion of 10th Statistics Day in Tripura on 29th June, 2016.
123rd Birth Anniversary of
Prof. (Lt) Prasanta Chandra Mahalanobis (1893-1972)

Theme: "Agriculture and Farmer Welfare"

Background:

Prof. (Lt) P.C. Mahalanobis was a well-known Indian statistician and scientist. Mahalanobis is greatly popular for introducing new methods of sampling. Prof. (Lt) P.C. Mahalanobis is remembered by Indians as an Indian scientist and as an applied statistician. His most significant contribution in the field of economic statistics for policy decisions. Besides, he had also made pioneering studies in the field of anthropometry and had founded the Indian Statistical Institute. He also contributed to the design of large scale sample survey through National Sample Survey (NSS) in India.

Early life:

Mahalanobis belonged to a family of Bengali landed gentry who lived in Bikrampur (now in Bangladesh). His grandfather Gurucharan (1833-1916) moved to Calcutta in 1854 and build up a business. Gurucharan was influenced by Debendranath Tagore (1817-1905), father of the Nobel poet, Rabindranath Tagore. Gurucharan was actively involved in social movements such as the Brahma Samaj, acting as its Treasurer and President. His house on 210 Cornwallis Street was the center of the Brahma Samaj. Gurucharan married a widow against social traditions. His elder son Subodhchandra (1857-1954) was the father of P.C. Mahalanobis. He was a distinguished educationist who studied physiology at Edinburgh University and later became a Professor at the Presidency College became head of the department of Physiology. Prof. (Lt.) P.C. Mahalanobis grew up in a socially active family surrounded by intellectuals and reformers.

A Child of Renaissance

A biographer of Mahalanobis has described him as a renaissance man and scientist. He could also be described as a child of renaissance. In spirit, if not quite in time, his roots may be traced to the Bengal Renaissance, a social and cultural awakening that shook the province of Bengal in nineteenth century India. Prasanta Chandra Mahalanobis's grandfather founded, with others, an organization called the Sadharan Brahmo Samaj, which was to become a torch-bearer of the Bengal Renaissance. His father, Prabodh Chandra, was an active member of this organization. His mother, Nirodbasini, belonged to a family of considerable academic achievements.

The Opening of a Window

Just before Mahalanobis left Cambridge, his tutor, W.H. Macaulay, drew his attention to Biometrika. Mahalanobis found the articles interesting, purchased the whole set of available volumes and brought these back to Calcutta. A window was opened to a new area of science, permanently changing the direction of his life.

His Formal Education

Prof. (Lt) Prasanta Chandra completed his schooling at the Brahma Boys School in Calcutta in 1908. In 1912, he graduated with honours in Physics from Presidency College, Calcutta University. He went to England in 1913 and completed Tripos in Mathematics and Physics from King's College, Cambridge. In Part II of the Tripos, he was the only candidate to get a first class in Physics. King's College awarded him a senior research fellowship. Before starting his research, he came to Calcutta for a short vacation, but never returned to England. The war intervened. Also, he had found a teaching job and plenty of other interesting things to do in Calcutta.

His Early Statistical Work

Among his mentors in Calcutta was Acharya Brojendranath Seal, a philosopher and an encyclopedist, who was also interested in Statistics. Seal was to have a lasting influence on Mahalanobis's life and work. In 1917, Seal, who held the Chair of Philosophy in Calcutta University, sought the help of Mahalanobis in analyzing examination results of the University. Soon thereafter, Mahalanobis met Nelson Annadale, the then Director of Zoological and Anthropological Survey of India, who had collected anthropometric measurements on Anglo-Indians of Calcutta. Annadale requested Mahalanobis to Analyze the data. The results of statistical analyses of a portion of these data resulted in Mahalanobis's first paper on statistics entitled 'Anthropological Observations on Anglo-Indians of Calcutta, Part I: Male Stature', published in Records of the Indian Museum in 1922. This paper attracted the attention of Sir Gilbert Walker, Director General of Observatories, who requested Mahalanobis to undertake a systematic study of some metrological problems. This resulted in an important discovery by Mahalanobis that the region of highest control for changes in weather on the surface of the earth is located about 4 kilometers above sea-level. Subsequently, he was appointed Meteorologist in the Alipore Observatory and he held this post from 1922 to 1926.

Personal life:

In Calcutta, Mahalanobis met Nirmalkumari, daughter of Herambhachandra Maitra, a leading educationist and member of the Brahma Samaj. They married on 27th February 1923 although her father did not completely approve of it. The contention was partly due to Mahalanobis opposition of various clauses in the membership of the student wing of the Brahma Samaj, including restraining members from drinking restraining members from drinking and smoking. Sir Nilratan Sircar, (in whose name the famous Nilratan Sircar Medical College & Hospital is situated at Sialdha, Kolkata), Prof. (Lt.) P.C. Mahalanobis uncle who took part in the wedding ceremony in place of the father of the bride.

Contributions to Statistics:

A chance meeting with Nelson Annandale, then the director of the Zoological Survey of India, at the 1920 Nagpur session of the Indian Science Congress led to a problem in anthropology. Annadale asked him to analyze anthropometric measurements of Anglo-Indians in Calcutta and this led to his first scientific paper in 1922. During the course of these studies he found a way of comparing and grouping populations using a multivariate distance measure. This measure, D^2, which is now named after him as Mahalanobis distance, is independent of measurement scale.

