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Francis Bacon's Contribution to the Development of Social Science in the Perspective of the History of Philosophy of Science

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Abstract. This study examines the contribution of Francis Bacon's epistemological thinking to the development of modern science and its relevance to the foundation of social science, especially in Social Studies education. The main issue of this research departs from the scientific paradigm shift from the speculative scholastic tradition to a scientific approach based on observation and empirical experience. By using qualitative methods through literature study and historical-philosophical analysis, this research traces how Bacon's inductive method shapes a scientific mindset that is rational, objective, and systematic. The results show that Bacon's principle of empiricism is not only the basis for natural sciences, but also provides a methodological framework for modern social studies. His concept of idola mentis emphasizes the importance of freeing the mind from bias and prejudice in the process of acquiring scientific knowledge. Bacon's thinking is also relevant in the context of modern education through the application of inquiry-based and experiential learning models that encourage students' critical and reflective thinking skills. Although this research is conceptual in nature, the results open new directions for empirical studies that examine the application of Bacon's principles of empiricism in contemporary social research and pedagogy. Thus, Bacon's intellectual legacy affirms the importance of balance between rationality, empirical experience, and moral responsibility in building the progress of science and civilization.

Keywords: Francis Bacon, Empiricism, Inductive Method, Philosophy of Science, Social Studies Education

INTRODUCTION

The development of modern science reflects a fundamental transformation in human thinking about how to obtain and verify the truth. This change is not just philosophical, but also has broad implications for scientific progress and social dynamics (Muktapa, 2021). . In Western intellectual history, this transformation marks a shift from the dominance of speculative scholastic rationality to a new paradigm that emphasizes empirical methods through systematic observation and experience. This shift then became the foundation for the birth of modern science (Tamami & Fauzi, 2025)

In the Middle Ages until the early Renaissance, the Western intellectual tradition was dominated by scholastic philosophy rooted in Aristotle's thought and tied to the church (Salsa dkk., 2024). Deductive and speculative methods were considered the main path to knowledge, while empirical experience did not yet occupy an important position. Figures such as Augustine emphasized absolute truth based on religious teachings, while Boethius translated Aristotelian logic into the Christian tradition (Salsa dkk., 2024; Wahid, 2021). This began to shift when Francis Bacon criticized the scholastic approach as unproductive, and proposed a new method based on observation and experience. This change marked the transition from speculative reasoning to systematic scientific methods, which became the foundation for the emergence of modern science (Anggara dkk., 2023; Tamami & Fauzi, 2025)

Francis Bacon (1561-1626) is known as one of the important figures who marked the birth of modern philosophy. Apart from being a philosopher, he was also an English statesman who once served as Lord Chancellor (Anam, 2022). Despite being involved in politics, Bacon's intellectual ambitions went beyond the limits of his profession. Bacon was determined to reform the way humans think in acquiring knowledge so that science can provide practical benefits for the advancement of civilization (Anggara dkk., 2023). Bacon's famous statement, "I have taken all knowledge to be my province", reflects the breadth of Bacon's horizons and his determination to establish a new basis for all branches of science (Anggara dkk., 2023; Nugrahanta, 2010).

As the "Father of Modern Scientific Philosophy", Bacon formulated a scientific method based on empiricism and inductivism that emphasizes drawing conclusions from particular facts to general principles (Setyaningsih, 2023). In his works such as Novum Organum (1620), Bacon rejected the scholastic deductive method and replaced it with an inductive method based on systematic observation of natural phenomena (F, 2010). According to him, true knowledge can only be obtained through experience and testing of reality, not through metaphysical speculation (Abadi, 2024). Bacon emphasized that the main purpose of science is to "master nature" for human welfare. Thus, his thought not only gave birth to the modern scientific method, but also directed science towards a pragmatic and applicative orientation.

Bacon's contribution did not stop at the realm of natural sciences alone. The empirical and inductive principles that Bacon formulated, then provided an epistemological foundation for the development of modern social sciences (Setyaningsih, 2023). Although social science only developed systematically in the 19th century through figures such as Auguste Comte and John Stuart Mill, its methodological roots can be traced to Bacon's thinking (Wimeta, 2018). Bacon's approach that emphasizes the importance of observation of facts, systematic analysis, and inductive generalization is the basis for the emergence of a scientific approach in understanding social phenomena. Through this paradigm, society is no longer understood only based on moral or metaphysical speculation, but as an object of empirical study that can be studied rationally and systematically. Thus, Bacon has paved the way for the birth of the positivistic tradition in social science, which later developed into the dominant approach in sociology and other social sciences.

