

# Philosophical Paradigms in Information Technology Research

Victor Otieno Mony <sup>[1]</sup>, Franklin Wabwoba <sup>[2]</sup>

<sup>[1]</sup> Department of Information Technology, Kibabii University, Bungoma Kenya.

<sup>[2]</sup> Department of Information Technology, Kibabii University, Bungoma Kenya.

## ABSTRACT

The field of Information Technology is relatively new and so are its philosophical perspectives. This paper seeks to identify the philosophical paradigms in Information Technology Research. The paper explores the interrelationships between ontology, epistemology, methodology, and methods while at the same time analysing their relation to research in the area of Information Technology. The paper is relevant to everyone who wishes to gain an understanding of different philosophical paradigms and their relation to Information Technology research. This paper aims to guide and help researchers in the field of Information Technology make the ideal choice of a philosophical paradigm before embarking on their research.

**Keywords:** Ontology, Epistemology, Methodology, Methods, Paradigm, Extreme Positivism, Extreme Subjectivism, Nominalism, Constructivism

## I. INTRODUCTION

Philosophy is the study of knowledge. Yet, in the field of information technology, what do we consider knowledge and what are the ways through which we discover such knowledge? Everyone in the field of Information technology will in one way or another perform research into knowledge and draw a conclusion based on the findings. It is therefore imperative that researchers should understand the subjective and objective ways through which knowledge is gained, discovered, and approved. The underlying ontological, epistemological, and methodological perspectives and assumptions in the search for knowledge cannot be ignored by Information Technology specialists.

## II. HALLMARK OF SCIENTIFIC RESEARCH

Research in the field of Information Technology falls largely in the area of scientific research. Science research has its thresholds that must be met at all times. All scientific research should have purposiveness. This means that they should start with a well-defined purpose and aim. Scientific research should also have a good theoretical basis with sound methodologies (Chege & Otieno, 2020). A good scientific researcher can develop testable hypotheses and make use of the right data collection methods to obtain correct data correlating to given research questions.

All types of scientific research produce precise and replicable results. The level of confidence in the probability of measure is high and conclusions are based on facts rather than personal feelings (Chege & Otieno, 2020). Thus, since scientific research goals are characterized by the positivist/phenomenological approach, most research done in Information Technology takes on the positivist approach.

## III. RESEARCH PHILOSOPHY PARADIGMS IN INFORMATION TECHNOLOGY

Philosophy is the study of knowledge while a paradigm is a philosophical way of thinking; a pattern of thought useful in the description of the researcher's worldview (Kivunja & Kuyini, 2017). A paradigm is how scientists make sense of their world and its realities within their time and society (Kelly et al., 2018). Abdullah adds that a paradigm is a researcher's set of beliefs and values regarding the world or given actions. Paradigms involve the way researchers define the world and how they perform their work within the world (Abdullah Kamal, 2019). It is a specific way in which a researcher sees and makes sense of the world. All researchers often present their unique understanding of what knowledge and truth are and this shapes their thoughts and views of the world (Abdullah Kamal, 2019; Kelly et al., 2018).

The research philosophy paradigm refers to the way a researcher views the world and makes sense of it to come up with his research topic. Research paradigm influences a researcher's thoughts, beliefs, and values on research issues (Abdullah Kamal, 2019). Research Philosophy Paradigms in information Technology influence and guides how an I.T. researcher does his research including how he performs investigations, data collection, and data analysis. Gichuki, Rubia, & Wabwoba (2019), state that Information Technology is useful in the design, progress, application, organization and administration of information systems in computers. They further add that the field of IT exploits existing computing platforms such as software and hardware to generate valuable solutions in the society. Research paradigms in IT are composed of ontology, epistemology, axiology, methodology, and methods; all of which have a close relationship with each other (Kasim & Antwi, 2015; Kivunja & Kuyini, 2017; Scotland, 2012).

### **A. Ontology**

The term Ontology is from two Greek words, 'onto' meaning being and 'logia' meaning science (Kasim & Antwi, 2015). Ontology is the study of being and is majorly concerned with the constitution of reality. A researcher's viewpoint from the ontological perspective forms an idea of how things are and how they work (Scotland, 2012). Ontology looks into the nature of existence, social entities, and reality. It defines whether reality is external or internal to an individual (Kasim & Antwi, 2015).

