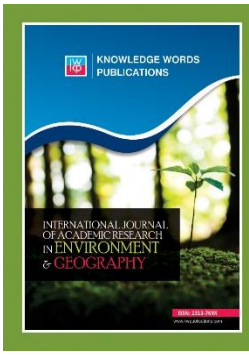

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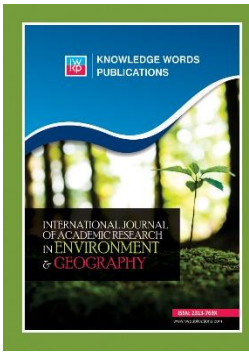

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The Usefulness of Applying Quantification, Statistical Method and Computer Programming in Geographical Explanation of Phenomena

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Abstract
Geography over the years faced varying degrees of difficulties in explaining and quantifying complex geographical phenomena in space. This is because the techniques involved in the handling of such complex geographical phenomena were on available and limited in ideological conception. This factors limited geographical knowledge to a mere descriptive explanation. This situation of non-scientific inquiring presented geographical knowledge to a high level criticism. Plato, Aristotle ptolemy and many other geographical scholars having been confronted with different complex variables on the earth surface with unanticipated complexity such that the need to apply quantification in other to separate similar but varying geographical data became inevitably clear. This ushered in the use of Mathematical application in solving geographical data; relying on the improvement and the usefulness of geographical data in resolving complex geographical variables. This paper argues that geography will effectively and accurately resolve the issue (problem) of what is where, and why through a systematic classification that involves the use of quantification (scientific method). in explaining the phenomena in space.
Keywords: Quantification, Statistical Method, Computer Programming, Geographical Explanation, Phenomena.

Introduction

Geography is a science discipline that studies the earth surface and the relationship between earth, man, and his environment. Geography generally studies earth bound phenomena together with their inter-relationships. Consequently, there is a tendency for some geographers to gaze at the diversity of earths humanised land-scapes and deduce or inter explanations of man's use of the natural resources. The concomitance is that there are as many definitions of geography as there are writers who have different viewpoints of what the subject is all about Jeje (1989:4) listed only a few definitions of geography as follows:

1) Geography is the science that describes the earth's surface with particular reference to the differentiation and relationship of areas (Kinvig, 1965:158).
2) Geography is concerned to provide accurate orderly and rational descriptions and interpretations of the earth's surface (Shrone, 1959:21).
3) Geography is the study of spatial distribution and space relations on the earth's surface (Ackerman et al., 1965:8).
4) Geography helps us to understand the earth as the world of man with particular reference to differentiation and integration of place (Brook, 1965:70).
5) Geography offers a broad synoptic view of spatial relationship in human affairs (Smith, 1977:2).
6) Geography is the study of the earth's surface as the space within which the human population lives (Haggett, 1981:133).
7) The focus of all geographical enquiry is place. This implies location on the earth's surface, the relationship between it and other locations and the processes affecting changes in those relationships (Jones, 1984:5).
8) Geography is concerned with synthesis in space and time.
9) Geography deals with open systems but places more emphasis than other disciplines on synthesizing the interactions of regions (Sayer, 1985).

Based on the above definitions, Amadi. C. Harrison agrees with Kinvig's (1953) observations that geography is the science that describes the earth's surface with particular reference to the differentiation and relationships of areas. These observations may also be one reason why Jeje (1988) viewed geography as a science of the spatial organisation of phenomena on the earth's surface aimed at achieving the most efficient spatial pattern that is capable of providing high quality of human life. The quality of life exhibited by man in any society is as a result of spatial organization adopted by geographical technique of inquiry and explanation of the differential existence of the environment and geographical features. This is because earlier before now there has been a deplorable level of ignorance among the general public about certain substance occurring on the earth surfaces arising from man's activities and as such need to be subdued and resolved by the concept of modern geography.

From the foregoing definitions, it is obvious that there are several schools of thought in geography. Each school of thought defines geography differently and invariable, they are bound to use different approaches. Must geography definitions accept that the focus is on the earth's surface but the ambiguity stems from what constitutes phenomena, and their interrelationships; hence, other phenomena abound on the earth surface; it is important to know therefore that other earth-bound phenomena are too unwieldy to be the subject matter if one discipline since it connotes physical and human elements. The German geographers favoured the physical aspects and employed the inductive scientific method to resolve identified geographical problems; this inductive scientific method could be referred to as positivism which may be described as deterministic in nature because of its realistic position in sieving and classifying data with similar identity that may not belong to same category but are interrelated in space and in existence. While, the French school learned more on the human aspects and its schools are referred to as possibilists whose philosophy stresses that man's actions are not determined by the environment but instead the environment offers possibilities from which man charts his line of action. This method of possibilities is described as deductive methodology.