Several previous studies have highlighted Bacon's role in the formation of modern scientific methods and the development of empirical epistemology. Among them, (Anggara dkk., 2023; Setianingsih, 2019), plays an important role in formulating the inductive method as the basis of scientific knowledge. However, studies that specifically relate Bacon's thinking to the methodological foundations of social science are still relatively limited. In fact, the empirical approach he initiated has major implications for the way humans understand and research social reality. It is this gap that this article analyzes, placing Bacon not only as a pioneer of the scientific method in the natural sciences, but also as a thinker who provides a philosophical basis for the empirical study of society.

Based on this description, this article aims to examine the contribution and legacy of Francis Bacon's thought in the perspective of the history of philosophy of science and trace its relevance to the development of social science, especially within the framework of Social Science (IPS). This study seeks to answer fundamental questions about how the epistemological principles formulated by Bacon form the methodological basis for social science, as well as the extent to which his thinking remains relevant in bridging empirical and reflective approaches in modern social studies. Through a historical-philosophical approach, this article highlights Bacon's role in establishing a scientific framework that became the foundation for the development of the scientific method in social science.

METHOD

This research uses a qualitative approach with a library research method. This approach was chosen because the main objective of the research is to examine in depth the contribution of Francis Bacon's thought to the development of social science in the perspective of the history of philosophy of science. The qualitative approach is interpretative, allowing researchers to understand the meaning, context, and implications of Bacon's thinking in shaping modern scientific paradigms, especially in the realm of social science. The unit of analysis in this study is Francis Bacon's thoughts and intellectual works, especially those related to the inductive method and his epistemological views on science. The focus of the research is directed at the role of Bacon's ideas in changing the scientific way of thinking and its impact on the formation of methodological foundations in modern social sciences. The data sources used are entirely secondary, including scientific literature, classical texts, manuscripts, as well as the results of previous research relevant to the topic of study. Bacon's main works such as Novum Organum and The Advancement

of Learning are used as primary sources, while philosophy of science books, journal articles, and contemporary academic publications are used as supporting sources to enrich the analysis. Data collection techniques were conducted through documentary studies, by systematically tracing, selecting, and interpreting texts. This process includes critical reading of Bacon's primary works and reviewing various academic interpretations that explain the influence of his thought on the development of social science. Data analysis was conducted through three stages, namely reduction, interpretation, and conceptual synthesis. The reduction stage was used to select the main concepts relevant to the topic of study. The interpretation stage is done by understanding the historical and philosophical context of the emergence of Bacon's ideas. Furthermore, the conceptual synthesis stage is used to connect the results of the interpretation with the development of the modern social science paradigm. Thus, this analytical process produces a comprehensive understanding of Francis Bacon's contribution to the methodological foundations of social science.

RESULTS AND DISCUSSION

1. Biography of Francis Bacon

Francis Bacon (1561-1626) was an English philosopher, statesman, jurist, and scientist known as the Father of Modern Philosophy of Science (Zittel, 2020). Francis Bacon was born on January 22, 1561 in London, at a time when England and Europe were undergoing major changes from the Middle Ages to the Renaissance. This period was marked by a shift from the dominance of dogmatic scholastic thought to a new spirit that emphasized rationality, observation, and the scientific method. His father, Sir Nicholas Bacon, served as Lord Keeper of the Great Seal, while his mother, Lady Anne Cooke, was known as a learned woman who mastered Latin and classical Greek. This intellectual family background greatly influenced the formation of Bacon's critical thinking and intellectual ambition (Balestra, 2021).

Bacon's early education was at Trinity College, Cambridge, where he studied Aristotelian logic and metaphysics. However, the experience fostered criticism of the scholastic method, which he considered dry and did not produce practical progress. Bacon then went on to study law at Gray's Inn and made a career in politics until he reached the highest position as Lord Chancellor of England. Administrative and political experiences broadened his view that science should not stop at the theoretical level, but have a real social function to improve human welfare.

In his works such as The Advancement of Learning (1605), Novum Organum (1620), and Instauratio Magna, Bacon sought to reform scientific thinking to be oriented towards experience, observation, and empirical testing. Novum Organum, which means "new tool", symbolizes the resistance to Aristotle's Organon, as well as the foundation for the modern scientific method. Bacon introduced the concept of inductionem veram or true induction, which is the process of drawing conclusions gradually from specific facts to general principles that are tested through experience. Bacon rejected speculative deduction and considered that the progress of science can only be achieved through systematic experimental methods that are open to correction (Abadi, 2024; Nguyen, 2024).

