

The Role of Philosophy of Science in the Development of Scientific Methods for Islamic Studies

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Abstract: *The scientific method has become an important foundation in the development of science, its application in Islamic studies still faces challenges in terms of integration with Islamic values, especially in the midst of the development of the Industrial Revolution 4.0. In-depth studies that combine modern technology with the perspective of Islamic philosophy of science are still limited, so more comprehensive research is needed to fill this void. This research explores the role of philosophy of science in the development of scientific methods in the context of Islamic studies. In the era of the Industrial Revolution 4.0, the scientific method plays an important role in various aspects of life, including in the application of information and communication technology that requires a strong scientific basis. This article highlights the close relationship between philosophy of science and Islam, especially in providing an epistemological basis that allows the integration of scientific methods with Islamic values. A literature study approach is used to examine various sources regarding the development of the scientific method as well as the application of philosophy in Islamic studies. The results show that philosophy of science not only provides a theoretical foundation for the scientific method, but also directs its application to be in accordance with spiritual and moral values in Islam.*

Keywords: *Philosophy of science, Scientific method, Islamic studies*

Abstrak: Metode ilmiah telah menjadi landasan penting dalam perkembangan ilmu pengetahuan, penerapannya dalam studi keislaman masih menghadapi tantangan dalam hal integrasi dengan nilai-nilai Islam, terutama di tengah perkembangan Revolusi Industri 4.0. Kajian mendalam yang memadukan teknologi modern dengan perspektif filsafat ilmu yang Islami masih terbatas, sehingga diperlukan penelitian yang lebih komprehensif untuk mengisi kekosongan ini. Penelitian ini mengeksplorasi peran filsafat ilmu dalam pengembangan metode ilmiah dalam konteks studi keislaman. Dalam era Revolusi Industri 4.0, metode ilmiah memainkan peran penting dalam berbagai aspek kehidupan, termasuk dalam penerapan teknologi informasi dan komunikasi yang memerlukan dasar ilmiah yang kuat. Artikel ini menyoroti hubungan erat antara filsafat ilmu dan Islam, terutama dalam memberikan dasar epistemologis yang

memungkinkan integrasi metode ilmiah dengan nilai-nilai Islam. Pendekatan studi literatur digunakan untuk menelaah berbagai sumber mengenai perkembangan metode ilmiah serta penerapan filsafat dalam studi keislaman. Hasil penelitian menunjukkan bahwa filsafat ilmu tidak hanya menyediakan landasan teoretis bagi metode ilmiah, tetapi juga mengarahkan penerapannya agar sesuai dengan nilai-nilai spiritual dan moral dalam Islam.

Kata Kunci: filsafat ilmu, metode ilmiah, studi keislaman

Introduction

The role of philosophy since ancient times until now continues to develop and adapt to social, cultural, and intellectual changes in humans. So that the development continues to go through changes in each era. In ancient times, philosophy served as the primary source for answering fundamental questions about existence, nature, and morality. In the Middle Ages, philosophy helped combine rational thought with religious beliefs and provided the basis for theology and metaphysics. In modern times, philosophy is the foundation for the development of science, rationality, and individual freedom. Until now, philosophy continues to play an important role in exploring the concepts of existentialism, ethics, politics, and human rights, which affect various fields of science.¹

Philosophy has changed the paradigm from myth to logos, from thinking based on superstitious things to thinking based on science.² With the advancement of science at this time, humans are required to be able to use communication and information technology, in the use of communication and information technology a scientific way is needed, so as to produce products or results that can be accounted for.³ Philosophy of science provides the epistemological basis for the scientific method, which is essentially a structured way to identify problems, formulate hypotheses, collect data, and draw conclusions based on evidence.⁴ The scientific method has developed rapidly from the ages to the present day driven by technological advances and globalization. So that the scientific method is a systematic tool that allows researchers to obtain valid and reliable knowledge.⁵ However, behind its application, there is a philosophical basis underlying the process of the

¹ Dian, Fauziyah, and Ayuna, "Eksistensialisme Dalam Filsafat Ilmu: Hubungan Antara Manusia Dan Pengetahuan."

² Juliwansyah and Ahida, "History Of Philosophy Of Science In The Classical And Middle Periods."

³ Natasya et al., "Filsafat Ilmu Dan Pengembangan Metode Ilmiah."

⁴ Iqbal, Muhammad, "Aji Muhammad Iqbal – Kajian Kritis Terhadap Epistemologi Ilmu Page 1."

⁵ Masykur, "Metode Dalam Mencari Pengetahuan: Sebuah Pendekatan Rasionalisme Dan Metode Keilmuan."

scientific method of philosophy of science provides a conceptual framework for understanding, evaluating, and criticizing the scientific method as a research tool.⁶

Philosophy of science examines the principles used to formulate scientific methods, tests the limits of scientific knowledge, and formulates questions about objectivity and truth.⁷ The development of scientific methods cannot be separated from the influence of philosophical thought, such as empiricism and rationalism.⁸ Therefore, it is important to explore how philosophy of science contributes to the development of the scientific method as an effective research tool. Advances in science and technology have changed human social behavior and lifestyle due to the impact of technological advances and the fourth industrial revolution.⁹ Industry 4.0 not only opens up social interaction widely but also brings significant changes in various aspects of human life. In academia, these changes require scientists to develop their potential and critical thinking to face the global developments of the times.¹⁰ Therefore, the philosophy of science is able to be a buffer to face changes as the times develop rapidly.¹¹

The history of scientific methodology has been greatly influenced by the philosophy of science. Philosophy has been used by people to answer basic questions about existence, nature, and morality since time immemorial.¹² Today, philosophy serves as the foundation of science, reason, and intellectual freedom that defines the Age of Enlightenment. To date, philosophy has influenced many scientific domains in addition to guiding people in exploring existentialist, ethical, political, and human rights issues.¹³ Researchers focus on the domain of Islam, especially in the context of the Industrial Revolution 4.0, the scientific method has changed many aspects of human life significantly, including in terms of communication and

⁶ Muzakir et al., "Filsafat Sebagai Dasar Perkembangan Ilmu Pengetahuan."

