Environmental Health Perspectives
Vol. 32, pp. 21-23, 1979

Statistics in Japanese Universities

by P. K. Ito*

The teaching of statistics in the U.S. and Japanese universities is briefly reviewed. It is found that H. Hotelling's articles and subsequent relevant publications on the teaching of statistics have contributed to a considerable extent to the establishment of excellent departments of statistics in U.S. universities and colleges. Today the U.S. may be proud of many well-staffed and well-organized departments of theoretical and applied statistics with excellent undergraduate and graduate programs. On the contrary, no Japanese universities have an independent department of statistics at present, and the teaching of statistics has been spread among a heterogeneous group of departments of application. This was mainly due to the Japanese government regulation concerning the establishment of a university. However, it has recently been revised so that an independent department of statistics may be started in a Japanese university with undergraduate and graduate programs. It is hoped that discussions will be started among those concerned on the question of organization of the teaching of statistics in Japanese universities as soon as possible.

In 1940, Harold Hotelling delivered his famous paper, "The Teaching of Statistics" (*1*), at a meeting of the Institute of Mathematical Statistics. He described the contemporary system of statistical teaching and of recruitment of university teachers in this subject in the U.S.A., and then presented his own views on what the system should be. With respect to the problem of departmental organization for teaching of statistics, he proposed:

> "A separate Department of Statistics, if competently staffed, could very well provide advice for the whole institution as well as conducting elementary instruction in statistical methods and theory, both for students having calculus and for those without it, and should certainly carry on advanced teaching and research in statistical theory and methods. But for efficient functioning of the institution as a whole it should be agreed that the Department of Statistics or the Department of Mathematics should do all the elementary instruction in statistics, and that courses in statistics in other departments should be confined to applications of the basic theory. Normally such courses in applied statistics in the other departments should require as a prerequisite one or more of the basic courses in the Department of Statistics, or of Mathematics. The basic course to be required as a prerequisite to others should be the one which itself requires calculus as a prerequisite wherever this is practicable."

In his subsequent paper (*2*), Hotelling argued that the teaching of statistics may be organized in any of the following ways: (1) in a two-department (theoretical and applied) Institute of Statistics; (2) in a single Department of Statistics; (3) under an interdepartmental committee; (4) under the exclusive jurisdiction of the Department of Mathematics; (5) scattered among a heterogeneous group of departments of application.

He proposed:

> "It is likely that the first plan will be adopted only by a few large institutions, and that the second will be found most suitable for the majority. The third should probably be regarded as a makeshift for the transitional period until a proper Department of Statistics can be organized.
>
> "To make statistics as a subdivision of a Mathematics Department is a solution that will appeal to administrators desirous of keeping down the number of departments."

The IMS Committee on the Teaching of Statistics with H. Hotelling as chairman issued a report giving recommendations for the problem of organization of teaching of statistics to the same effect as above (*3*). Neyman (*4*) noted that the establishment of the excellent departments of statistics in such universities as Chicago, Columbia, Harvard, North Carolina, and Stanford was due to a considerable extent to the publication of Hotelling's articles and subsequent relevant publications. More than three decades after this, the U.S. may well be proud of well-staffed and organized departments of theoretical and applied statistics in many universities throughout the country with excellent undergraduate and graduate programs.

Advocating the necessity of getting an independent Department of Statistics started in Japan, Ogawa (*5*) in 1960 argued:

*Nanzan University, Nagoya, Japan.

"In Japan the necessity and usefulness of modern statistical mthods have been well established among most of the research workers in many fields of sciences (natural and social) and of industry as of now. The demand for well trained statisticians by every field has been and is increasing rapidly. Although in some universities there are courses on statistics, they are mostly isolated courses dealing with a general introduction to the modern statistical theories. There is not any Statistics Department at all by now. The present situation of statistics in Japan seems to be similar, in a sense, to that in the U.S.A. some 15 years ago. Thus the author believes that it will be helpful to explain the predicament to our country-men by quoting some relevant parts of "The Report of the Committee on the Teaching of Statistics" [3]. "In view of the tremendous developments of theories and applications of the modern statistics during the last two decades, it is quite urgent to get an independent Statistics Department started in Japan as soon as possible."

