STATISTICS IN THE SERVICE OF INSURANCE ADMINISTRATION

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The Educational Program of the Society

When this Society was founded more than ten years ago, one of the aims of the founders was to provide facilities for the interchange of the views and experience of three groups of insurance technicians whose interests are more or less intimately related. The Society's meetings and publications, and the work of its Educational Committees, were designed primarily, however, to promote professional education for the growing group of actuaries in the companies conducting principally casualty and miscellaneous lines of insurance. Most of these technicians had grown up in these lines of insurance and had not had an opportunity for training in the actuarial and allied insurance sciences similar to that extended to men in the life insurance business.

Actuary, Statistician and Accountant

There are essentially different technical problems in the casualty and miscellaneous lines as compared with those in life insurance. In view of the increased need for the services of the accountant and of the statistician in casualty lines, it was apparently the sense of the founders of the Society that provision should be made also for the promotion of the technical education of insurance accountants and of statisticians and for parity of relationship with the actuaries in this Society.

And so, we found in our initial membership a group of actuaries, statisticians and accountants, from the life and casualty companies, and from governmental offices and the universities. It is the purpose of this paper to define the scope of the statistician's work in insurance service, to indicate the nature of statistical training for the accountant, actuary and administrative statistician, and to suggest what progress can be made in the provision of facilities for statistical education.

It is reasonable to assume that we shall continue to have three types of technical specialists in the insurance business, *i. e.*,

actuaries, accountants and administrative statisticians, because it is becoming increasingly difficult for any one man to develop the required competence in each of these fields. Persons who are expert actuaries, expert administrative statisticians or expert accountants in insurance service will need to cooperate more closely in the future than they have in the past, but neither one can encroach upon the field of the other. It is a fortunate circumstance that the founders of the Society envisioned this development and provided a facility for harmonious relationship and cooperation for these three groups. With this in view, your Educational Committees, in preparing the recommendations to candidates for admission to our Society suggested that the Society encourage the preparation of comprehensive texts in insurance statistics*, insurance accounting*, in rate-making and valuation technique, insurance law* and insurance economics, in order that our students may receive proper preparation for the examinations of the Society. Each text will be prepared under the supervision of a special sub-committee, the Chairman of which is a member of our Educational Committee. Mr. George D. Moore is in charge of the special committee which is to advise Mr. R. S. Hull in the preparation of the casualty insurance accounting text. These matters have been left with the Educational Committee for further development, and no decisive action will be taken without the approval of the Council and membership. It should be recalled that your present Educational Committee is carrying out simply the recommendations of past committees under the leadership of Messrs. Moore, Blanchard, Mowbray and Cogswell.

Scope of Administrative Statistics; The Statistician in Insurance Service

The experience of the past ten years has shown conclusively that the administrative statistician has his rightful place as counselor, historian, critic and trail-blazer of the business.

**In preparation:* Insurance administration and statistics (E. W. Kopf); casualty insurance accounting (R. S. Hull); insurance law (Byron Clayton and a casualty insurance lawyer to be selected) under the auspices of the Committee. Other texts are being planned (insurance economics, casualty ratemaking, etc.)

Functionally, his work is a part of general insurance administration. He serves most efficiently when he acts as the intelligence officer for the executives, and not when he is employed simply in the collection of routine loss experience and financial records, or assists in the preparation of the ordinary books of account. The "handy-man" or tabulating-clerk view of the situation is wholly wrong.

The insurance statistician is, or should be, entrusted with that branch of modern administrative practice known as "statistical control," the competent pursuit of which is necessary when any business enterprise assumes the colossal proportions into which the different branches of the insurance business have grown during the past ten years. Take life insurance as an instance. In 1914, there were in force in the United States twenty-two billion dollars of Ordinary and Industrial life insurance; at the end of 1923, the amount was close to fifty-seven billions. This vast increase in coverage over ten years has been accompanied by an unparalleled expansion in the numbers of head office and field personnel and has increased beyond former expectation the responsibilities of executives. These responsibilities, which also imply deep obligation for wise, economical management, can be met only when administrative decisions are made on the basis of responsible recommendations and conclusions based upon accurately prepared and analyzed statistical facts. The facts of the insurance executive relate to masses or aggregates of persons, things or events; these are *statistical* facts.