⁷ Natasya et al., "Philosophy of Science and the Development of the Scientific Method."

⁸ Vera and Hambali, "Aliran Rasionalisme Dan Empirisme Dalam Kerangka Ilmu Pengetahuan."

⁹ Uli, "Pengaruh Kemajuan Teknologi Terhadap Perilaku Sosial Dan Lingkungan Anak."

¹⁰ Faizin et al., "21st Century Students: Imam Al-Ghazali's Perspective in Islamic Education."

¹¹ Nabila, Berutu, and Tambunan, "Filsafat Ilmu Di Era Globalisasi."

¹² Hrp et al., "Sejarah Perkembangan Filsafat Dan Sains Pada Zaman Yunani."

¹³ Dwi Septiwiharti, *Filsafat Pendidikan: Memahami Pendidikan Dari Socrates Sampai Fuad Hassan*.

information processing.¹⁴ Today, information and communication technology is essential for research, but the biggest problem is finding ways to ensure that its application is based on scientific concepts that can be valid and valid. The technical aspects of data collection pose difficulties, but so does our understanding and assessment of the scientific approaches taken to address more complex social and scientific problems. In this case, philosophy of science provides a conceptual framework for recognizing problems, developing theories, and arriving at conclusions supported by reliable data.¹⁵

The main issue is how the scientific method can continue to develop in the face of new difficulties posed by the era of globalization and digitalization. In order to remain relevant and meet the demands of the times, the scientific methods currently used in research need to be challenged and modified. This is where the philosophy of science plays an important role, offering an epistemological foundation for the process of creating trustworthy scientific procedures. This research also focuses on the contribution given by the philosophy of science to the evolution of the scientific method of Islamic studies as a useful research instrument. Several previous studies have examined how philosophy of science has made an important contribution to the development of scientific methods. Sholikatin's research shows that with the advancement of science today, humans are required to be able to use communication and information technology scientifically.¹⁶ In this context, the scientific method functions as a systematic tool that allows researchers to obtain valid and accountable knowledge. This method not only functions in the data collection process, but also in the evaluation and drawing conclusions based on evidence.¹⁷

The philosophy of science in Islam has a close relationship because Islam encourages the search for science based on moral and spiritual values. Philosophy of science is a branch of philosophy that discusses the basics, methods, and goals of science, while in Islam, science is seen as part of worship and duty, with the aim of getting closer to Allah and benefiting people and nature.¹⁸ In Islam, the main sources of knowledge are revelation (the Qur'an) and reason. Revelation provides spiritual and moral guidance, while reason is used to understand the universe through observation, logic,

¹⁴ Alimuddin et al., "Teknologi Dalam Pendidikan: Membantu Siswa Beradaptasi Dengan Revolusi Industri 4.0."

¹⁵ Muslih, "Sains Islam Dalam Diskursus Filsafat Ilmu."

¹⁶ Sholikatin, Natasya, and MUnawir, "Optimalisasi Peran Masjid Sebagai Sarana Pendidikan Islam Di Indonesia."

¹⁷ Rosmiati et al., "Evaluasi Pelaksanaan Assesment Autentik Dalam Pembelajaran Ekonomi Di Sekolah Menengah Atas."

¹⁸ Soelaiman, *Filsafat Ilmu Pengetahuan Pespektif Barat Dan Islam*.

and critical thinking.¹⁹ This is in line with the philosophy of science, which also emphasizes the importance of the scientific method in seeking truth. Many classical Muslim philosophers, such as Al-Farabi, Ibn Sina, and Al-Ghazali, have aligned their philosophical approach with Islamic teachings to create a synthesis between rationality and faith. Overall, the philosophy of science in Islam emphasizes the balance between empirical knowledge and spiritual ethics, making science not only a tool for understanding the physical world, but also a means of achieving wisdom and devotion to God.²⁰

The strategy of scientific methods in raising Islamic issues involves a systematic approach that combines scientific principles with Islamic teachings. Broadly speaking, this process begins by identifying Islamic problems or issues that need to be solved, such as social, legal, economic, or ethical issues in Muslim society. This issue is clearly formulated to ensure proper focus. After that, an in-depth study of Islamic literature, such as the Qur'an, Hadith, as well as the views of classical and contemporary scholars, along with relevant scientific literature, is carried out. The goal is to understand the historical and theoretical context of the problem. This step provides a strong foundation for the research process. After the analysis, the researcher draws conclusions based on scientific findings and relates them to the teachings of Islam. This conclusion includes solutions that are in accordance with sharia as well as providing practical recommendations for the community or relevant policies.²¹ The results of the research are then verified through trials or discussions with scholars or other experts to ensure that the proposed solution is truly in accordance with Islamic values and can be applied effectively. With this strategy, the scientific method allows Islamic issues to be raised and resolved in a rational, objective, and consistent manner with religious teachings.²²

The development of philosophy from ancient times to the present continues to develop and adapt to social, cultural, and intellectual changes of human beings.²³ The tradition of empiricism and rationalism, studied by Sudarmin, became the foundation for the development of the modern scientific method, where they both provide guidance on how we understand

¹⁹ Sudrajat and Sufiyana, "Sumber Filsafat Islam: Wahyu, Akal, Dan Indera."

²⁰ Wardanah et al., "Filsafat Ilmu Dalam Pandangan Islam."

²¹ Dkk, "Metode Ilmiah Dalam Islam."

²² Sirojuddin et al., "MENINTEGRASIKAN PENALARAN DAN PENDEKATAN ILMIAH DALAM PEMAHAMAN AGAMA: Telaah Dialektika Term Rasional Dan Scientific."

²³ Fadli, "Hubungan Filsafat Dengan Ilmu Pengetahuan Dan Relevansinya Di Era Revolusi Industri 4.0 (Society 5.0)."

and acquire knowledge.²⁴ In other words, the philosophy of science not only serves as a theoretical basis for scientific methods, but also as a buffer against the challenges faced by modern science, especially in the era of the Industrial Revolution 4.0.

