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# Theoretical Framework And Its Relevance To Geographic Studies: An Application Of Innovation Diffusion Theory In CWM

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### ABSTRACT

This paper examines the meaning of concept, theory and theoretical framework and their relevance in geographic studies. In particular, the paper discussed the rationale behind the formulation and application of theoretical framework in carrying out a reliable geographic study. A categorical distinction in the use of 'concept' and 'theory' interchangeably was established and it was reiterated that every science has a goal, especially in the understanding and explanation of the real world phenomena. The paper also reiterated that although geography is short on theories and long on facts, yet development of theory seems to be vital both to satisfactory explanations and to the identification of geography as an independent field of study. An empirical application of innovation diffusion theory in geographic study (collaborative web mapping – CWM) is presented. The paper concludes that, like the human body, a theoretical framework plays a central role in geographic studies because it is the skeleton on which principles, methods and overall research goals are hinged.

**Keywords:** Concept, Geographic Studies, Theory, Theoretical Framework

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## Introduction

We live in a complex and dynamic geographic space with many phenomena requiring explanations, and by asking questions and searching for answers, we understand the world better hence, the need to carry out research that can stand the test of time in theory and in principle (Hawking, 1988; Obadan, 2012). It is common to observe in many studies where conceptual issues are discussed but the theoretical basis on which the entire research is built is often neglected (Imenda, 2014). This is, however, not the case in many geographic studies because geographic research, like many other types of research in scientific disciplines, is geared towards generating new knowledge and promoting the growth and development of nations (Obadan, 2012).

According to Akinbode (1996), research method in geography involves all the processes of field investigation, data collection, data processing and analysis, data classification and interpretation as well as tests of significance which are designed to establish the critical level of association among diverse geographic variables. Thus, achieving a reliable research that integrates all the above processes without a working framework may lead to uncoordinated research and unsatisfactory result. Theories, therefore, prove that there is 'some hidden order within chaos' and the geographers' task is to search for that order (rule or law) (Rana, na). This is because, as reiterated by Imenda (2014), research is "guided by theory". The suggestion here is that without 'theory' research would lack direction – and this explains why in every research, one is expected to present one's 'theoretical' framework.

## Concepts, theories and theoretical framework in geographic studies

In literature, many definitions abound. In this paper, some salient and more meaningful

definitions in relation to geographic studies are provided.

### Concept

Hornby (2005: in Imenda, 2014) argued that defining concepts is not an innocent exercise because meanings and interpretations of concepts are largely influenced by their context. He further stressed that concepts reflect theoretical concerns and ideological conflicts and as such, definitions have their defenders and critics. In this paper, a concept may, therefore, be regarded as a generalized notion about a geographic phenomenon. To Liehr and Smith (1999: 7), "a concept is an image or symbolic representation of an abstract idea". Chinn and Kramer (1999: 252) defined concepts as "the components of theory which convey the abstract ideas within a theory"; they also see a concept as a "complex mental formulation of experience". Concept can, therefore, be regarded as the fundamental building blocks of a theory, the idea that one seeks to explain.

It has been argued that geographers have in the past developed concepts to facilitate explanation and that such concepts may ultimately act as the basic postulates for theory in geography (Onokerhoraye, 1994). As reiterated by Onokerhoraye, concepts used in geography may be (i) indigenous (developed in geography) or (ii) derivative (developed outside geography but used or applied in geographic studies). For example, it is a well-known fact that 'the sun rises from the east and sets in the west'. The notions of 'sunrise and sunset' are conceptual issues and fundamental laws which may necessarily not require empirical validation as mere observation is enough.

### Theory

In geography, "scientific explanation is closely associated with the formulation of theory" (Onokerhoraye, 1994: 155). A theory may be defined as an 'expression of knowledge, a creative and rigorous structuring of ideas that project a tentative purposeful and systematic

view of phenomenon” (Chinn and Kramer 1999: 258). According to Rana (na), a theory is defined as “a system of ideas explaining something”; or “a system of ideas based on general principles independent of the facts or phenomena to be explained”; or “a scientific statement or a group of scientific statements”. In addition, a theory may be regarded as “a set of interrelated propositions, concepts and definitions that present a systematic point of view of specifying relationships between variables with a view to predicting and explaining phenomena” (Liehr and Smith, 1999). In view of the complexity of a theory from mere statement or propositions, the word ‘theory’ has been defined by the American Academy for the Advancement of Science to be “a comprehensive explanation of an important feature of nature that is supported by many facts gathered over time” (Weisenmiller, 2008: 2). These all-encompassing definitions signify the relevance of user-validity over time (Fox and Bayat, 2007).

