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Research Paradigms: Theory and Practice

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Abstract
This paper reflects on the ontological, epistemological and methodological underpinnings of the two major research approaches i.e the quantitative and the qualitative approaches. Their differences, occasioned by these philosophical foundations are discussed and practical implications examined. It is our view that this paper will have positive impact on the work of researchers and students undertaking courses in research studies.
***Key words**: Research paradigms, ontology, epistemology, methodology, quantitative, qualitative*

Introduction

Research methodology used in social science for much of the 20thcentury was largely quantitative methodology, which originated in the natural sciences (Biology, Chemistry, Physics and Geology etc) and was concerned with investigating things which could be observed and measured in some way. Such observations and measurements could be made objectively and repeated by other researchers. However, as Tuli (2010) observes, researchers within the social sciences (Sociology, Anthropology etc) began to express dissatisfaction with the quantitative methodology as a means of both conducting research and generating knowledge. These researchers argued that the aim of research practice should be to focus on understanding the meaning that events have for the phenomena being studied.

Having this argument in mind these researchers began to explore alternative ways of conducting research in social science and latter developed qualitative methodology, which attempts to increase understanding of why things are the way they are in the social world and why people act the way they do. As a result of this intellectual debate, purists have emerged on both sides i.e. the quantitative purists and the qualitative purists (Tuli, 2010). This paper attempts to outline the differences between these two traditions based on their ontological, epistemological and methodological perspectives and their implications in research practice.

The quantitative versus qualitative research paradigms

The quantitative purists articulate assumptions that are consistent with what is commonly called positivist paradigm and believe that social observations should be treated as entities in much the same way that physical scientists treat physical phenomena. On the other hand, the qualitative purists also called interpretivists or constructivists reject the positivist assumption. They contend that reality is subjective, multiple and socially constructed by its participants (Krauss, 2005; Bryman, 1984; Lincoln & Guba, 2000; Guba and Lincoln, 1994; Amare, 2004). Although these methodologies are acknowledged as a means to conduct research, scholars within the social science have argued that the relative preference of each research methodology depends on philosophical issues related to the question of ontology (the nature of reality) and epistemology (the nature of knowledge) (Tuli, 2010). We discuss this dichotomy in the following section.

Ontological differences between quantitative qualitative approaches

Ontological questions in social science research are related to the nature of reality. There are two broad and contrasting positions: objectivism that holds that there is an independent reality and constructionism that assumes that reality is the product of social processes (Neuman, 2003). A researcher with a positivist orientation regards reality as being 'out there' in the world and needing to be discovered using conventional scientific methodologies (Bassey, 1995). People, through the use of their senses, can observe this reality and the discoveries made about the realities of human actions are expressed as factual statements (Bassey, 1995; Mutch, 2005).

Positivist researchers do not regard themselves as important variables in their research and believe they remain detached from what they research. The philosophical basis is that the world exists and is knowable and researchers can use quantitative methodology to discover it (Cohen, Manion & Morrison, 2000). Through this orientation, knowledge is a given and must be studied using objective ways. Research findings are usually represented quantitatively in numbers which speak for themselves (Bassey, 1995; Cohen, Manion & Morrison, 2000; Mutch, 2005).

On the other hand, interpretive researchers cannot accept the idea of there being a reality "out there", which exists irrespective of people (Tuli, 2010). They see reality as a human construct (Mutch, 2005). The interpretive research paradigm views reality and meaning making as socially constructed and it holds that people make their own sense of social realities. Interpretive researchers use qualitative research methodologies to investigate, interpret and describe social realities (Bassey, 1995; Cohen, Manion & Morrison, 2000). The research findings in qualitative methodology are usually reported descriptively using words (Mutch, 2005).

In addition, the qualitative research methodology treats people as research participants and not as objects/items/specimen as in the positivist research approach. This emphasis can be an empowering process for participants in qualitative research, as the participants can be seen as the writers of their own history rather than objects of research (Casey, 1993). This methodology enables the participants to make meanings of their own realities and come to appreciate their own construction of knowledge through practice (Cohen, Manion & Morrison, 2000).

