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Hierarchy And Interrelationships Of Research Methodological Concepts

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Abstract: ***This paper seeks to clarify understanding on research methodological concepts and dispel the misconceptions and misuse of the terms concerned. Mainly the paper focusses on the following concepts: research paradigm, research design, research method, and research instrument. It also explores the following research processes: data collection, processing, analysis and interpretation. These terms are central to any research project. This paper is a review of related literature. It focuses on descriptions and explanations of the terms and applications. It tries to understand each term separately and jointly used with the rest. It is anticipated the paper will enlighten research scholars and practitioners on the utilization of the terms concerned.***

Keyword: ***research paradigm, research design, research method, research instrument, research analysis, data collection, data processing, analysis and interpretation***

I. INTRODUCTION

Research methodological concepts are terms which are concerned with the procedures followed in carrying out a study. The terms or concepts are classified in a hierarchy; from the most abstract to the most tangible. These terms interact or their uses interact in a study. It is imperative to clarify the hierarchy and their interrelation in a study. The paradigm is the most abstract term among the rest here. Paradigm is the perspective in which a research is based. For each paradigm there are research designs. Research design is the road map, plan or blue print which guides the study. It is less abstract and a bit concrete. It provides direction of the research process.

For each research design there are fitting research methods for collecting data. The methods are means through which data are collected. They are laconic and practical. For each method are right tools or instruments to facilitate data collection. The tools are the vessels in which the required data is attain.

There are varieties of data collection procedures in which the tool are applied. These are the mechanism through which the data collection instruments reach the source of information. The source of information gives the feedback to the researcher in the format anticipated in the tool.

It is upon the researcher receiving the feedback to process the data and analyse in effort to determine the extent to which it has responded to the research problem concerned. The researcher interprets the findings in the light of the procedures followed and the limitation existing. At this point the research is open to the audience's interpretation and critique.

II. RESEARCH PARADIGM (APPROACH)

Research paradigm is the perspective in which the researcher perceives the research process. It guides the research practice and dictates the interpretation of the research findings. It is the lens through which the researcher sees the research procedure and it determines the explication and application of the findings. According to Johnson and Christensen (2012) "a research paradigm is a perspective about research held by a community of researchers that is based on shared assumptions, concepts, values and practices.... it is an approach to thinking about doing research" (p.31). It is very abstract; not tangible, existing only in the mid. It can only be explained (in word or writing). It can only be implied from

action; not visible. In the research project it is not discussed for it is implied in the research design and methods.

Perspective is a way of looking at things. It is the point of view from which one sees things. Collins Dictionary describes perspective as "a particular way of thinking about something, especially one that is influenced by your beliefs or experiences." For instance, if one is to talk about the origin of man, from the start it should be clear from which point of view. One can approach the origin of man from the scientific view point, religious view point and the like. Each explanation as long as it is being interpreted in the specific point of view it cannot be discredited; otherwise, if the explanation is interpreted in a different point of view, it is out-rightly discredited. The same applies to research. From the start it has to be clear under which paradigm the study is based; hence, the interpretation. If a study grounded on a given research paradigm (approach), is interpreted on basis of parameters of a different paradigm, then, the results may wrongfully be discredited.

There are two main research paradigms. These are qualitative and quantitative research paradigms. When aspects of these two paradigms are used concurrently in a study or consecutively in successive related studies, we talk of mixed paradigm. Sometimes the term mixed method is used in reference to mixed paradigm, implying methods destined for different research paradigms were used in a single study or in connected studies (studies building on one another). It would be more appropriate when talking of paradigms to use the term mixed paradigm rather than, mixed methods.

Qualitative research paradigm is carried in a natural setting with no manipulation of variables. The kind of data anticipated is in form of words. Descriptions, explanations and interpretations are made in effort to generate in depth understanding of the phenomenon understudy. Thomas (2003) explains "qualitative methods involve a researcher describing kinds of characteristic of people and events without comparing events in terms of measurements or amounts" (p.1). This explanation seems to summarize the expectations of a qualitative research. Case study, ethnography, phenomenology, grounded theory and historical research are some of research designs applicable in qualitative research approach. Non probability sampling procedures are used to get the participants. Observations, interview and other methods are used in data collection. The instrument for data collection may include observation schedule and interview guide.

Quantitative research paradigm anticipates numerical data, with statistical computation for generalization of the findings. Probability sampling procedures are used to pick the participants for the study. Thomas (2003) maintains that, "quantitative methods…focus attention on measurement and amounts of the characteristics displayed by the people and events that the researcher studies" (p.1). This explanation clearly determines the parameters of quantitative research. Experimental research, causal comparative research and correlational research are some of research designed used. Some methods include: observations and document analysis. The instruments used include check list and document analysis guide.