In his research, Muzakir added that philosophy of science provides a conceptual framework for understanding, evaluating, and criticizing existing scientific methods, so that this method remains relevant in the midst of the development of the times.²⁵ In addition, the findings of Vera and Hambali link the development of the scientific method to two main schools of philosophy, namely empiricism and rationalism, both of which play a role in shaping the way we acquire knowledge through the scientific method.²⁶ Previous research has highlighted the importance of philosophy of science in underpinning the scientific method, but this study offers novelty in exploring how the scientific method of Islamic studies continues to adapt to the new challenges presented by globalization and the Industrial Revolution 4.0. With the rapid advancement of technology, the question arises of how the philosophy of science can direct the development of this scientific method to remain valid and relevant in the face of rapid social and technological changes.

Therefore, this study aims to explore the relationship between the philosophy of science and the scientific method of Islamic studies in the modern context, as well as to question how the boundaries of scientific knowledge can be identified and evaluated.

Method

This study uses a qualitative approach with a literature study method to collect and analyze data from various relevant sources, such as books, scientific articles, and previous research. The approach used is a descriptive approach, which allows researchers to understand, interpret, and explain the phenomenon studied in depth based on existing literature sources.

The research stage of literature study begins with the identification of a clear research topic, followed by the search and collection of relevant sources from the existing literature. After that, the researcher conducted a critical evaluation of the collected literature to assess the credibility, relevance, and quality of the information. Then a synthesis stage is carried out, where researchers group key findings from various sources, identify knowledge gaps, and connect information to gain a deeper understanding. In the final stage, the researcher thoroughly compiles and interprets the results in a broader research context, as well as draws conclusions based on the analyzed literature.

²⁴ Sudarmin et al., "Hubungan Filsafat Dengan Pendidikan Islam."

²⁵ Muzakir et al., "Filsafat Sebagai Dasar Perkembangan Ilmu Pengetahuan."

²⁶ Vera and Hambali, "Aliran Rasionalisme Dan Empirisme Dalam Kerangka Ilmu Pengetahuan."

Result And Discussion

The Relationship Between Philosophy of Science and Islamic Education

Because the two influence each other in the process of knowledge development, the relationship between philosophy of science and Islam is very close.²⁷ The philosophy of science provides a rational basis for Islamic education by emphasizing the importance of using reason and scientific methods in seeking truth.²⁸ In Islam, the quest for knowledge is not only a spiritual obligation, but also part of the formation of a whole personality.²⁹ The philosophy of science helps structure this search process by providing a logical and critical framework for understanding various concepts, including Islamic concepts. Philosophy of science plays a role in building epistemology or theory of knowledge in Islamic education.³⁰ Islamic epistemology emphasizes that the source of knowledge consists of revelation (Qur'an and Hadith) as well as human intellect. The philosophy of science highlights ways to verify, develop, and apply that knowledge. This is important in Islamic education because it encourages students to think critically, not only to receive information passively, but also to question, analyze, and integrate knowledge with religious teachings.

The philosophy of science provides a methodological foundation for Islamic education. The learning method in Islam is based on a comprehensive approach, including spiritual, moral, and intellectual aspects. The philosophy of science supports this by providing guidance on how science should be taught, i.e. in a way that encourages freedom of thought within ethical boundaries, respect for truth, and the development of analytical skills. In this context, Islamic education not only aims to transfer knowledge, but also to build human beings who have high moral and intellectual integrity.³¹ Philosophy of science integrates ethical aspects in Islamic education. In the Islamic tradition, knowledge must always be directed to a good purpose, namely for the benefit of mankind and to get closer to Allah.³² The philosophy of science helps to direct Islamic education to remain ethical, by emphasizing the moral responsibility of every knowledge learned and applied. Thus, the philosophy of science not only provides a logical and methodological basis for Islamic education, but also helps to maintain a balance between spiritual, intellectual, and moral aspects in the educational process. Islamic education integrated with the philosophy of science will produce individuals who are

²⁷ Sudarmin et al.

²⁸ Rahmatullah and Kamal, "Peran Filsafat Islam Dalam Membangun Pendidikan."

²⁹ Sofiani, Fadli, and Saputra, "Pembentukan Kepribadian Islami Dalam Pendidikan Agama Islam."

³⁰ Qifari, "Epistimologi Pendidikan Islam."

³¹ Juariah, "Paradigma Pendidikan Islam Dan Pengembangan Sumber Daya Insani Dalam Membentuk Etika Dan Karakter Dalam Masyarakat Islam."

³² Ridwan, Kurniati, and Misbahuddin, "The Relevance of the Function and Purpose of Islamic Law in the Modern Era."

not only intellectually intelligent, but also have noble character and have deep spiritual awareness.

The development of the scientific method in the perspective of Islamic philosophy

From the perspective of Islamic philosophy, the scientific method is colored by an approach that combines rationality and empiricism, in line with the principles inherited by Greek thinkers such as Plato and Aristotle, which are further expanded by Muslim scholars. The works of Islamic philosophers such as Al-Farabi, Ibn Sina, and Al-Ghazali highlight the concept of rationality based on empirical observation, as well as ethics that are integrated in the exploration of science. This emphasizes how the scientific method in Islamic philosophy not only aims at the achievement of scientific knowledge, but also involves deep moral reflection.

The golden age of Islam shows the increasingly blurred boundaries between basic and applied science, with a comprehensive view that makes science a means of deepening understanding God and the universe. This paradigm change was in line with the development of Western science which then developed through the Scientific Revolution, which took the influence of the scientific method in Islamic philosophical thought. At the peak of Islam's glory, science underwent a massive transformation that allowed science to achieve its independence. This is the period in which the human mind begins to feel the freedom to explore, analyze,³³ and develop science without being bound by strict dogmas or authorities.³⁴ Science began to stand on its own as an independent force, and this change not only affected the way of thinking, but also redefined how humans understood reality and sought the truth. In that era, there was a fundamental overhaul in the perspective of what knowledge is and how to obtain it. The view of science is no longer static, but becomes dynamic, which continues to change with the times.³⁵ According to Koento in Nabila's research, there are three main aspects that change the way humans view science.³⁶

First, it is increasingly difficult to separate basic science from applied science. In the past, basic science was often considered a purely theoretical study, while applied science focused more on practical applications. However, in those times, the boundaries between these two types of science are increasingly blurred. One science becomes so closely related to the other, that it is almost impossible to draw a clear line between theory and practice. For example, the development of physical science not only has an impact on pure knowledge, but also affects the technology used in everyday life. Second,

³³ Usman et al., "The Concept of Freedom in the Eyes of the Young Generation of Muslims in the Bandung and Jakarta Areas: A Phenomenological Study."

