

A Critical Review of the Relationship between Paradigm, Methodology, Design and Method in Research

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Abstract: *This paper makes a conceptual clarification of some research elements--paradigm, methodology, design and method which have proved confusing to early career researchers, postgraduate supervisors and authors. This confusion has often been created and perpetuated by many research textbooks and journals over the years. By using a literature review and author's experience, this paper provides an exposition of the distinction and relationship between these concepts with a view to better the understanding and application of the concepts, for early career researchers, especially Master's and PhD students and post-graduate supervisors.*

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I. Introduction

My interest in this paper arose during the course of my PhD research. I observed that some authors and post-graduate students refer to quantitative and qualitative as research methods or designs, and yet, others refer to them as paradigms or methodologies (e.g., Krauss, 2005, p.758; Harwell, 2010, p.148; Tuli, 2010, p.105; Antwi & Hamza, 2015, p.217; Silva, 2017, pp.3-4). For instance, Antwi & Hamza (2015, p.217), write:

“The research methodology that was traditionally used in social sciences for several decades was the quantitative methodology, which originated in the natural sciences . . . , and was concerned with investigating things which could be observed and measured in some way. Quantitative research was the generally accepted research paradigm in educational research until the early 1980s, when the “paradigm wars” between advocates of quantitative and qualitative research reached a new peak.”

On the other hand, Guba & Lincoln (1994, p.105), suggest that the term qualitative or quantitative be limited for the description of method only. Whereas, (Tuli, 2010, p.105) states that the two major forms of research are: “quantitative and qualitative research methodologies”. The loose use of these terms by authors often creates confusion in understanding and distinguishing these important research concepts, especially among early post-graduate researchers and supervisors. Additionally, some studies have found that some research students failed to locate their study in a particular paradigm (Mackenzie & Knipe, 2006; Gringeri, Barusch, et al., 2013; Makombe, 2017). For example, Gringeri, Barusch, et al. (2013), in a study of 75 social work doctoral dissertations from U.S. universities, finds that only 13 percent specifically stated the paradigm in their study. Also, Makombe (2017) using a sample of 11 students from different South African universities, observes that there is confusion in the understanding of the research concepts, paradigm, methodology, design and method.

Furthermore, this author has observed inconsistency in the use of the term, research design and absence of its discussion in many texts and journals. Research design and method are not interchangeable. Although some authors attempt to use them interchangeably (e.g, Harwell, 2010, p.148; Bhatta, 2018, p.78). While it may be taken for granted that experienced researchers and authors may understand the distinction and relationship between these concepts, however, these findings (Gringeri, Barusch, et al., 2013; Makombe, 2017) suggest that this may not be the case for early career researchers, especially Master's and PhD students, and non-methodology post-graduate supervisors. Therefore, the current study attempts to address the confusion by providing a clear explanations of these critical components of research inquiry: paradigm, methodology, design and method; and the relationship between them. It is hoped that this will assist early career researchers, Masters' and PhD students in understanding and correctly applying the concepts in their research methodology chapter and conduct their research bearing these elements in mind. More importantly, the study further aims to assist post-graduate supervisors to evaluate any research study accordingly.

The next section of this paper defines and discusses the nature of a research inquiry. This is followed by a discussion of the key elements of research in social sciences--paradigm, methodology, design and method, forming the thrust of this paper with emphasis on their interface and point of departure. The paper ends with a concluding section.

II. Literature Review

2.1 What is Research?

The search for truth and the exploration of nature has been one of the persistent efforts of human beings which has been accomplished primarily through experience, reasoning and research (Shah & Al-Bargi, 2013, p.253). Saunders, Lewis, et al. (2009, p.5) define research as something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge. This suggests that research is a vital tool for solving problems, addressing societal issues and gaining knowledge. Thus, if research is such a powerful tool that benefits society and the individual, researchers must have a proper understanding about its elements and processes. These elements are the research paradigm, methodology, design and method (Lincoln & Guba, 1985; Saunders, Lewis, et. al., 2009; Fard, 2012; Makombe, 2017; Kivunja & Kuyini, 2017).

However, there is no harmony among writers and authors as to what comes first, between the paradigm and methodology. While some authors prefer to state the paradigm first (e.g. Lincoln & Guba, 1985; Shah & Al-Bargi, 2013; Kivunja & Kuyini, 2017); suggesting that the paradigm encompasses elements such as methodology and method. Others prefer to state and discuss the methodology first; suggesting that methodology encompasses the paradigm, design and method (Irny & Rose, 2005; Igwenagu, 2016, p.4; Makombe, 2017, pp.3367-3368). This is like the old debate or argument as to which came first: the hen or the egg; the seed or the tree. Contradictory approaches however, presupposes that there is important relationship and connection between the paradigm and methodology as will be discussed in the succeeding sections. Nevertheless, the approach of this paper is to begin with the discussion on paradigm. This is because from the outset, it is important that any research inquiry be guided by a paradigm or philosophy (a theoretical base). However, many early career researchers do not mention the research paradigm guiding their inquiry. While qualitative and quantitative methods are sometimes erroneously cited as research paradigms. Hence, there is need for conceptual clarification.

