

## The Role of Philosophical Schools in Scientific Research

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### ABSTRACT

This study examines the contributions of philosophical streams – positivism, interpretivism, pragmatism, and critical realism – in shaping scientific research paradigms, methods, and ethics. Each philosophical approach has unique characteristics that influence how researchers understand reality, develop theories, and select research methods. Positivism emphasizes objectivity through empirical observation and quantitative analysis to identify causal relationships. In contrast, interpretivism focuses on subjective understanding and social meaning derived from individual experiences, making it suitable for qualitative research. Pragmatism offers a flexible approach by integrating quantitative and qualitative methods to address complex research questions and provide practical benefits. Critical realism bridges objective and subjective approaches by exploring the underlying mechanisms of phenomena. Furthermore, these philosophical approaches provide an ethical foundation to ensure that research is conducted responsibly and meets societal needs. By understanding and applying these philosophical paradigms, researchers can produce more holistic studies and contribute significantly to advancing knowledge.

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## INTRODUCTION

Scientific research is grounded in a philosophical framework that is the foundation for shaping research paradigms. These paradigms, influenced by philosophical schools of thought such as positivism, interpretivism, pragmatism, and critical realism, function to understand reality, develop theories, and determine the most appropriate methods for addressing research questions. Each paradigm reflects a unique approach to reality and knowledge acquisition, thus influencing how research is designed and conducted by scholars.

Positivism emphasizes empirical observation and rational analysis to understand reality objectively. This paradigm is relevant for quantitative research, where systematically obtained data are analyzed to uncover causal relationships that can be mathematically measured (Creswell & Creswell, 2023). In contrast, interpretivism highlights that reality is subjective and shaped by human experiences and social interactions. This paradigm is more suited for qualitative research, which explores meanings from participants' perspectives, as applied in ethnographic or phenomenological studies (Denzin & Lincoln, 2018).

Pragmatism emerges as a flexible approach that integrates elements from both quantitative and qualitative methods. This paradigm allows researchers to address complex research questions without being confined to a single methodological approach. Its primary focus is the practical utility of research outcomes within specific contexts (Morgan, 2014). Meanwhile, critical realism bridge's objective and subjective perspectives, emphasizing the importance of uncovering the social structures underlying phenomena. This approach aids in understanding the profound relationships between individuals and larger social systems (Bhaskar, 2020).

Philosophical schools of thought guide methodological approaches and provide ethical foundations for scientific research. For instance, the deontological approach emphasizes respecting research subjects' rights, while utilitarianism assesses the success of research based on its impact on societal well-being (Rensik, 2018). Combining philosophical and ethical paradigms creates a holistic framework to ensure that research is scientifically relevant and socially responsible.

Thus, exploring the role of philosophical schools of thought in shaping research paradigms, methods, and ethics is crucial. A comprehensive understanding of these concepts can enhance research quality and ensure the relevance of its outcomes to societal needs. This article aims to examine philosophical thought's contributions to various aspects of scientific research.

## LITERATURE REVIEW

### *Positivism*

Positivism is a philosophical school introduced by Auguste Comte in the 19th century. It emphasizes that valid knowledge must be based on empirical facts verifiable through observation, experimentation, and scientific methods (Ritzer & Goodman, 2022). According to Comte, human thought progresses through three stages: the theological stage, the metaphysical stage, and the positive stage. The theological stage explains phenomena by referring to

supernatural forces, the metaphysical stage shifts to abstract concepts, while the positive stage focuses on observable and testable natural laws (Turner, 2023).

### *Interpretivism*

Interpretivism is an approach in the philosophy of social science that emphasizes the subjective understanding of social phenomena. Unlike positivism, which prioritizes objective facts and quantitative measurement, interpretivism focuses on the meanings and experiences individuals assign within their social contexts (Suyanto, 2023). This approach is rooted in philosophical traditions such as phenomenology and hermeneutics, which stress that social knowledge is constructed through interaction and individuals' subjective understanding of their world (Rahardjo, 2023).