There has been a similarly stupendous growth in the casualty and miscellaneous lines. We do not know what the future holds, but executives who are gifted with the prophetic faculty feel that insurance service has just hit its stride and that steady progress will be made within the next few decades both in the volume of coverage, in the types of risks insured and in refinements of service for the assured and general public. Guidance and constructive criticism of these ventures should be entrusted to experienced, seasoned insurance logicians. So, the pioneer work of the few men who have been privileged to specialize in statistics as an adjunct to insurance administration will be followed by the work of others now in training, and these few words as to the outlook for the administrative statistician in insurance work may serve to initiate educational effort.

The Important Branches of Theoretical and Applied Statistics; Types of Statistical Activity in the Service of Insurance

We have suggested that the administrative statistician needs to be thoroughly equipped with full technical competence in the tested principles, methods or arts, and subject-matter of statistics and that instruction in statistics is desirable for the actuary and the accountant. Let us make this clear by defining the two general types of statistical *method* or procedure and the several levels of statistical *competency*.

Descriptive Statistics

Historically, we have the first type, or *descriptive statistics*, which is the collection of the raw materials of the description of groups of persons, things or events. These methods include the principles of drafting inquiry forms or schedules of original record, such as questionnaires and routine statistical records of individual events, sometimes routine office records; the editing, inspection or criticism of such primary records; the classification of individuals under the rubrics or titles of conventional statistical lists; the hand or machine tallying or tabulation of classified data; the drafting of schedules for the marshalling or tabulation of classified materials; the arts of practical calculation; the preparation of graphic charts and exhibit material; elementary report-writing; the abstraction, re-tabulation or re-calculation of statistical materials shown in reports of governmental and private agencies; the operation of an efficient general information service, library technique; office management, and general clerical practice. Much of this outline applies equally to the principles underlying office procedures of the actuary, accountant and statistician.

Analytical Statistics

When important conclusions are to be drawn from data, especially such conclusions as may have a bearing upon an organic administrative policy, it is often necessary to submit the facts to further treatment under the methods of quantitative logic.

While higher statistical analysis is superficially a mathematical discipline, the arts of statistical analysis are in reality the working-tools of quantitative logic. *Analytical statistics* is, therefore, the application of quantitative logic to the crude numerical results of primary descriptive processes, and the aim of this analysis is to form reasoned, tested conclusions which lead to decisive action, or to a choice of action. With the single difference of subject matter, this technique applies to actuaries and statisticians.

Levels of Statistical Competence

Another convenient classification of statistics is from the standpoint of technical difficulty and of application to specific subject-matter. This classification and its applicability to the work of administrative statisticians, accountants and actuaries in insurance service is as follows: (a) *elementary statistics*, which includes descriptive methods only; (b) *intermediate statistics*, which includes the algebraic treatment of permutations and combinations, and probabilities and perhaps a little higher algebra and analytic geometry, with an elementary insight into the more obvious procedures of the theory of observations, including differencing; the practical calculation of constants (statistical measures of dispersion, co-variation and association), elementary curve-fitting, and tests for the dependability of statistical ratios; (c) *advanced statistics*, which includes the rigorous demonstration by mathematical methods of the advanced analytical procedures. This implies an expert knowledge of the calculus of probabilities, the higher theory of observations and the general philosophy and theory of group phenomena; (d) *statistical subject-matter*, which includes acquaintance with the historical and contemporary facts of insurance and insurance research, and the results, in their insurance bearings, of applying statistical methods to the external fields of sociology, public affairs, medicine, surgery and public health. It also includes principles of management as developed through the statistical control and analysis of practical business operations.

Now, retaining our (a), (b), (c), and (d) notations for purposes of brevity, let us suggest the scope of the statistical training of certain technical officers of an insurance organization. This is set forth in categorical form below.

