

Research Article

The Utility of Mixed Methodology for Climate Governance Research in Nigeria

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Received: Apr 8, 2019

Accepted: Apr 15, 2019

Published: Apr 19, 2019

Abstract: Even before the onset of the twenty first century, the subject of research in climate change as a subset of the environment gained attention in the academia. Since the 90s, the Intergovernmental Panel on Climate Change (IPCC) continues to lead research on climate change which has gained importance owing to the trans-boundary nature of environmental issues (UNFCCC, 2014). Given the rising prominence of climate change governance as a field of study in international relations, defining the methodology for any academic investigation in this field is also of equal importance. This is due to the fact that methodology is one of the three major elements that reflect the intellectual progress of any academic field (Sprinz & Wolinsky, 2004, p.3); the other two being the empirical phenomenon and development of theory. When we consider methodology as a systematic way of testing theories, it is self-evident that methodology is critical in the assessment of any phenomenon or theory in a research area.

Keywords: Climate change, environmental issues, assessment.

Introduction

Indeed, like any field in political science, the subject of governance specifically has evolved overtime and so has her methodology. King (1991) explains that, before the 1980s, this field relied on external data sets and statistical methods from other fields in the social sciences. However, today, there are political science methodologies with tools designed to respond to political science questions. For instance, mathematical models and soft rational choice approaches are applied in the development and refinement of ideas like the hegemonic stability theory and democratic peace (Weaver, 1986; Goldman 1995).

All these reflect important developments in the conduct of international relations research, with emphasis on various methodological models. Like any specialization in political science, the subfield of climate change governance is going to be shaped by the methodology adopted and its ability to achieve its research objective. Experts have applied and recommended multi-method approach as a veritable methodology for climate change research (Lakatos, 1986). This is owing to its multidisciplinary nature. The other assumption is that cross-method analysis allows for alternate explanations in addition to its ability to compensate for the other's weaknesses (Sprinz and Wolinsky, 2002).

In line with the above, our purpose in this paper is to uphold the usefulness of mixed method approach in pursuing climate governance research in Nigeria. In this regard, we shall provide details of the methodological elements that will be deployed to achieve set objectives. This is with the conviction that methodology in social science research decides the success, reliability and validity of any academic endeavour.

Statement of the Problem

This research will establish the usefulness of mixed methodology in climate governance research in Nigeria. This is drawing from the challenge posed by existing data depicting Nigeria's initiatives on climate change which are scarce and far between (Oladipo, 2008). The conviction here is that information on Nigeria's climate change action will greatly enrich negotiations on the subject. Most importantly, detailed information on the critical areas to the climate change framework will give the needed direction on the way forward for all stakeholders. There is no doubt that if developing countries must be assisted by developed countries, the onus is equally on them (developing countries) to take practical initiatives provide information on their activities. As stated by Giddens "no amount of discussion at an international level will be of any consequence if...countries... do not make effective and radical responses to it" (Giddens, 2008, p. 3).

Critics from developed nations have observed that the inability of the UNFCCC benchmark to be met since its inception is more a function of developing nations failed action than that of developed nations. As a party to UNFCCC, Nigeria agrees to the provisions of the convention which demands member states to, "formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing...measures to facilitate adequate adaptation to climate change" (UNFCCC, 2014, Article 4.1b). Part of the problem regarding the status of developing countries like Nigeria in terms of climate change is that concrete facts about their compliance activities are hardly readily available (IPCC, 2010). Even though most authors argue that failed policies in Nigeria are due to weak institutions, the availability of research to establish this propositions in terms of climate change has continued to constitute a challenge (Okunola and Ikuomola, 2010). This outcome pose a serious threat to climate governance in the country.

Mixed Methodology and Climate Governance in Nigeria

Generally, research methodology refers to the systematic plan of conducting research. Hence, it is the procedure applied in identifying, selecting, processing and analyzing information or data in a study. This methodological framework is used in attaining the stated objectives of a study. Research methodology entails a research design, type and sources of data, population description, sample size, sampling frame and its characteristics, sampling technique and a description of the choice of data collection instruments and analyses.

