



MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF APPLIED SCIENCES & TECHNOLOGY

DEPARTMENT OF APPLIED STATISTICS

MODULE: RESEARCH METHODS

CODE: HAST 127

SESSIONAL EXAMINATIONS
OCTOBER 2021

DURATION: 3 HOURS

EXAMINER: DR WD GOVERE/MR I ZVAWANDA

INSTRUCTIONS

1. Answer **All** in Section A
2. Answer **three** questions in Section B.
3. Start a new question on a fresh page
4. Total marks 100

Additional material(s): Non-programmable electronic scientific calculator,
Statistical tables.

SECTION A (ANSWER ALL QUESTIONS) [40 MARKS]

A1.

- (a). Research is an objective formal process of systematically collecting, analysing and interpretation of data for the purpose of providing functional information to managers or management for decision making. Explain the motives for carrying out a research.
- (b). Which hypothesis, the null or the alternative, is the status-quo hypothesis? Which is the research hypothesis?
- (c). If you test a hypothesis and reject the null hypothesis in favour of the alternative hypothesis, does your test prove that the alternative hypothesis is correct? Explain.
- (d). Justify the importance of literature review when carrying out research.

[6, 2, 2, 4]

A2.

The Managing Director (MD) of a company, established before the dawn of independence is facing a problem. The company which was initially profitable and attracted very many graduates to work with is currently unprofitable. It is operating, in the MD's opinion, inefficiently. The company offers a wide range of communications facilities including parcel services in the country, region and world-wide. Initially, the company was a monopolist but the changing world market trends and globalization; survival will be more difficult in the future.

In particular, many communications and parcel service delivery companies are bypassing its services by not only offering door to door delivery but also offering the services at affordable rates. In addition, many of the companies that have joined the communications and parcel services have stationed themselves in various strategic positions so that customers can reach at their service delivery points at ease. As a research consultant, the MD has commissioned you to undertake a comprehensive study on the firm as a whole to determine possible strategies the company can undertake to face the existing problem.

- (a). State an appropriate research title for the research.
- (b). Identify a possible research problem from the above case study for a proposed study.
- (c). Formulate three possible research objectives and three possible research questions for the proposed study.

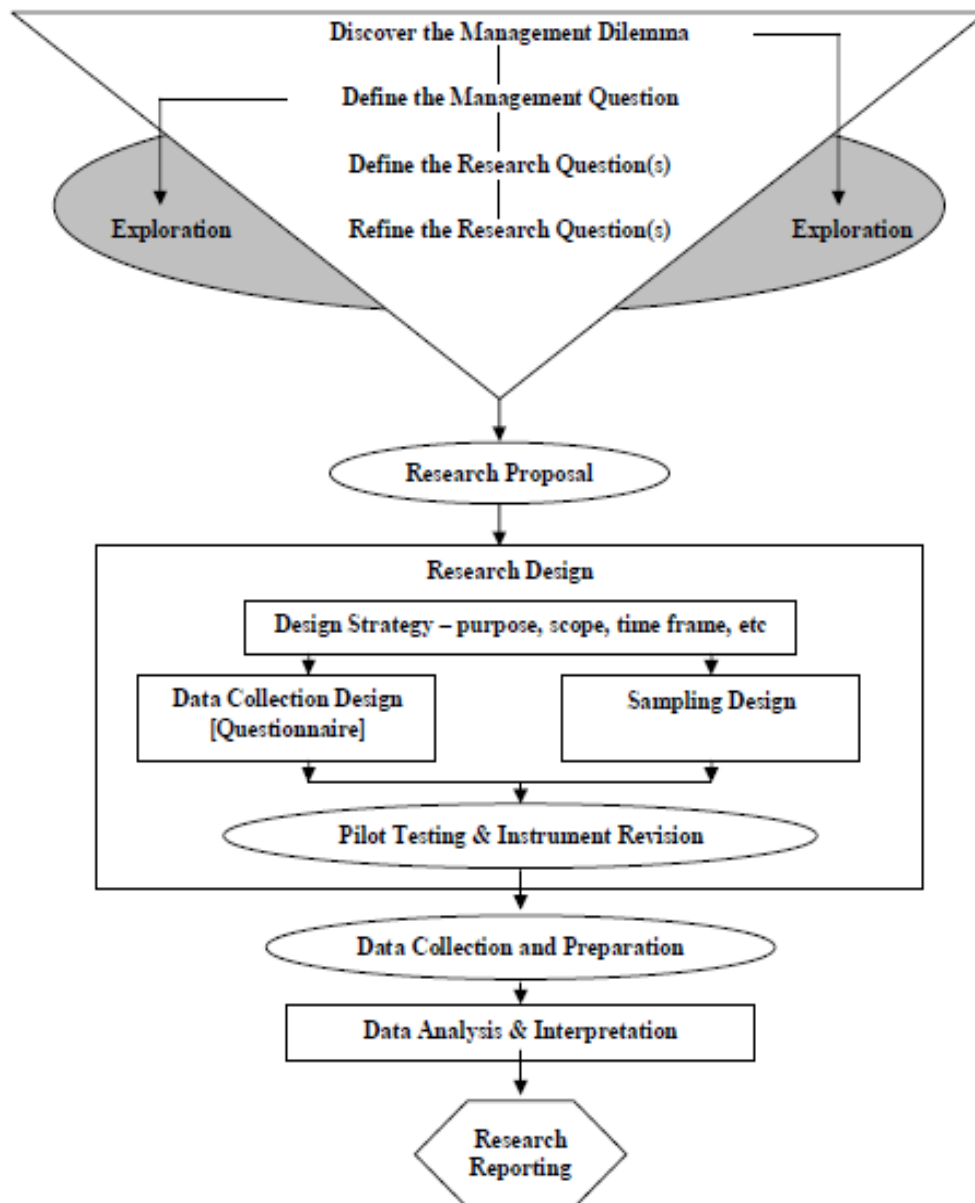
- (d). In formulating your objectives above, what factors did you take into consideration?
- (e). Briefly explain some ways that you would use to improve the reliability and validity of the study.
- (f). Explain any four ethical considerations that you would bear in mind while conducting your research.
- (g). Conceptualize variables in the above situation that could be used in a conceptual framework.