Mixed research paradigm as earlier indicated implies application of methods meant for different paradigms either concurrently in the same study or consecutively in related studies. The methods inform us of the research design and the paradigm, hence, when mixed they denote interaction or interrelation of paradigm in a study or studies. It should be noted here that what is mixed is the methods and not the paradigms, however, the resultant implication is mixed paradigm. Mixed research method, considered by some to be a new paradigm, according to Johnson and Onwuegbuzie (as cited in Wyse, Selwyn, Smith & Suter, 2017) was defined as "the class of research where researchers mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (p.14).

It should be clear that, it is hardly possible to have pure research which utilizes only words with no connotation and implication of numbers; or a research that uses numbers without descriptions, explanations and interpretations. This implies that researches usually have traces of qualitative and quantitative paradigm. To determine which paradigm a given study falls under, we assess the paradigm to which the study is more inclined to.

In a study it is needless to try to explain the paradigm applied in the study; for it is implied from the rest of the methodological components of the study. Each study will automatically determine the paradigm in which it is based. One is not expected to mention or discuss paradigms under methodology, but to describe the methods which, eventually brings out the proposition of the paradigms involved. Paradigm in a study is inferred rather than expressed. It is a matter of interpretation as oppose to explanation. When one tries to explain, it displays failure of presenting scenario for the audience to determine the paradigm. The paradigm will dictate the interpretations and conclusions which can be derived from a study.

III. RESEARCH DESIGN

A design is a plan to guide accomplishment of a given task. Research design is a road map to guide a given study. It is a mental picture; it is less abstract. It can be produced in diagrams and models. It can be made visible (just like a road map which can be produced in print or drawing and be made visible). According to Kumar (2002) "a research design is a plan of action. It is a plan for collecting and analysing data in an economic, efficient and relevant manner. It's a blue print" (p.62). The emphasis here is provision of guidance in research process. The research problem and the kind of data required and anticipated, determine the research design. The design dictates the rest of the procedures and requirements for the accomplishment of the study. In a study the design need to be described. The strengths and weaknesses of the design need to be highlighted. The rationale for the choice of the design notwithstanding the weaknesses and from a host of designs, need to be elucidated.

Research designs can be appropriate either for qualitative or quantitative research approaches or both. Each study should be guided by one research design, hence, determining the paradigm and influencing the methods used. In cases where there is need to collect data which are qualitative and quantitative in nature at the same time, a design which

supports mixed methods of collecting data should be chosen. Consequently, the research instruments will be predisposed. Some of research designs include: survey, case study, correlational, causal comparative, experimental, descriptive, historical, ethnography, phenomenology, and grounded theory among others.

IV. RESEARCH METHODS

Research method is the means or the way of achieving the desired results. It is a way of collecting the desired data for a study. It is precise and practical. It is evident. As per Walliman (2011) "Research methods are the techniques you use to do research. They represent the tools of trade, and provide you with ways to collect, sort and analyse information so that you can come to some conclusions" (p.7). Some commonly used methods include: observation, interview, document analysis, focused group discussion and survey. Each method is unique and it elicits certain kind of data. Research methods help to determine the source of data, the procedures of data collection the tools to be used. Specific tools are used in each method to collect data. The methods in research emerge in the discussion of the application of tools and data collection procedure. They may not necessarily be expressed but implied.

V. RESEARCH INSTRUMENTS

Research instrument is the vehicle or tool through which the desired data is reached. It is tangible and visible. According to Wilkinson and Birmingham (2003) "research instruments are simply devices for obtaining information relevant to your research project and there are many alternatives from which to choose" (p.3). If the right instrument is chosen the desired data will be achieved. The development of the instrument should be guided by the research problem, research objectives, research questions and research hypothesis. The items in the instrument should address specific research objective or research question. No item should be for general knowledge with no focus to addressing the concerns of the study. Ensure each research objective or research question is addressed by some items in the instrument. A variety of items should be generated to address same issue of concern as per the stated research objectives or research questions. The order of items in the instrument does not matter provided that, each item can be matched with the objective or question it is addressing in the study.

VI. DATA COLLECTION

This is the process in which the data collection methods and instruments are put into use. It is the commencement of the journey of getting the desired information, from the start to destination. The identified vessel or tool is put into use in the right means (method), as planned. The methods and tools are applied so as get the anticipated data (the destination). As per Best and Krueger (2004),

Data collection unfolds in three stages…. It commences with researcher drawing a sample of individuals to participate in the research study. Next, it entails administering an instrument to the enlisted participants. The final stage centres on compiling responses from participants (p.2).

This is summarized as "data collection entails decisions and actions regarding the collection of the information required to address the research question" (Sarantakos, 2013, p.141). The legal and ethical considerations are upheld in the process of data collection.

VII. DATA PROCESSING AND ANALYSIS

It is taking stalk of the whole process (assessing the journey after arrival) of data collection. Some figurative questions asked include: How was the journey? Arrived safely? Missed some steps on the way? It ranges from more abstract to more tangible. It is conceptualized in the mind, presented in words, diagrams, models and print outs. According to Cauvery, Nayak, Girija, Meenakshi and Chand (2007) "data processing consists of editing, coding and tabulation" (p.187). In processing the researcher tries to organize and classify data in preparation for analysis. In analysis the researcher tries to organize data so as to respond to research problem. Thomas and Hodges (2010), recapitulates "in broad terms, data analysis is the process of drawing meaning from or making sense of the information or evidence collected from the project" (p.23).