### Components of a theory

A theory has four components. These components according to Wacker (1998: 363) are:

- i) definition of terms, concepts or variables,
- ii) a domain to which the theory is applicable,
- iii) a set of relationships amongst the variables, and
- iv) specific predictive claims.

From the above submissions, a theory is, therefore, a careful outline of “the precise definitions in a specific domain to explain why and how the relationships are logically tied so that the theory gives specific predictions” (Wacker 1998: 363-364). Thus, a good theory is taken to be one which gives a very clear and precise picture of events of the domain it seeks to explain.

### Key features of a good theory

According to Wacker (1998: 365), the followings constitute the virtues and key features of a good theory:

- i. uniqueness – that is, being distinguishable from others;
- ii. conservatism – a theory persists until a superior theory replaces it;
- iii. generalizability – the greater the area a theory can be applied to, the more powerful it is;
- iv. fecundity – a theory that is more fertile in generating new models and hypotheses is better than one that generates fewer;
- v. parsimony – other things being equal, the fewer the assumptions the better;
- vi. internal consistency – a theory that has identified all the relationships on the basis of which adequate explanations are rendered;
- vii. empirical riskiness – any empirical test of a theory should be risky; refutation must be possible for a good theory; and
- viii. abstraction – the theory is independent of time and space, usually achieved by adding more relationships.

### Types of theories in geographic studies

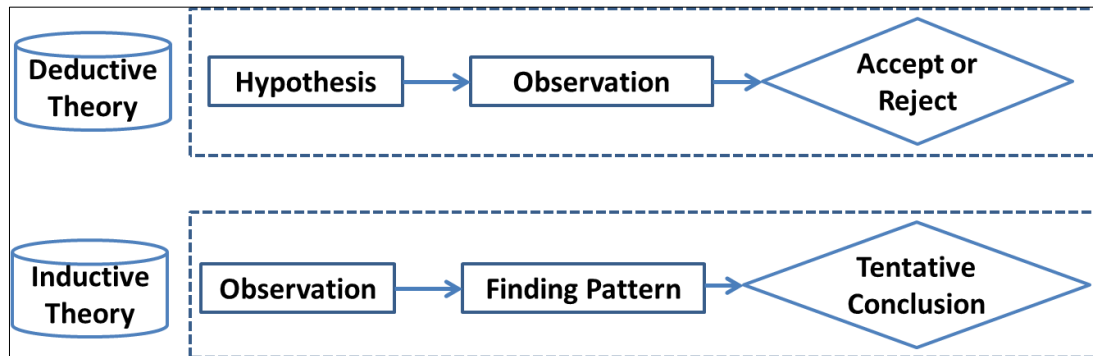
Theories can be categorically classified into two types depending on the logic behind their formulations. They include:

- (i) **Inductive theories.** These set of theories are formulated from particular instance to general principles. In inductive reasoning, geographers use specific instances or occurrences to draw conclusions about entire classes of objects or events” (De Vos *et al.*, 2005: in Imenda, 2014). In this approach, one starts from observed data and develops a generalization which explains the relationship between the objects observed. The inductive theory is, therefore, a means by which general principles are developed from specific observations. It forms the basis upon

which the *Conceptual framework* is built (Figure 1) (Liehr and Smith, 1999).

- (ii) **Deductive theories.** Deduction moves from the general laws to a specific case scenario. "It moves from a pattern that might be logically or theoretically expected to observations that test whether the expected pattern actually occurs" (De Vos *et al.*, 2005: in Imenda, 2014) Thus, a researcher following a

deductive approach starts by specifying the theory guiding the study – in the process, citing the main points emphasized in the theory, and illustrating how the main aspects of the theory relate to the research problem (Imenda, 2014). Deductive theories are, therefore, means by which specific expectations of hypotheses are developed on the bases of general principles or laws.