[2, 2, 6, 3, 3, 4, 6]

SECTION B (ANSWER ANY THREE QUESTIONS) [60 MARKS]

B3

- (a). The research process outlined below summarises the sequence of steps involve in defining a systematic procedure for the objectives of a research to be met. Describe fully and clearly the steps involved in the process.



- (b). A food-products company conducted a market study by randomly sampling and interviewing 1000 consumers to determine which brand of breakfast cereal they prefer. Suppose 313 consumers were found to prefer the company's brand. Explain clearly, how would you estimate the true fraction of all consumers who prefer the company's cereal brand?

- (c). Explain what each of the following sample correlation coefficients tells you about the relationship between two variables x and y :

$$r = 1, r = 0, r = 0.10, r = -0.88$$

[12, 6, 2]

B4

- (a). The “School Compost Project” was launched in 2015 in secondary schools in Zimbabwe with the objective of developing an awareness of how to make use of biodegradable waste in a profitable way. Explain how you would select a sample of secondary school students in Zimbabwe for the purpose of eliciting their views on the “School Compost Project” by

- (i) simple random sampling,
- (ii) systematic sampling, and
- (iii) cluster sampling.

Elaborate on the statistical efficiency of each of the sampling methods.

- (b). A good research report is one which communicates the research findings to readers efficiently and effectively. State any five components of a research report that would be required to achieve the above objective.
- (c). A country is divided into regions and in each region there are both urban and rural areas. A survey is to be undertaken in which adults are to be interviewed. Devise a sampling scheme which is a combination of stratified, cluster and quota sampling.
- (d). A village has 506 inhabitants, listed by name and address in a register. Explain in detail how to take a systematic sample of about 50 inhabitants from this list. State the benefits and drawbacks of this method.