³⁴ Hidayat, "A Comparative Study of the Thought of Paul Feyerabend and Muhammad Iqbal."

³⁵ Santika, Suarni, and Lasmawan, "Analysis of Curriculum Changes Reviewed from the Curriculum as an Idea."

³⁶ Nabila, Berutu, and Tambunan.

the boundaries between various disciplines are increasingly blurred. As science has evolved, scientists have begun to realize that many natural and social phenomena cannot be explained by a single discipline. This poses a challenge for scientists to understand the extent to which they should be involved in ethical and moral issues. For example, a scientist studying biotechnology must consider the ethical impact of his discoveries, especially when it comes to human life or the environment. Third, with the impact of science on the life of mankind, a fundamental question arises about the meaning of science itself. Does science really bring progress, or does it even create new problems? At this point, the philosophy of science plays an important role in answering these questions. The philosophy of science helps to analyze whether the advances made by science are actually beneficial, or present more complex challenges.

In the 18th century, the philosophy of science began to develop as a more systematic discipline. During this period, logic, language, and mathematics became integral parts of the philosophy of science, known as *the theory of knowledge*.³⁷ Philosophers began to investigate what was the source of knowledge, whether it was through sensory experience, intellect, mind, or intuition. In addition, philosophy of science also examines the concept of evidence, which is how a person can know that the knowledge obtained is correct and reliable.³⁸ The philosophy of science, thus, provides the foundation for understanding the limits of the validity of science in reaching out to what is called reality or truth.

The reality faced has underlined the role of philosophy of science in helping humans not only understand knowledge theoretically, but also practically. It includes an in-depth analysis of how scientific knowledge is used in everyday life, how it is organized, as well as how that knowledge contributes to human progress. The development of the scientific method has undergone significant changes throughout history, with strong roots in the underlying philosophical thought. As a discipline that investigates the origins of knowledge, reality, and values, philosophy has played an important role in shaping and enriching the scientific methods used today.³⁹ The following narrative outlines the development of the scientific method from a philosophical perspective.

The scientific method began to attract serious attention among Ancient Greek philosophers, especially through the thought of Plato and Aristotle. Plato emphasized the importance of rationalism, which views that true knowledge can only be achieved through reason.⁴⁰ In contrast, Aristotle introduced an inductive method based on empirical observation. He believed

³⁷ Asy'ari et al., "Tracing the Development of the Philosophy of Science: A Historical Review and Its Logical Logic."

³⁸ Erwinsyahbana and Ramlan, "Qualitative Research in the Field of Law in the Perspective of Constructivist Philosophy."

³⁹ Rianie, "Approaches and Methods of Islamic Education (A Comparison in the Concept of Islamic and Western Educational Theory)."

⁴⁰ Basuki et al., "The Journey to a Deep Understanding of Science: A Philosophical Study of the Nature of Reality."

that knowledge could be gained by observing natural phenomena and compiling general principles from the results of these observations.⁴¹ These two thinkers laid the foundation for the scientific method that combined rationalism and empiricism.

The 17th century marked the Scientific Revolution, led by scientists and philosophers such as Galileo Galilei, René Descartes, and Isaac Newton. During this time, the scientific method underwent major changes. Descartes is known as the pioneer of the deductive method, which emphasizes the use of rational logic to achieve knowledge.⁴² Through his work *Discourse on the Method*, Descartes introduced systematic skepticism, which encouraged individuals to doubt everything until it was proven true.⁴³ Meanwhile, Newton, with his theory of gravity, relied on hypothetical, experimental, and proof-based methods, which became the main pillars in science.

In the 18th century, the Age of Enlightenment strengthened the relationship between philosophy and science. Immanuel Kant contributed greatly to his critical philosophy, which combined elements of empiricism (knowledge through the senses) and rationalism (knowledge through reason).⁴⁴ The scientific method is becoming increasingly systematic with the use of hypotheses, observations, and experiments as the primary means of seeking scientific truth.⁴⁵ The emphasis on rationality and a critical approach became the hallmark of the scientific method of this period.

In the 20th century, the development of the scientific method was further advanced with the concept of falsification introduced by Karl Popper. According to Popper, scientific theories cannot be proven to be absolutely true, but can be tested by being refuted.⁴⁶ If the theory is irrefutable, then it is considered strong. Meanwhile, Thomas Kuhn offered his views on the changing scientific paradigm. Kuhn argued that science does not always develop linearly,⁴⁷ but through a paradigm revolution that replaces the old scientific understanding with the new.

In the contemporary era, the development of scientific methods is increasingly enriched with multidisciplinary and interdisciplinary approaches. Science is no longer limited to a specific discipline, but is integrated across disciplines to understand complex phenomena.⁴⁸ Inductive

⁴¹ Daniel, "Philosophy According to Aristotle."

⁴² Salsabila et al., "An Analysis of Rene Descartes' Thought on Rationalism and Its Synergy on Islamic Education."

⁴³ Copleston, *Filsafat René Descartes*.

⁴⁴ Boe, "SPACE AND TIME AS A FORM OF PRESENTATION OF INTUITION A PRIORI IMMANUEL KANT'S PERSPECTIVE."

⁴⁵ Iqbal, "A Critical Study of the Epistemology of Science: Theories of Knowledge and Scientific Methods."

⁴⁶ Ulum, "The Inclusivity of Islamic Thought and Education Towards the Perspective of Karl R. Popper."

⁴⁷ Sahbana, "The Epistimology of Thomas Kuhn's Paradigm and Scientific Revolution."