### *Pragmatism*

Pragmatism, a philosophical orientation emphasizing practicality and knowledge based on experience, has significantly influenced the discourse on probability in the early decades of the 20th century. This influence played a crucial role in conceptualizing and developing subjective probability, a construct shaped by prominent figures such as Frank Ramsey, Bruno de Finetti, and Emile Borel (Galavotti, 2019).

### *Critical Realism*

Critical realism, as a philosophy of science developed by Roy Bhaskar, integrates the view that reality is independent of human consciousness with the understanding that human knowledge of that reality is always constructive. In scientific research, this approach offers a theoretical foundation that bridges the dualism between positivism, which focuses on observable objective facts, and interpretivism, which emphasizes the subjective meanings assigned by individuals to social phenomena (Dewanto & Hartono, 2021).

## **METHODOLOGY**

The research method employed in this study is a literature review, which involves collecting, critically analyzing, and synthesizing information from various academic sources. This approach aims to identify and summarize relevant findings, understand underlying theories and concepts, and evaluate existing research gaps. The literature search was conducted systematically through reliable databases such as Scopus, PubMed, and Google Scholar, using keywords aligned with the research topic. Subsequently, the collected literature was critically analyzed to ensure its validity, reliability, and relevance to the focus of this study (Snyder, 2019).

The strength of the literature review method lies in its ability to provide a robust theoretical foundation and support the proposed arguments. Utilizing credible sources ensures that the study is grounded in strong scientific evidence and enriches understanding of the discussed issue (Chris Hart, 2018). Therefore, the literature review is appropriate for addressing research questions comprehensively and systematically.

## RESEARCH RESULT AND DISCUSSION

Philosophical schools of thought such as positivism, interpretivism, pragmatism, and critical realism play a fundamental role in shaping scientific research paradigms. Each school provides epistemological and ontological foundations that guide researchers in understanding reality, developing theories, and selecting research methods.

### *Positivism*

Positivism aims to replace metaphysical speculation with a fact-based approach, making science a tool for objectively understanding the world. In his work, *Cours de Philosophie Positive*, Comte emphasized the importance of sociology, which he called "social physics," as a discipline for studying the laws of society. This philosophy has significantly impacted the development of modern science, particularly in quantitatively oriented natural and social sciences (Bryant, 2023).

However, Karl Popper and Thomas Kuhn have also criticized positivism. Popper criticized positivism's heavy reliance on verification and introduced the concept of falsification as a more robust method for testing scientific theories (Chalmers, 2021). On the other hand, Kuhn argued that science often progresses through fundamental paradigm shifts involving subjective aspects within the scientific community (Godfrey-Smith, 2023).

Despite these critiques, positivism remains relevant in establishing scientific standards based on evidence and observation, providing a solid framework for empirical research even today (Creswell & Creswell, 2023).

Positivism plays a crucial role in shaping the methodological framework of modern scientific research. This paradigm highlights the importance of empirical facts, systematic observation, and data-driven approaches to understanding the world objectively. Several critical aspects of positivism's role in scientific research include:

a. Strong Epistemological Foundation

Positivism proposes that valid knowledge must be based on direct observation and verifiable facts. This principle provides a robust epistemological foundation for the development of science. By emphasizing empirical verification, positivism ensures that scientific claims are free from metaphysical speculation or untested assumptions (Ritzer & Goodman, 2022).

b. Development of Scientific Methods

The positivist paradigm has driven the emergence of modern scientific methods, including systematic data collection, experimentation, and statistical analysis. This approach is used in research to identify cause-and-effect relationships, test hypotheses, and formulate universal laws. Positivist principles have profoundly influenced fields such as physics, biology, and experimental psychology (Creswell & Creswell, 2023).

c. Relevance to Quantitative Research

Positivism is the foundation for quantitative research, which aims to measure phenomena using statistical tools objectively. Quantitative research is often used to predict trends, test mathematical models, and assess the

effectiveness of interventions. For instance, in social sciences such as sociology or economics, survey data and experiments are employed to understand broad patterns of human behavior (Turner, 2023).

d. Standards of Objectivity and Replicability

By emphasizing the importance of objectivity, positivism establishes the standard that research findings must be replicable under the same conditions by other researchers. This principle enhances scientific research's credibility and ensures its results are reliable and applicable across various contexts (Bryant, 2023).