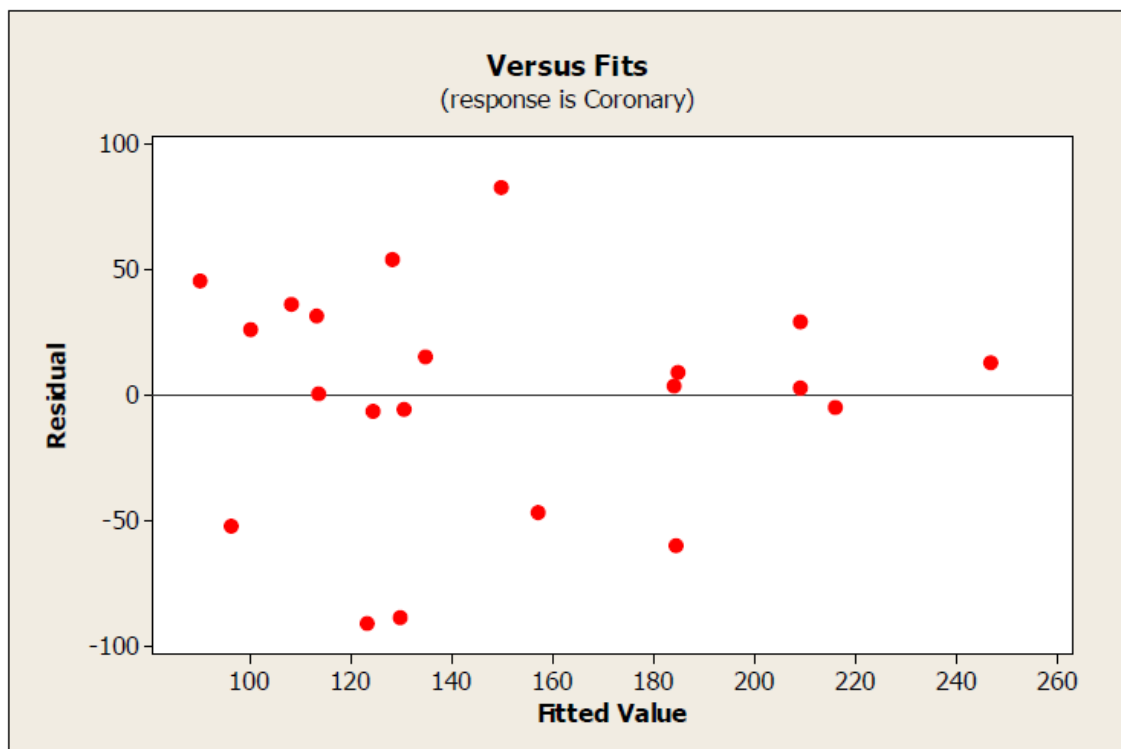
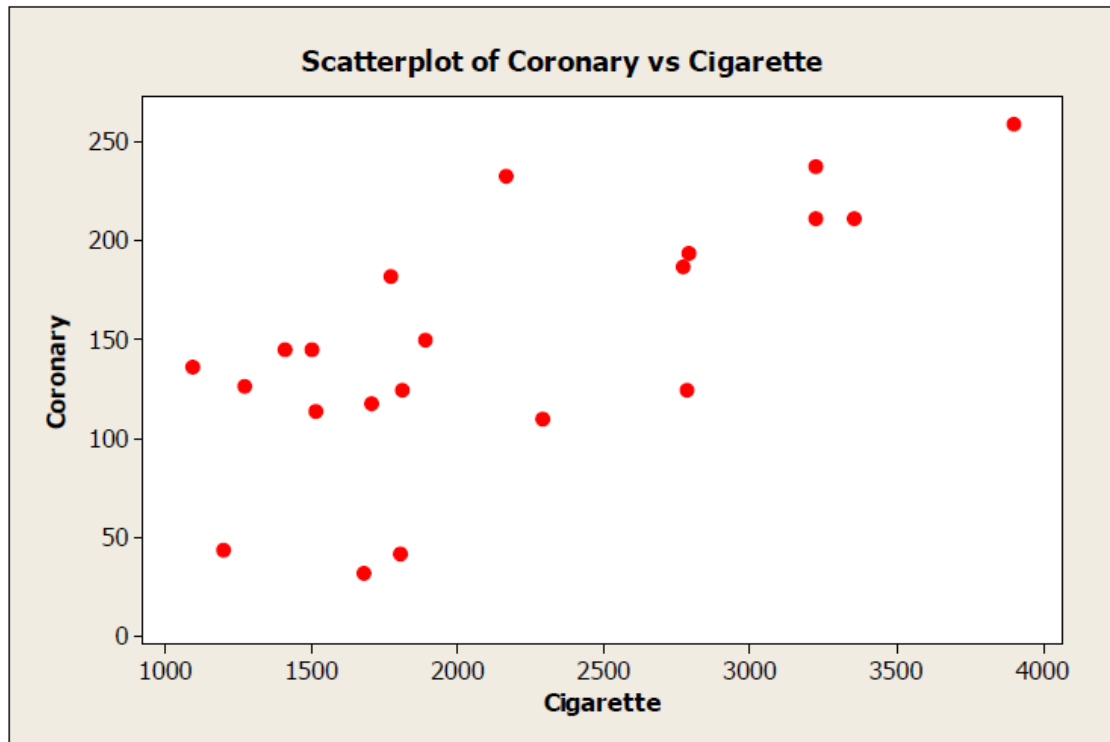
[3, 3, 3, 4, 4, 3]

