

# STATISTICS THE WONDER TOOL OF MODERN RESEARCH \*

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In observance of the National Statistics Week, I chose as subject for my talk today — “Statistics, The Wonder Tool of Modern Research.”

Never before has the need for the formation of scientific attitude and the use of scientific methods in the solution of socio-economic problems been felt as keenly as it is today in the Philippines. The analysis of the basic weaknesses of our economy, the preparation and the implementation of long and short range plans for expanding it require careful evaluation of accurate and reliable data. Properly collected, analyzed and interpreted, data on births and deaths, unemployment, incidence of diseases, agricultural production, output of industries and similar data reveal vast wealth of information which can be used as basis for decisive action. A plan of action supported with adequate and reliable data readily gains acceptance and is wisely implemented.

Proper understanding of statistical techniques enable us to look beneath the surface of things and discern the difference between reality and ideas which printed and other matters seem to convey. Knowledge of statistics, therefore, provides the necessary safeguards against dangers of propaganda.

Nowhere are the value and the tremendous uses of statistical techniques more evident than in those activities of political, social and commercial institutions which make up the cultural and social structure of the nation. The Government leads all other institutions in the use of mass statistical data. In the formulation of policy, statistics provides the device to measure the relative importance of problems. It aids the policy maker

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to establish the order or priority among the various problems needing immediate solutions.

A great number of government agencies would be rendered ineffective without adequate and reliable statistics to guide them. A program designed to expand school facilities and hire additional competent teachers must depend on statistical investigations on school-leaving age, the rise in birth rate, the effect of migration on population, potential sources of trained teachers and other factors. Legislation to accelerate the solutions of economic and social problems must be based on accurate and reliable data about such factors as unemployment, cost of living, wages, man power and material resources and a host of other vital data. The preparation of the National Budget requires sound appraisal of all available data to establish the relationship between expected income from various sources and planned expenditures.

The urge to apply statistical methods seems greatest where human factors are involved. This is particularly true in the field of business. Executives must plan for production as well as for marketing. In any sound preconceived plan of marketing, business executives generally aim to attain the following: to sell the right product in the right quantity at a right time in to right market at the right price. Statistical methods enable the industrialist to perfect the product before placing it on the market, to guarantee consumers of the standard quality of the product he sells and to reliably establish the conformity to the requirements of a consignment of raw or manufactured materials which he procures. No matter how efficient the control of production may be, products can and do vary. To safeguard the consumers against the vagaries of sampling and protect the producer from losses incurred by chances "unjust" to him statistical methods have to be employed.

The ability to forecast trends can be developed through the use of statistical techniques. Not a few businessmen and industrialists today are using statistical devices to guide them in making important decisions in the conduct of their respective enterprises. Consumer habits, preferences, desires and reactions can be discerned from experience and knowledge record-

ed in the past and statistically analyzed. Sales executives depend a great deal on market indexes to ascertain the quantity of a product which could be absorbed by a market from time to time. In this connection two factors namely: the ability to buy and the willingness to buy are invariably considered. The ability to buy is generally indicated by such indexes as per capita wealth, the number of income tax returns, the number of homes owned, the amount of savings-bank deposits, the amount of life insurance carried and to some extent the number of automobiles owned. Willingness to buy can be gauged by the way people actually spend money, particularly the way they spend it for luxuries. Statistical investigations on family expenditures reveal the amount of the family income of families belonging to various income levels that is expended on the many expense items under such group classifications as food, fuel and lighting, clothing apparel, household requisites, luxury and other miscellaneous items. It is evident therefore that the use of statistical methods in the production and marketing of a product reduces guesswork to a minimum.

Statistical methods provide management handy and reliable tools for measuring performance and efficiency. Investigations of the various facets of the operations and other activities of firms and other entities reveal the necessary pointers for effecting improvement. \*

Let us turn our attention to the advances achieved by statistical devices in other sciences. The development and use of statistical devices in the sciences has been rapid during the last sixty to eighty years. It has infiltrated and has assumed a major position in such fields of sciences as physics, biology, meteorology, chemistry and astronomy. It has likewise gained growing significance in the number of other fields such as political and social sciences.

The role of statistics in science starts with the interpretation of measurements. Theories that have been mathematically proved have yet to be confirmed by experiments, in many instances, in order to strengthen their validity. It is in the drawing of conclusions from these experiments that methods of sta-

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\* Charts and other devices used by ACCFA to measure performance and efficiency were shown to the audience. — *Ed.*

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tistics and the probability calculus have been put to effective use. The accurate determination of the error in the calculation of the distance of the sun from the earth or to be precise the semi-major axis of the earth's orbit has reduced uncertainty about distances, masses, sizes and densities of planets, of their satellites and of the stars.

The application of statistical techniques in standardizing biological extracts as well as in the calculation of the potency of such drugs as penicillin, insulin, digitalis and others are gaining wide popularity in the field of medical research.

Statistical methods have helped bring conclusive results from the analysis of experimental data in applied and experimental psychology. The sizes of samples are small and the number of cases available for investigations limited in most quantitative investigations on psychological problems. The problem of selecting representative samples, the elimination of bias, the reliability and validity of the instruments used are but a few problems which statistical methods have solved in this field.

Systematic methods of sampling have likewise been used to analyze public opinion on vital issues of the day. Expert analyses of such polls have made no little contribution in the theory and practice of democratic government.

No discussion of the place of statistics in the field of research is complete without a discussion of the advances achieved in the mechanization of statistical calculations. The development of the electronic calculator and the amazing speed it performs a mathematical task should be of interest to all having to do with statistical work. The electronic numerical integrator and computer the ENIAC completes in two hours what 100 trained men could do in one year. This wonder machine does not have even a single moving part. Only the tiniest elements of matter — electrons — move within its eighteen thousand vacuum tubes and several miles of wiring.

This evaluation of the use of statistics as a tool in modern research attempts to portray the impact of statistical method of approach to the solution of problems in our daily life. Its uses and application in all aspects of human activities are almost limitless.