Some researchers define ontology as the way through which truth and reality are defined by an investigator. To them, ontology deals with the question of what is reality and what is there that can be known (Abdullah Kamal, 2019). In ontological philosophy, the nature of reality is not only defined but also the differences between reality, how we perceive the said reality, and how our perception of reality influences everything around us (Chege & Otieno, 2020). In philosophical paradigms of Information Technology Research, Ontology defines different types of worldviews, objects, and social actors under research. Ontology can be used to refer to software, an end user, societal change towards I.T., an organization, or even a given part of a larger system under research. Ontology can be divided into two broad areas namely objective reality and subjective reality:

1) **Objective Reality (Realism):** Object reality promotes the worldview of realism. This is a single reality perspective where there is one truth that is independent of the knower. This truth exists as a discoverable reality, waiting for the researcher to discover it. The existing reality is not dependent on the ideas and views of the researcher (Scotland, 2012). For instance, a desktop computer is known by everyone (one reality) as a desktop computer and will always remain a desktop computer regardless of your vendetta and perception. Perhaps, there exists something about a desktop computer that is yet to be discovered but that will not change it from being a desktop computer.

2) **Subjective Reality (Nominalism):** Subjective reality promotes the worldview of relativism/Nominalism. In relativism, there exist multiple realities that are built between the researcher and the participants in the research. Varied interpretations of the world are constructed and not discovered. The meaning of the world that one experiences are a result of the social interactions between people. Many factors influence meaning and knowledge such as previous experiences, gender, race, class, nationality, social status, race, class, social and political status (Abdullah Kamal, 2019). A good example of subjective reality in Information Technology research is the different world views of different social actors on some emerging technologies such as Artificial intelligence (AI), cloud computing, and the Internet of Things (IoT).

### **B. Epistemology**

Epistemology has its roots in the Greek word episteme which means knowledge. The main concern of epistemology

is how knowledge is created (Kivunja & Kuyini, 2017; Scotland, 2012). Epistemology looks into the assumptions of the nature and forms of knowledge with an emphasis on how knowledge is created, acquired, and passed (Abdullah Kamal, 2019). Epistemology asks questions such as what it means to know and what is the relationship between what can be known and the would-be knower. Is knowledge acquired or is it gained through experience? (Abdullah Kamal, 2019; Kivunja & Kuyini, 2017). In Information Technology research, epistemology refers to the process through which we gain meaningful knowledge on different I.T Systems, their users, their relationships, and their functionality.

In summary, epistemology defines the process through which reality is known by a researcher. This is through the examination of the existing relationship between the research ontology and the researcher (Abdullah Kamal, 2019). The process that Information Technology Research follows to come up with knowledge is known as its epistemology. Epistemology is defined under objectivism/positivism epistemology and Subjectivism/interpretivism epistemology.

1) **Objectivism/Positivism:** Positivism epistemology takes on the ontological position of objective reality (realism). Positivism states that the discovery of truth is possible because such truth is not related to human behavior which is subject to internal pressure and feelings (Abdullah Kamal, 2019). Truth is independent of personal interpretations and views and instead relies on deductive logic (Chege & Otieno, 2020).

Positivists are researchers aligned with the ideology of positivism. Positivists assume that reality is not in any way mediated by the human senses and that the researcher and research ontology are two different independent entities (Scotland, 2012). Thus, to a positivist, meaning is found in the objects under research and not in the researcher's conscience. The researcher, therefore, aims to obtain meaning from the given objects. To a positivist, the world and knowledge are a reflection of hidden truths waiting to be uncovered (Abdullah Kamal, 2019). In Information Technology research, a researcher trying to compare the speed of different algorithms to ascertain which algorithm is faster will quantitatively uncover what is already in existence without adding his values to the research.

To a positive, reality is examined through the use of the rigorous processes of scientific inquiry through surveys and experiments. The methodological approach is quantitative with accurate and verifiable measures. Positivists argue that everything including human behavior can be predicted, observed, identified, measured, and quantified (Abdullah Kamal, 2019). Thus positivists lean on the domain of the natural sciences.

2) **Interpretivism/Subjectivism:** The ontological position of interpretivism is relativism which is subjective truth. In this reasoning, the reality is subjective and differs from person to person. According to interpretivism, the world cannot exist separate from our knowledge about it. Reality is

individually constructed and meditated by our senses. Reality is born when a researcher's consciousness interacts with objects pregnant with meaning (Scotland, 2012). As a result, without our consciousness, the world becomes meaningless, and thus to an interpretive, there are multiple interpretations of realities as the number of individuals doing the research. Personal interpretations in interpretivism are through inference reasoning and not deductive logic as in the case of positivists (Chege & Otieno, 2020). In Information Technology, research can sometimes take an interpretive turn if it seeks to find a societal perception of a given object such as how people perceive a newly launched software. The research methodologies used by interpretivism are qualitative and involve methods such as questionnaires and interviews. This is the perspective taken on research performed by the social sciences.