Inspired by Biometrika and mentored by Acharya Brajendra Nath Seal he started his statistical work. Initially, he worked on analyzing university exam results, anthropometric measurements on Anglo-Indians of Calcutta and some meteorological problems. He also worked as a meteorologist for some time. In 1924, when he was working on the probable error of results of agricultural experiments, he met Ronald Fisher, with whom he established a life-long friendship. He also worked on schemes to prevent floods.

His most important contributions are related to large scale sample surveys. He introduced the concept of pilot surveys and advocated the usefulness of sampling methods. Early surveys began between 1937 to 1944 and included topics such as consumer expenditure, tea-drinking habits, public opinion, crop acreage and plant disease. Harold Hotelling wrote*: "No technique of random sample has, so far as I can find, been developed in the United States or elsewhere, which can compare in accuracy with that described by Professor Mahalanobis"* and Sir R.A. Fisher commented *that "The I.S.I. has taken the lead in the original development of the technique of sample surveys, the most potent fact finding process available to the administration"*.

He introduced a method for estimating crop yields which involved statisticians sampling in the fields by cutting crops in a circle of diameter 4 feet. Others such as P.V. Sukhatme and V.G. Panse who began to work on crop surveys with he Indian Council of Agricultural Research and the Indian Agricultural Statistics Research Institute suggested that a survey system should make use of the existing administrative framework. The differences in opinion led to acrimony and there was a little interaction between Mahalanobis and agricultural research in later years.

In later life Mahalanobis was a member of then Planning Commission (now NITI Aaayog) contributed prominently to newly independent India's five-year plans starting from the second. In the second five-year plan he emphasized industrialization on the basis of a two-sector model. His variant of Wassily Leontiefs Input-output model, the Mahalanobis model, was employed in the Second Five Year Plan, which worked towards the rapid industrialization of India and with other colleagues at his institute; he played a key role in the development of a statistical infrastructure. He encouraged a project to assess deindustrialization in India and correct some previous census methodology errors and entrusted this project to Daniel Thorner.

Mahalanobis also had an abiding interest in cultural pursuits and served as secretary to Rabindranath Tagore, particularly during the latter's foreign travels, and also worked at his Visva-Bharati University, for some time. He received one of the highest civilian awards, the Padma Vibhushan from the Government of India for his contribution to science and services to the country.

Floods and Dams

- At the request of the Indian Government, Mahalanobis undertook some work on prevention of floods in various regions of the country. His findings and recommendations, though often contrary to engineering wisdom of the time, were accepted by the Government and resulted in alleviation of the problem of flooding to a large extent.

He Plans for Economic Prosperity of the Nation

- Mahalanobis believed that statistics should be an integral part of the dynamics of national planning. He was acutely aware of national problems and national resources. He took a keen interest and played a key role in formulating India's second five-year plan based on the four-sector model developed by him. Broad sectoral allocations of employment, capital investment and increment in national income were worked out and then split into detailed targets. Even though national planning seems to have now gone out of fashion, the need for planning in the initial stages of a nation's development is still acknowledged and Mahalanobis's contributions to Indian national planning continue to be held in high esteem by economists. During the last decade of his life, he devised a statistical method, fractile graphical analysis, for comparison of socio-economic conditions of groups of people. This technique has now been used in many other branches of science.

Awards/ Honours:

- Weldon Medal from Oxford University (1944)
- Fellow of the Royal Society, London (1945)
- President of Indian Science Congress (1950)
- Fellow of the Econometric Society, U.S.A. (1951)
- Fellow of the Pakistan Statistical Association (1952)
- Honorary Fellow of the Royal Statistical Society, U.K. (1954)
- Sir Deviprasad Sarvadhikari Gold Medal (1957)
- Foreign member of the Academy of Sciences of the USSR (1958)

- Honorary Fellow of King's College, Cambridge (1959)
- Fellow of the American Statistical Association (1961)
- Durgaprasad Khaitan Gold Medal (1961)
- Padma Vibhushan (1968)
- Srinivasa Ramanujam Gold Medal (1968)

Statistical Day:

Mahalanobis died on 28th June 1972, a day before his seventy-ninth birthday. Even at this age, he was still active doing research work and discharging his duties as the Secretary and Director of the Indian Statistical Institute and as the Honorary Statistical Advisor to the Cabinet of the Government of India. Even at such a ripe age he participated in his research work and discharged all his duties perfectly. In recognition of the notable contribution made by (Late) Prof. Prasanta Chandra Mahalanobis in the fields of economic planning and statistical development in the post independent era, the Govt. of India has decided to designate 29th June every year, coinciding with his birth anniversary as the Statistics Day in the category of Special Day to be celebrated at the National Level vide Gazette Notification No.146 dated 5th June, 2007.

Over the years, the quality and range of economic statistics relating to the economy of Tripura has improved vastly. The *10th Statistics Day being observed on 29th June 2016 for "Agriculture and Farmer Welfare" statistics* is an area which requires for fresh ideas. Generating regular, timely and reliable agriculture related economic statistics is, without doubt, a challenging task in a developing State like Tripura on account of the predominance of the unorganized and informal sectors and also infrastructure bottle necks. We need to seriously ponder how to improve the data relating to the various dimensions of our "Agriculture and Farmer Welfare" statistics for meeting the growing challenges of policy needs. In this context, a State Level Workshop would be held on 29th June 2016 at Press Club, Agartala.