In addition, Bacon warned about four types of idols mentis (idols of the mind) that hinder scientific objectivity, namely idol tribus (natural human prejudice), idol specus (individual bias), idol fori (errors due to language), and idol theatri (dogma of authority and tradition). According to Bacon, these four idols are the main sources of error in scientific thinking and must be guarded against so that knowledge can be obtained objectively. The idols tribus and specus highlight the limitations of human perception and personal bias, while the idols fori and theatri emphasize the influence of language and tradition in shaping collective thinking errors (Cooper, 2019; Huang, 2023).

The concept of idol mentis demonstrates Bacon's epistemological awareness of the various obstacles in the scientific thinking process. By understanding and avoiding these idols, the objectivity and progress of science can be better guaranteed. This thinking is in line with Bacon's view that knowledge is a means to master nature and improve human life, as reflected in his famous motto, "Knowledge is power". Bacon's ideas not only became the basis for the birth of the scientific revolution, but also had a major influence on the development of modern philosophy. The empirical and inductive methods that Bacon developed inspired great scientists and philosophers such as Descartes, Newton, Locke, Leibniz, and Voltaire in formulating a rational approach to reality (Anggara dkk., 2023; Setianingsih, 2019). Although Bacon died on April 9, 1626 (Mbusa, 2021), his contribution to knowledge reform makes him one of the most influential figures in the history of philosophy of science, especially in laying the foundation for a critical, systematic, and bias-free way of scientific thinking.

2. Francis Bacon Epistemology and the Reformation of Science

Francis Bacon is a central figure in shifting the scientific paradigm from the speculative scholastic tradition to a scientific approach based on empirical observation and experience. This shift is not only methodological, but also reflects a fundamental change in the way humans understand the source and process of knowledge. Through his monumental work Novum Organum (1620), Bacon rejected the deductive way of thinking that had been dominated by church authorities and Aristotelian philosophy, and introduced the inductive method as a new way of obtaining valid and empirically verifiable knowledge (Nguyen, 2024; Woodruff, 2019).

According to Bacon, true knowledge cannot be obtained solely through logical reasoning or traditional dogma, but through direct interaction with objective reality. Bacon asserted that humans can only understand nature to the extent that they are able to observe and interpret phenomena empirically and systematically. This is contained in his famous statement: "Man, as the minister and interpreter of nature, does and understands as much as his observations on the order of nature permit him." The statement emphasizes that the limits of human knowledge are determined by the extent to which humans use their senses and observations of nature (Omodeo, 2021).

Bacon developed the concept of inductionem veram or true induction, which is the process of drawing conclusions from specific facts to general principles carefully and gradually. For Bacon, scientific truth is born from the accumulation of empirical data verified through experimentation, not from metaphysical speculation. Thus, the inductive method he offers places empirical experience as the basis for theory formation and emphasizes the importance of verification, objectivity, and testing in finding natural and social laws (Anggara dkk., 2023; Setianingsih, 2019). This approach is an important milestone of modern epistemological reform because it shifts the orientation of science from intellectual speculation to systematic and evidence-based research activities.

In line with the spirit of epistemological reform, Bacon proposed the concept of "idols" to explain the cognitive and social barriers that prevent humans from achieving true knowledge. In Novum Organum, Bacon categorized four types of thinking errors: Idols Tribus (tribal idols) stemming from natural human tendencies; Idols Specus (cave idols) resulting from subjective experience; Idols Fori (market idols) arising from the ambiguity of language; and Idols Theatri (theater idols) relating to the uncritical acceptance of dogma. Through the critique of these "idols", Bacon sought to free human reason from prejudice and bias so that the scientific process runs objectively and rationally (Cooper, 2019; Huang, 2023).

Bacon's empirical thinking has been widely influential in the development of modern research methodology. His principles are not only foundational to the natural sciences, but also contribute significantly to the development of the social sciences and modern education that emphasizes experiential learning and empirical evidence. In the context of philosophy of science, Bacon can be called a pioneer of the modern scientific method because he succeeded in placing observation, experimentation and rationality as the main instruments in the search for truth. With a pragmatic orientation reflected in his phrase "knowledge is power", Bacon emphasized that knowledge is not just for intellectual satisfaction, but a means to improve human welfare and progress.