### *Interpretivism*

Methods commonly used in interpretivism are qualitative, such as in-depth interviews and participant observation, aiming to uncover the meanings behind social phenomena (Prasetyo & Wahyuni, 2023). Although it provides profound insights, interpretivism often faces criticism for being overly subjective and neglecting objective aspects in understanding social reality (Hidayat, 2023). There are several critical aspects of the role of interpretivism in scientific research:

a. An Alternative to Positivism

Interpretivism offers an alternative to the positivist paradigm, emphasizing objectivity and generalization through quantitative methods. This approach allows for a deeper understanding of social phenomena by highlighting individuals' meanings, contexts, and subjective experiences (Suyanto, 2023).

b. Understanding Social Reality through Interaction

One of interpretivism's primary roles is enabling researchers to understand social reality as something constructed through social interactions. This perspective is valuable for exploring complex, dynamic phenomena and is influenced by cultural values, norms, and societal beliefs. In this context, researchers collect data and interpret the meanings participants assign to their experiences (Rahardjo, 2023).

c. In-Depth Research Methods

Interpretive research methods, such as in-depth interviews, participant observation, and narrative analysis, help researchers gain insights into the unique perspectives of individuals or groups. For instance, studies on cultural identity or migration experiences can yield a rich understanding of how individuals interpret the social changes they encounter (Prasetyo & Wahyuni, 2023).

d. Critical Reflection on the Researcher's Role

Interpretivism encourages critical reflection on the researcher's role in the research process. Researchers are seen as active subjects who contribute to the interpretation, making transparency and reflection on potential biases essential in maintaining the research's credibility (Hidayat, 2023).

### *Pragmatism*

Furthermore, John Dewey's pragmatic philosophy provides a robust framework for understanding educational environments, focusing on human experience and scientific principles. This philosophical foundation facilitates the

constructive and responsible evolution of knowledge in the educational domain (Kosasih, 2022).

In Indonesia, pragmatism as a theoretical framework emphasizing truth and methodology has significantly impacted science pedagogy. This is particularly evident in research-based education and learning approaches emphasizing practical relevance and hands-on experiences. Pragmatism fosters dynamic, problem-oriented learning and highlights the meaningfulness of knowledge in daily life (Riga, 2020).

In scientific research, pragmatism contributes significantly by integrating theory and practice to generate concrete solutions to real-world problems. This approach recognizes that knowledge evolves through a dynamic process involving hypotheses, experimentation, and critical reflection on outcomes. Several vital aspects illustrate the role of pragmatism in scientific research:

a. Framework for Multidisciplinary Research

Pragmatism is a reference for researchers to adopt a multidisciplinary approach, where qualitative and quantitative methods can be combined to address research questions. This approach provides methodological flexibility relevant to complex research contexts requiring comprehensive analysis (Kosasih, 2022).

b. Emphasis on Practical Benefits

In scientific research, pragmatism emphasizes the direct benefits that research can generate for knowledge development and practical applications. This philosophy guides researchers to ensure that research outcomes are theoretically relevant and have a tangible impact on society, as seen in experience-based educational research (Riga, 2020).

c. Enhancing the Social Relevance of Research

Pragmatism encourages researchers to focus on real-world problems faced by society. This ensures that research is not only theory-driven but also implementation-oriented. This approach is particularly relevant in education, where pragmatism supports project-based learning models and action research that integrate theory and practice (Rahayu & Sutanto, 2021).

### ***Critical Realism***

The critical realist approach emphasizes the existence of three levels of reality: (1) natural (fundamental structures and causal mechanisms that are not always observable), (2) actual (events generated by these mechanisms), and (3) empirical (human experiences of phenomena). By distinguishing these levels, critical realism helps researchers understand that surface phenomena are often the result of more profound, more complex mechanisms (Santoso, 2022).