However, the obvious thing about geographical explanation of phenomena is the fact that geography as a discipline has undergone what i may call genetic evolution over the years.

As a result of the genetic evolution of geography, what constitutes the field of study of geography gives rise to the various schools of thought which range from the landscape school of Sauer, to the school of Areal Differentiation of Hartshorne, to the Ecological school of Barrows, to the Locational and Spatial organisation school of Grould, to the Behavioural and Theoretical school and until recently the school of phenomenology and Existentialism. While the physicalists articulate the role of physical environment, the behaviourists emphasize the role of man in the man environment system; and now as applied science.

Over the years and more recently Geography has further extended its scope and interest in understanding more geographic knowledge with regard to multiple number to complexity of phenomena and at the same time concerned more than others with individual cases; this is because geography now is viewed as applied science which advocate for problem solving approach. The application of complex geographic knowledge in proving mans ability and efforts in effective and efficient solving of spatial organisation of space seem to be influenced by the use of quantification method, this is because what seems to be the greatest controversy in geography is embedded in its methodology. The quantification method which deal with measurable data, can easily be quantifiable phenomena and as such can employ or use mechanistic, stochastic, statistics models and quantitative techniques in resolving such controversy in geographical explanation of phenomena in space. The paper critically examines the hitherto unconsidered but probable "the usefulness of applying quantification, statistic methods and computer programming in geographical explanation of phenomena in space in order to the relevance and influence played by a given dependable and independable and independable variables in a circumstance.

The next section of the paper will look at what is quantification, the usefulness of statistical method, and computer programming in geography. The third section examines the need of applying scientific method n geographical explanation of phenomena in space while the fourth section concludes the paper.

Quantification in Geography

The decade starting from 1950 witness what is referred to as the quantitative revolution in geography. Of a truth, not that quantification is new to geography, no, what is new is the level of sophistication of the quantification technique involved in the handling of complex geographical phenomena in space which generate data analysis. The early geographers identified the need to apply quantification in geographical application of phenomena. Those who conceived this idea are Plato, Aristotle, Ptolemy, Erasthotenes, Strabo, Kant, Humbolt, Ritter Semple, Sauer, etc. Thus Aristotle stressed that for anyone to be a geographer, he must first be a mathematician, this reason is because geography deals with spatial differences of geographical features that are numerous in nature and as such brings the questions: what is where and how?. What is where and why? The answers to these questions led to the growth and development of what we may call systematic classification which now may be studied in detail, for instance classifying a segment of a region and studying them instead of the region itself. Simmons and Cox (1985:45) refer to these as holistic approach and reductionist view points, and in a well

hackneyed phrase they assert that "the whole is more than the sum of its parts"; the parts been a representative segment in the whole form an Integra part of geographical analysis.

The implication of these possibilities for geographical explanation is the fact that the methodology and philosophy of the subject are obvious. James (1972:71) asserts that ever since Hacataeus, there has been a literary tradition in geography; ever since Anaximander, a Cartographic tradition; and ever since Pythagoras, a mathematical tradition which has become the predominant tradition of the subject since the 1950s. The enabling philosophies for these parading shift have been empiricism and positivism which is also the driving force for the natural sciences. The geographical researcher today gains much from the collection of data or information about the problem identified with a view to subjecting these data to the rigour of statistical analysis as a means to arriving at geographical truths of explanation. The geographical researcher does this through the use of two different data platform available at the disposal of geographical explanation; these data are the qualitative and quantitative data.

The Qualitative Data

The qualitative data arise when the observation and or the geographical researcher fall into separate distinct categories with no notion of numerical magnitude. Such data are measured on the nominal or ordinal scales. Normally nominal scales are mainly classified and there is no natural order between the categories which are also mutually exclusive, as no individual can belong to more than one category. Those kinds of data are inherently discrete in nature and as such there is a finite number of possible categories into which each observation or explanation to their nature may fall; these type of data includes but are not limited to

1) Individual eye colour: Red, white, green, brown, and yellow.
2) Gender personality: Male, female.
3) Types of chair: Plastic, ion, wood and rope.
4) Building types: Glass, block, wood and metal building.
5) Students result: Pass or fail.
6) Diagnosis of medical types: Hivinfectios, Ebolla disease, asthma, cancer of the skin, hypertension, diabetes mellitus and tuberculosis.