3.1 Research Paradigm

According to Fard (2012, p.58) and Kivunja and Kuyini (2017, p.26), the term paradigm was first introduced by Thomas Kuhn (1962) in his seminal work, 'The Structure of Scientific Revolution'. Kuhn defines paradigm as a philosophical way of thinking (Kivunja & Kuyini, 2017, p.26). Guba and Lincoln (1994) define paradigm as "a basic system or worldview that guides the investigator" (p.105), while McGregor and Murnane (2010, p.419) defined paradigm as "a set of assumptions, concepts, values, and practices that constitutes a way of viewing reality". On their part, Saunders, Lewis, et al. (2009, pp.108-109), prefer to use the term 'philosophy' instead of 'paradigm', and define it as the researcher's world view or assumptions guiding the research. Further, Guba and Lincoln (1994, p.116) argue that, "Paradigm issues are crucial; no inquirer, we maintain, ought to go about the business of inquiry without being clear about just what paradigm informs and guides his or her approach." As Mackenzie and Knipe (2006, p.2) states, "it is the choice of the paradigm that sets down the intent, motivation and expectations for the research". Therefore, a paradigm defines a researcher's philosophical orientation, or perspective, or thinking, or school of thought, or set of shared beliefs, that influence what should be studied, how it should be studied, and how the results of the study should be interpreted.

Thus, without adopting a paradigm, as the first step there is no foundation for subsequent choices regarding methodology, design and method. Unfortunately, paradigms are not discussed in many research texts or sometimes given little emphasis and more often, given conflicting definitions (Mackenzie & Knipe 2006, p.2). As such, early carrier researchers do find difficulty in locating where paradigm fits into the research work. It is therefore very important, that in carrying out a research or writing a research report, the paradigm in which the researcher locates the research is clearly stated.

According to Lincoln and Guba (1985) and Kivunja and Kuyini (2017, p.26), a paradigm comprises four elements or dimensions, namely, ontology, epistemology, methodology, and axiology. Whereas, (Saunders, Lewis et al., 2009, 2019, p.133; Mkansi & Acheampong, 2012, p.132) identified three elements or dimensions, namely, ontology, epistemology, and axiology. Following the preceding definitions and this author's understanding of the paradigm, the study adopts (Saunders, Lewis, et al., 2009, 2019; Mkansi & Acheampong, 2012) composition of three elements---ontology, epistemology and axiology. It argues that the research methodology although related to paradigm, is distinct in some respect as shall be discussed later (see section 4.1).

First, **Ontology**: The ontology of a research paradigm is the way the world is thought to be and its very nature or what is called reality of the social phenomenon being investigated (Lincoln & Guba, 1985; Fard, 2012, p.59; Fazliogullari, 2012; Scotland, 2012; Makombe, 2017; Nguyen, 2019; Saunders, Lewis, et. al., 2019, p.133). There are four ontological positions based on research paradigms. The first is naïve realism or single reality (Fard, 2012, p.64; Saunders, Lewis, et. al., 2009, 2019). Naïve realism assumes a world of material objects which could be known through the researcher's sense-experience (Scotland, 2012, p.10), that is external, objective and independent of social actors. Next is, the relativist ontology which holds that the research

problems have multiple realities that can be explored and meaning to be derived by the researcher through their interaction with the research participants (Fard, 2012; Saunders, Lewis, et. al., 2009, p.119). The third is, historical realism which traces the history of social, political and economic oppression in order to bring about justice and emancipation in the society (Fard, 2012; Kivunja & Kuyini, 2017). Finally, non-singular reality ontology argues that there is no one way to interpret reality and understand human behaviour, hence, advocates for a pragmatic way to understand human behaviour or mixed orientation or worldview (Kivunja & Kuyini, 2017, p.35; Makombe, 2017).

Second, **Epistemology**: The epistemology of a research paradigm refers to how we come to know something; how we know the truth or reality (Lincoln & Guba, 1985; Krauss, 2005, p.759; Saunders, Lewis, et. al., 2009, p.112; Kivunja & Kuyini, 2017, p.27; Nguyen, 2019, p.3). In other words, it refers to how the researcher comes to know, the nature of the knowledge, and how the researcher communicates the same to contribute to knowledge in a particular field of study. There are four ways the researcher can come to know: intuitively, authoritatively, logically, and empirically (Kivunja & Kuyini, 2017, p.27). According to Kivunja and Kuyini, (2017, p.27), the natural source of knowledge is a belief, faith, or intuition. The authoritative sources are people knowledgeable about the topic, leaders, and books. Reasoning from generally accepted to new knowledge is the logical or rationalist source of knowledge. Lastly, knowledge based on verifiable and objective facts defines empirical knowledge. Although these sources of knowledge differ, the relationship with the researcher is common to all, and the researcher relies on each at different stages of the research process. For example, through intuitive knowledge, a researcher may come up with the idea of a study after reviewing extant literature (authoritative) and reasoning from findings from previous studies to identify the research problems (logical). Subsequently, the conclusions of the study are based on knowledge gained from empirical findings.

Furthermore, epistemological positions focus on the relationship between the researcher and the researched (Krauss, 2005, p.759; Fard, 2012, p.59; Kivunja & Kuyini, 2017). Four epistemological positions are common: objective, subjective, transactional/subjective, and relational. One, objective epistemology argues that the researcher can gain knowledge through reasoning independent of the research participants (Scotland, 2012; Fard, 2012). Two, subjective epistemology assumes that the researcher and the researched jointly generate knowledge based on the researcher's personal experiences and interaction with the participants (Kivunja & Kuyini, 2017, p.33) or inter-subjective relationship (Fard, 2012, p.67). Three, the transactional epistemology although similar to the subjective epistemology, requires the researcher to go beyond the surface of participants' opinions to gain knowledge of the phenomenon cognitively through interaction with participants (Kivunja & Kuyini, 2017, p.35) in order to address key social issues such as inequality, empowerment, domination and oppression (Shah & Al-Bargi, 2013, p.260; Creswell, 2014). Four, relational epistemology holds that the relationships that exist between the researcher, and research participants are relative to the researcher who determines what is appropriate to that particular study (Kivunja & Kuyini, 2017, p.35), and mostly dependent on the research question(s) (Saunders, Lewis, et. al., 2009, p.119).