Climate governance in Nigeria is better suited for mixed methodology given the emerging nature of research on climate change in social science research in Nigeria. Climate governance in Nigeria is also suited for a descriptive research design because it assumes a-priori knowledge of the research questions and problems. In addition, descriptive research design allows for diverse method of data collection that ensures adequate process and procedure in obtaining extensive information regarding the research questions. And generally, descriptive research design are amenable to a combination of qualitative and quantitative methods. The utility of mixed methodology in climate governance research is embedded in the fact that integration of qualitative and quantitative method reduces the possibility of personal bias by not depending on only one method (Schiazza, 2013).

The research design uniquely combines quantitative data that involves primary questionnaire with secondary data that are qualitative in nature. Through mixed methodology, the review of published scholarly work, Nigerian government documents and other documents alike, provide a reliable source for analysis; while quantitative research, just as qualitative research, adds scientific value by emphasizing, consistency, applicability and neutrality (Lincoln &

Guba, 1985). A remarkable feature of mixed methodology in research is that, the focus of academic analysis could be either on Nigeria's climate change actions or the activities of other actors in Nigeria. Thus, through mixed methodology, structured or unstructured questionnaire could be administered to identified respondents who could be Government officials, representatives of host communities of industry and Representatives of Non-Governmental Organisations/Civil Society Organisations, the general public etc. Mixed methodology also provides for testing both dependent and independent variables which are critical in social science research (Schiazza, 2013). The idea behind this is to obtain cross-referencing primary data as well as a range of opinions from established literature. In applying secondary data, objective measurements of climate change activity as reflected in Nigeria's weather records could be further analysed from any period and entries on Nigeria's carbon emission and ancillary anthropogenic activities during the period under review could also be analysed.

Population, Sample and Sampling Technique for Climate Governance in Nigeria

The population refers to the entire group of people, objects, events or things of interest to be investigated (Sekaran, 1992, 225). Makodi (2005) terms population as the universe of content. Explaining further, he says population can be delineated to cover what is relevant to a study (Makodi, 2005, 262). This specification is to facilitate research. For instance in studying print news and election in an area, one may delineate the population to be only magazines, newspapers or journals published in a particular period (Makodi, 2005). Going by provision for population delineation, the most critical population in climate change governance in Nigeria constitute Nigerian Government officials, Industrial Emitters and Non-Governmental Organisations (NGOs) in Nigeria who make up the main Stakeholders in Environment (ShE). The UNFCCC encourages consultation with ShE if there is to be any progress on climate change action (Dilling and Berggren, 2014). As the major actors on issues of climate change, even the UNFCCC acknowledges that their input and cooperation is central to the implementation of agreements. These groups comprises enforcers and awareness experts identified by the UNFCCC as target-professionals in Climate Change Compliance action (UNFCCC, 2004). These groups also exist in Nigeria and are involved in Nigeria's compliance to the UNFCCC. In our case, these are the main actors in climate change action in Nigeria. Responses from these groups will be analysed against documented evidence as illustrated in secondary data.

Specifically, respondents can be drawn from organisations that have existed before the timeframe of a study. This is so as to benefit from their institutional memory and knowledge of climate change action in Nigeria. In the absence of published records of population involved in climate change action in Nigeria, the researcher could adopt the formular for unknown population to determine a sample size for research. The following formular could be applied for unknown population among many others (Researchgate, 2014), Where $n = \text{population}$.

$$n = \frac{z^2(p)(1-p)}{C^2}$$

Z=standard normal deviation set at 95% confidence level

P= percentage picking a choice or response

C= confidence interval

Alternatively, sample frame from a known population could be derived using Yamane formula given its time-tested suitability in the social sciences.

Yamane (Glenn, 2002) formula for deriving sample size:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size

N = population size

e = error limit.

