EXAMINATIONS OF THE HONG KONG STATISTICAL SOCIETY

ORDINARY CERTIFICATE IN STATISTICS, 2003

Paper I

Time Allowed: Three Hours

*Candidates may attempt **all** the questions.*

The number of marks allotted to each question or part-question is shown in brackets.

The total for the whole paper is 100.

A pass may be obtained by scoring at least 50 marks.

Graph paper and Official tables are provided.

Candidates may use silent, cordless, non-programmable electronic calculators.

*Where a calculator is used the **method** of calculation should be stated in full.*

1

1. Describe the method of data collection, and the types of data collected, in either the UK decennial population census or some other large national or official population survey known to you. Who might use such data, and for what purposes?

(15)

Questions 2 to 8 all relate to the following scenario. The county council for a region of the United Kingdom has 3000 staff in a town-centre complex in a large city. The central canteen for this complex at present has a main self-service area for hot meals, and a salad bar. The canteen is not open to the general public but is intended for council staff, who pay prices that are slightly subsidised by the council. The head of the canteen service intends to carry out a survey.

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2. (i)   Briefly explain the concept of a "target population" for a survey.

(3)

    (ii) Suggest two possible target populations that the canteen head could adopt for this survey, relating these to possible aims for the survey.

(6)

The following methods for conducting the survey have been suggested:

A. Leave paper questionnaires near to the pay desks in the canteen with an invitation to anyone to complete one.

B. Arrange for one of the canteen staff to conduct personal interviews with a random sample of employees in their workplaces.

C. Send an email questionnaire to all staff (each member of staff has a work email address).

D. Set up a display in the main entrance foyer of the central council building, with questionnaires available on it for anyone passing to pick up.

E. Send out a questionnaire with a prepaid reply envelope to a stratified sample of staff.

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3. (i)   Briefly explain the concepts of "selection bias" and "response rate" and why they may cause problems in the interpretation of survey results.

(4)

    (ii) Discuss how these concepts might relate to the above suggestions *A* to *E*, noting the advantages and disadvantages of each suggestion.

(12)

4. The strata referred to in method *E* are the four council departments listed:

Department	Number of staff
Education	1100
Social Services	900
Chief Executive's	320
Environment and Resources	680

   (i)   Using simple *proportional allocation*, how many staff should be sampled from each department to give a total sample of 450?

   (4)

   (ii) Why might stratified random sampling be an improvement on simple random sampling of the entire population?

   (4)

5. (i)   Discuss any other factors (such as cost, speed of completion or "need for people to feel consulted") that might enter into the decision on the sampling method to be used for this survey.

   (4)

   (ii) The head of the canteen service has heard that a "multi-stage" survey can be cheaper. Discuss situations in which this may be true, and whether it is likely to be relevant in the present instance.

   (4)

   (iii) Assume that the aims of the survey are both to improve the service to existing customers and to extend the customer base. State, giving reasons, your recommendation for a sampling method to be used to meet these aims.

   (4)

6. (i)   Briefly explain the difference between longitudinal and cross-sectional surveys, and how the distinction might apply in this proposed survey.

   (4)

   (ii) Explain how the canteen might use a "panel" for a longitudinal attitude survey, and what the advantages and disadvantages of such an approach might be.

   (4)

3

7. A suitable questionnaire is to be designed for use in the survey.

   (i)   It is thought that some staff, who have specialised diets for religious, health or other reasons, feel unable to utilise the canteen. Draft one "open" question and one "closed" question that concern this issue, explaining what your questions are trying to achieve and why you have worded them as you have.

   (6)

   (ii) Explain the general difference between open and closed questions, and discuss the relative advantages of each.

   (6)

   (iii) Explain how the wording of a question may lead to biased responses. Give an example of a possible question for this survey that is worded in a way likely to produce a bias, and give a rewording of the question that you believe should avoid such bias.

   (8)

8. Explain the following in the context of this survey.

   (i)   The advantages and disadvantages of computer analysis using a data-analysis package (such as SPSS or some other package known to you) compared with analysis of the data by hand.

   (4)

   (ii) How the questionnaire might be formatted to enable easy data entry to the computer. *[Optical Character Recognition is NOT available.]*

   (3)

   (iii) How the data analysis package might be used to help check the consistency and accuracy of the data entered. Give two possible examples.

   (5)