Third, **Axiology**: This covers the role of values in research as well as the ethical considerations (Lincoln & Guba 1985; Fard, 2012, p.59; Kivunja and Kuyini, 2017; Saunders, Lewis, et. al., 2019, p.134). Axiology per research paradigm include: value-neutral; value-laden and balanced; value-laden, biased and culture-sensitive; and value-driven. According to Fard (2012, p.63), value-neutral axiology requires that the facts of the findings must be separated from the researcher's values/bias. In other words, research should be undertaken in a value-free way, whereby the researcher is independent of the data and maintains an objective stance. Value-laden and balanced axiology assume that the researcher accounts for their bias and those of the participants in presenting a balanced report of findings (Fard, 2012, p.66; Kivunja & Kuyini, 2017; Nguyen, 2019, p.6). In other words, it assumes that the research is value bound since it is carried out by subjective individuals, hence the need to account for these subjectivities. Value-laden, biased and culture-sensitive axiology requires that the researcher recognises and respects cultural norms and the inherent bias (Fard, 2012, p.72; Kivunja & Kuyini, 2017, p.35). This implies that the researcher is biased by orientation and cultural experiences and as such these will impact on the research. Value-driven axiology (for pragmatic) assumes that the researcher's values play a large role in the research (Kivunja & Kuyini, 2017, p.35; Saunders, Lewis, et. al., 2019, p.145). That is, the researcher is influenced by the research problem(s) and research question(s). Following the fore-going exposition of the key elements of the research paradigm, the next section discusses some classification or types of paradigms and how these elements feature in each paradigm.

3.1.1 Classification of Research Paradigm

A number of paradigms have been discussed in the literature with no agreement among researchers and authors as to an acceptable amount of standards in social science research. Some authors and researchers have classified research paradigms into three: positivism, interpretivism/constructivist and critical theory or paradigm (Fazliogullari, 2012; Scotland, 2012; Shah & Al-Bargi, 2013). Gupa and Lincoln (1994) classify paradigms into four: positivism, post-positivism, constructivism and critical paradigm. Similarly, Gringeri, Barusch, et al.

(2013) identify post-positivism, constructivism, critical theory and participatory action framework as paradigms that are applied in social science research. Mackenzie and Knipe (2006) on their part also suggest a four-type model of classification comprising of positivist/post-positivist, interpretive/constructivist, transformative and pragmatic. Shannon-Baker (2016), motivated by mixed perspectives, also proposes a four-model classification, namely, pragmatism, transformative-emancipation, dialectics, and critical realism (p.322). A recent position by Saunders, Lewis, et al. (2019, pp.144-145), classifies paradigm which they referred to as philosophy into five, namely, positivism, critical realism, interpretivism, post-modernism and pragmatism.

Following the preceding discussion on the suggested paradigms in the literature, it follows therefore that there is no agreement as to an acceptable number or model of classification of paradigms in social science research. Thus, no view or rating can be considered better or superior to the others. This study, therefore, posits that each classification is based on each author's motivation, orientation, and worldview of knowledge or research. Based on this argument, the next sections review four familiar paradigms or perspectives (positivism, interpretivism/constructivism, critical paradigm/theory and pragmatic paradigm) that may be used in social science research, bringing out their distinctive features.

Positivist Paradigm (Positivism)

The positivist paradigm is regarded as scientific inquiry (Scotland, 2012, p.10), and is based on rationalistic and empiricist philosophy of research (Shah & Al-Bargi, 2013, p.254). According to Mertens (2005, p.8) is closely associated with Aristotle, Francis Bacon, John Locke, and Auguste Comte, but popularized by Auguste Comte who interprets it as a philosophy that defines observation and reason as a means of understanding human behavior or sees human beings as a phenomenon which can be studied scientifically. At the ontological level, positivists assume realism (naïve realism) or single reality (Fard, 2012, p.61; Shah & Al-Bargi, 2013, p.254), which implies that reality is objective, quantifiable and measurable through processes independent of the researcher and his or her instruments. At the epistemological level, positivists assume that the knower and the object to be known are different entities, and neither of them exerts influence on the other (Guba & Lincoln, 1994; Fard, 2012, p.61). Therefore, this separation makes objective knowledge possible. On Axiology, positivists are typically focused on facts and hold that research should be value-free (Fard, 2012, p.63). Positivism is also often referred to (in various versions) as empiricism, instrumentalism, modernism, objectivism, or determinism (Shah & Al-Bargi, 2013, p.254).

Proponents of alternative paradigms such as interpretivism and critical theory criticise positivism for its generalisation. They are that studying social life is considered to be different in many ways from studying natural objects or other things in a laboratory (Shah & Al-Bargi, 2013; Saunders, Lewis, et al., 2019, p.149). For example, the social research consists of politics, values, and experiences that are difficult to separate from the data that the study produces. More so, critics argue that generalisation is difficult and inapplicable in social science research based on differences in culture, belief, and human experiences (Krauss, 2005, p.760; Shah & Al-Bargi, 2013). Therefore, objectivity needs to be replaced by subjectivity in the process of scientific inquiry or social science research.

Interpretivist Paradigm (Interpretivism)

Interpretivism, also called Constructivist paradigm (Fard, 2012, p.64; Fazliogullari, 2012, p.49), is a paradigm that aims to understand people and social phenomenon (Fard, 2012; Fazliogullari, 2012; Edwards and Holland, 2013). Interpretivist researchers aim at exploring and understanding phenomenon inductively and believe that the social event is understood from the point of the individuals who are part of the ongoing action being investigated (Krauss, 2005; Cohen, Manion, et al, 2007; Fazliogullari, 2012, p.49). For this reason, interpretive researchers start with individuals and try to understand their interpretations of the world surrounding them; while actual words of individuals become the evidence of realities (Krauss, 2005). In other words, the reality is interpreted through the meanings that people give to their lives and this meaning can be discovered through language or dialogue.