VIII. INTERPRETATION

It is making sense out the research findings. After assessing the journey through analysis of the results, then one tries to make sense of the whole process. As per Miller and Brewer (2003),

Interpretation is the process by which meaning is attached to data. Interpretation is a creative enterprise that depend on the insight and imagination of the researcher, regardless of whether he/ she is a qualitative analyst… or... a quantitative researcher…. The way in which the researcher attaches meaning to the data is not mechanical but requires skills, imagination and creativity (p.164).

This is not a preserve of the researcher a lone, but also to the audience of the concerned study. Patton (as cited in Sensing, 2011), expounds "interpretation means attaching significance to what was found, making sense of findings, offering explanations, drawing conclusions, extrapolating lessons, making inferences, considering meanings, and otherwise imposing order on an unruly but surely patterned world" (p.213). Varied interpretations can be made out of a given study. The more a study tends to elicit unified interpretation the better. This is an indicator that the study was more focused to the issue of concern and methodological facets were appropriately utilized. Issues of validity of the study findings are raised at this point.

IX. THE BIG PICTURE OF METHODOLOGICAL CONCEPTS

The methodological concepts are in a hierarchical order; where the most abstract is at the top, and the most tangible is at the base. At the peak is the paradigm, which is a perspective; a way of thinking, it is based in the mind. One can only liken it, for it is neither tangible nor visible, for instance, religious perspective or scientific perspective. Next is the research design, which is the road map or plan. It is first form in the mind, then presented in writing or drawing on a tangible material. Just like a road map from one point to another; the person who has the knowledge of the route (which is in the mind) can put it in writing or drawing. The map or design act as act as guide to the destination. The map itself will not take one to the destination. The appropriate means or method has to be chosen. In real life journey, one has to choose the most appropriate means to the desired destination. The available means include: road, air, water and railway. This is applicable in research, with the road map which is the design; one has to choose the most appropriate means which is the research method.

Just like in a normal journey, where one may require only one means to reach a destination or use a combination, the same is applicable in research. A researcher may comfortably employ one method to collect data and be in a position to satisfactorily address the main research question. However, other circumstances may require a combination of research methods of collecting data in order to adequately tackle the research problem.

By identifying and choosing the means does not guarantee one to reach the desired destination; up to this point the individual will remain at the starting point. To reach the destination one will require an appropriate vessel or vehicle for the chosen means. It would be a tragedy to choose wrong vessel or vehicle for the identified means. For instance, if the appropriate means is by air, then it would be unfortunate for one to choose a car as a tool or vehicle for such means. The same way, this is applicable in research. After identifying the appropriate method (means) for a study, one will not get the data (destination) expected unless one chooses the suitable tool or instrument (vessel) for the study. In case one chooses the wrong tool for a given research method (means), then, the study will face problems and may end up not getting the expected results. The hierarchy and the interrelationships of the concepts concerned is demonstrated in figure 1, below.

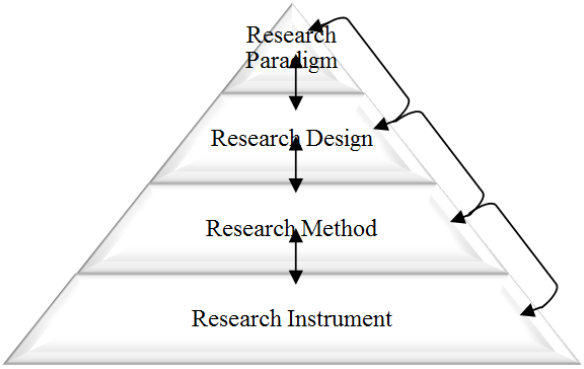

Figure 1: Hierarchy and Interrelationships influenced by interaction of Research Methodological Concepts

The diagram shows possible influence and relationships between levels and across levels of methodological concepts. The relationship is not in one direction. What is in one level informs what is expected in the other level(s).

X. CONCLUSIONS

The research paradigm is the perspective; it's far and remote to comprehend in the absence of the rest of research methodological facets. It is abstract. Research design is the plan or road map. It is formed in the mind and presented in words, write ups, diagrams and models. It can be made visible or easier to comprehend. Research methods are the means through which the research plan is executed. They are easy to comprehend, more practical and less abstract. Research instruments are the tools in the chosen research methods for data collection. They are visible and tangible.

Data collection, processing, analysis and interpretation are processes informed by the interaction of research paradigm, research design, research methods and research instruments. The quality of the processes will depend on the interaction of the methodological components mentioned above. When there is proper interaction of the methodological elements, there is assurance of correct functioning of the research processes.

Therefore, there is need to have clear understanding of the methodological concepts, their hierarchy and interrelationships. The understanding helps in facilitating the right use of the concepts. Hence, it guarantees the best results of the processes of data collection, processing, analysis and interpretation.

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