⁴⁸ Fadli, "The Relationship Between Philosophy and Science and Its Relevance in the Era of the Industrial Revolution 4.0 (Society 5.0)."

and deductive methods continue to develop and complement each other. Empirical research must now be based on a clear theory, while theories must also be tested through experiments to maintain their validity.⁴⁹ Philosophical views from various schools such as positivism, constructivism, and pragmatism have made diverse contributions to the application of modern scientific methods.

The development of the scientific method in philosophy reflects the evolution of human thought on how to acquire reliable knowledge. From the era of Ancient Greece to the present day, the scientific method has continued to develop through the influence of philosophical thinking about reality, truth, and values. Today, the modern scientific method remains based on rationality, empirical observation, and openness to revision, making it a solid foundation for the development of science in various disciplines. The common thread of the development of the scientific method in the perspective of Islamic philosophy, explores how the development of the scientific method in the perspective of Islamic philosophy provides a foundation for the integration of science, ethics, and spirituality. This view reaffirms the importance of Islamic philosophy in shaping a sustainable scientific perspective, so that it becomes the foundation for the modern scientific method that we know today.

Implementation of the scientific method to Islamic studies

The philosophy of science has a very fundamental contribution to the development of the scientific method, since it provides the basis of thinking that allows science to develop systematically and logically.⁵⁰ The philosophy of science not only serves as a tool for critical reflection on science itself, but also plays a role in determining how scientific methods should be formulated, applied, and evaluated.⁵¹ By exploring the nature of knowledge, reality, and values, philosophy of science influences all aspects of the scientific process, from the formulation of questions to the interpretation of research results. In Islamic studies, the philosophy of science provides a framework for understanding how the concepts of Islamic knowledge, reality, and values can be explored and used as a basis for research.

One of the main branches of philosophy of science, which is ontology, studies the nature of reality and plays an important role in shaping the scientific method.⁵² Scientists, based on their view of reality whether material, spiritual, or a combination of the two will use different scientific approaches. An approach that focuses on observable physical reality reflects a materialist view, while a more inclusive view of non-material aspects can encourage the

⁴⁹ Mustafa et al., "Quantitative, Qualitative, and Classroom Action Research Methodologies in Sports Education."

⁵⁰ Mustofa, "The window of logic in thinking; Deduction and induction as the basis of scientific reasoning."

⁵¹ Rapik, "Discourse on Philosophy of Science: From Human Civilization to God's Civilization."

⁵² Afriandi et al., "Objects of Study of the Philosophy of Science (Ontology, Epistemology, Axiology) and Their Urgency in Islamic Studies."

development of new methodologies that consider subjective or mental experiences.⁵³ This view influences the scientific approach used, for example: the study of Islam that combines empirical and spiritual aspects will direct the scientific method to explore the dimensions of Islam more broadly. This allows the use of methodologies that take into account both objective and subjective aspects of spiritual experience that are important in the Islamic tradition. An understanding of what constitutes reality ultimately determines how the scientific method is constructed to test hypotheses and construct theories.

Philosophy of science also examines how knowledge is obtained, through epistemology. The question of how we can know something, whether through sensory experience, reason, or intuition, has significant implications for the scientific method.⁵⁴ The empirical approach, which focuses on observation and experimentation, and the rational approach, which prioritizes logical deduction, form the basis for the modern scientific method that combines the two perspectives.⁵⁵ This perspective considers the sources of knowledge in Islam, both through intellect, sensory experience, and intuition, all of which are important in formulating valid research methods. Empirical and rational approaches complement each other, making the scientific method in Islamic studies a combination of empirical observation and logical deduction, in line with the Islamic scientific tradition. As shown by great thinkers such as Descartes and Newton, this approach resulted in a scientific method that balances theoretical deduction with induction from observation.

On the other hand, axiology in philosophy of science examines the values that underlie science and how these values affect the use of science in life. The question of the neutrality of science and its purpose for humanity becomes important as the scientific method continues to evolve and begins to affect many aspects of human life.⁵⁶ Here, Islamic studies that use scientific methods will consider the ethics and goals of science in achieving the benefit of the people. This ethical aspect ensures that the scientific methods applied are relevant and beneficial to the progress and welfare of Muslims. Scientific ethics, from research involving humans to the technological impact that results from science, is now an integral part of the scientific method itself.

The concept of falsification introduced by Karl Popper also made a great contribution to the modern scientific method. Popper argued that science cannot achieve absolute certainty.⁵⁷ Instead, scientific theories should

⁵³ Aziz and Biography, "MAN, DIALECTICAL-HISTORICAL MATERIALISM, AND SOCIAL CLASS IN KARL MARX'S VIEW."

⁵⁴ Mujtahidin and Oktianto, "Basic Education Research Methods: A Study of the Perspective of Philosophy of Science."

⁵⁵ Kuswandi and Ofianto, "The Development of Science in the Concept of Empirical Rationalism: Historical and Epistemological Perspectives."

⁵⁶ Mukti, "Ethics and Morals in the World of Science and Humanity."

⁵⁷ Priyatama, "Discourse on the Philosophy of Science in Psychology."

always be tested and open to refutation.⁵⁸ With this approach, the scientific method is more focused on trying to prove the inaccuracy of a theory, rather than confirming its absolute truth. An open attitude towards theoretical revisions is an important basis in the development of scientific methods in the modern era.

In addition, Thomas Kuhn through the concept of paradigm change shows that the development of science does not always run linearly, but through a series of major changes in the paradigm that underlies scientific understanding.⁵⁹ Thus, the scientific method is not fixed, but can always develop and change along with the scientific revolution. Today, the development of the scientific method is greatly influenced by a multidisciplinary approach inspired by the philosophy of constructivism and pragmatism. Constructivism emphasizes that knowledge is shaped by social and cultural interactions, thus encouraging a more open and collaborative scientific approach.⁶⁰ Meanwhile, Nurdin,⁶¹ in his research, added from the point of view of pragmatism that sees scientific truth in terms of its ability to solve practical problems, so that scientific methods are increasingly directed to produce real solutions to complex problems.