The ontology of interpretivism is relativist (Fard, 2012, p.65) and advocates that any phenomenon has multiple realities. In other words, all knowledge is relative to the knower and can be understood from the point of view of the individual who is directly involved. The epistemology is subjective with both the researcher and the object (respondent) interacting and involved in the knowing process and the reality is also influenced by the context (Fard, 2012, p.65; Nguyen, 2019, p.6). In interpretivist paradigm, researcher admits the value- laden nature of the study and actively reports his or her values and biases, as well as the value nature of information gathered in the field (Fard, 2012, p.66; Kivunja & Kuyini, 2017).

However, interpretive research has also been criticised on the ground that the subjective and contextual nature of such research findings hinders generalisation to different organisational settings (Cohen, Manion et al., 2007). Also, carrying out interpretive research sometimes may become costly and problematic because of time

constraints and resources needed to observe and document the investigation. Besides, personal subjectivity it has been argued may influence the outcome of the study (Shah & Al-Bargi, 2013).

Critical Paradigm or Theory

Critical theory, as a form of research and analysis, first emerged in the Frankfurt School of Social Research through the work of Adorno, Horkheimer, Marcuse, and, later, Habermas (Fard, 2012, p.67; Shah & Al-Bargi, 2013). The advocates of this theory critiques the paradigms of positivism and interpretivism as ways of knowing the social world; the theory challenges oppression and beliefs that restrict human freedom and thus seeks to bring about social change and freedom (Fazliogullari, 2012, p.51). Critical researchers presume that social reality is constituted by past events produced and reproduced by people (Kivunja & Kuyini, 2017). Critical researchers recognise that people's ability to change their social and economic circumstances is constrained by various forms of social, cultural and political domination (Fard, 2012; Kivunja & Kuyini, 2017). Therefore, critical researchers desire to expose taken-for-granted beliefs, values, norms and social structures by highlighting the problems and the structures behind them, encouraging self-conscious criticism, and by developing emancipatory consciousness in researchers and social members in general.

Whereas the aim of positivist inquiry is prediction, explanation, and control, the objective of critical theory is a critique of the status quo, focus on the conflicts and constraints in contemporary society, and seek to bring about cultural, political and social change that would eliminate the causes of alienation and domination.

Ontologically, critical theory suggests that there is no single reality or truth, but believes that there are multiple realities just like interpretivism which can be explored by the interaction between the knower and the known. However, it differs from interpretivism in that it focuses on oppression and unequal power relationship in the society and hence privileged the voices of the oppressed or marginalised. It focuses on understanding the live experiences of people in their context. Hence, the ontology of critical paradigm is historical realism (Guba & Lincoln, 1994, p.109; Fard, 2012, p.72).

On epistemology, according to this paradigm, the values of the investigator and the researched inevitably influence the inquiry with context being of paramount importance (Guba & Lincoln, 1994, p.110; Kivunja & Kuyini, 2017). Hence it advocates for a subjective/transactional and culture sensitive epistemology unlike positivism which assumes an objective and value-neutral investigations. Consequently, the critical theory admits to bias being present in every action of a human being and expects the findings to support that bias. However, the researcher should continue to be as 'objective' (transparent) as possible, and must carefully research in a manner that bias does not influence the findings.

However, critical theory has also been criticised on some fronts. For instance, that due to the vested interest, ideological or political standpoint of researchers, 'objectivity' of research may be compromised while individual bias may lead researchers to introduce political change with a vested interest (Cohen, Manion, et al., 2007). Also, subjectivity inherent in this type of research sometimes does not provide clarity regarding strategies needed to achieve the desired outcomes in the undertaken study.

Pragmatic Paradigm

Pragmatic paradigm argues that a single paradigm orientation as advocated by the positivists and interpretivists was not ideal to determine social reality or search for knowledge. Proponents (e.g., Tashakkori and Teddlie, 2003; Johnson and Onwuegbuzie, 2004; Alise and Teddlie, 2010) argue that what is needed is a worldview which would provide perspective of research that are seen to be most appropriate for studying the phenomenon at hand. So, they suggest for approaches to research that could be more practical and employ a combination of worldviews to carryout research in order to address research problems and contribute to knowledge, hence, pragmatic paradigm. This paradigm advocates a non-singular reality ontology (that there is no single reality and all individuals have their own and unique interpretations of reality); relational epistemology (i.e. relationships in research are best determined by what the researcher deems appropriate to that particular study); and a value-driven axiology (conducting research that benefits people) (Mackenzie & Knipe, 2006; Kivunja & Kuyini, 2017, p.35; Nguyen, 2019, p.7). Johnson and Onwuegbuzie (2004) and Creswell (2014) prefer to use the term mix-method research rather than pragmatic paradigm.

Pragmatic paradigm accommodates mixed or uses a variety of approaches in providing the best answer to the research question concerning the situation. This is achieved through a process that compliments the advantages and disadvantages present within each perspective (Shannon-Baker, 2016, p.325). Pragmatism recommends a balance between subjectivity and objectivity throughout the inquiry (Shannon-Baker, 2016, p.331).

The critics of pragmatic paradigm note that it mixes the objective and subjective epistemologies without providing a conceptual framework to hold the two together (Shah & Al-Bargi, 2013). Further, critics argue that the process of combining two different paradigms and methods is fundamentally flawed as it is

believed that paradigms have closed boundaries such that mixing of approaches in research is not plausible due to the incompatibility of the paradigms underlying them (Guba & Lincoln, 1994).