**FIGURE 1: DEDUCTIVE AND INDUCTIVE LOGICAL MODEL**

### Implications of deductive and inductive theories in geographic studies

In giving an exposition of a theory, one needs to bring into the discussion the main proponents as well as detractors and critics of the theory in order to offer a balanced argument and a logical structure to follow (Cline, 2002). However, it helps when a researcher successfully demonstrates that despite criticisms of a theory, it is nonetheless supported by other experts in the field, particularly with respect to research problems of the class of the one the researcher is pursuing. The following specific arguments are raised:

- Liehr and Smith (1999) associate most theoretical frameworks with quantitative research, which in turn tends to rely on deductive reasoning (see Figure 1), whereas most conceptual frameworks are associated with qualitative research – mainly utilising inductive reasoning.
- The deductive theory can be viewed as a scientific and empirical tool for explanation of patterns and regularities because it starts with a hypothesis (a

scientific proposition awaiting an empirical validation) whose result may be accepted or rejected against a set standard of investigation.

- In addition, in deductive research, researchers normally use a dominant theory to address a given research problem, while in inductive research, many aspects of different theoretical perspectives are brought together to build up a generalisation with enough "power" to guide the study (Liehr and Smith, 1999).
- On the other hand, the inductive theory begins with observation which ultimately leads to finding patterns whose conclusion are usually tentative on assumptions made about them.

### Geographic laws and its relationship with theories

Onokerhoraye (1994) noted that a number of human geographers such as Bunge, Haggett and Harvey have pioneered the argument that laws can be conceived and applied in human geography as most of the existing laws used in

physical geography are from disciplines like Physics, Chemistry and Biology. By implication, 'laws' are simply universal generalization of classes of facts hence, they are discovered and not created and are used in the explanation of phenomena. In general, laws are derived from theories on the basis of data gathered. In other words, theory may be defined as embodiments of systematic laws and facts that are used in structuring the problems under investigation. From the arguments presented above, we can conclude that a theory is the building block upon which geographic researches are conducted. That building block must have a framework in research execution. Then what is a theoretical framework?

### **Theoretical framework**

Imenda (2014: 189) defined a *theoretical framework* "as the application of a theory, or a set of concepts drawn from one and the same theory, to offer an explanation of an event, or shed some light on a particular phenomenon or research problem". In theoretical framework, the defining characteristic of a scientific theory is that it makes falsifiable or testable predictions - the relevance and specificity of which determine how potentially useful the theory is. Accordingly, a purported theory that makes no predictions which can be studied or systematically followed through is of no use (Imenda, 2014). From the foregoing, a theoretical framework of a geographic study relates to the philosophical basis on which the research takes place, and forms the link between the theoretical aspects and practical components of the investigation undertaken.

### **Some of the theories used in geographic studies**

In geographic studies, theoretical framework may refer to the theory that a researcher chooses to guide a research. Whether indigenous or derivative (Onokerhoraye, 1994), some of the theories used in geographic studies include:

- a) the innovation diffusion theory by Torsten Hagarstrand (Hagarstrand, 1967),
- b) the Set theory in quantitative techniques,
- c) theory of evolution credited to Charles Darwin in 'geographic thought, philosophy and methodology',
- d) the Central Place theory by Walter Chrystaller,
- e) the industrial location theory by Weber,
- f) the Von Thunens theory of Agricultural location,
- g) the Growth Pole theory by Peroux, and
- h) the Concentric Theories of City Structure by Burgess

These theories help to put a geographic research into scientific perspective. These perspectives guide the individual researcher in terms of specific research questions, hypotheses or objectives – leading to a better directed review of literature, the selection and identification of appropriate research methods, and the interpretation of results (Imenda, 2014).

### **The nexus and hiatus between conceptual framework and theoretical framework**

In some research, conceptual framework and theoretical framework are used interchangeably. This should not be so in view of the logic behind their formulation: inductive or deductive.

### **Nexus between conceptual framework and theoretical framework**

Evans (2007) argued that both "theoretical and conceptual frameworks" help the reader understand the reasons why a given researcher decides to study a particular topic, the assumptions made, how approach are conceptually followed, the scholars in dialogue with, and agreement or disagreements observed. Hence, Evans opines that these two constructs serve the same purpose, suggesting that it is extremely important for every researcher to identify or develop, as well as describe an appropriate conceptual or theoretical framework. In addition, Imenda (2014) stated that the conceptual and

theoretical frameworks represent an integrated understanding of issues, within a given field of study, which enables the researcher to address a specific research problem. Thus, we can have a number of researchers working on the same research problem, where each one of them investigated the problem from different theoretical and conceptual frameworks, and each coming up with legitimate findings and knowledge claims at the end of it all.