In the context of globalization and the Industrial Revolution 4.0, the philosophy of science is increasingly relevant for Islamic studies, because it provides conceptual and ethical direction in facing modern scientific and social challenges. By emphasizing ontology, epistemology, and axiology, philosophy of science equips the scientific method in Islamic studies to continue to develop, ensuring its validity, relevance, and positive contribution to humanity in the midst of rapid change.

The implementation of the scientific method in Islamic studies presents a strong foundation for systematic and relevant exploration of aspects of Islam. The main implication is that the philosophy of science, with its ontology, epistemology, and axiology frameworks, allows Islamic studies to flourish while still considering ethics, values, and goals in the context of Islam. This has a significant impact on the development of a comprehensive methodology and can integrate material and spiritual aspects, making a scientific approach in Islamic studies more inclusive.

The novelty of this approach lies in its integration with modern challenges, especially in the era of globalization and the Industrial Revolution 4.0. This study not only enriches the scientific method with an Islamic perspective but also offers relevant solutions to contemporary problems through a multidisciplinary approach inspired by the philosophy of constructivism and pragmatism. This approach provides a more adaptive

⁵⁸ Dochmie, "The Scientificity of Islamic Sciences Reviewed from the Principle of Falsification of Karl Popper."

⁵⁹ Wulandari, "Thomas Kuhn's Epistemology (Paradigm & Revolution of Science) and the Application of His Methodology in Islamic Education."

⁶⁰ Sugrah, "Implementation of Constructivism Learning Theory in Science Learning."

⁶¹ Nurdin, "Truth According to Pragmatism and Its Response to Islam."

scientific method, allowing Islamic research to respond to social and technological changes with a solid ethical foundation.

Conclusion

It can be concluded that the philosophy of science plays a very important role in the development of scientific methods, especially in the context of Islamic studies which is increasingly relevant to the development of the Industrial Revolution 4.0 era. Along with the times, philosophy of science has influenced the scientific framework of thinking by highlighting fundamental concepts such as epistemology, ontology, and axiology. In Islamic studies, philosophy of science not only provides a strong methodological foundation, but also collaborates with Islamic spiritual values and ethics, resulting in a comprehensive research approach. With this approach, Islamic studies can address contemporary issues rationally and objectively, without putting aside the moral aspect. Philosophy of science encourages the application of scientific methods that are responsive, relevant, and able to answer modern challenges while still being based on Islamic values. This study shows that the integration of philosophy of science in the scientific method of Islamic studies creates a strong foundation for the development of knowledge that is ethical, insightful, and beneficial to mankind.

Bibliography

- Afriandi, Budi, Hengki Ras Bumi, Tamrin Kamal, Rosniati Hakim, Halim Hanafi, and Julhadi Julhadi. "Objek-Objek Kajian Filsafat Ilmu (Ontologi, Epistemologi, Aksiologi) Dan Urgensinya Dalam Kajian Keislaman." *Jurnal Kajian Dan Pengembangan Umat* 7, no. 1 (2024): 72-80.
- Alimuddin, Asriani, Justin Niaga Siman Juntak, R Ayu Erni Jusnita, Indri Murniawaty, and Hilda Yunita Wono. "Teknologi Dalam Pendidikan: Membantu Siswa Beradaptasi Dengan Revolusi Industri 4.0." *Journal on Education* 5, no. 4 (2023): 11777-90.
- Asy'ari, Ary, Sibawaihi Sibawaihi, Usman Usman, and Mahfudz Ridwan. "Melacak Perkembangan Filsafat Ilmu: Tinjauan Historis Dan Logika Penalaranya." *Jurnal Studi Islam Dan Kemuhammadiyah (JASIKA)* 4, no. 1 (2024).
- Aziz, Ibnu Abdul, and A Biografi. "Manusia, Materialisme Dialektis-Historis, Dan Kelas Sosial Dalam Pandangan Karl Marx." *Filsafat Manusia: Memahami Manusia Sebagai Homo Complexus*, 2024, 78.
- Basuki, Basuki, Arif Rahman, Dase Erwin Juansah, and Lukman Nulhakim. "Perjalanan Menuju Pemahaman Yang Mendalam Mengenai Ilmu Pengetahuan: Studi Filsafat Tentang Sifat Realitas." *Jurnal Ilmiah Global Education* 4, no. 2 (2023): 722-34.

- Boe, Maria Roswita. "Ruang Dan Waktu Sebagai Bentuk Presentasi Dari Intuisi A Priori Perspektif Immanuel Kant." *Pedagogi: Jurnal Ilmiah Pendidikan* 9, no. 2 (2023): 54–61.
- Copleston, Frederick. *Filsafat Rene Descartes*. Basabasi, 2021.
- Daniel, Raihan Feris. "Filsafat Menurut Aristoteles." *Studi Kritis Hukum Dan Masyarakat* 1, no. 01 (2024).
- Dian, Helmiyatunnisa Fauziyah, and Nadia Ayuna. "Eksistensialisme Dalam Filsafat Ilmu: Hubungan Antara Manusia Dan Pengetahuan." *Edukasi Islami: Jurnal Pendidikan Islam* 12, no. 1 (2022): 713–24.
- Dkk, Junaidi. "Metode Ilmiah Dalam Islam." *Islamika: Jurnal Ilmu-Ilmu Keislaman* 14, no. 2 (2016): 173–86. <https://doi.org/10.32939/islamika.v14i2.30>.
- Dochmie, Mohammad Rivaldi. "Keilmiahan Ilmu-Ilmu Islam Ditinjau Dari Prinsip Falsifikasi Karl Popper." *Prosiding Konferensi Integrasi Interkoneksi Islam Dan Sains* 1 (2018): 145–50.
- Dwi Septiwiharti, S S. *Filsafat Pendidikan: Memahami Pendidikan Dari Socrates Sampai Fuad Hassan*. Prenada Media, 2024.
- Erwinsyahbana, Tengku, and Ramlan Ramlan. "Penelitian Kualitatif Bidang Ilmu Hukum Dalam Perspektif Filsafat Konstruktivis." *Borneo Law Review* 1, no. 1 (2017): 1–19.
- Fadli, Muhammad Rijal. "Hubungan Filsafat Dengan Ilmu Pengetahuan Dan Relevansinya Di Era Revolusi Industri 4.0 (Society 5.0)." *Jurnal Filsafat* 31, no. 1 (2021): 130. <https://doi.org/10.22146/jf.42521>.
- Faizin, Moh, Bintana Cahya, Kamila Alnaria, Maulida Intan, Safitri Alya, and Hanun Putri. "Peserta Didik Abad 21 Perspektif Imam Al-Ghazali Dalam Pendidikan Islam." *Jurnal Pendidikan Islam* 9, no. 1 (2023): 8–19. <https://jurnal-tarbiyah.iainsorong.ac.id/index.php/alfikr/article/view/309>.
- Hidayat, Thaufiq. "Studi Komparasi Pemikiran Paul Feyerabend Dan Muhammad Iqbal." *EL-FIKR: Jurnal Aqidah Dan Filsafat Islam* 5, no. 1 (2024): 54–71.
- Hrp, Ibnu Alwi Jarkasih, Salminawati Salminawati, Ade Ilfah, and Ummi Nadrah Nasution. "Sejarah Perkembangan Filsafat Dan Sains Pada Zaman Yunani." *Tarbiatuna: Journal of Islamic Education Studies* 4, no. 2 (2024): 474–85.
- Iqbal, Muhammad, Aji. "Aji Muhammad Iqbal – Kajian Kritis Terhadap Epistemologi Ilmu Page 1." *Jurnal Hikmah: Jurnal Pendidikan Islam* 11, no. 1 (2022): 1–11.
- Iqbal, Aji Muhammad. "Kajian Kritis Terhadap Epistimologi Ilmu: Teori Pengetahuan Dan Metode Ilmiah." *HIKMAH: Jurnal Pendidikan Islam* 11,