#### **IV. METHODS USED IN INFORMATION TECHNOLOGY**

The methodology is a strategy through which a researcher can map out an approach to finding solutions to research problems. It is the complete strategy that determines the choice and use of specific methods (Jamshed, 2014). The methodology is the overall blanket used to describe a set of actions or plans behind a choice of given methods. The methodology is also known as the method used in performing research investigations (Abdullah Kamal, 2019; Kasim & Antwi, 2015). Methodology's main concern is why a given method is selected, what method will be used, and when and how data will be collected and analyzed. The methodology seeks to know the path that the researcher will use to find out the truth about a given belief (Almalki, 2016; Scotland, 2012). The main question behind the methodology is how a researcher can go about acquiring knowledge (Almalki, 2016). The constructivist states that there are multiple realities while the positivist view is of single universal realities and thus the methodology used by researchers in the two areas must be different (Abdullah Kamal, 2019). Information Technology research requires that the choice of methodology selected by a researcher must conform to research ontology and epistemology. The methodology can be defined as either quantitative or qualitative.

##### **C. Quantitative Methodology**

A quantitative approach to research is known also known as a deductive approach where researchers see the world as outside themselves (Almalki, 2016). Quantitative methodology is associated with research in the natural sciences and takes on a positivist worldview. In quantitative methodology, researchers agree to the consensus of existing truth 'out there' which can be rightly estimated and quantified. Quantitative research examines measured variables to test objective research theories (Abdullah Kamal, 2019; Almalki, 2016). In quantitative research, the cause-and-effect, distribution description of a given attribute is determined.

Statistical analysis of data is performed to get the needed results.

##### **D. Qualitative Methodology**

A Qualitative research is the meaning social actors or a given group of people give to a human or social problem. Qualitative research aims to reveal meaning in an occurrence for people involved in it (Abdullah Kamal, 2019; Jamshed, 2014). The main concern of qualitative researchers is the identification of the description given by social actors to their personal experiences (Abdullah Kamal, 2019; Jamshed, 2014).

Qualitative research lays its emphasis on exploring and understanding people's experiences with its main data collection and analysis instrument being the researcher (Almalki, 2016). It is the researcher who generates concept explanations, and theories for study and finally gives a rich description of data produced from sources such as field notes and interviews (Abdullah Kamal, 2019). Therefore, qualitative research is a social science type of research that makes use of words collected and analyzed in varying ways.

Phenomenology and Ethnography are some of the widely known and used qualitative research methods. In Phenomenology a researcher seeks to know and understand social actors' views and perspectives on social realities while Ethnography looks into the cultural groups in natural settings and seeks to find solutions to problems in such local settings (Chege & Otieno, 2020). Ethnography developed the use of unstructured interviews and observations which are sometimes used as a supplemental method for corroborating research findings (Jamshed, 2014).

##### **E. Interpretive Methodology**

The interpretive methodology takes on Subjective ontology and a constructive viewpoint of epistemology (Kelly et al., 2018; Scotland, 2012). In interpretive methodology, the social world can only be analyzed and understood from the viewpoint of social actors who are participating in it. This methodology aims to understand the phenomenon from individuals' perspectives and investigates the interaction between social actors and the historical/cultural contexts which they inhabit (Scotland, 2012). The ontological position is that of multiple realities through the reflection of a person's lived experience and cultural experiences (Kelly et al., 2018).

The interpretive methodology includes case studies, ethnography which is the study of cultural groups, hermeneutics, and phenomenology which is the study of the direct experiences of social actors (Scotland, 2012).

Hermeneutics focuses on understanding the behavior of social actors to gain insight into their view of the construction of the social world. Hermeneutics sees the social world as socially constructed and is based on the belief that there exist limits to the ability to discern the real social world. Hermeneutics has more influence in the social sciences than positivist approaches (Chege & Otieno, 2020; Kelly et al., 2018).