While in the ordinary scale of measurements an ordering of data exists as such the mutually exclusive categories are graded and classified for categorical explanation of each of the data measurement. It is however sometimes referred to as ranking scale. This type of ranking scale include the following but are not limited to them:

I) Educational qualification: Teachers grade II certificate, NCE, B.Ed, B.Scor B.A, PGDE, Masters and PhD degrees.
II) Socio-economic status: Rich, moderatly rich, poor, or high class, middle or low class, and or
III) Level of pain: Severe, moderate and mild
IV) Death and survival

The assemblage of data collected on these scales are referred to as categorical data which is in turn quantified for either descriptive purpose or for drawing inferences or both.

The Quantitative Data

The quantitative data has the influence or notion of numerical magnitude. This is to say that the values are expressed in numbers such that the units of measurements are well known; this is because they are measured on the interval scale; even though they may have all the properties of norminal and ordinal scales. It is important to know that in the Interval scale of measurement, the zero level is always arbitrary but the differences between successive points are equal. Example, the difference between 70% and 71% is the same as the difference between 71% and 72% and these can be seen in student's scores during examination result of student's performance in school. Another example can be taken from a patient "temperature measured on either Celsius or Fahrenheit units". Normally, the scale has both numerical magnitude, direction (interval) and an absolute or true zero. In this case, both weight, height and age all of them have absolute zeros regardless of their units of measurements. For example, zero centimetre equals zero feet of height is measured on either unit of the scale measurement.

Any data on these scales of measurements are said to be discrete of the measurements are integers-assuming only whole numbers or counts. Examples are number of building in an area, number of students in a class. They are continuing if the measurements can take om any value. Usually within some range in a continuum. A good example of this is the students score in a geography test, this is seen as a discrete variable while weight for instance is a continuous variable in this instance.

Usefulness of Statistical method

In the cause of geographical explanation, statistical quantities employed in data analyses are useful for either descriptive purposes or for inferences or both. In research however, there are some specific situation that requires date situations and this requires strong dependence on the nature of the statistical questions at hand which has arising from the problem identified the common standard statistical procedures which cut across all disciplines are univariate analysis, bivariate analysis or multivariate analysis these procedures serves as a spring board for specific nature of data analysis.

The nature of statistical analysis depends on the research questions which generally dictate the study objectives in the problem identified; the research problem inform the type of data to be collected and as such this bring in mind the likely objectives of such study. The objectives of most studies however arise from the need to:

I) Estimate certain population parameters.

II) Find relationships between variables to explain observed effects and/or to predict future events from observed data.

III) Compare attributes of data in many groups.

IV) Determine the best factor and or opportunity or even interventions to produce certain results that will account for the realistic situation on ground

The researcher here having observed the nature of the problem at hand will be able to identify the extent of statistics of the study; such that provides the needed technique and be able to know if the study will only need description statistics or will require any other mathematical techniques to test the stated hypothesis so as to draw appropriate inferences from the data.

Infact, the obvious reality in the application of statistical and mathematical techniques theorems and proofs in understanding and explaining geographical systems is in its self-

quantification in geography; and these amounts to counting figures or measuring how many cells you have in a specific tissues or culture. It could also be the different stages of sieving substances. It could even be the total cell number, viable cells or fix specific antibody stained cells. In short, the application of statistics gives room for several methods.

Other usefulness in statistical geographical explanation is the fact that it allows room for the study and practice of collecting, analyzing and presenting of data that has a geographic or areal dimension, for instance Census or demographics data which requires field observation and collection of real figures which is inturn subjected into critical calculation that involves techniques from spatial analysis to understand the influence of various categories to the analysis.

Contemporary geographical study analysis and explanation has shifted from mere exploring how features are distributed on a physical or cultural landscape, as well as observing spatial patterns and the variation of phenomena. The use of statistical tools to resolve the geographical problems in space help to determine why a specific spatial pattern exists, this answers the 'why' question in any problem identified.; such that it takes care of what spatial or ecological processes may have affected a pattern, and why such processes operated in such area or unit of geographical location; this environmental situation of an area could be observed by the means of various statistical techniques and procedures through the application of data collected and summarized which gives statistics the needed sound analysis and interpretation of results for such problem at hand.