### **Differences between Conceptual Framework and Theoretical Framework**

Many concepts may be defined in a geographic study, because the overall goal is to provide an understanding and insight into the main problem under investigation. In the case of theoretical framework, only one theory is necessary to drive home the rationale behind the entire study. As argued by Borgatti (1999: 1), “theoretical frameworks are obviously critical in deductive, theory-testing sorts of studies”. A summary of the differences between conceptual framework and theoretical framework is presented in Table 1.

Furthermore, in trying to distinguish between theoretical and conceptual frameworks one may say that, whereas research based on deductive reasoning makes use of a pre-existing theory, or theoretical framework, research based on inductive reasoning tends to be ‘theory-building’ (Imenda, 2014). Accordingly, in inductive reasoning, conceptual framework emerges as the researcher identifies and pieces together the relevant concepts from both theoretical perspectives and empirical findings on the topic with, so to speak, “an open mind”. Thus, a conceptual framework is synthesized from a number of concepts (Imenda, 2014).

### **Paradigm shift: Impact on conceptual and theoretical issues in geographic studies**

When gathering data for substantiating theoretical or conceptual issues, the possibility of devising a different approach in getting a more reliable and valid result by adopting a new

method may result to paradigm shift (Guba and Lincoln, 2005). Smith (2008: 4) defines paradigms as “schools of shared assumptions, values and views about the phenomena addressed in particular sciences”. In geographic studies, especially in data analysis, the shift from qualitative to quantitative techniques that involve the application of verifiable statistical analysis is an example of such. The major factor that has encouraged this development has been the spread of quantification. A growing number of geographers became aware that mathematics and statistics could be applied to geographical problems as these provide precise tools to test theories and analyze data (Rana, na).

From the foregoing, we can reiterate that “every science has a goal, i.e. to understand and explain the real world phenomena and conclude that although geography is short on theories and long on facts, yet development of theory seems to be vital both to satisfactory explanations and to the identification of geography as an independent field of study. What then is the relevance of theoretical framework to geographic studies?

### **Relevance of theoretical framework to geographic studies**

The followings are the major relevance of a theoretical framework to geographic studies:

- 1) The theoretical framework plays an important role in guiding the entire process of the geographic research. It is, therefore, regarded as a structure that provides “guidance for the researcher as study questions are fine-tuned, methods for measuring variables are selected and analysis are planned” (Liehr and Smith, 1999: 13)
- 2) Without a theoretical framework, a study lacks proper direction and a basis for pursuing a fruitful review of literature, as well as interpreting and explaining the findings accruing from the investigation (Evans, 2007).

- 3) If the theoretical framework is logically sound and substantiated by previous research studies, there is a strong possibility that the predictions or hypotheses evolving from that framework will be conveniently supported.

**Table 1: Summary of the differences between conceptual and theoretical frameworks**

Variable	Conceptual Framework	Theoretical framework
<b>Genesis</b>	a) Created by the researcher from a variety of conceptual or theoretical perspectives	Evolves or ‘takes shape’ from reviewed literature and/or the data collected. Adopted / adapted from a pre-existing theory or theoretical perspective.
<b>Purpose</b>	a) Helps the researcher see clearly the main variables and concepts in a given study; b) Provides the researcher with a general approach (methodology – research design, target population and research sample, data collection and analysis); c) Guides the researcher in the collection, interpretation and explanation of the data, where no dominant theoretical perspective exists. d) Guides future research – specifically where the conceptual framework integrates literature review and field data.	a) Helps the researcher see clearly the main variable and concepts in a given study. b) Provides the researcher with a general approach (methodology – research design, a target population and research sample, data collection & analysis); and c) Guides the researcher in the collection, interpretation and explanation of the data.
<b>Conceptual Meaning</b>	Synthesis of relevant concepts.	Application of a theory as a whole or in a part.
<b>Process Underlying Review of Literature</b>	a) Mainly inductive, as in social sciences where research problems cannot ordinarily be explained by one theoretical perspective; b) Some social science research also gets driven by theories, but theories in the social ‘power’ as those in the natural sciences.	Mainly deductive, as in the natural sciences where hypothesis testing takes place to verify the ‘power ‘of’ a theory.
<b>Methodological Approach</b>	a) May be located in both quantitative and qualitative research paradigms; increasingly, mixed-methods approaches are recommended; b) Data mostly collected through both empirical and descriptive survey instruments, interviews and direct observations – hence, a preponderance of qualitative data; c) Strong on consideration of context.	a) Located mainly in the quantitative research paradigm; b) Data collected mainly through experimental designs, empirical survey and tests; c) Efforts made to standardize context, or else ignore it.
<b>Scope of Application</b>	Limited to specific research problem and or context.	Wider application beyond the current research problem and context