## V. PHILOSOPHICAL PARADIGMS OF THE NATURAL SCIENCES

### F. An analysis of Positivism

A Philosophical paradigms of the natural sciences rose to prominence during the Age of Enlightenment. Positivists such as Comte coined and popularized positivism as they sought to argue the application of scientific paradigms (Scotland, 2012).

Positivism is associated with the French philosopher Auguste Comte (1789-1857) (Kasim & Antwi, 2015; Kelly et al., 2018). According to Comte, observation and means are the best means of understanding the behavior of human beings (Kasim & Antwi, 2015). It reflects the belief in logic, measurements, and the use of deductive reasoning to prove absolute truths in the study of phenomena. Reality is independent of social construction. The main characteristic of positivism is empiricism which argues that what is observable is factual thus there exist subjects that are universal truths (Kasim & Antwi, 2015; Kelly et al., 2018). Positivists believe that reality exists independent of human behavior and thus, the reality is not a creation of the human mind. In positivism, science provides a researcher with an objective account of the world (Scotland, 2012).

Positivism holds that the methods used in research should have validity and reliability. Consistent results that can be replicated and proven through given instruments drive positivist scientists in their choice of methods. Statements made by positivists are descriptive and factual and their scientific paradigm is founded on data and facts (Kelly et al., 2018; Scotland, 2012). The methodology used in positivism focuses on the explanation of relationships and focuses on attempts to identify causes influencing outcomes. Positivist methodologies are created with the target of formulating laws that will help in predictive analysis (Kelly et al., 2018). In positivism, a deductive approach is used where experiments help in the reduction of complex interactions. The methodology is empirical and verifiable evidence is sought in the process through testing, random sampling, control groups, dependent variables, and independent variables (Scotland, 2012). A positivist believes that reality does not change and depends on universal laws. Thus, the positivist paradigm is associated with the quantitative research approach with the main goal being to predict, control and generalize findings through surveys, questionnaires, and experimental methods (Abdullah Kamal, 2019).

1) **Nomothetic approach:** The positivist methodology takes on the nomothetic approach in its methodology. This is characterized by methods and procedures designed to discover general laws. In the eyes of a positivist, the methodologies are not value-laden and as such, the generated knowledge is neutral to any set of values (Scotland, 2012). To a positivist, reality is real, external, objective, quantifiable, and measurable (Abdullah Kamal, 2019).

2) **Extreme Positivism:** Ontologically, Extreme positivists view the world as a concrete, real thing with an effect on everyone. Extreme positivism ontological paradigm takes the world as a structure with a network of casual relationships with its essential parts. It views the social world in a concrete and real manner as the natural world (Evely et al., 2008).

Epistemologically, extreme positivism views reality as an objective phenomenon that can be observed and measured to get accurate or inaccurate results.

When positivism is used in Information Technology research, research questions on given aspects of the social world are quantitatively answered. Because positivism makes use of empirical data, a large number of participants can be questioned unlike in a qualitative approach. This makes it possible to get more accurate results over a larger sample size than subjectivism.

### G. Post Positivism

Post-positivism emerged from positivism ideology in the 20<sup>th</sup> century. Even though it has the same ontological and epistemological beliefs as positivism, it differs in given ways. First, unlike the positivist view, post-positivism believes that truth produced by scientific paradigms is simply our belief in the truth of tested hypotheses. Secondly, post-positivism presents the principle of falsification by arguing that scientific theories can never be proven as true and can only be accepted tentatively when attempts to refute them fail. Thus, in post-positivism, scientific truths remain tentative forever. Research outcomes are an estimation of truth but not absolute truth as reflected in the positivist ontological view (Kelly et al., 2018; Scotland, 2012). Experimental and correlation studies are used in post-positivism since it seeks to understand casual relationships. Beyond the collection of data, perspectives are sought and hypotheses are not proven and neither are they wholly rejected because of the tentative nature of knowledge presented by post-positivism (Scotland, 2012).

Methodologies used in post-positivism include standardized tests, closed-ended questionnaires, and standard observation tools used to describe phenomena. The analysis is done through the description and inferential statistics which allow external validity of results through generalization or transferability of sample results to other situations. This means that different researchers can record the same data in the same way and come to the same conclusion thus making data both reliable and replicable (Kelly et al., 2018; Scotland, 2012).

1) **Structural Realism:** Structural realism has set its base in the belief that scientific theories are capable of offering true descriptions of reality structure. However, it views the social world as composed of processes that change throughout time. To understand the change process, structural realism enables a researcher to incorporate qualitative data collection methods in his methodology (Evely et al., 2008).