4.1 Methodology

Saunders, Lewis, et al. (2009, p.595), define methodology as the theory of how research should be undertaken, including the theoretical and philosophical assumptions upon which research is based and the implications of these for the methods or method adopted. Walter (2006) suggests that methodology is the frame of reference for the research which is influenced by the “paradigm in which our theoretical perspective is placed or developed” (p.35). Similarly, Nguyen (2019, p.4) posits that methodology is the overall approach to research linked to the paradigm, theoretical framework, literature and ethical principles. From these authors stance, it is clear that methodology encompasses concepts such as paradigm, strategies, procedures and methods of research. In other words, there is a link between paradigm and methodology on the one hand, and methodology and method on the other hand. As for method, this refers to systematic procedures or tools used for collection and analysis of data (Mackenzie & Knipe 2006, p.5; Makombe, 2017).

Therefore, methodology is a broad term which covers the research philosophical approach, design, method, and procedures used to carry out an investigation including data gathering, participants’ selection, instruments use, and data analysis. It also includes assumptions made, limitations encountered and how they are mitigated or minimised. In essence, it represents a flow of how the researcher gained knowledge, understanding and obtained the desired data, to answer the research questions to contribute to knowledge.

Relationship between Paradigm and Methodology

As stated earlier, authors differ in their conception of the relationship of inclusion between methodology and paradigm. However, what is important is to note that there is a link between methodology and paradigm. The type of research methodology the researcher chooses is determined or influenced by the research philosophy (paradigm) which the researcher adheres to and this choice will determine the research objectives and the research instruments developed and used as well as the quest for the solution to the problem s/he is investigating. Methodology is also not the same as method as shall be discussed later.

Therefore, each research paradigm has different methodologies that flow appropriately from it, and some of these are listed in Table 1. For instance, positivist paradigm apply methodology that is concerned with explaining relationships among various phenomena or variables that are consistent in time and context (Shah & Al-Bargi, 2013). This could be experimental (cause and effect), quasi-experimental, randomised control trials and non-experimental, wherein questions and / or hypotheses are stated in advance in a propositional form and are subjected to an empirical test (falsification) for verification (Guba & Lincoln, 1994, p.110; Fard, 2012, p.62; Kivunja & Kuyini, 2017, p.30; Nguyen, 2019). These methodologies often favour quantitative methods (approach to data collection and analysis) which focus on generating quantitative or numerical data; statistical analysis; use of random or probability samples; and thus, causal relationships can be established, and therefore generalisation and replicability become possible beyond specific research context (Kivunja & Kuyini, 2017, p.31; Makombe, 2017).

Interpretivist paradigm on the other hand, espouses for loose and flexible methodology, such as phenomenology, symbolic interactionism, ethno-methodology, narrative research and hermeneutics (Edwards & Holland, 2013, p.16; Shah & Al-Bargi, 2013, pp.257-258; Saunders, Lewis, et al., 2019, p.149), which aims to explain or study the experiences and perceptions of participants in given context. It views social phenomena as socially constructed, and concerned with generating meanings and gaining insights into those phenomena (Krauss, 2005; Edwards & Holland, 2013, pp.16-17; Nguyen, 2019). The methodology often favours qualitative method or approaches in data gathering and analysis. The methodology does not predefine dependent and independent variables but focuses on the full complexity of human sense-making as the situation emerges. Further, the methodology does not apply method that relies on randomisation, but uses purposeful sampling techniques and selects individuals and sites that are information rich in conducting research.

Research based on critical paradigm apply methodology that seeks to carryout research that address key social and economic issues such as inequality, domination, oppression marginalisation and other beliefs that restrict human freedom in order to bring about social change, freedom, equality and empowerment. These methodologies include, neo-Marxism, feminism, materialism, queer theory, participatory inquiry, ideology critique, action research etc (Guba & Lincoln, 1994, p.109; Cohen, Manion, et al., 2007; Shah & Al-Bargi, 2013, p.260). For instance, Feminist theory methodology advocates for the study and understanding of women’s needs through their own narratives and experiences. The methodology assumes that research is not value-free and employs method that initiate dialogues with participants as sources of information and analysis of discourse, hence, it often favours qualitative method of data collection and analysis (Fard, 2012; Edwards & Holland, 2013). However, they may also adopt quantitative or mixed methods as well as triangulation in order to critically examine the realities from a cultural, historical and political stance (Mertens, 2005; Shah & Al-Bargi,

2013, p.260). Techniques, procedures and instruments used include, open-ended interviews, focus group discussions, participant observation, journals, and questionnaires (Mertens, 2005; Shah & Al-Bargi, 2013).

Lastly, research based on pragmatic paradigm allows for research methodologies that are best suited to studying the phenomenon being investigated, that is a combination of methodologies or mixed-methodologies. These include, experimental methodology, quasi-experimental methodology, phenomenology, narrative inquiry, action research etc (Kivunja & Kuyini, 2017, p.38). It favours a combination of these methodologies leading to a combination of data collection and analysis method, that is, mix-methods or a combination of quantitative and qualitative methods rather than relying on either a qualitative or quantitative method in a single study. Proponents suggest that mix-methodology aims to enhance and strengthen research validity and credibility (Johnson & Onwuegbuzie, 2004; Shannon-Baker, 2016). For example, using interviews as well as questionnaires add depth to the results that would not be possible using a single-method, thereby increasing the validity and reliability of the findings.

5.1 Research Design

The way the researcher chooses to go about the research or answer the research question(s) is influenced by the research philosophy and research methodology employed. This subsequently informs or influences other decisions such as: the choice of strategy, data collection procedures/techniques, analysis procedures/techniques, constraints and ethical issues likely envisaged and involved in the process, and the time horizon over which the research or project will be undertaken as well as justification for all these decisions. All these come under a conceptual structure which constitutes the plan for the processes. For instance, before architects or builders draw up a plan and construct a building they must first establish the type of building required (its purpose and use), and how they intend to go about the work, the resources and time that is required to accomplish the project. Social science research just like the building, needs a structure and plan of action or design before data collection and analysis can commence.

