A DISCUSSION ON THE PAPER:

RESEARCH AND DEVELOPMENT FOR STATISTICS IN FOOD AND AGRICULTURE: THE BAECON EXPERIENCE[1]

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As I view it the following are the highlights of the paper of Messrs. Damasco and Besa.

1. The authors classified the statistical data collection on a sampling basis in the Philippines into three sample surveys, namely: (a) household interview; (b) farm book-keeping survey; and (c) objective area and yield surveys. The authors emphasized that BAECON through its statistical research and development arm aims to make improvements on each of these three types of operations to improve the quality of data available on food and agriculture in the country. The main emphasis of the paper is on the presentation and discussion of the results of BAECON's more recent studies on non-sampling errors, frame improvement and improvement of the efficiency of estimation procedure.

2. The statistical research activities of BAECON started in 1969. Through the counterpart Project 70169, the BAECON conducted experiments on crop cutting and objective area measurement in the province of Nueva Ecija. Through this project, BAECON also developed important elements of survey operations. The project also enabled six key personnel of the Bureau to be trained on research and development in the United States.

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Up to 1977 the training of the staff of the R & D continued and it was during this year when UPLB and BAECON conducted a joint research-oriented training program. Seventeen BAECON personnel finished the training course.

This year, five of the BAECON personnel are doing their M.S. degree in Statistics and within one years time, they will be finishing their studies.

3. For the BAECON study on non-sampling errors, the authors reported their experiments on area measurement and crop-cutting in the province of Nueva Ecija under the Counterpart Project 70169. On area measurement, for example, the palay area was obtained from the interview of the farmer and this interview area was compared with the measured area. The percentage error of interview area, assuming that the measured area is the correct value, was defined as

$$\text{Error (\%)} = \frac{\text{Reported area - Measured area}}{\text{Measured area}} \times 100$$

The 60 sample farmers were classified by type of crop and variety harvested before the percentage errors were computed (Table 1).

The farmers under the lowland irrigated under-reported the palay area by as much as 7.04%, while the farmers in the lowland not irrigated over-reported the palay area by as much as 2.03%. For all the 60 farmers, there was a 2.87% under-reporting of palay area.

In the presentation of percentage errors, the authors did not distinguish between under-reporting and over-reporting. It is obvious from the formula that under-reporting percentages should have negative signs. Also, the authors considered the under-reporting in lowland irrigated farms and over-reporting in lowland not irrigated farms as random which, they said would even up for the whole population. In my view, the observed differences were due to differences in seeding rate which is greater in lowland not irrigated as compared with lowland irrigated (Table 2).

On the crop-cutting experiment, BAECON used two methods – the area method and the line method. A total of 22 sample parcels were covered – 11 for each method. For each method, the productions from the sample parcels were computed based on the crop cut and compare the results with the actual productions. Again, the formula for percentage error was

$$\text{Error (\%)} = \frac{\text{Computed production} - \text{Actual production}}{\text{Actual production}} \times 100$$

In general the area method was found to have small percentage errors, ranging only from – .085% to 1.32% (Table 3). For all the varieties and types of farm, the line method under-estimated the production, the values ranging from -31.11% to -.86%. But apart from one farm under the line method which yielded a big under-estimation of -31.11%, the line method had only a slight under-estimation for the 10 sample farms.

In the presentation of percentage errors in Table 3, the authors again failed to distinguish under-estimation from over-estimation. The authors also failed to report the size and shape of plots used in this study.

4. The earlier findings on the usefulness of the BSS data prompted BAECON to conduct an extensive study on coffee area and garlic area using the 1976 BSS data and 1978 HSS. Classifying the farmers by size of farm, the results of the comparison between the 1976 BSS data and 1978 HSS for coffee areas in Cavite showed tremendous under-estimation and over-estimation by the barangay captains (Table 4). In percentage form, the percentage error range from an under-estimation of -98.9% to an over-estimation of 100.1%. It was noted that under-estimation occurred when the sizes of coffee area as reported by the barangay captains range from less than one hectare to about 60 hectares. Above 60 hectares, the barangay captains already over-estimate the actual coffee areas.

In the case of Garlic Survey (Table 5), the barangay captains under-estimated the garlic area by as high as 99.6% when the size reported was below 25 hectares. Beyond 25 hectares, the over-estimation was about 109.3%. Worst of all, was in Ilocos Norte where the under-estimation was about 100% and over-estimation was as high as 288.9%.

Notice that in this comparison between BSS and HSS there is a time difference of two years. In a span of two years, the farmers in the barangay who used to have only small size farms planted to garlic or coffee might have already expanded the areas planted to the crop for increase in production. If this is the case, then the actual areas that the farmers have in 1978 must be higher than the actual area in 1976 from which the barangay captains based their report. This

would then explain also the tremendous under-estimation of areas planted to garlic or coffee under small size farms.

5. In 1978, BAECON conducted another experiment on area measurement in order to improve the reliability of estimate derived from interview surveys. The experiment covered 11 major rice-producing provinces covering the 12 regions. In the final analysis, out of the 1,200 original sample farmers, only 637 survey returns were analyzed.

When classified by province, the percentage errors of interview areas against measured areas range from -11.4% to 18.4% (Table 7). For the total of 637 farmers, the over-estimation by interview was only 2.2%. It was also noted that there was very high correlation between the interview area and measured areas within each province.

When the tenure was used as the classification variable, the discrepancies between the interview areas and measured areas even became smaller. In five tenure status, the interview areas all over estimated the measured areas ranging from 0.2% to 4.82%. Very high correlation between interview areas and measured areas were observed within each tenure status.

Classifying the areas by size of farm also indicated a moderate magnitude of over-estimation and under-estimation by the interview area (Table 9). What is noticeable in this table are the low correlation coefficients between the interview areas and measured areas. The reason here is the short ranges of the classes of size of farms.

6. The last portion of the paper dealt with the discussion of the future plans of the BAECON R & D program. It was stated that there will be an expansion in the objective area surveys, specifically to develop a system to use double sampling with regression estimate. Further studies will be made on the comparison of the BSS and HSS data and utilize the results for stratification purposes. Construction of area frame was also mentioned which will soon be developed in Central Luzon as pilot area. BAECON is also envisioning to expand crop-cutting surveys pending availability of fund.

7. Finally, let us summarize the three most important findings in the statistical studies conducted by BAECON as reported in the paper:

(a) In general, the magnitude of the difference between the interview area and measures area may be considered statistically significant, and the presence of a very strong correlation between the

two methods makes the interview method very valid in area measurement. In addition, the strong correlation can be used to increase the efficiency of estimate by utilizing interview as an auxiliary variable in ratio or regression type estimations.

(b) The almost negligible error found between the computed production and actual production by the area method of crop cutting is an indication that BAECON has already found the correct size and shape of crop cut which can be used effectively in yield surveys. However, the technique still needs further testing because of the limited number of trials used in the study.

(c) There are still questions on the validity of using the barangay captains as source of agricultural information at the barangay level as shown by the studies conducted by BAECON and Dr. David of UPLB who compared the discrepancies between BSS data and HSS data. The degree of correlation between them was found to be only of moderate magnitude implying that the BSS data may be used effectively only in stratification but not as auxiliary variable in a ratio or regression type estimation.