Sampling Techniques

Any sampling techniques could be applied for climate governance research in Nigeria. These could be purposive, Cluster, random sampling etc. as long as it can satisfy the requirement of the researcher. The questionnaire can be administered to the respondents as encouraged by the UNFCCC. Usually, purposive sampling is advisable as one of the sampling methods in climate change governance research. Barbour and Schostak (2005, p.46) expound purposive sampling as "...a sampling technique in which participants are selected because they are a purposive, although not necessarily representative, sample of a specific population; this group being 'focused' on a given topic." Given the central role of knowledge of the subject of climate change, this sampling technique is most suitable. The choice of purposive sampling is also based on its ability to meet specified targets while gathering large information for the study. Cluster sampling is another useful method recognized by the UNFCCC as well as random sampling to allow every respondent equal opportunity to be selected for the study without bias. Thus using these different sampling techniques, a sample frame of respondents could be drawn from the population.

Methods of Data Collection

Data can only be meaningful or relevant when analysed to achieve the objectives of the research. This involves the establishment of categories and their application to data and statistical tools (MacCallum, Widaman, Preacher & Hong, 2001). Consequently, since the climate governance research combines two methods of data collection, primary data will be collected through the administration of questionnaire in a field survey. Structured questionnaires designed with uniform questions can be administered on selected respondents through purposive sampling and random sampling.

Bolsten and Lindsay (1989) describe questionnaire as the most popular instrument of data collection. Reliable and valuable information can easily be collected and analysed to confirm or reject research propositions or null hypothesis through questionnaire. In fact, Kerlinger (1973) avers that questionnaire is so widely used that more than half of most social science researches conducted use questionnaire as data collection method.

In climate governance research, questionnaires could be structured or unstructured questionnaire with open ended questions. The objective here is to grant respondents the opportunity to freely express their opinions in detail. The questionnaire schedule should specifically capture the items in the research questions under three subsets using a preferred rating scale as a measurement technique. For example, with likert scale, respondents provide their level of agreement or disagreement with statements based on a set of graduated response options which will facilitate quantitative analysis of hitherto qualitative attitudes, opinions or values (Mbonu, 2005). The other data collected for climate governance study under mixed methodology is through documentary method. Being that the research is usually post hoc (events or facts that occurred in the past), these documents and official records are useful past events whose context are not dependent on a researcher's subjectivity (Onyema, 2005). Through target isolation of materials, this documentary method saves time and it is less cumbersome. Documents here include where we shall derive our quantitative data, books,

journals, articles, workshop papers/seminar, magazines, newspapers, printed materials from existing policy documents from International Organization and Non-Governmental Organization as well as internet sourced materials that deal with Nigeria's Climate Change activities and policies. Local sources of such documents could include the Ministry of Environment, Nigeria Energy Commission, Nigeria National Petroleum Corporation, Nigeria Environmental Standard Regulatory and Enforcement Agency, libraries of research institutes and the Nigeria Meteorological Agency (NiMET) etc.

Techniques for (Statistical) Data Analysis in Climate Governance Research

Using descriptive method, data from the field as well as documentary evidence can be analysed via integrated data analysis otherwise called triangulation. Here description shall involve the use of percentages, frequency distribution tables, histograms and charts as tools of analysis of data. Frequency distribution tables, simple percentages and mean criterion will form the basis for deciding whether to accept or reject the research proposition and questions raised.

The above technique is derived from the need to allow knowledgeable experts express how much they agree or disagree with a particular question on the questionnaire to provide the research with measurable data to assess the extent of climate governance initiatives in Nigeria.

Given the descriptive nature of research, bivariate or multivariate trend analysis based on time series model could also form part of this triangulation. This technique refers to the practice of collecting information in order to spot a pattern using two or more variables at a time. It can be used both for the future and to spot uncertain events in the past (Mbonu, 2005). Using graphs and tables, the study could establish the nature of Nigeria's emission activity for the period under review, taking cognizance of the country's UNFCCC voluntary commitments. Given the centrality of rainfall, temperature and carbon emission/gas flaring to weather and climate, entries on Nigeria's performance on these indices could be analysed to spot the pattern of climatic changes.

In the above process the research could depict the longitudinal pattern of climate change action in Nigeria. In trend analysis, variables are observed over the years. "Time" counts or exists as a variable and it is accepted as a factor responsible for changes in the variables (Onyema, 2005, p.75). Thus time shall be stated as "T" in the design. Each set of observation shall be directed at different sample (Time) of the same phenomena (climate). This method is aimed at facilitating the collation of data for answering research questions as well as describing the changing pattern of these variables.

