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THE FAILURE OF PROBITY TEST IN QUANTITATIVE DATA ANALYSIS

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ABSTRACT

Over the years social sciences have enjoyed the robustness of quantitative methods as veritable tools for data analysis. Empirical proofs based on statistical data analysis have been used to establish the authenticity of research findings. Fans of quantitative analysis have advocated the effectiveness of quantitative methods in research findings over qualitative methods. Today, scientists use quantitative methods of data analysis to arrive at empirical conclusions. As good as quantitative data analysis may be, it is obvious that it has limitations, although its proponents may not readily accept. Despite its robustness, quantitative method(s) cannot be a substitute for judgement, knowledge and wisdom, neither can qualitative data analysis. The integrity of quantitative analysis is entirely dependent on the integrity of the respondents in response to questionnaire. The study conducted on a population of over 450, had only 250 respondents. Among this figure, some respondents only completed the questionnaire for the sake of it. It was observed in our findings that respondents tend to just tick responses to questionnaires without considering the veracity of the response. This act resulted in false conclusions and destroyed the purpose of research. Quantitative methods (QM) have no facility to detect lies which can be eradicated through a qualitative study. This paper investigates instances where respondents respond to questionnaire without an in-depth knowledge on the truthfulness of the response thereby exposing the probable flaws in quantitative data analysis.

INTRODUCTION

A quantitative method aims to be objective and scientific in approach as it gives the respondents the freedom of ticking any option on a questionnaire without the option of choosing appropriate words for a question, as it is in the qualitative method. Proponents of quantitative research believe that it is reliable as it tends to remove the subjectivity of the researcher, and because it accepts sample representation as the population. It can also prove to be unreliable where respondents treat with levity the questions on the questionnaire. However, relationships between quantitative variables can establish cause and effect "in highly controlled circumstances". The quantitative research method stands, according to Popper (2005), in relation to falsification thus: ". . . theories cannot be verified absolutely and forever; however, they can be falsified – that is, they can be proven to be wrong - given a certain degree of certainty (or probability)". Theories that cannot be tested, re-tested and changed if found to be false should be dismissed. Quantitative research tests theories are open to criticism based on available statistical results.

Qualitative research on the other hand is effective for studying subtle nuances in attitudes and behaviours and for examining social processes over time. Stimson et al. (2006) stated that qualitative research is suitable for the assessment of policy development, which is a core area in this study. The main strength of this method,

then, lies in the depth of understanding that it allows. Other important aspects of qualitative research are that a small-scale sample is enough for analysis. The mode of data collection is interactive; thus, it allows new issues and concepts to be explored. The question format in qualitative research is open-ended as opposed to the closed-ended format proposed by a quantitative research approach. Qualitative research is flexible in its study design. Questions are generated based on responses from participants. Amongst all, the study design can be said to be iterative, that is, research questions and data collections are adjusted according to what is learnt (Mack et al., 2005). Qualitative research offers enough contextual and subjective materials for the research. According to Snape and Spencer (2003) and Ormston et al. (2014), qualitative research provides a deeper understanding of the social world in contrast to quantitative research.

For a deeper understanding of the thrust of the paper, the following sections are considered: the research design, the data collection strategy, results and the analysis, and the concluding notes.

RESEARCH DESIGN

It is important to state that the initial research design for the study as indicated below was not intended for this paper. The results obtained necessitated this publication.

The research design adopted in the study aimed at presenting a detailed plan for the study based on the research questions. Research design defines the type of study undertaken, whether descriptive (presented as observational, case-study, or survey), correlational (as in case-control or observational study), semi- experimental (field experiment or quasi-experimental study), experimental, review (literature or systematic review), or meta-analytic (as in meta-analysis) (Robson, 1993).

This study was conducted using the descriptive research design. Principally, science aims at description, prediction and explanation. Descriptive research design aims at providing accurate and valid representation of the factors or variables that are relevant to the research questions, but it is deficient in making accurate predictions and the determination of cause and effect. The descriptive research design is grouped into three categories namely, observational methods, case-study methods, and survey methods.

The case-study approach as a descriptive research design strategy was used in the study. This involves the use of an in-depth investigation of a phenomenon related to individuals, a group of individuals or any social setting (organisation or activity). It involved the use of a variety of data sources as cases. A case-study has a feature of flexibility (Hakim, 2000). Although the study can be very rigorous, it can also be a simple narrative description and a "selection of cases on the basis of the presence or absence of key factors rather than the use of random assignment" (Jupp, 2006 p. 20).

As a prelude to a case-study research used in the study, the following facts relating to case-study is presented here as follows: a case-study can involve a single case or a number of cases. Case studies can be descriptive, exploratory or explanatory (Yin, 2013). A descriptive case study attempts to present a full picture of the case(s) being studied. Exploratory case studies could be used to provide an initial analysis of a phenomenon capable of being systematically explored in other studies, possibly useable by other research methods. Exploratory case studies help in the development of theories capable of being used in bigger studies and over a longer

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period of time. Explanatory case studies give an account of the occurrences of an observed phenomenon in a study.