no. 1 (2022): 1–11.

Juariah, Siti. "Paradigma Pendidikan Islam Dan Pengembangan Sumber Daya Insani Dalam Membentuk Etika Dan Karakter Dalam Masyarakat Islam." *Kumpulan Artikel Ilmiah Pendidikan Islam* 1, no. 2 (2023): 65–71.

Juliwansyah, and Ridha Ahida. "History Of Philosophy Of Science In The Classical And Middle Periods." *JKIP : Jurnal Kajian Ilmu Pendidikan* 3, no. 1 (2022): 83–89. <http://journal.al-matani.com/index.php/jkip/index>.

Kuswandi, Rudi, and Ofianto Ofianto. "Pengembangan Ilmu Pengetahuan Dalam Konsep Rasionalisme Empirisme: Perspektif Historis Dan Epistemologis." *Jurnal Pendidikan Tambusai* 7, no. 3 (2023): 28511–19.

Masykur, Fuad. "Metode Dalam Mencari Pengetahuan: Sebuah Pendekatan Rasionalisme Dan Metode Keilmuan." *Tarbawi* 1 (2019): 57–68.

Mujtahidin, Mujtahidin, and M Luthfi Oktariato. "Metode Penelitian Pendidikan Dasar: Kajian Perspektif Filsafat Ilmu." *Terampil: Jurnal Pendidikan Dan Pembelajaran Dasar* 9, no. 1 (2022): 95–106.

Mukti, Abdul. "Etika Dan Moral Dalam Dunia Ilmiah Dan Kemanusiaan." *JURNAL AS-SAID* 2, no. 1 (2022): 80–99.

Muslih, Mohammad. "Sains Islam Dalam Diskursus Filsafat Ilmu." *Kalam* 8, no. 1 (2014): 1–26.

Mustafa, Pinton Setya, Hafidz Gusdiyanto, Andif Victoria, Ndaru Kuku Masgumelar, and Nurika Dyah Lestariningsih. "Metodologi Penelitian Kuantitatif, Kualitatif, Dan Penelitian Tindakan Kelas Dalam Pendidikan Olahraga." *Insight Mediatama*, 2022.

Mustofa, Imron. "Jendela Logika Dalam Berfikir; Deduksi Dan Induksi Sebagai Dasar Penalaran Ilmiah." *EL-BANAT: Jurnal Pemikiran Dan Pendidikan Islam* 6, no. 2 (2016): 1–21.

Muzakir, Khairul, Cut Noer Aqlima, Toharuddin Simbolon, Khairil Agusrian, and Rosita Dongoran. "Filsafat Sebagai Dasar Perkembangan Ilmu Pengetahuan." *Jurnal Ilmiah Nusantara* 1, no. 4 (2024): 218–29.

Nabila, Nabila, Aisyah Tusyakhia Berutu, and Nur Febri Aldilla Tambunan. "Filsafat Ilmu Di Era Globalisasi." *Hibrul Ulama* 5, no. 1 (2023): 11–20. <https://doi.org/10.47662/hibrululama.v5i1.506>.

Natasya, Azzahra, Tiara Putri, Rizki Putri Jasmin Siahaan, and Ardina Khoirunnisa. "Filsafat Ilmu Dan Pengembangan Metode Ilmiah." *Mahaguru: Jurnal Pendidikan Guru Sekolah Dasar* 3, no. 1 (2022): 167–79. <https://doi.org/10.33487/mgr.v3i1.3932>.

Nurdin, Fauziah. "Kebenaran Menurut Pragmatisme Dan Tanggapannya Terhadap Islam." *Jurnal Ilmiah Islam Futura* 13, no. 2 (2014): 184–200.