Source: Imenda (2014)

- 4) Resulting from 3 above, theoretical framework provides a context for examining a geographic problem i.e. theoretical rationale for (i) developing hypotheses, (ii) a frame of reference and base for observations, definition of concepts, research designs, interpretations, and generalizations, and (iii) serves as a guide to systematically

identify logical, precisely defined relationships among variables

- 5) Once geographic data are collected and analysed, the theoretical framework is used as a mirror to check whether the findings agree with the framework or whether there are some discrepancies; where discrepancies exist, a question is asked as to whether or not the framework can be used to explain them (Imenda, 2014)
- 6) Just as the foundation supports a house, a theoretical framework provides a basis for predictions about the relationships among variables of a research study
- 7) Theoretical framework makes geographic research findings meaningful and generalizable
- 8) It establish orderly connections between observations and facts
- 9) Theoretical framework specifically helps to stimulate the direction of geographic research and the extension of knowledge
- 10) Theoretical framework is the skeleton on which the entire research body is built on.

#### **Assessment of an empirical application of theoretical framework in geographic study: the innovation diffusion theory**

The Innovation Diffusion Theory has its origin in the studies of the Swedish pioneer, Torsten Hagarstrand in 1952 entitled "The Propagation of Innovation Waves" (Hagarstrand, 1952). His later work on *Innovation Diffusion as a Spatial Process* (Hagarstrand, 1967) became an eye opener in explaining movement in geographic space. The literature on innovation diffusion emphasize that the process of information diffusion is central to the innovation diffusion process (Omuta & Onokerhoraye, 1994). In geographic studies, Rogers (1995) described diffusion as an idea, practice, or object that is perceived to be new by an individual or other unit of adoption, while innovation communication is a process in which participants create and share information with

one another to reach a mutual understanding. The first and necessary condition for people to adopt an innovation must be that they have heard or read enough about it to be familiar with it. Thus, the person who first received a sufficient amount of information about an innovation will also be the first to adopt it. Although the role of innovation is not as important in developing countries compared with the advanced countries, it is clear that innovation diffusion and adoption had contributed remarkably to the process of regional development in Nigeria (Ajaegbu, 1976).

#### **Innovation diffusion theory explained in relation to collaborative web mapping of VGI**

According to Bello & Ojigi (2013), the *innovation diffusion* is a theory that seeks to explain how, why, and at what rate new ideas and technology, such as crowd sourcing of Volunteered Geographic Information (VGI) or disease, spread through cultures. The theory predicts that media, as well as interpersonal contacts, will increasingly provide information and so influence people's opinions and judgments.

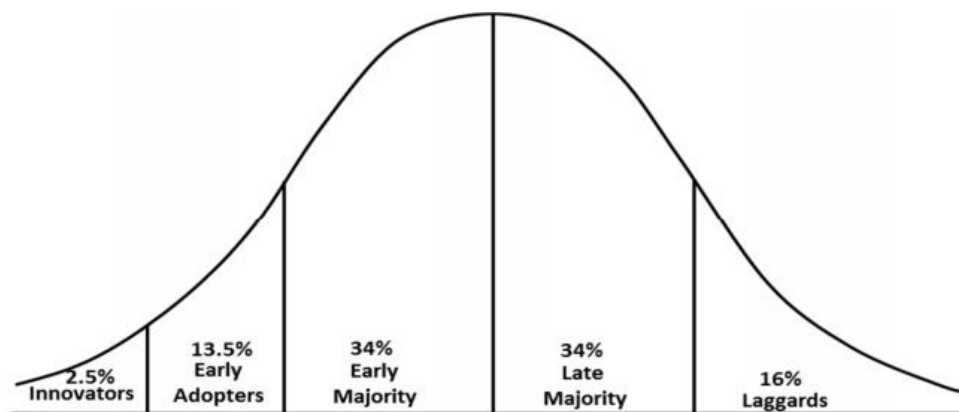
Rogers (1995) further argued that innovation diffusion has four aspects:

- i. invention (the source or origin of a phenomenon),
- ii. idiffusion (or spread/communication) through the social system,
- iii. time, and
- iv. consequences (impact on people or environment).

