The increasing needs and expectation for statistical education at the university in Japan

-- From the results of survey for companies and public institutions --

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1. Introduction

According to the expansion of computer network and the current information society, collected data should be more utilized in various fields of life. Therefore, the needs for statistical knowledge and skills for data processing and analysis are more essential than before. On the other hand, the curriculum for data processing at the primary and secondary education level in Japan has been lessened due to the introduction of "the relaxed style education". As the contents of school lessons for mathematics and statistics reduced in both primary and secondary school, worrying indication of declining academic abilities are widely observed. This also has caused the deterioration of academic performance by university students.

New students in the university, who learned through this relaxed education system, have smaller knowledge in statistics than before regardless of their specialized area. Not a few students learn statistics for the first time at the university. Under these circumstances, it is necessary for the statistics education at the university level to bear even greater responsibility in raising qualified personnel to the society. Therefore, to seek the future developments for statistical education at the university stage, we conducted the essential survey for private companies and public institutions in March 2005. We investigated the demand for data analysis and statistics knowledge and the expectation and evaluation for the statistics education at the university level.

2. Survey Description

The outline of the essentiality survey is as follows. We posted questionnaire to the private enterprises that employs more than 1000 people and the public institutions that employs more than 500 people. The valid respondents are 302 (184 private companies, 117 public institutions and 1 non-responder. The responding rate is 12%.

3. Results and Outlook

In essentiality survey, we asked various items, such as adoption, education and evaluation of respondents' employees. Chief results related statistics education are as follows:

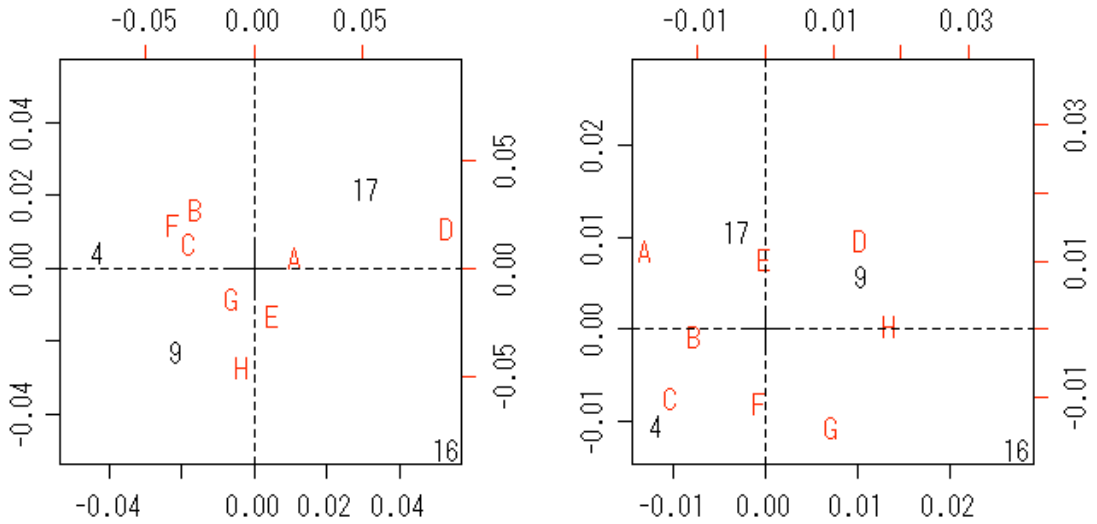
1) Most private enterprises and public institutions (respondents) think statistical knowledge is essential to their business. 46.7% of respondents think basic statistical skill is necessary and 94.1% of respondents think it useful for their business. In addition, 25.5% of respondents think their employees have advanced statistical knowledge is desirable.

2) We subdivided the ability about the data processing and analyzing into 8 categories and asked respondents whether they think (i) these skills are necessary to their business and (ii) these knowledge are achieved by the statistics education at the university level. Results are summarized in Table1. From the table, the strong needs for wide-ranging statistical skills are evident and the degree of achievement at the present level of statistics education in universities is not sufficient.

3) By correspondence analysis, we find out statistical knowledge considered useful for business is different by the type of industry. Figure 1 shows the essential statistical skills of four industries.

Table 1 The necessity of the statistical skill and the evaluation of the statistical education (unit:%)

Abilities	(a)Students of liberal arts and social science		(b)Students of science	
	necessity	degree of achievement	necessity	degree of achievement
A. to collect data	87.1	48.0	88.4	59.6
B. to understand numbers in tables and graphs	87.1	46.4	88.4	60.9
C. to grasp the problem quantitatively	86.8	35.1	87.7	52.6
D. to plan investigation/experiment to collect data	75.8	30.8	83.1	42.1
E. to use PC and process data	88.1	56.0	88.4	64.6
F. to do data analysis (factor analysis and forecasting)	80.5	30.5	85.8	46.0
G. to extract the meaning of analytical results	86.4	27.8	86.8	42.4
H. to communicate analytical results to others	89.7	31.8	88.4	39.4



(a)Students of liberal arts and social science (b)Students of science

Figure 1 Useful statistical knowledge by the type of industries

(Numbers indicate industries. 4: manufacturing, 9: retail trade, 16: services, 17: public institutions. Alphabets shows subdivided statistical skills.)

The propensities in Table 1 are regardless of public and private. So, most private companies and public institutions evaluate the statistical knowledge. However, they are not very satisfied with the statistics education in universities. In fact, comments in the opinion column show more concrete and demanding requests. Some respondents criticize that the statistical knowledge of students are rather superficial and cannot be expanded in application. They ask more adaptable and practical potentials to the future employees.

Achievements evaluated by companies and institutions in Table 1 show that the level of statistical literacy of Japanese university students is precarious. However, the socially desirable statistical skills and abilities are higher and more pragmatic. Responding to these needs, that is the pursuit of statistical thinking and reasoning without delay is the challenges of the future for Japanese statistics education.

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