In policy studies, which are most suited for a case-study approach, and focus of the study, a major setback is the criteria for selecting the cases to be studied. A persuasive result was based on those "cases that provide a report of the operation of the policy in a range of settings" (Jupp, 2006 p. 20). The major general weakness of the case-study approach is that in most situations the individual cases cannot be used as a representative of other situations. This means that individual cases cannot be generalised, and it has been postulated that to overcome this situation a large number of cases must be selected to improve their representativeness, with possibilities of comparative analysis (Bryman, 2003). Other weaknesses of the case-study approach are expectancy effects based on the researcher's bias, and that of the description of atypical individuals leading to poor generalisations and detraction from external validity (Jamie, 2011).

Data Collection Strategy

Data collection methods employed in the study involved interviews, a questionnaire and policy documents. Thus, existing documents on the current national ICT policy were also used during the study. Interviews were initially conducted, but it was later discovered that the use of a questionnaire would bring in more respondents, thereby broadening the scope of the study and coverage of the population size. It was also discovered that there were aspects of the study that would demand the use of a questionnaire; in particular, those questions that would not need clarification of the responses. The questionnaire was thus introduced to capture those areas that the interview would not capture, and to broaden the scope and population size. The responses from the questionnaire form the central theme of this paper.

Questionnaire

A questionnaire is a practical approach to information gathering. It involves a large amount of data and a large population size. Results from a quantitative analysis can be easily quantified (scientifically and objectively), unlike interviews that take lots of effort to analyse. These characteristics make the use of a questionnaire very desirable, however, a questionnaire as a means of data acquisition has been said to have some major disadvantages as discussed in the data analysis section of this paper. Among these disadvantages are the difficulties in explaining the truthfulness of the respondents. It is also believed that respondents may not be in the right state of mind while responding to the questions. Because of these setbacks, quantitative analysis is believed to lack validity and probity (Ackroyd, 1992).

The questionnaire used in this study consisted of five sections, namely, demographic data, personnel attitude – personnel views of ICT and healthcare delivery, ICT infrastructure and policy management, e-health solution policy, and ICT end-users' view. The questionnaire development was based on the need to identify any existing problem that could be channelled through the respective policy streams identified in the framework design to produce an enabling ICT policy for the development of the health sector within the Niger Delta region. The questionnaires were distributed across the entire facilities in the hospitals visited – all categories of staff, except junior staff (cleaners, etc.) who had no link with ICT usage, were contacted.

DATA ANALYSIS AND DISCUSSION

Descriptive statistics were calculated using various statistical measures such as; mean, standard deviation, one-sample t-test, the

Pearson correlation and the binomial test, where applicable. The one-sample t-test was used in this study to test whether the average value was significantly different from the value of 3 (the central score); this was applied to the Likert scale questions presented in the questionnaire. A correlation analysis was performed to determine the degree of association between two or more variables, while regression analysis estimated the value of one variable for a given value of another (Rumsey, 2010). The binomial test was used (where necessary) to test whether a significant proportion of the respondents selected one of a possible two responses.

It was in the process of the above analysis that it was discovered that some of the respondents merely picked values that were not so much realistic considering their responses to follow-up questions captured on the questionnaire, that to a reasonable extent suggests the lack of probity in quantitative analysis which purely relies on responses to questionnaire.

Item Three - I use my personal modem to connect to the Internet during work hours

Neither agreement nor disagreement was found regarding the use of personal modems to connect to the Internet during work hours, as indicated by the result presented in Table 1. Although further comments might not have been necessary following this insignificant result, it was still necessary to state that with as much as 47.8 per cent of the respondents working with their own personal modems during office hours, there really was limited provision of IT services. It was also very likely that subscription to the Internet Service Provider (ISP) was done by the individuals themselves. Although the greater percentage of individual category responses (26%) were represented by 'disagree', the overall results were pointers to the fact that an Internet infrastructure was not readily available in most departments in hospitals visited. Comparing this result with that of Items Four and Five, it was difficult to guess the veracity of their response which raises doubt on the result of most questionnaire-based research.

Item Four - ***I use the Internet provided in my office during work hours***

The analysis of this item indicated a significant disagreement with the statement that, it was the internet provided in the office that was used during working hours ($t(244) = -16.194$, $p < .0005$) in Table 1. It was apparent from the statistics that 81.3 per cent did not use an Internet facility that was provided by hospitals. Recall that 43 per cent that disagreed with Item Three did not use their personal modems to connect to the Internet. It thus became difficult to know where to group them. If they used other means of connectivity, then who provided the connectivity? Was it possible that they and their colleagues provided and shared their own Internet facility/connectivity? With $\sigma = 1.132$, and $\mu = 1.83$, one could observe the overwhelming disagreement with this Item Four (199/245).