Extent of Technical Training in Statistics and Acquaintance with Statistical Subject Matter

Technical Group	Statistical Training			
	a	b	c	d
Actuaries	X	X	X	—
Accountants	X	—	—	X*
Investment experts	X	—	—	X*
Administrative statisticians	X	X	X	X
Underwriters and agency executives	X†	—	—	—
Medical directors	X	—	—	X*
Insurance lawyers	—	—	—	X*
Publicity specialists and journalists	X†	—	—	X*

*Special fields
†Graphics chiefly

Administrative Statistics

Colonel M. C. Rorty*, defines the administrative function of statistical control under the auspices of the statistician as follows:

"Genuine statistical control (in business) must begin with the desire of the executive to base his decisions so far as practicable, on a careful analysis of the facts, both external and internal, which relate to his business. It is the function of the statistician to assemble the facts, all the facts, and nothing but the facts; to analyze these facts in such manner as to indicate obvious courses of action, and where obvious courses of action cannot be indicated, to determine as accurately as possible the probable range of results under different plans of procedure. The principle to be followed is that of centralization of statistical control in matters of method and general policy, combined with decentralization in matters lying within the field of individual departments or organization units."

Data for the Administrative Statistician

Now, the administrative statistician has recourse to several important sources of data in the insurance business and these are set forth below.

(a) The ordinary, routine books of account, the records compiled for the executives by the several departmental units of the company. For some of these records the analysis and interpre-

* "Statistical Control of Business Activities," *Harvard Business Review*, January, 1923. *Also:* Colonel Rorty's "Making Statistics Talk," *Industrial Management*, Dec. 1920, Jan-Feb, 1921.

tation, should, under Colonel Rorty's definition of statistical control, be left entirely with the departmental executive; but, when these interpretations affect organic executive policy, it seems well to recommend that the analysis be developed by the administrative statistician because he is in control of comparative external data of the same type, and is acquainted with the sources and characteristics of published data on matters relating to the proposition in hand. He is often able to judge the reliability of external data through his knowledge of the personalities and methods back of certain published records. This is important.

(b) Year books, periodicals and published tables and charts dealing with insurance or other data which bear upon the problems of the insurance business.

(c) Special inquiries undertaken either by the statistician or by departmental executives into the various underwriting, investment, supervisory, regulatory and other problems initiated either by the statistician or by his fellow technicians.

(d) Published statistics of governmental and private agencies which bear directly or indirectly upon the four important branches of insurance service.

Definitions of the Administrative Statistician's Field of Service

You may wonder what that term "insurance service" covers. I have given below a classification of the four important aspects of insurance as a public service function.

a. *Insurance service pioneers for opportunities to assume or have transferred to it measurable, insurable risk.** It *discovers* insurable risk. It is rather interesting in reviewing the history of the several insurance branches to determine what lines of coverage were instituted by reason of the initiative of insurance institutions and in what instances the coverage resulted from external initiative.

b. *Insurance service determines the degree and nature of measurable, insurable risk* and attempts a statement of the tangible losses involved and of the social costs of untransferred or undistributed risk.*

*For a classification of risk and of methods of dealing with risk, *see:* Hardy, C. O. "Risk and Risk-Bearing" pp. 1-10, *University of Chicago Press*, 1923.

c. *Insurance service sets up suitable rate-making, underwriting and funding machinery for the efficient transfer of measurable, insurable risk* and for the transmission, investment or payment of moneys involved.

d. *Insurance service endeavors to minimize risk through the wise use of the funds which it may draw from the premium or other income*; or it encourages, through demonstration or otherwise, the risk-mitigation activities of the federal and state governments empowered to do such work by statute law or under the welfare clauses of the federal and state constitutions.

On the General and Technical Education of Insurance Actuaries, Accountants, and Statisticians

The insurance technician, whether he be actuary, accountant or administrative statistician, ought to be an expert in his particular specialty, but should have also a working-knowledge of a number of fundamental insurance sciences. Considering insurance technicians as a group, it seems desirable for our Society to encourage the attainment of a working-knowledge of the seven subjects set forth below. Your Educational Committees have considered this syllabus to be desirable* for the insurance technician.