Epistemological differences between quantitative and qualitative approaches

The traditional view regards the social sciences as largely similar to the natural sciences, and the researchers who adopt this approach are thus concerned with discovering laws concerning human behavior (Schulze, 2003; Krauss, 2005). The critical epistemological debate in terms of conducting social science research is whether or not the social world can be studied according to the same principles as the natural sciences (Bryman, 2001). There are two broad epistemological positions: positivism and interpretivism/constructivism.

Epistemology poses the following questions: What is the relationship between the knower and what is known? How do we know what we know? What counts as knowledge? For positivists, who evolved largely from the nineteenth-century philosophical approach, the purpose of research is scientific explanation. According to Neuman (2003) positivists see social science as an organized method for combining deductive logic with precise empirical observations of individual behavior in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity. The nature of social reality for positivists is that empirical facts exist apart from the researcher's ideas or thoughts; they are governed by laws of cause and effect; patterns of social reality are stable and knowledge of them is additive (Crotty, 1998; Neuman, 2003; Marczyk, DeMatteo and Festinger, 2005).

The basic assumption of this paradigm as Ulin, Robinson and Tolley (2004) observe is that the goal of science is to develop the most objective methods possible to get the closest approximation of reality. Researchers who work from this perspective explain in quantitative terms how variables interact, shape events, and cause outcomes. They often develop and test these explanations in experimental studies. Multivariate analysis and techniques for statistical prediction are among the classic contributions of this type of research. This framework maintains that reliable knowledge is based on direct observation or manipulation of natural phenomena through empirical, often experimental means (Lincoln & Guba, 2000, 2005; Neuman, 2003). The positivist researchers often use highly standardized tools such as close ended questionnaires and psychological tests with precisely worded questions for data collection.

On the other hand, the interpretivist/constructivist researchers see the world as constructed, interpreted, and experienced by people in their interactions with each other and with the wider social systems (Maxwell, 2006; Bogdan & Biklen, 1992; Guba and Lincoln, 1985; Merriam, 1988). According to this paradigm the nature of inquiry is interpretive and the purpose of inquiry is to understand a particular phenomenon, not to generalize the findings to a population (Farzanfar, 2005). Researchers within the interpretivist paradigm are naturalistic since they study real-world situations as they unfold naturally. More specifically, they tend to be non-manipulative, unobtrusive, and noncontrolling (Tuli, 2010).

Qualitative research methodology often relies on personal contact over some period of time between the researcher and the group being studied. Building a partnership with study participants can lead to deeper insight into the context under study, adding richness and depth to the data. Thus, qualitative methodologies use induction, that is, oriented toward discovery and process, have high validity, are less concerned with generalizability, and are more concerned with deeper understanding of the research problem in its own unique context (Ulin, Robinson and Tolley, 2004).

Both positivist and interpretive researchers hold that human behaviour may be patterned and regular. However, while positivists see this in terms of the laws of cause and effect, interpretivists view such patterns as being created out of evolving meaning systems that people generate as they socially interact (Neuman, 2003). Since interpretive researchers place strong emphasis on understanding of the world through firsthand experience, truthful reporting and quotations of actual conversation form insiders perspectives (Merriam, 1998) than testing the laws of human behavior (Bryman, 2001; Farzanfar, 2005), they employ data gathering methods that are sensitive to context (Neuman, 2003), and which enable rich and detailed, or "thick description" of social phenomena by encouraging participants to speak freely and understand the investigator's quest for insight into a phenomenon that the participant has experienced. Owing to this, in depth interviews, focus group discussions and naturalistic observation are the most widely used data gathering methods for researchers using the interpretive (qualitative) research approach/methodology.

Qualitative research puts emphasis on issues of trustworthiness and credibility as opposed to the positivist criteria of validity, reliability and objectivity. Whereas the deductive (quantitative) approach uses validity, reliability, objectivity, precision, and generalizability to describe, predict, and verify empirical relationships in relatively controlled settings, the inductive approach aims to explore, discover, and understand phenomena through the process of social interaction (Ulin, Robinson and Tolle, 2004).

Methodological differences between quantitative and qualitative approaches

Methodology is a research strategy that translates ontological and epistemological principles into guidelines that show how research is to be conducted (Sarantakos, 2005). Methodology also describes the principles, procedures, and practices that govern research (Kazdin, 1992, 2003a, cited in Marczyk, DeMatteo and Festinger, 2005).