Table 1: Statistics for ICT infrastructure and policy management

Item	Strongly disagree (%)	Disagree (%)	Uncertain (%)	Agree (%)	Strongly agree (%)	N	Mean	Standard Deviation	t	df	Sig. (2-tailed)
ITPM3: I use my personal modem to connect to the Internet during work hours	43 (17.4)	65 (26.3)	21 (8.5)	59 (23.9)	59 (23.9)	247	3.11	1.467	1.128	246	.260

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ITPM4: I use the Internet provided in my office during work hours	129 (52.7)	70 (28.6)	16 (6.5)	19 (7.8)	11 (4.5)	245	1.83	1.132	-16.194	244	.000
ITPM5: There is a functional broadband network facility in our health facility	97 (39.6)	68 (27.8)	39 (15.9)	25 (10.2)	16 (6.5)	245	2.16	1.237	-10.586	244	.000
ITPM6: We have a functional Local Area Network in my health facility	88 (35.6)	68 (27.5)	47 (19)	34 (13.8)	10 (4)	247	2.23	1.189	-10.167	246	.000
ITPM7:The computers I work with are connected to the Local Area Network	122 (50.4)	56 (23.1)	28 (11.6)	31 (12.8)	5 (2.1)	242	1.93	1.148	-14.498	241	.000
ITPM8:Personal Computers or laptops are readily available to staff in our health facility	133 (53.2)	66 (26.4)	20 (8)	15 (6)	16 (6.4)	250	1.86	1.189	-15.158	249	.000

Item Five - There is a functional broadband network facility in our health facility

There was significant disagreement that there was a functional broadband network facility in hospitals where this study was conducted ($t(244) = 10.586$, $p < -.0005$) - Table 1. One would have expected that if 81.3 per cent didn't use an Internet facility 'provided' by hospitals (indicated in Item Four), and that 47 per cent used their personal modems (according to the result of Item Three), that the response to whether there was a functional broadband network or not would not have been significant.

Item Six - We have a functional Local Area Network (LAN) in my health facility

There was significant disagreement that the computers available were connected to the Local Area Network ($t(241) = -14.498$, $p < .0005$), as captured in Table 1. The responses to Item Six supported the earlier suppositions on the absence of adequate ICT infrastructure to drive the health sector within the Niger Delta region. 63 per cent (156/247) disagreed (of which 36% disagreed strongly - the highest in the series) that there was a functional LAN within the health facilities investigated. The mean and the standard deviation were shown in the table, indicating values tending to the lower ranges.

Item Seven - The computers I work with are connected to the Local Area Network

The responses to Item Seven indicated a significant disagreement that staff were connected to the office LAN ($t(241) = -14.498$, $p < .0005$), as presented in Table 1. The gap between those in agreement and those in disagreement was so wide that no doubt was left as to the conclusion (178:36). This was in line with the response to Item Six, and the result agreed with the qualitative analysis presented in the overall results in (Baridam, 2017).

Item Eight - ***Personal Computers or laptops are readily available to sta***ff ***in our health facility*** There was significant disagreement that personal computers or laptops were readily available to staff in hospitals where the study was conducted ($t(249) = -15.158$, $p < .0005$). The descriptive statistics and one-sample t-test were presented in Table 1. This was another significantly challenging situation. The statistics of 80 per cent (199/250) disagreement in comparison to 12 per cent (31/250) agreement spoke for itself. However, analytically criticizing the results, it is clear that the majority of the respondents were just picking values at random. The results were skewed.

CONCLUSION

As stated earlier, quantitative analysis is a great tool for empirical evidence in science, biological science, and social sciences. It has stood the test of time over the years. However, quantitative analysis depends on human inputs purely from the target population. The IBM SPSS software used is perfect and does not constitute any problem. For example, the problem with the results presented in this study are purely based on responses from the questionnaire. The conclusion, therefore, is that the integrity of the respondents largely determines the result from a quantitative research. Quantitative research will pass the probity test if questionnaire is completed with a high sense of integrity. There will be problem if members of the target population treat the questionnaire with a care-free attitude and without any sense of responsibility - the resultant quantitative data analysis will fail the probity test. This challenge can also occur in qualitative studies, but highly negligible since it involves person-to-person interaction.

Therefore, it will be recommended that questionnaires in quantitative studies be given to credible persons who must be stakeholders in the study being conducted, and who understand the implication of giving out wrong information about the subject. To this end, researchers should include a declaration page for respondents to declare their willingness to give correct responses to the best of their knowledge to questionnaire items. Questionnaires should be explicit enough to remove every form of ambiguity. Diligence is also expected on the part of the researcher during analysis.

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