Frankly speaking, geographers in their quest to give a sound analysis and interpretation of result of any identified problem uses statistics to:

1) Describe and summarize spatial data
2) Differentiate the complex relationship found in multiple variables in a unit.
3) Learn whether an actual spatial pattern matched some expected pattern.
4) Make generalizations concerning complex spatial patterns.
5) Estimate the probability of outcomes for an event at a given location.
6) Determine if the magnitude or frequency of some phenomenon differs from one location to another.
7) Sample geographic data in other to infer characteristics for a larger set of geographic data or population of such study.

It is important to know at this point that in employing statistics particularly with the use of spatial data and descriptive statistics; it has been observed that there are noticeable potential difficulties associated with the analysis or explanation of spatial data, among these are boundary delineation ,modifiable areal units, and the level of spatial aggression or scale. In each of these cases, the absolute descriptive statistics of an area- the mean, median, mode, standard deviation and variation are changed through the manipulation of these spatial problems as identified.

Computer Programming in Geography

The application of computer programming in geography has drastically transformed both the world of geography as an academic discipline and the geography of the world in which we live; this is because computer can be employed to do lots of versatile job ranging from collection of data passing through subjecting such data into critical manipulation, analyzing such data, encoding such data into map and producing such data into visualization. Computer has provided geography with automated application which has revolutionized and expanded the scope of

making inquiries and improve greatly the research work in geography, by so doing complex and vigorous data analysis are reduced into simple and clear explanation which also provide easy calculations for the basic understanding of step by step analysis of a given problem.

The computer does this through the central processing unit (C.P.U), this unit has a large space in which data are stored having received instructions from the soft-wares, the information (data) then is transmitted to the compiler which converts the instructions given to the computer language of binary codes and transforms the information having checked if such information are correctly stated in other to avoid "garbage in, garbage out".

Obviously, the use of computer application in geographical study and analysis help to bring about an in-depth study of geographical features as well as subjecting such study into a critical analysis of the otherwise complex sets of phenomena in nature as may exist. The ability of every geographers to employ the use of quantification, statistical methods and computer programming in studying and explaining geographical phenomena depends on the painstaking collection of reliable data about earth surface phenomena which are put into formats that are amenable to computer analysis, hence the use of computer helps in the simplistic quantification of measurement of numerous elements in the geographic environment.

The Need of Applying Scientific Method

It is important out this point to usher a brief history of the need to apply scientific method in geography. Before 1950 there was a growing concern that surrounded geographic inquiry, hence the existing paradigm (methodology) for geographical research and explanation was not adequate in explaining how physical economic, social and organized and or ecologically related; geography was also unable to explain how an outcome of a particular feature or phenomena generated by them are evidence for a given time and place given the prevailing processes of such outcome.

Sequel to the concern, a growing number of geographers started expressing their dissatisfaction with the traditional paradigm of the discipline and its focus on regional geographic mentality, observing the inquiry and explanation of geographic feature as too descriptive, fragmented, and non-generalizable. In other to address these concerns, early critics such as Ackerman propose the systematization of the discipline; while many others opted for methodological approaches such as the likes of Schaefer vs Hartshome debate. In 1953 exceptionalism in geography: a methodological examination was published. Schaefer in this work rejected Hartshome's exceptionalist interpretations about the discipline of geography since it considers the region as its central object of study. Instead, Schaefer envisioned as the discipline's main objective the establishment of morphological laws through scientific inquiry; this means to say that geography should incorporate laws and methods from other disciplines in the social sciences that place a greater emphasis on processes.

Conclusion

During the late 1940s and 1950s there was vigorous paradigm shift in the explanation of geographical phenomena that ushered in quantitative revolution (QR) which sought to develop vigorous and systematic methodology to explain geographic phenomena. Earlier in history geography had suffered a general inadequacy in the explanation of general spatial dynamics of the environment that led to the shift from a descriptive (idiographic) geography to an empirical

law making (nomothetic) geography. The obvious fact in this conclusion is that geography having identified the need and usefulness of applying scientific method in geographic inquiry and explanation; it became more useful for geography to continue to develop that status of a prescriptive and predictive science that develop and use laws as well as classical theories in resolving complex and multi-complex environmental changes that has bedevil the world today through the applicability of quantification method in unveiling the complex challenges of the work that will be strictly judged on its scientific validity that will turn and reposition geography into a nomothetic science that will guide the world; through an inquiry of a numerical quantification that will enhance the classification and interpretation of geographical explanation as an in depth analysis of the otherwise complex sets of phenomena in nature.

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