Based on the above four aspects, five adopter categories have been quantitatively identified, and they follow a standard deviation curve (Figure 2):

1. few innovators adopt the innovation in the beginning (2.5%),
2. early adopters make up 13.5% a short time later,
3. the early majority, 34%,

4. the late majority, 34% and, after some time, 5. the laggards, 16%.



**Figure 2: Innovation Adoption Phases**

Source: Rogers (1995)

The innovation diffusion theory suggest that not many people will adopt the new collaborative web mapping idea, especially in Nigeria, and given more time and space as enjoyed in developed countries, there is a possibility of eventually having a critical mass of adopters represented as early adopters (13.5%), early majority (34%), and eventually late majority (34%), all of which will constitute about 77.5% of the population under consideration while no adopters (laggards) will constitute 16%.

#### **Applying the diffusion theory framework: A case study of collaborative web mapping and volunteered geographic information in Nigeria**

The status and limitations of Collaborative Web Mapping as a viable tool for freely contributing to and using globally assessed, free Web Mapping Platforms (WMPs) such as Google Maps, Google Earth, OpenStreetMap, Bing Maps, Wikimapia and Yahoo! Maps was examined. In the study, Google Map Maker Web 2.0 was adopted to conduct an experimental mapping analysis using 50 volunteers drawn from the staff of different departments of the National Space Research and Development Agency (NASRDA) and the Centre for Satellite Technology Development (CSTD) in Abuja, Nigeria, with 22% being

Geoinformation science and technology experts and 78% non-experts

Some literatures were reviewed to substantiate the gap in research. For example, Haklay, Singleton and Parker (2008) argued that since 1993, the use of the Internet to deliver geographic information and maps has steadily grown, and the number of visitors to public Web mapping sites provides an indication of this change. The Wall Street Journal (2007) reported that, in mid-2005, the market leader in the UK (MultiMap) attracted 7.3 million visitors and, in the USA, MapQuest was used by 47 million visitors. By the end of 2007, Google Maps was used by 71.5 million and Google Earth by 22.7 million (Wall Street Journal, 2007). Moreover, by mid-2007 there were over 50,000 new websites based on Google Maps (Trans, 2007; Haklay *et al.*, 2008). In Nigeria, no known web site for crowd sourcing maps and there is currently low coverage of most rural parts of Africa in the ones developed in other countries.

To study the drive for, and impediments to, the diffusion of Collaborative Web Mapping (CWM) system, the *Innovation Diffusion Theory* was adopted as the *Theoretical Framework* for examining the emerging trend in geographic data acquisition and dissemination using the

Internet with experimental hands-on practical (2005) model of Collaborative Web Mapping (online) on web mapping. The Chuang and Huang Mapping was adopted (Figure 3).

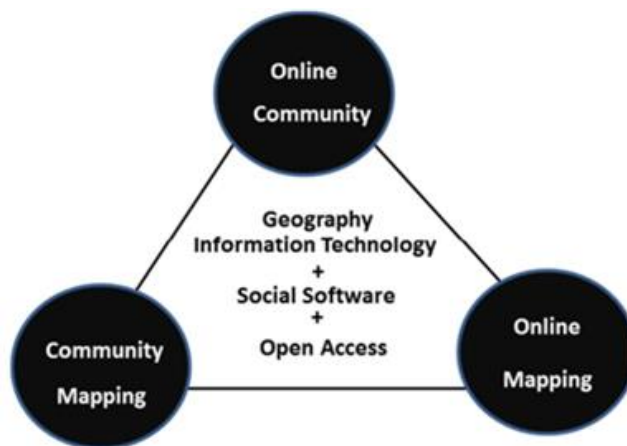


Figure 3: Conceptualization of Collaborative Web Mapping

Source: Modified after Chuang & Huang (2005)

CWM is described as a seamless contribution of geographic data and geo-tags by many people from different geographic locations using moderated/supervised online or web-based mapping platforms like Google Map Maker and OpenStreetMap.