According to Griffiee (2012, p.44), a research design is a model or blueprint of how the researcher intend conducting the research and answering the research question(s). Saunders, Lewis, et al. (2009, pp.136-138), make a further elaboration and highlight the research design to be thought of in terms of the purpose, strategies employed, choices made with respect to data collection and analysis, including procedures and techniques, as well as time horizon and ethical considerations. Thus, research design is the conceptual structure which constitutes the plan for the choices made including strategies employed and process of collection, analysis and interpretation of data. However, Makombe (2017, p.3364) observes that research students rarely mentioned their design in their projects or confuse it with research method. Some writers and authors (e.g. Harwell, 2010; Bhatta, 2018) also often confuse these terms in their writings or use them interchangeably. For instance, Harwell (2010, p.148) writes, "The terms research method and research design will be used interchangeably in this chapter", while Bhatta (2018, p.78) refers to case study as both research method and qualitative research design respectively. Given the definitional distinction between design and method in this paper, it is important not to confuse researchers, especially, early career researchers. This study opines that research design is different from research method--which is the way data are collected and analysed (quantitative, qualitative or mix method) as will be discussed later (see section 5.1.3).

To this end, the *research design* in this paper is discussed under the following: research purpose (objective), research strategy, research method, time horizon, credibility of choices made and findings, ethical considerations and limitations encountered.

5.1.1 Research Purpose

The purpose of any research is very essential because it leads the researcher to choose appropriate strategy and method (s) that will ensure that the research questions are answered and the objectives of the research are also achieved (Saunders, Lewis, et al., 2009). According to Wahyuni (2012, p.78), "the research purpose and research questions are the fundamental basis on which to craft a research design". Whether a researcher sets out to expand a solution, describe a problem, explain the solution or explore the solution or problem, every research has a peculiar purpose. The purpose can also be to confirm a solution, predict an outcome, criticise previous research efforts, or even to propose how to apply research solutions. It is against that premise that researchers design or define their approach to research. Where researchers seek to gain more insights into a subject or an existing problem which has been sparsely studied, they carry out an *exploratory research* to better understand the problem and the underlying phenomenon (Saunders, Lewis, et al., 2009, p.139). Whereas, when a problem and the solution to it is understood, a researcher may set out to describe the state of the solution or problem and how it has evolved or a variation in the results of several researchers on the same phenomenon under investigation, the researcher carries out a *descriptive research*. Primarily, the purpose of this type of research is to describe a phenomenon and its characteristics (Saunders, Lewis, et al., 2009, p.140). Also, when a researcher seeks to show the cause of a problem, how a problem or solution leads to another, they

carry out an *explanatory research* with a primary purpose of explaining the relationship between changing entities (Saunders, Lewis, et al., 2009, p.140). Therefore, research in terms of design, could be descriptive, explanatory, exploratory or a combination of two or more purposes (Saunders, Lewis, et al., 2009, p.139).

5.1.2 Research Strategy

The research strategy is the general way the researcher seeks to proffer solution to problems raised in order to meet the research objectives (Melnikovas, 2018, p.39). The researcher may use any of the available strategies such as survey, case study, grounded theory or ethnography as it applies to their field of research (Saunders, Lewis, et al., 2009, p.141). The case study strategy isolates a specific case for analysis. The structure of a case study could be an individual, a group, institution(s), problem(s), context(s) or issue(s). The grounded theory strategy explores processes, activities and events and involves theorising from in-depth interviews, while ethnography study's entire group that shares common culture using interviews and participants' observations (Williams, 2007, p.68). The survey strategy on the other hand, is highly structured and is connected to deductive research approach using questionnaire. These strategies are not mutually exclusive, but could be combined. For instance a case study could be combined with the survey strategy, etc. However the choice of a research strategy greatly depends on the research time, objectives, appropriateness to research questions, and other issues such as: the extent of existing knowledge and the researcher's philosophical stance.

However, some authors and writers (e.g. Leedy & Ormrod, 2001; Williams, 2007, pp.67-68) refer to (survey, case study, grounded theory and ethnography) as methodology rather than research design strategy as used in this paper. Furthermore, while Krauss (2005, p.762), and Yin (2014) refer to case study as a research method, Creswell (2014) refers to it as a qualitative design approach. As aptly stated by Harrison, Birks, et al. (2017, p.6), "given the variation in definitions and descriptions, referring to case study as a methodology and/or a design strategy or method can be perplexing, misleading, and at times counterproductive". This is because case study can use both quantitative and qualitative methods within their designs. Therefore, early carrier researchers should understand this use of the terms where authors do not distinguish between their methodology, design strategy and method. In essence, it is important to note that research design strategies and methodologies are not the same; neither is the research design the same with method--which is discussed hereafter (in section 5.1.3).

5.1.3 Research method

Method refers to the way or how data are collected, analysed and the type of generalisation or representations derived from the data (Mackenzie & Knipe, 2006, p.6; Makombe, 2017, p.3375). There are three conventional methods: *quantitative*, *qualitative* and *mix methods* (Williams, 2007, p.65; Makombe, 2017, p.3373). Arguments about which method is better were common in the past, but most authors today emphasise that each method represents different ways of collecting and analyzing data based on understanding of social reality. Thus, what is essential is the selection of appropriate method or methods for an inquiry (Makombe, 2017, p.3379). The choice of a method, however, depends on the nature of the problem studied, the paradigm adopted, the methodology, training of the researcher, and resources available.