Under the time series model, simple regression is usually applied to understand the relationship between variables.

The formula for simple linear regression equation is indicated as:

$$E(y) = (\beta_0 + \beta_1 x).$$

Where

β_0 = the y intercept of the regression line.

β_1 = the slope.

x = the independent variable

E(y) = the mean or expected value of y for a given value of x.

Table 1. Proposed critical weather indices for trend study

S. No.	Weather Index	Period of Assessment
1	Rain	2008-2017
2	Temperature	2008-2017
3	Humidity	2008-2017
Source: To be Determined		

Content Analysis Technique

Mixed methodology also entails a nuanced qualitative discussion to explore Nigeria's climate governance performance. This will involve analyses of the outcome of our administered questionnaire. The textual analysis here should also expose Nigeria's performance in terms of climate change policy action and examine Nigeria's environmental needs with a view to repositioning Nigeria's climate change actions. Content analysis is adopted given the imperative to analyse data related to our study. The logical character of content analysis makes it useful in objective description of the manifest content of communication. Moreover, this method enables a researcher to "scrutinize the content of a document in order to quantify the message it relates (Onyema, 2005, p.74). Thus reified content analysis with its rigorous and systematic analysis of contents of documents becomes appropriate in the analytical technique. In light of the above, the mixed methodology provide documented description of Nigeria's emission records. Secondly it captures the driving force behind Nigeria's governance initiatives. The analytical narrative here will be used to address issues relating to the pattern of Nigeria's actions vis-à-vis the outcome of the interview survey conducted.

Reliability

Reliability refers to how data collection methods would yield consistent findings if replicated elsewhere (Tanyanyiwa and Kanyepi, 2015). This is achieved here through the logical principle of induction drawn from our scientific analysis of quantitative data.

Validity

Validity is the accuracy of data collection methods (Tanyanyiwa and Kanyepi, 2015). The application of triangulation will achieve this task in our study. The combination of quantitative and qualitative approaches is intended to reinforce each other and grant validity of the outcome of any study (Lincoln and Guba, 1985). This method draws parallels between compliance action in Nigeria and other developing countries to provide conclusive explanation for convergence or divergence (c.f. Shoonenboom and Burke, 2017). In essence, it is criterion-related validity since it involves content validity that compares our results with one or more external variables known to measure the attributes under study (Makodi, 2005). This integration produces a better and more complete understanding of the phenomenon under study "as compared to what might have been produced by either method alone" (Shiazza, 2013, p.20).

Justification of Methods

The inter-disciplinary character of our study involving natural sciences and values in the social sciences makes it amenable to integrative method of inquiry. Our focus on Nigeria satisfies the academic standard for research to be specific in terms of time, issue and location as preferred in this study. This is in agreement with Yin (2005) who states that a research depicting location "is a thorough evaluation of contemporary phenomenon in the context of the actual events; when limitations between phenomenon and context are not quite obvious; and in which several sources of evidences are applied." (Yin, 2005, p.58). Our application of

trend analysis in specific contexts is based on its suitability for the descriptive evaluation of performance over a period. It is also amenable to clear explanation using descriptive method without losing its essence. Given the linear nature of our study, trend analytic technique facilitates our computation of climate change records for the duration of our time frame.

Conclusion

Through mixed methodology in climate change governance research, quantitative and qualitative data are harmonized to provide a balanced perspective. Given the nascent nature of climate governance in Nigeria, mixed methodology provides the avenues for dialogue between variables in the natural sciences and humanities. Through such integration of data, research is enriched and climate governance is improved upon by all stakeholders. And with the limitations associated with the separate use of quantitative or qualitative methodology in climate governance research, mixed methodology emerges as a veritable tool for undertaking climate governance research in Nigeria.

Conflicts of interest: The authors declare no conflicts of interest.

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Citation: Zakari F. Zirra, Usman Abu Tom and Modibo, A.S. 2019. The Utility of Mixed Methodology for Climate Governance Research in Nigeria. *International Journal of Recent Innovations in Academic Research*, 3(4): 163-170.

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