2) **Transcendental Realism:** This is perceived as a bridge between extreme positivist and subjectivist views of the world. Transcendental realism accepts the limitations present in the human mind in conceptualizing objective reality and thus also takes into account the percentage through which reality can be a projection of human imagination. Thus, it conjoins both positivists' and subjectivists' ways of doing research (Evely et al., 2008).

Transcendental realism is a type of realism approach that enables top management in Information Technology companies to gain insights from the feelings and emotions of their workforce transcendental takes on both quantitative and qualitative approaches and based on the qualitative and quantitative data analyzed, researchers can know to know the belief and motivation of social actors (Evely et al., 2008). E.g. Managers can know what motivates their employees and their belief in a newly implemented system. Because it incorporates the benefits of a positivist and subjectivist approach, it provides the most balanced form of research for philosophical paradigms in Information Technology.

## **VI. PHILOSOPHICAL PARADIGMS OF THE SOCIAL SCIENCES**

### **A. An analysis of Subjectivism**

The use of the subjectivist approach limits data to a small group of participants due to the methods involved. For instance, it will take a lot of time to transcribe and analyse interviews. Despite this, data gained from a subjectivist approach can help Information Technology managers in developing a people-based management trajectory including the knowledge of what motivates social actors and why there exists a difference in people's actions (Evely et al., 2008).

Interpretive methods help in providing insight and understanding of the behaviour of social actors, explaining actions from the participant's point of view without dominating the participants. Methods used in interpretative methods include open-ended interviews and questionnaires, focus groups, open-ended observations, role-playing, and think-aloud protocols. All these produce qualitative data which are analysed and interpretations made (Scotland, 2012).

1) **Constructivism:** This is a philosophical paradigm where people construct their understanding and knowledge of the world through their personal experiences (Dickson et al., 2016; Kelly et al., 2018). The social Constructivism paradigm gets its roots from the interpretive theory. Social constructivism argues that we are born into a world in which meaning has already been made. We are born into a culture and inhabit pre-existing systems which consist of already-reached consensuses about knowledge (Scotland, 2012). Metatheoretical perspectives found in this paradigm mean that knowledge is not a reflection of the objective world but rather an interchange of artifacts. Social constructivism is mostly used in the psychological sciences (Danielyan et al., 2015). In constructive paradigms, research interests are influenced by

culture, gender, race, and location. Most studies in this theory revolve around the life histories of renowned personalities in the communities, clan history, and the history of ethnic societies (Dickson et al., 2016; Scotland, 2012).

In the constructivist paradigm, multiple realities are subjective and always changing. Entities exist in the minds of persons contemplating them and understandings about the world are constructed and interpreted by people (Abdullah Kamal, 2019; Danielyan et al., 2015). The epistemological perspective of constructivism is on how we know and the essence of what meaning is placed on knowledge by an individual (Kelly et al., 2018).

2) **Critical Realism:** Critical realism alters core ontological assumptions to include human perceptions by arguing that reality is shaped by social, political, ethnic, economic, and gender values. In other words, it crystalizes reality which was once seen as plastic in nature. The critical paradigm is historical realism in that realities are socially constructed entities that are constantly being influenced by internal forces (Evely et al., 2008; Scotland, 2012).

The ontological position of critical realism is a combination of ontology and interpretative epistemology (Kelly et al., 2018). Since critical realism is based on real-world phenomena linked with ideologies of society, the epistemology of critical realism is that of subjectivism. It seeks to address issues of social justice and marginalization with some of its theoretical perspectives being Marxism, feminism, and queer theory (Scotland, 2012).

The axiological question asked in critical reality is what is worthwhile. Thus, it is normative because it puts into consideration how things ought to be by judging reality. The aim of critical realism is the materialization of a more democratic society. The methodology used interrogates values and assumptions and challenges social structures to expose social injustices (Kelly et al., 2018; Scotland, 2012).

3) **Nominalism:** In nominalism, the social world is investigated as the nature and patterns of symbols used by humans to work their way through to the perception of reality. Nominalism advocates that human ideas presented by words don't exist beyond an individual's imagination (Evely et al., 2008).

4) **Extreme Subjectivism:** In extreme subjectivism, the reality is viewed as a projection of human imagination. Extreme subjectivism advocates that reality differs and varies based on individual perception. When research is done under this paradigm a researcher allows an interviewee to express his values in his way before looking for common themes among those interviewed to gain an overall impression of the values of a given reality (Evely et al., 2008). Thus, humans use their intuition and experience to shape the world through their own experiences.