Some distinguishing features characterise the quantitative method: It favours structured procedures and numerical measuring instruments for data collection, including questionnaires, measurements and tests (Saunders, Lewis et al., 2009; Makombe, 2017). Furthermore, this method tends toward the collection of numerical data and use of statistical analysis such as hypothesis testing, random sampling and use of large samples. Quantitative methods progress from the positivist paradigm (Makombe, 2017, p.3372), which is deductive and the outcome may either confirm a theory or result in the modification of the theory in the light of findings (Williams, 2007; Saunders, Lewis, et al., 2009; Makombe, 2017).

Qualitative method, on the other hand, is characterised by some distinguishing features: It uses relatively unstructured procedures and instruments for data collection (e.g. semi-structured interviews, or in-depth unstructured interviews and observations); relies on qualitative data or data in form of words, pictures and objects; and is concerned with using small samples and purposive sampling technique (Williams, 2007; Makombe, 2017). Qualitative methods are usually associated with the normative paradigms (e.g. Interpretivism, Critical theory and Pragmatism) (Makombe, 2017, p.3372), which can be inductive (aimed at generating new knowledge or theory) or deductive (aimed at confirming the validity of existing knowledge or theory (Makombe, 2017).

The mixed-methods approach is an extension of, rather than, a replacement for the quantitative and qualitative methods or approaches to data collection and analysis (Williams, 2007). In the mixed methods approach, researchers incorporate methods of collecting or analysing data from the quantitative and qualitative approaches in a single research study (Williams, 2007, p.70; Shannon-Baker, 2016). Mix-method involves a combination of the two methods (Johnson & Onwuegbuzie, 2004; Creswell, 2014). Therefore, researchers typically select the quantitative method to respond to research questions requiring evaluation, explanation and

numerical data; the qualitative method for research questions requiring exploration and textual data, and the mixed methods approach for research questions requiring both numerical and textual data (Williams, 2007, p.65).

5.1.4 Time horizon

According to some authors (Saunders, Lewis, et al., 2009, p.155; Bryman, 2012), the time horizon is the time over which the research or project will be undertaken; which is either *cross-sectional* or *longitudinal*. In a cross-sectional design, the researcher collects data at a single point in time (Saunders, Lewis, et al., 2009; Bryman, 2012). In other words, the researcher can collect data just once in a determined period, possibly days, weeks, or months to answer the research questions. In contrast, in longitudinal studies, the researcher collects data over different periods to answer the research questions (Saunders, Lewis, et al., 2009; Bryman, 2012). Furthermore, this type of study aims to track the continuity of response and to detect changes that appear over time (Zikmund, 2003). Deciding on any one of these two types is determined by some factors such as research strategy, the time available to the researcher, and the purpose of the research (Saunders, Lewis, et al., 2009, p.155).

5.1.5 Credibility of research findings

Any research, irrespective of its approach, is usually evaluated for accuracy or trustworthiness (Anney, 2014). Trustworthiness is the corresponding term used in the qualitative method as a measure of the quality of the research or the extent to which the data and data analysis are believable and reliable (Anney, 2014). Each research approach employs different evaluation criteria to ensure the rigour of the inquiry because of various philosophical and methodological assumptions that guide each path (Anney, 2014). Lincoln and Guba (1985) posit that positivist inquiry using quantitative method assumes a single reality and inquiry findings are based on a separate fact, while (interpretivist, constructionist and critical) using qualitative methods consider multiple facts as an alternative explanation for social existence. Many researchers have identified trustworthiness criteria eg. (Guba, 1981; Wahyuni, 2012; Anney, 2014) for assessing the findings of qualitative methods which fall under four broad areas: credibility, transferability dependability and confirmability (Wahyuni, 2012; Anney, 2014). Findings for positivist paradigm and quantitative method is usually validated by applying four criteria namely, internal validity, external validity, reliability, and objectivity (Saunders, Lewis, et al., 2009; Shah & Al-Bargi, 2013). For details on discussion of these criteria and suggested strategies under each (see e.g., Guba, 1981; Lincoln & Guba, 1985; Saunders, Lewis, et al., 2009; Wahyuni, 2012; Anney, 2014).

5.1.6 Ethical consideration

According to Saunders, Lewis et al. (2009, p.160) research ethics relates to questions about: how research topics are formulated, how research is designed, how access is gained to respondents, how data is collected, processed and stored; as well as how data is analysed and how data is reported. The issue of ethics is an important consideration in research. Researchers are required to protect participants from harm or risk and also work according to ethical guidelines and rules (Kritsch, 2005; British Sociological Association (BSA), 2017; Surmiak, 2018). The guidelines also cover the researcher's responsibility to protect themselves by conducting the research safely and accurately reporting research findings. Ethical considerations are also determined by the phenomena and context of the study (Saunders, Lewis, et al., 2009). Informed consent should be sought to ensure that information are obtained freely and willingly from participants without force or coercion. Also, confidentiality of data and anonymity of respondents/organisations should be adhered to as these are essential to ethical practice (Kritsch, 2005; Saunders, Lewis et al., 2009). Access and ethics are critical aspects of research design and as such many institutions and universities require candidates or researchers to obtain ethical approvals before embarking upon field work which should guide their research.

5.1.7 Limitations

As the case with any research, challenges are expected, including resource constraints, time constraints, extent of generalisation of findings and other factors. How these issues impact on the study are addressed and also expected to be covered in the research design.