Priyatama, Aditya Nanda. "Wacana Filsafat Ilmu Dalam Psikologi." *Wacana*

- 5, no. 1 (2013).
- Qifari, Abudzar Al. "Epistimologi Pendidikan Islam." *Jurnal Pendidikan Kreatif* 2, no. 1 (2021): 16–30. <https://doi.org/10.24252/jpk.v2i1.22543>.
- Rahmatullah, Rahmatullah Rahmatullah, and Abdulloh Kamal Kamal. "Peran Filsafat Islam Dalam Membangun Pendidikan." *Journal Islamic Studies* 4, no. 1 (2023): 15–31. <https://doi.org/10.32478/jis.v5i1.1507>.
- Rapik, Mohamad. "Diskursus Filsafat Ilmu: Dari Peradaban Manusia Ke Peradaban Tuhan." *Titian: Jurnal Ilmu Humaniora* 1, no. 2 (2017): 156–71.
- Rianie, Nurjannah. "Pendekatan Dan Metode Pendidikan Islam (Sebuah Perbandingan Dalam Konsep Teori Pendidikan Islam Dan Barat)." *Management of Education: Jurnal Manajemen Pendidikan Islam* 1, no. 2 (2015).
- Ridwan, Kurniati, and Misbahuddin. "Relevansi Fungsi Dan Tujuan Hukum Islam Dalam Era Modern." *Al-Mutsala* 5, no. 2 (2023): 390–404. <https://doi.org/10.46870/jstain.v5i2.838>.
- Rosmiati, Rosmiati, Noviatr Indah, Frin Eben, and Sindi Mertisia Bouti. "Evaluasi Pelaksanaan Assesment Autentik Dalam Pembelajaran Ekonomi Di Sekolah Menengah Atas." *Business and Accounting Education Journal* 4, no. 2 (2023): 219–28.
- Sahbana, M Dwi Rahman. "Epistimologi Paradigma Dan Revolusi Ilmu Pengetahuan Thomas Kuhn." *Kanz Philosophia: A Journal for Islamic Philosophy and Mysticism* 8, no. 1 (2022): 31–48.
- Salsabila, Athaya Nurma, A Usis Fadhlulloh, Mauli Nafis Sabila, Nola Farizatun Nabila, Nasikhin Nasikhin, Mahfud Junaedi, and Deborah Jean Brown. "Analisa Pemikiran Rene Descartes Mengenai Rasionalisme Dan Sinergitasnya Terhadap Pendidikan Islam." *Jurnal Pendidikan Islam Muta'allimin* 1, no. 1 (2023): 43–52.
- Santika, I Gusti Ngurah, Ni Ketut Suarni, and I Wayan Lasmawan. "Analisis Perubahan Kurikulum Ditinjau Dari Kurikulum Sebagai Suatu Ide." *Jurnal Education and Development* 10, no. 3 (2022): 694–700.
- Sholikatin, Hafsa Kurnia Binti, Amalia Natasya, and Munawir MUnawir. "Optimalisasi Peran Masjid Sebagai Sarana Pendidikan Islam Di Indonesia." *Jurnal Basicedu* 8, no. 2 (2024): 1411–19.
- Sirojuddin, Muhammad, Iksan Kamil Sahri, Abdul Majid, and Dawi Farah Adibah. "Mengintegrasikan Penalaran Dan Pendekatan Ilmiah Dalam Pemahaman Agama: Telaah Dialektika Term Rasional Dan Scientific." *Journal of Research and Thought on Islamic Education (JRTIE)* 6, no. 1 (2023): 14–33. <https://doi.org/10.24260/jrtie.v6i1.2713>.
- Soelaiman, Darwis A. *Filsafat Ilmu Pengetahuan Pespektif Barat Dan Islam*, 2019.
- Sofiani, Ika Kurnia, M Khairul Fadli, and Indra Wahyu Saputra.

- "Pembentukan Kepribadian Islami Dalam Pendidikan Agama Islam." *Mutiara: Jurnal Penelitian Dan Karya Ilmiah* 2, no. 3 (2024): 299–306.
- Sudarmin, A. Widya Asih Muhammad, Ainun Jariah, and Muhammad Ilham Akbar J. "Hubungan Filsafat Dengan Pendidikan Islam." *Saraweta: Jurnal Pendidikan Dan Keguruan* Vol.1, no. No.02 (2023): 115 h. <https://ejurnal.staiddimaros.ac.id/index.php/saraweta/article/download/51/25/231>.
- Sudrajat, Adi, and Atika Zuhrotus Sufiyana. "Sumber Filsafat Islam: Wahyu, Akal, Dan Indera." *Tinta* 5, no. 1 (2023): 73–82.
- Sugrah, Nurfatimah. "Implementasi Teori Belajar Konstruktivisme Dalam Pembelajaran Sains." *Humanika, Kajian Ilmiah Mata Kuliah Umum* 19, no. 2 (2019): 121–38.
- Uli, Oktafia Dwi Sinta. "Pengaruh Kemajuan Teknologi Terhadap Perilaku Sosial Dan Lingkungan Anak." *Program Studi Psikologi Universitas Lambung Mangkurat* 1, no. 1 (2020): 1–7. <http://dx.doi.org/10.31234/osf.io/c8u9a>.
- Ulum, Bahrin. "Inklusifitas Pemikiran Dan Pendidikan Islam Terhadap Perspektif Karl R. Popper." *Jurnal At-Tajdid: Jurnal Pendidikan Dan Pemikiran Islam* 4, no. 1 (2020).
- Usman, Irianti, Riyanda Utari, Firdaus Dwi Suwandi, and Isman Rahmani Yusron. "Konsep Kebebasan Di Mata Generasi Muda Muslim Di Daerah Bandung Dan Jakarta: Sebuah Studi Fenomenologi." *Jaafi: Jurnal Aqidah Dan Filsafat Islam* 7, no. 1 (2022): 15–33.
- Vera, Susanti, and R. Yuli A. Hambali. "Aliran Rasionalisme Dan Empirisme Dalam Kerangka Ilmu Pengetahuan." *Jurnal Penelitian Ilmu Ushuluddin* 1, no. 2 (2021): 59–73. <https://doi.org/10.15575/jpiu.12207>.
- Wardanah, Jeihan Fitrah, Lili Aspinda, Nasyah Aurin, Nasyah Aurin, and Yuda Akbar Nasution. "Filsafat Ilmu Dalam Pandangan Islam." *Hibrul Ulama* 5, no. 1 (2023): 21–29. <https://doi.org/10.47662/hibrululama.v5i1.507>.
- Wulandari, Rizki Isma. "Epistemologi Thomas Kuhn (Paradigma & Revolusi Ilmu Pengetahuan) Dan Penerapan Metodologinya Dalam Pendidikan Islam." *Didaktik: Jurnal Ilmiah PGSD STKIP Subang* 9, no. 2 (2023): 2911–36.