## **VII. AN ANALYSIS OF THE PRAGMATIC APPROACH**

Pragmatism is also known by some researchers as the mixed-method approach. Mixed-method is a type of research where the researcher combines both quantitative and qualitative techniques, theories, and approaches into a single study (Almalki, 2016; Jamshed, 2014; Kelly et al., 2018). The ontological and epistemological views of pragmatism are practical approaches to solving ever-complex problems depending on an understanding of the world with flexible methodologies. Research questions and problems are solved based on the best methods that can best answer the research questions (Kelly et al., 2018).

## **VIII. A DISCUSSION ON THE PHILOSOPHICAL PARADIGMS IN INFORMATION TECHNOLOGY RESEARCH**

Paradigm shift refers to the transient nature of societal development and scientific evolution. This evolutionary development creates different considerations of paradigmatic perspectives as to how research is done for understanding to be achieved (Kelly et al., 2018). The state of Information Technology research is one of the great paradigm shifts due to the constant and rapidly evolving nature of Information Technology.

Research is impossible without a researcher committing to some form of ontological and epistemological positions. The type of ontology and epistemology adopted by a researcher often determines the research approach to a given phenomenon (Kasim & Antwi, 2015). The philosophical paradigms that can be adopted by a researcher can either be scientific, interpretive, or critical. Each paradigm has its own ontological and epistemological assumptions which in turn are reflected in the methodology and methods utilized in the research (Kelly et al., 2018; Scotland, 2012). Every research paradigm has its ways of achieving its aims and objectives. In the field of Information Technology research, the scientific paradigm seeks to generalize, the interpretive paradigm is used to gain in-depth ontological understandings while the critical paradigm emancipates.

A researcher in the Information Technology field must understand the philosophical assumptions underpinning each paradigm and how these paradigms are manifested in methodology and methods. Without this, it is impossible to perform successful research using the right tools in Information Technology Research (Evely et al., 2008). Certain approaches can best be applied in Information Technology research. The most critical part of information technology research is the communication of research findings. This happens through presentations at given meetings, publications in scientific journals, the development of research reports, or the publication of books.

Research done in the field of information technology should have a detailed description of procedures used not only for understanding but also for replication should the need arise. Research rationale, procedures, findings, and interpretations should be precise and clear. The work done must be able to pass evaluations by other researchers should such a need arise (Chege & Otieno, 2020).

Positivism has limitations because it utilizes methods developed for the investigation of the natural sciences, which in the essence can always be transferred to the social sciences. Even though positivists state that their research is free of values, researchers argue that a positivist still has to make value-laden judgments in such processes as variable selections, determination of observable actions, and interpretation of findings (Scotland, 2012). Positivists try to formulate methods that will yield commonly accepted results by the use of verifiable experimentation methods to arrive at useful statements for policymakers in the field of Information Technology.

If social research is restricted to a positivist approach, an incomplete understanding of the issues may occur and this may greatly reduce the scope of the study. To overcome this limitation the ideal research in Information Technology considers other world views with mixed methodological approaches.

Subjectivism on the other hand lays its emphasis on the importance of understanding the process through which social actors relate to the world. Subjectivism advocates that individuals create their reality through their emotions and experiences. Thus, a subjectivist believes that it is not possible to use a sample representation of individuals from a given group to provide an overall view of one reality. Subjectivists would prefer the snowball sampling technique to the stratified sampling design.

Social science, attached to subjectivism often makes use of positivism through the collection of quantitative data and the application of standardized research instruments such as questionnaires. However, social scientists believe that a positivist approach cannot sufficiently examine human feelings, emotions, and values. A subjectivist researcher will reject the estimation hypothesis resting on qualitative methods. The Positivists view sees the researcher as the sole possessor of knowledge and the sole originator of actions that will be taken in a passive world.

## **IX. CONCLUSIONS**

In conclusion, with the above knowledge, a researcher in the field of Information Technology can choose the best angle for his research depending on his research ontology approach. Any good research in the field of I.T. will provide rich evidence and give credible and justifiable results which can be replicated by researchers in other situations.

In our case, due to the extremely fluid paradigm shift in I.T., we would recommend a pragmatic approach to I.T. philosophical paradigms in research. We would most likely make use of mixed methods. However, regardless of your

choice of the research philosophical paradigms, research in Information Technology should not only be replicable, but also verifiable and dependable.

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