1. Mathematics, the principles of science and applied logic.
2. Actuarial methods. (Ratemaking, valuation and surplus distribution.)
3. Insurance principles and practises—description of the important lines of coverage.
4. Insurance accounting.
5. Insurance law.
6. Insurance statistics, including administration and management principles.
7. Insurance economics, including the theory of risk, investment principles, social insurance and allied topics.

The administrative statistician in insurance service should "major" in statistics in its several sub-categories, in the principles and practices of insurance, in the description of the important

**See* recommendations of Dr. Blanchard's Committee, p. 443, *Proc.* C. A. S., Vol. IV, 1917-1918.

lines of coverage, in insurance economics and in management principles. He needs a working-knowledge of general economics, insurance investment practice, insurance accounting, insurance law, and elementary actuarial methods.

GENERALIZED SERVICE PROBLEMS FOR THE INSURANCE STATISTICIAN

Innumerable problems confront the forward-looking executive and his intelligence officer, the insurance statistician. There are generalized problems affecting the economic and social welfare of the population as a whole, into the solution of which the administrative statistician can enter through his external connections with statesmen, economists, sociologists, physicians and sanitarians. One of the most important of these general problems which deserves the attention of insurance executives is the outlook for the economic well-being of the population of this country over the next twenty-five or thirty years. Are we facing a period of long-time downward trend in wages and in the cost of living and what are the prospects for improvement in real wages? What is the probable trend of yield rates on our fixed-rate investments? What is the outlook for the further improvement of conditions affecting the public health and the physical welfare of the individual citizen? What is the prospect for the control of the rising tide of accidents and injuries on our public highways? This is a function of increased population and of more widely diffused prosperity. What are the implications of the ever-increasing concentration of modern populations in large cities? What will be the effect upon the market for the several lines of insurance, and for the extension of coverage, when impending large-scale changes in industrial organization become definitized? What will be the effect upon industry and upon the welfare of the workers of super-power development and of the wholesale migration of organic industries, such as textiles, etc. What of the farmer? All of these are immensely important problems for the insurance executive of the future, and require the services of the statistician,—one qualified not only in external, social, economic and vital statistics, but in the seven basic insurance sciences.

Specific Service Problems for the Insurance Executive

So far as the detailed operations of insurance institutions are concerned, the service-problems for the executive and for the administrative statistician of the immediate future fall into nine chief groups.

(a) *Problems of personnel and space.*

Selection, retention, promotion and compensation of head office and field personnel. Trends of wages and the labor market for clerical and field personnel. Debased currency and the service expense-rate.

Application of principles of business management to personnel problems; head and branch office space facilities in relation to cost and speed of service to the assured.

(b) *Underwriting problems*—Potential markets for insurance; adequacy and extension of existing coverage; practical underwriting and the expense problem; conservation of existing coverage; improvements in policy practice; relative advantages of medical, lay and engineering inspection of risks; agency administration (remote control *versus* regional head office and specific locality control); agency and brokerage systems and costs from the policyholder's point of view; criteria for the selection and education of agents and brokers.

(c) *Funding problems*—facilities for premium collection; banking practice of insurance organizations; settlement and adjustment of claims from the policyholder's point of view.

(d) *Insurance investments; accounting practice.*

Insurance as investment banking; the money market and the yield on fixed-rate securities; aid from insurance institutions in the development of a national program for constructive credit *versus* the existing consumptive credit structure; national monetary policies; the rectification of insurance accounting methods and the establishment of insurance accounting principles.

(e) *Supervision, regulation and taxation of insurance; insurance law.*

(f) *Policy provisions and stipulations.*

Liberalization of policy provisions; special adaptation of underwriting methods to secure maximum coverage at minimum cost

(group insurance); wholesale insurance and the co-operative movement.

(g) *Significance of general data of the insurance business; insurance publications.*

How shall the data published in insurance year-books and periodicals be developed for the good of the business? How shall we use current publications (sociological, economic, medical, legal, etc.) in the education of head office and field personnel? Insurance journalism and the universities.

(h) *Loss experience.*

The review of loss experience in relation to risk classification and the soundness of lay, medical or engineering selection; value to the public of analyzed loss experience; preventive aspects of insurable, measurable risk; service of published insurance loss experience to national and international agencies for public health and public safety.