B5

The following table presents data collected in the 1960s for 21 countries on X = Annual Per Capita Cigarette Consumption (“Cigarette”), and Y = Deaths from Coronary Heart Disease per 100,000 persons of age 35 – 64 (“Coronary”).

Country	Cigarette	Coronary
United States	3900	259.9
Canada	3350	211.6
Australia	3220	238.1
New Zealand	3220	211.8
United Kingdom	2790	194.1
Switzerland	2780	124.5
Ireland	2770	187.3
Iceland	2290	110.5
Finland	2160	233.1
West Germany	1890	150.3
Netherlands	1810	124.7
Greece	1800	41.2
Austria	1770	182.1
Belgium	1700	118.1
Mexico	1680	31.9
Italy	1510	114.3
Denmark	1500	144.9
France	1410	144.9
Sweden	1270	126.9
Spain	1200	43.9
Norway	1090	136.3

The following outputs were generated from running a statistical software.



Regression Analysis: Coronary versus Cigarette

The regression equation is
Coronary = 29.5 + 0.0557 Cigarette

Predictor	Coef	SE Coef	T	P
Constant	29.45	29.48	1.00	0.330
Cigarette	0.05568	0.01288	4.32	0.000

S = 46.5558 R-Sq = 49.6% R-Sq(adj) = 46.9%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	40484	40484	18.68	0.000
Residual Error	19	41181	2167		
Total	20	81666			

- Comment on the relationship between cigarette consumption and heart disease based on the given scatterplot of Coronary versus Cigarette.
- What patterns or problems, if any, do you see in the residuals versus fits plot? Would you feel reasonably comfortable in fitting a simple linear regression model to this data set?
- Write the equation for the fitted model.
- Give an interpretation of the fitted slope, $\hat{\beta}_1$.
- Compute the residual for Greece.
- Determine whether sufficient statistical evidence exists to conclude that there is a positive linear relationship between Cigarette and Coronary at the 1% level of significance.
- Based on R^2 , assess the strength of the linear relationship between Cigarette and Coronary.

[2, 4, 2, 2, 3, 4, 3]

B6

- A research design is the heart of research. Elaborate.
- Survey researchers should adhere to ethical principles when conducting surveys. The researcher has responsibilities to at least the following four categories of people:
 - The Public
 - Client/Sponsors
 - The Profession

- Respondents

Provide a short note on each of the category, which outlines the responsibility of the researcher.

- (c). A preliminary analysis of a survey of 44177 people with asthma has revealed that the condition causes frequent symptoms and substantially interferes with daily life. There is also a trend for older people with asthma to experience more problems. More information about treatment was seen by many as the best way to improve care. The impact of Asthma Survey was conducted by Gallup on behalf of the National Asthma Campaign with funding from Allen and Hanburys. Questionnaires were given to people with asthma via surgeries, pharmacies, retail outlets, the media and direct mailing in the autumn of 1995; the respondents were therefore self-selected and may not be representative of the population with asthma. Asthma symptoms were experienced on most days or daily by 41% of survey respondents, ranging from 18% of the under-11s to 55% of pensioners. Waking every night with wheeze, cough or breathlessness was reported by 13% and 43% say they are woken by symptoms at least once a week. About 20% consider that asthma dominates their life, ranging from 17% in children to 37% in the over-60s; over 40% of each age group say the condition has a moderate impact on their quality of life.
- i) How was the sample selected for this survey?
 - ii) Did the researchers use random or non-random sampling methods?
 - iii) The sample size was 44177. Why was the sample size so large and was this necessary?

[4, 8, 2, 3, 3]

END OF EXAMINATION PAPER