The positivist research paradigm underpins quantitative methodology owing to its deductive nature. The realist/objectivist ontology and empiricist epistemology contained in the positivist paradigm requires a research methodology that is objective or detached since the emphasis is on measuring variables and testing hypotheses that are linked to general causal explanations (Sarantakos, 2005; Marczyk, DeMatteo and Festinger ,2005). Positivist research uses experimental designs to measure effects, especially through group changes. The data collection techniques focus on collecting hard data in the form of numbers to enable evidence to be presented in quantitative form (Neuman, 2003; Sarantakos, 2005).

On the other hand, qualitative methodology is underpinned by interpretivist epistemology and constructivist ontology. This assumes that meaning is embedded in the participants' experiences and that this meaning is mediated through the researcher's own perceptions (Merriman, 1998). Researchers using qualitative methodology immerse themselves in a culture or group by observing its people and their interactions, often participating in activities, interviewing key people, taking life histories, constructing case studies, and analyzing existing documents or other cultural artifacts. The qualitative researcher's goal is to attain an insider's view of the group under study (Tuli 2010).

The main differences between quantitative and qualitative approaches can be summarized as shown in the table below:

Quantitative approach	Qualitative approach
Objective in nature	Subjective in nature
Deductive (Tests theory)	Inductive (Develops theory)
Research questions: How many? Strength of association?	Research questions: What? Why?
"Hard" science	"Soft" science
Literature review must be done early in study	Literature review may be done as study progresses or afterwards
One reality: focus is concise and narrow	Multiple realities: focus is complex and broad
Facts are value-free and unbiased	Facts are value-laden and biased
Reduction, control, precision	Discovery, description, understanding, shared Interpretation
Measurable	Interpretive
Mechanistic: parts equal the whole	Organic: whole is greater than the parts
Uses subjects/objects/items/specimen	Uses participants
Context free	Context dependent
Has hypothesis that is usually tested	Research questions
Reasoning is logistic and deductive	Reasoning is dialectic and inductive
Establishes relationships, causation	Describes meaning, discovery
Strives for generalization leading to prediction, explanation, and understanding	Strives for uniqueness. Patterns and theories developed for understanding
Highly controlled setting: experimental setting (outcome oriented)	Flexible approach: natural setting (process oriented)
Uses instruments	Uses communications and observation
Sample size is an issue of concern	Sample size is not a concern; seeks "informal rich" sample

Research implications

Both ontology and epistemology influence the type of research methodology chosen, and this in turn guides the choice of research design and instruments. Ontology informs the methodology about the nature of reality and what should be studied in a research process whereas epistemology informs the methodology about the nature of knowledge or where knowledge is to be sought. Methodology (quantitative/qualitative) then dictate the design that is to be employed by the researcher. Seen from this perspective, methodology is a research strategy that translates the ontological and epistemological principles in the process of research activity i.e how the research is conducted and constructed (Tuli, 2010).

In this regard, the constructivist ontology, claiming multiple, individual or socially constructed reality implies that both the researcher and the participant construct their own reality and knowledge that will be studied contextually and holistically. The constructivist epistemology while rejecting the traditional image between the researcher and things (objects) to be studied guide the qualitative methodology into prescribing flexible design in which the researcher has got unlimited freedom of movement between the steps of research.

Researchers within interpretivist paradigm (qualitative approach) are led to employ data gathering methods such as participant observation, in-depth interview and focused group discussions among others. This paradigm also utilizes non-numerical data analysis techniques.

On the other hand the positivist ontology that claims an objective, single, reality that has to be studied exclusive of the researcher's ideas together with the positivist epistemology advocating for the detachment of the knower and things to be known/studied guide the quantitative methodology which prescribe fixed research designs with highly structured and controlled procedures. Data collection methods in this paradigm include questionnaires, tests, inventories, and checklists among others. Data analysis is done using statistical techniques and mathematical operations.

Conclusion

The basic differences between quantitative and qualitative research approaches emanate from their varying ontological and epistemological foundations. In turn, these philosophical foundations affect the methodological implications of both approaches. It is imperative for scholars and students in research related fields to clearly understand the basic differences between the quantitative and qualitative approaches so that their work becomes manageable, meaningful and informative.

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