The study shows that the trend in geographic data acquisition and management, as well as developments in desktop cartography and web GIS or CWM can be described as “*innovation diffusion*” among a people at different time period. Thus, the degree to which people adopt such innovation can be explained using the theory of innovation diffusion in terms of *carrier* (persons) and *barrier* (impediments) to new innovation. This was confirmed in the study as only 62% fully participated in the pilot study as

critical mass while others opted out (Laggards). Using the framework, it is argued that the previous era of internet mapping, the number of mapping websites were significantly smaller due to technical and financial barriers - as currently experienced in developing countries like Nigeria, but gradually increased with time as stated by Trans (2007) and Haklay *et al.*, (2008). Hence diffusion of the innovation is from a region of higher concentration to lower region of no concentration.

Bello and Ojigi (2013) study show that the major seasons (ranked in order of priority) given for the adoption of the innovation of generating VGI (Table 2) and its impediments act as either barrier or carrier to the diffusion of web mapping in Nigeria.

**Table 2: Driving Force to Participating in Collaborative Web Mapping Innovation Diffusion**

Factors aiding participation in CWM/VGI	Ranking (percentage)
insufficient data content in most parts of Nigeria	1 <sup>st</sup> (40%)
free access to the web 2.0 mapping platforms	2 <sup>nd</sup> (32%)
opportunity to familiarize with web maps/GIS	3 <sup>rd</sup> (20%)
carrying out location-based analysis such as finding directions and places	4 <sup>th</sup> (8%)

Source: Bello & Ojigi (2013)

Consequently, the identified barriers to CWM innovation diffusion include:

- i) inability to provide useful identification for mapping,

- ii) inability to identify and classify geographic features as observed from the background satellite images owing to differences in their spatial resolutions,
- iii) inability to effectively digitize features as points, lines or polygons, due to lack of high resolution images covering most parts of Nigeria,
- iv) unstable electric power supply - about 19% opted out and so could not complete the exercise. This corresponds to the laggards,
- v) the slow but high cost of Internet services,
- vi) lack of knowledge about satellite or aerial photo interpretation, and
- vii) lack of volunteered time

The study further shows that most people see the CWM trend as a new innovation (early adopters, early majority and late majority) while others (laggards) still entertain some fear in adopting the technological approach in geographic data acquisition and dissemination. Thus the Innovation Diffusion Theory proved successfully useful in explaining the status of collaborative geographic data production and dissemination in Nigeria with a Pilot study using people with different background in geography, mapping and computer application. The study reveals that, although, many still don't understand the trend, they are however optimistic that with time, the innovation will diffuse to most places to generate interest. The deductive approach of the study further gave credence to what a theory should entail.

### Summary and Conclusion

In this paper, we made a categorical distinction in the use of 'concept' and 'theory' interchangeably. We reiterated that every science has a goal, i.e. to understand and explain the real-world phenomena and reasoned that although geography is 'short on theories and long on facts', yet development of theory seems to be vital both to satisfactory explanations and to the identification of geography as an *independent* field of study. With an experimental study using volunteers to

carry out collaborative web mapping, the innovation diffusion theory was adopted to examine the diffusion of the innovation in Nigeria. The study showed that although some participants expressed optimism on the innovation (early majority) most people still do not understand the technological trend in mapping geographic phenomena and as such find it difficult to fully embrace the approach (late majority and laggards). The lack of knowledge in geography and spatial data was observed as a problem and a barrier from non-experts in geo-related disciplines. This paper shows that like the human body, a theoretical framework is important in geographic studies because it is the skeleton on which principles, methods and overall research goals are built on. It is recommended that students, lecturers and researchers properly situate their study framework as either theoretically-based or conceptually-based so as to avoid ambiguity and misuse of relevant approach in qualitative or quantitative studies respectively.