Critical realism is a framework for uncovering and understanding the fundamental structures that cause various phenomena in scientific research. For example, in studies of social inequality, this approach not only identifies disparities in resource distribution but also explores structural factors such as economic policies, cultural values, and educational systems that are the root causes (Rahmawati, 2023).

Critical realism also enables the integration of qualitative and quantitative research methods, making it a powerful tool for analyzing complex phenomena.

This method describes causal relationships and explains the contexts and dynamics influencing those relationships, providing a more holistic understanding of the phenomena studied (Rahayu & Sutanto, 2021).

Thus, critical realism offers a rich approach to scientific research, integrating theoretical and practical analyses to understand complex realities. This approach allows researchers to describe phenomena and uncover the mechanisms underlying them, significantly contributing to more profound scientific knowledge development. There are several key aspects of the role of critical realism in scientific research:

a. Core Principles of Critical Realism

Critical realism is based on the idea that there are three levels of reality: accurate, actual, and empirical. The "real" level encompasses structures and mechanisms that may not always be observable but are the causes of occurring phenomena. The "actual" level refers to the events produced by these mechanisms, while the "empirical" level includes direct human experiences of phenomena (Dewanto & Hartono, 2021). This approach is relevant in scientific research, particularly in studies aiming to uncover the fundamental structures behind social and natural phenomena.

b. Relevance in Social Science Research

In social research, critical realism encourages researchers to describe observable phenomena and explore the underlying structures and mechanisms that cause them. For instance, in studies of social inequality, this approach helps identify structural factors such as policies, culture, and economics that influence resource distribution (Santoso, 2022).

c. Methodological Integration

Critical realism facilitates the integration of qualitative and quantitative methods, creating a more holistic research approach. This methodological combination aids researchers in understanding causal relationships in complex phenomena, such as the connection between education and social mobility (Rahmawati, 2023).

## CONCLUSIONS AND RECOMMENDATIONS

The conclusion of this discussion highlights that philosophical schools such as positivism, interpretivism, pragmatism, and critical realism play a fundamental role in shaping scientific research paradigms, methods, and ethics. Each school offers unique characteristics that guide research approaches to understanding reality. Positivism emphasizes objectivity through empirical observation and quantitative analysis, making it relevant for data-driven research to identify causal relationships. In contrast, interpretivism focuses on subjective understanding, social context, and meanings derived from individual experiences, making it suitable for qualitative research using methods like in-depth interviews and participatory observation.

With its flexible approach, pragmatism integrates quantitative and qualitative methods to address complex research questions while emphasizing the practical relevance and immediate benefits of research outcomes. Meanwhile, critical realism bridge's objective and subjective perspectives by uncovering the

deeper mechanisms underlying phenomena, making it relevant for understanding social structures and foundational factors in complex phenomena.

Moreover, each philosophical school contributes to the ethical foundations of scientific research, ensuring the conduct of responsible research aligned with societal needs. Researchers can develop more holistic methods and significantly advance knowledge by understanding and applying these diverse paradigms.

### **ADVANCED RESEARCH**

Advancing research through the lens of philosophical schools requires a critical synthesis of their principles to create innovative, context-sensitive methodologies capable of addressing contemporary challenges. Positivism's focus on empirical rigor can be expanded through advanced statistical modeling and machine learning, enabling the identification of intricate causal relationships across vast datasets. Interpretivism, on the other hand, can benefit from integrating digital ethnography and narrative analytics to explore subjective experiences in increasingly interconnected social contexts. Pragmatism's versatility offers opportunities to design mixed-methods frameworks that prioritize actionable insights, bridging the gap between theoretical inquiry and practical applications. Critical realism, with its focus on uncovering underlying mechanisms, can be leveraged through systems thinking and multi-layered analyses to dissect the interplay between social structures and emergent phenomena. By embracing these philosophical paradigms holistically, researchers can cultivate a more nuanced understanding of complex realities, fostering ethical, impactful, and socially responsive advancements in scientific inquiry.



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