In addition, statement of a study's limitations provides the researcher with an opportunity to demonstrate critical thoughts about the research problem, identify the relevant literature published about it, and does a correct assessment of the method(s) chosen for studying the problem. This is because "a key objective of the research process is not only discovering new knowledge but to also confront assumptions and explore what we don't know" (Price & Murnan, 2004). Therefore, stating the limitations of a study not only reflects honesty, transparency and a thorough understanding of the subject matter, "but also gives the authors a chance to identify clear directions for future research" (Greener, 2018, p.568). However, it is important that discussion about the limitations of a study be restricted to the research problem under study.

Table 1: Comparison of four research paradigms and their components

Paradigm	Positivist	Interpretivist	Critical	Pragmatic
Ontology	Naïve realism Single reality	Relativist Multiple realities	Historical realism Multiple realities	Relational Non-singular reality
Epistemology	Objective	Subjective	Transactional / subjective	Objective -subjective Either or both dependent upon the research question(s)
Axiology	Value-free	Value laden, biased and balanced	Value laden, biased and culture-sensitive	Value-driven, both objective and subjective stance
Methodology	Experimental- methodology Quasi-experimental Correlational Causal-comparative Randomised control trials	Phenomenology Symbolic-interactionism Ethno-methodology Narrative-inquiry Hermeneutics Action research	Feminist theory Neo-Marxist Cultural studies Action research Disability theories Queer theory Participatory-inquiry Ideology-critique	Mixed- methodology: Experimental- methodology Quasi-experimental methodology Phenomenology Narrative inquiry Action research
Design	Descriptive Explanatory Survey Case study Longitudinal Cross-sectional	Descriptive Exploratory Ethnography Grounded theory Case study Longitudinal Cross-sectional	Descriptive Exploratory Ethnography Grounded theory Case study Longitudinal Cross-sectional	Descriptive Explanatory Exploratory Ethnography Grounded theory Case study Longitudinal Cross-sectional
Method (most often used)	Quantitative Highly structured (Questionnaires) Tests Observations Document Analysis Large samples Hypothesis testing Random sampling Statistical analysis	Qualitative In-depth investigations (Semi-structured interviews, or in-depth unstructured interviews and observations) Document analysis Small samples and purposive sampling	Qualitative or quantitative (mostly qualitative) Interviews Participants' observation Questionnaires Triangulation of methods	Mixed-method Quantitative and qualitative (combine both methods)

Source: (Saunders, Lewis, et al., 2009; Fard, 2012; Shah & Al-Bargi, 2013; Kivunja & Kuyini, 2017; and Makombe, 2017), modified by author.

III. Conclusion

The paper critically reviews key research concepts that have often proved confusing to early carrier researchers and sometimes used interchangeably or without clarity by authors and writers over the years. These key concepts are—research paradigm, methodology, design and method. This paper found that the terms quantitative and qualitative have been used in four different discourses in the literature. The first application relates to what is regarded to be the research paradigm. The second relates to what is referred to as methodology. The third refers to research design, and the last, connotes the research methods. This finding establishes one of the causes of confusion in the understanding of these key concepts among early carrier researchers and non-methodology post-graduate supervisors.

For the purpose of clarity, the research paradigm is defined in this paper as *a researcher's philosophical orientation, or perspective, or thinking, or school of thought, or set of shared beliefs that influence what should be studied, how it should be studied, and how the results of the study should be interpreted*. The paradigm is composed of three elements, ontology, epistemology and axiology. Although there is no agreement as to an acceptable number or model of classification of paradigms in social science research, four common paradigms were identified in the literature: positivism, interpretivism/constructivism, critical paradigm/theory and pragmatic paradigm that may be used in social sciences research. Methodology on the other hand, is the overall approach to the research linked to the paradigm or theoretical framework. Methodology encompasses concepts such as, design, strategies, procedures and methods. In other words, there is a link between paradigm and methodology on the one hand, and methodology and method on the other hand. Each research paradigm has different methodologies that flow appropriately from it. Research methodologies include, experimental-methodology, quasi-experimental, randomised control trials, phenomenology, symbolic-interactionism, narrative-inquiry, hermeneutics, action research, feminist theory, neo-Marxist, cultural studies, queer theory, etc. It is also possible to combine two or more methodologies within a research paradigm.

Research design relates to the blueprint which covers the way the researcher chooses to go about the research in order to answer the research question(s) or address the research problem(s). It includes the purpose of the research, choice of research strategy, method of data collection and analysis, constraints and ethical issues involved in the process, and the time horizon over which the research project will be undertaken. Research method on the other hand, refers to ways, procedures and tools used for collection and analysis of data, including participants' selection and instruments used for data collection and analysis. There are three conventional methods: *quantitative*, *qualitative* and *mix methods*. This is where the terms qualitative and quantitative are to be used in research—data collection and analysis and not within paradigm, methodology or design.

It is the paradigm that drives the choice of methodology and method respectively. Hence, if a researcher situates the research in a particular paradigm, it is almost certain that s/he would be able to employ appropriate methodology and method respectively to carry out the research. The method used for collection or analysis of data does not determine the kind of study; it is the paradigm and or methodology that does. Importantly, it is within the research design that the choice of data collection and analysis is made and not the choice of method determining the choice of design. However, Makombe (2017), suggested otherwise in his argument he said, "I, however argue that ethnography is a design which can be selected after the decision of method (qualitative) is made, not the other way around" (Makombe, 2017, p.3376). Importantly, this paper argues to the contrary as the research design is a bigger construct to the research method, which is a subset of the research design. The research design include the purpose, strategy and method. The purpose and strategy guides the choice of method. Hence, research design determines the method and not the method preceding the design.

IV. Limitation

This paper is not an attempt to promote a particular paradigm, methodology, design or method over another, rather, it is to provide an exposition and reflection of the differences and relationship between these concepts with a view to better the understanding and application of the concepts, for early career researchers, especially Master's and PhD students and post-graduate supervisors.

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