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### References

- Ajaegbu, H. I. (1976). *Urban and Rural Development in Nigeria*. London, Heinemann
- Akinbode, A. (1996). *Research Methods in Geography*. Ekpoma: Edo State University Publishing House.
- Bello, I.E. & Ojigi, L.M. (2013). Collaborative web mapping and volunteered geographic information: a study in Nigeria. *Applied GIS*, 9(2): 1-17
- Borgatti, S. P. (1999). *Elements of Research*. (Online), retrieved June 17, 2015 from <http://www.analytictech.com/mb313/elements.htm>
- Chinn, P. L. & Kramer, M. K. (1999). *Theory and Nursing: A Systematic Approach*. 5th Edition. St Louis, USA: Mosby.
- Chuang, T. & Huang, A. W. (2005). Online Community Mapping, Presented at *the PNC 2005 Annual Conference and Joint Meetings*. October 31 – November 3. University of Hawaii at Manoa,

Honolulu. Retrieved Oct. 11, 2013 from [http://pnclink.org/pnc2005/02\\_GIS.htm](http://pnclink.org/pnc2005/02_GIS.htm)

Cline, D. (2002). *Logical Structure, Theoretical Framework*. Education Leadership Center for Excellence. (Online), retrieved from <Http://Education.Astate.Edu.>, accessed June 20, 2015.

Fox, W. & Bayat, M.S. (2007). *A Guide to Managing Research*. Cape Town: JUTA and Co Ltd. Shredding.

Guba, E. G. & Lincoln, Y.S. (2005). Paradigmatic controversies, contradictions, and emerging confluences. in: NK Denzin, YS Lincoln (Eds.): *The Sage Handbook of Qualitative Research*. 3rd Edition. Thousand Oaks, CA: Sage, pp. 191-215.

Hägerstrand, T. (1952). The propagation of innovation waves. *Lund studies in geography: Series B, Human geography*, 4. Lund: Royal University of Lund, Dept. of Geography

Hägerstrand, T. (1967). *Innovation Diffusion as a Spatial Process*. Chicago: University of Chicago Press.

Haklay, M., Singleton, A. & Parker, C. (2008). Web Mapping 2.0: The Neogeography of the GeoWeb. *Geography Compass*, 2(6): 2011–2039

Hawking, S. (1988). *A Brief History of Time: The Updated and Expanded Tenth Anniversary Edition*. New York: Bantam Press.

Imenda, S. (2014). Is There a Conceptual Difference between Theoretical and Conceptual Frameworks? *J Soc Sci*, 38(2): 185-195

Liehr, P. and Smith, M.J. (1999). Middle range theory: Spinning research and practice to create knowledge for the new millennium. *Advances in Nursing Science*, 21(4): 81-91.

Obadan, M. I. (2012). *Research Process, Report Writing and Referencing: A Guide for Researchers and Scholars in all disciplines*. Abuja, Goldmark Press limited.

Omuta, G. E. D. & Onokerhoraye, A. G. (1994). Regional Development and Planning for Africa. *Benin Social Science for Africa*. Benin City, Ilupeju Press Limited.

Onokerhoraye, A. G. (1994). Geographic Thought, Philosophy and Methodology. *Benin Social Science for Africa*. Ibadan, Intec Printers Limited.

Rana, L. (na). Models, Theory and Systems Analysis In Geography, *The Association for Geographical Studies*. Retrieved June 30, 2015 from [http://ags.geography.du.ac.in/Study%20Materials\\_files/Lalita%20Rana\\_SC.pdf](http://ags.geography.du.ac.in/Study%20Materials_files/Lalita%20Rana_SC.pdf)

Rogers, E. M. (1995). *Diffusion of innovations* (4th edition). New York, The Free Press

Smith, M.J. (2008). Disciplinary perspectives linked to middle range theory. In: MJ Smith, PR Liehr (Eds.): *Middle Range Theory for Nursing*. 2nd Edition, New York: Springer Publishing Company, pp. 3-14.

Trans, T. (2007). Google Maps Mashups 2.0. Google Lat-Long Blog. Posted 11/7/2007, retrieved 2/11/2007 from <http://google-latlong.blogspot.com/>

Wacker, J.G. (1998). A definition of theory: Research guidelines for different theory-building research methods in operations management. *Journal of Operations Management*, 16:361-385

Wall Street Journal (2007). *Acquisition to Expand Microsoft's Map Services*, 13 December 2007

Weisenmiller, M. (2008). *Florida Considers Laws Supporting "Intelligent Design"*. Teaching, Monitor, Issue 169, August 7. (online), retrieved June 23, 2015 from <http://www.albionmonitor.com/0805a/copyright/floridaintelligentdesign.html>.