Professor Ogawa was one of the very few Japanese statisticians who tried hard to have an independent Department of Statistics established in a Japanese university. As a matter of fact, he succeeded in getting one started in the Faculty of Engineering of a private university in the mid-1960, which, however, was doomed to be dissolved after a very short period of existence. Thus, no Japanese universities have independent Departments of Statistics at present. In Japanese universities, isolated courses in statistical theory and methods are given with a view to their applications to such fields of natural and social sciences as physics, engineering, biology, agriculture, medicine, economics, business and others. The recent survey (*6*) shows that out of 926 courses in statistics, theoretical and/or applied, given at Japanese universities throughout the country, 12.0% are given in the Faculty of Science, 19.2% in the Faculty of Engineering, 6.9% in the Faculty of Medicine, 4.6% in the Faculty of Agriculture, 30.2% in the Faculty of Economics, 23.6% in the Faculty of Education or Division of General Education, and the remaining 3.3% in other faculties. Thus, the general state of affairs with respect to organization of the teaching of statistics, with no improvement after Professor Ogawa's paper appeared, amounts more or less to what was described by Hotelling as the fifth way. There is, however, an exception to this. At some big national universities where the Koza-sei (chair system) is adopted, there is a Koza of mathematical statistics consisting of one full professor, one assistant professor and two research assistants in the Department of Mathematics of the Faculty of Science. In these institutions there are well qualified mathematical statisticians who devote themselves to teaching of and research in statistical theory and methods.

One of the main reasons why the establishment of an independent Department of Statistics in a Japanese university, national, prefectural, municipal or private, has not been materialized so far and is not in sight at present, seems that the Japanese university must have one or more Gakubu (Faculties) to which departments of specialization belong. The government regulation concerning the establishment of a university specifies the Gakubu (Faculties) which it may have as follows. They are Faculties of Literature, Education, Law, Economics, Commerce, Science, Medicine, Dentistry, Engineering, Agriculture, Pharmacology, Home Economics, Art, Music, Physical Education and the like. Hence, one has a difficulty of finding a proper Gakubu to which an independent Department of Statistics may belong, while it may be established in the college of arts and science in an American university. Creating a new Gakubu of Statistics seems to be out of question from all practical considerations.

There are, however, some possibilities of getting an independent Department of Statistics which has undergraduate and/or graduate programs started in a Japanese university in the future. One possibility is to make use of the recent movement of reorganization of a Japanese national university. Based on a revision of the above-mentioned government regulation, the newly established Tsukuba University does not have a traditional Gakubu system. At some leading national universities the Division of General Education (Kyoyobu), which is to take care of the first two years of undergraduate programs without the privilege of Gakubu, is being reorganized as a Gakubu of liberal arts and the like. In these national universities a number of departments of interdisciplinary nature have been established and are being planned in the new Gakubu of Liberal Arts and the like. Hence it is possible at least from the standpoint of the government regulation to establish an independent Department of Statistics in a national university where there is no Gakubu system or in a Gakubu of Liberal Arts or the like.

According to the newly revised Japanese Law on Schools it has become possible to establish a university consisting only of a graduate school with no Gakubu for undergraduate programs. A government regulation on graduate degrees has also been revised so that a university may confer on a candidate a Gakujutsu-shushi (Master of Arts) degree or Gakujutsuhakushi (Doctor of Philosophy) degree when the candidate's field of specialization does not belong to any field that is specified by a Gakubu. Traditional graduate degrees take the names of Gakubu such as Master of Literature, of Science, of Economics, or Doctor of Literature, of Science, of Economics, etc. In this situation a possibility arises for establishing an independent Department of Statistics with graduate programs. There is a national research institute named Institute of Statistical Mathematics

under the jurisdiction of the Ministry of Education, which is concerned with the study of statistical theory and its applications (7). From the standpoint of the government regulation it is possible to establish a national university with this research institute as core. This new national university will have only a graduate school with at least two departments of theoretical and applied statistics, where M.A. program and Ph.D. program are offered, together with opportunities for advanced studies in statistical theory, methods and their applications. Theoretically this Institute with a graduate school for the teaching of statistics may function according to the first plan proposed by Hotelling (2).

It is to be noted that all the above views on the possibilities of establishing a Department of Statistics in a Japanese national university are personal on the part of the present author and that its feasibility depends much on many factors and conditions other than government regulations. It is hoped that discussions be started on this important question of organization of the teaching of statistics among those concerned as soon as possible.

REFERENCES

1. Hotelling, H. The teaching of statistics. Ann. Math. Statist. 11: 457, (1940).
2. Hotelling, H. The place of statistics in the university. In: Proceedings of the Berkeley Symposium on Mathematics, Statistics, and Probability, J. Neyman, Ed., University of California Press, Berkeley, 1949.
3. Institute of Mathematical Statistics. The teaching of statistics: A report of the IMS Committee on the Teaching of Statistics. Ann. Math. Statist. 19: 95 (1948).
4. Neyman, J. Harold Hotelling — A leader in mathematical statistics. In: Contributions to Probability and Statistics I. Olkin et al., Eds., Stanford University Press, Stanford, California, 1960.
5. Ogawa, J. Necessity of getting an independent statistics department started in Japan. Proc. Inst. Statist. Math. (in Japanese). 8: 153 (1960).
6. Institute of Statistical Mathematics. Survey on the Teaching of Statistics in Japanese Universities (in Japanese). Report No. 41, Tokyo, Japan, 1977.
7. Institute of Statistical Mathematics. Catalogue (in English) Tokyo, Japan, 1977.