(i) *Public relations aspects of the insurance business.*

Risk-mitigation service of insurance institutions and the public welfare; extension of public service features of the insurance business; extent to which insurance coverage alleviates economic distress; an inventory and an appreciation of fifty years of insurance service; public *versus* private insurance enterprise; the segments of the policyholder's premium dollar; critical survey of insurance history and the outlook for future service possibilities.

WHO SHALL BE CHOSEN FOR ADMINISTRATIVE STATISTICAL SERVICE?

Certain principles govern the choice of persons who shall be given the opportunity to serve insurance as administrative counselors. There is first the question of physique adequate for the gruelling, never-ending program of study, the polishing of technique, the active employment of powers of constructive imagination, criticism and discourse which fall to the lot of an administrative statistician. Then there are also those inborn characters of courage, intellectual honesty, the capacity for firmness and decision, the logical faculty, historical sense, the capacity for real understanding or wisdom and the prophetic attri-

butes. These, with technical equipment, stamp him as the scholar in business; but he should have the address and manner of men accustomed to deal with business facts. Rather an impossible proposal? Perhaps, but it is a goal to shoot at! Targets are meant to be missed occasionally! It is not always a case of "*aut Caesar aut nullus*," but rather a question of choosing for employment and training the candidate who has a number of these personal attributes.

Technical Training of Administrative Statisticians

Our Society and the American Statistical Association are the only two learned societies in this country that are officially committed to a search for ways and means of educating statisticians. Neither Society has more than a provisional outline of a plan. Perhaps, some real progress will be made during the next few years in suggesting a working procedure whereby persons may secure first, a background, humanistic education for the development of the natural faculties prerequisite for a statistical career; and second, a technical education in the statistical arts and, from our point of view, in the basic insurance sciences. As our fellow-member, Mr. W. W. Greene, has pointed out this is not exclusively the task of the colleges and universities, because true educational processes extend throughout life. Much of the burden of the teaching program will fall upon technicians in the business. With respect to the administrative statistician one could properly suggest five years of practical training under a teaching actuary, two or three years under an accountant, and several years of practical work in the underwriting and administrative branches of the business.

We aim to serve four groups of insurance students: (1) the young people entering the business during adolescence, after some high school training, who are inspired by the precept and example of their elders to qualify for professional service; (2) graduates of colleges, and in recent years particularly, graduates of schools of business conducted by the universities; (3) persons who have pursued graduate studies in economics, insurance, accounting or the actuarial sciences; (4) persons of established reputation in the business,—underwriters, engineers, physicians, lawyers, etc., who wish to broaden their technical knowledge of the insurance sciences.

The first group, as we have learned in our ten years of educational work in the Society, consists of (a) employed students in small towns with inadequate facilities for study, and these we have tried to help through our loan library, and by suggesting correspondence courses; and (b) students in large centers of population having access to extension departments of the universities. The second group—college graduates—sometimes enters the business with more than fair preparation in mathematics and the business sciences. The third group—postgraduates—presents the problem of reversing the tendency toward excessive specialization. The latter two classes of students need to be provided with sound training in the operations and aims of the business and, of course, in the rest of the seven applied branches of insurance science.

It rests upon your Educational Committee to survey this field for future service to the insurance business, to recommend the preparation of suitable texts which will replace the scattered materials at present so ineffective and wasteful of the student's energy, to enlist the support of the Society for these enterprises or to secure proper external publishing facilities, to arouse the interest of insurance executives in the matter, to invite university teachers of insurance to organize their field, and to enlist the cooperation of insurance journals. The past ten years have witnessed progress in the preparation of statistical texts, not all of which are suitable for our students. It is hoped that before we meet in 1934 to celebrate the completion of another decade of service by our Society, we shall be able to report not only substantial progress in the education of insurance technicians but also offer concrete evidence of the effect of our Society's efforts to foster education. For the latter, the best test will be the plain facts that better actuaries, better accountants and better administrative statisticians have extended the benefits of a fourfold insurance service to groups of the American population who are now unprotected, that insurance costs have been reduced, and public good-will enhanced.