Thus, Francis Bacon's contribution to the history of philosophy of science lies in his efforts to build an epistemological foundation that is rational, empirical, and open to verification, which until now has become the main principle in the modern scientific tradition, including in the discipline of social science. Through an inductive method that emphasizes the importance of observation, direct experience, and systematic testing, Bacon changed the direction of scientific development from mere philosophical speculation to research based on empirical data and facts. This principle then became the basis for the birth of social sciences that seek to understand human and societal symptoms in a scientific, objective and measurable manner. His criticism of "idols" that hinder the objectivity of thinking also inspires social scientists to always be aware of subjective, ideological, and linguistic biases in the process of scientific analysis. Therefore, Bacon's thought not only reformed the way humans understand nature, but also made a fundamental contribution to the development of the scientific paradigm in social studies, where knowledge is seen as the result of the interaction between rationality, empirical experience, and moral responsibility for the progress of human civilization.

3. Impact on the Foundations of Modern Social Science

The inductive method developed by Francis Bacon provides a solid philosophical foundation for the birth and development of modern social sciences. The basic principles that Bacon offered, namely

observation, empirical experience, and systematic verification, became an important foothold for social scientists in understanding the phenomenon of society objectively. This approach shifts social studies from mere speculative reflection to empirical data-based analysis, where individual behavior, group interactions, and social structures are seen as objects of study that can be observed, measured, and interpreted scientifically (Abadi, 2024; Puger dkk., 2025). Bacon emphasized the need to free the human mind from various forms of prejudice that can obscure scientific objectivity. Through Novum Organum, Bacon mentions four types of "idols of the mind" (idol mentis), namely idol tribus (natural human prejudice), idol specus (individual bias), idol fori (errors due to language), and idol theatri (dogma of tradition and authority). This concept is very relevant in the context of modern social science, which seeks to get rid of subjective, ideological and cultural biases in the process of understanding social reality. By getting rid of these idols, social researchers can see society more clearly and scientifically, without being trapped in prejudice or dogmatic views (Cooper, 2019; Huang, 2023).

Bacon's idea of inductionem veram also emphasizes that knowledge must be built from real facts obtained through direct observation. In the context of social science, this spirit is manifested in the use of survey methods, field observations, and social experiments to test cause-and-effect relationships between social phenomena (Abadi, 2024; Setianingsih, 2019). Although experiments in the social sciences are not always identical to experiments in the natural sciences, the spirit of verification, systematization, and openness to correction are the main characteristics of the scientific approach that Bacon inherited.

Francis Bacon's contribution to the foundation of modern social science lies in the paradigm shift from speculative thinking towards an empirically-based scientific approach. Through the inductive method and the principle of systematic verification, Bacon emphasized that an understanding of society must be built on real observation and objective analysis of social facts. His idea of idola mentis emphasizes the importance of freeing research from bias and prejudice, thus enabling the birth of a social science that is more rational, critical, and open to correction. Thus, Bacon's epistemological legacy is an important foundation for the development of modern social research methods that are oriented towards empirical truth and scientific accountability.

4. Relevance of Bacon in Education and Social Studies

Francis Bacon's thought not only has an impact on the philosophy of science, but also provides important inspiration for the world of education, especially in learning Social Studies. The principle of empiricism and inductive method that Bacon developed into a philosophical foundation in fostering scientific attitudes, critical thinking skills, and analytical skills of students. In the context of social studies education, Bacon's ideas encourage learning that is oriented towards direct experience and scientific discovery, where students are invited to observe social phenomena, collect data, and draw conclusions based on empirical evidence (Mutiani dkk., 2022).

Francis Bacon's principle that true knowledge is born from experience and observation of the real world, not from dogma or authority, has strong relevance in learning Social Studies. Bacon's famous phrase, "Knowledge is power," asserts that human power lies in empirical knowledge gained through active exploration and direct understanding of social reality (F, 2010; Nguyen, 2024). In the context of modern education, this principle is in line with the views of (Dewey,1986) who emphasized that learning is an interactive process between experience and reflection. Therefore, the application of Bacon's empirical principles in social studies learning is realized through Inquiry-Based Learning and Evidence-Based Education models that emphasize the importance of direct experience, observation, and analysis of social data as the basis for knowledge formation (Aswira dkk., 2025; Hasni dkk., 2025).

The inquiry-based learning model involves students actively in social exploration activities such as field observations, case studies, interviews, and simple surveys (Hasni dkk., 2025). Through such engagement, students not only understand social concepts theoretically, but also experience how these concepts work in real life. This scientific discovery process fosters inductive thinking, sharpens analytical skills, and shapes scientific attitudes such as objectivity, openness to data, and critical reflection (Prince & Felder, 2006). Teachers and students together collect, analyze, and reflect on social data to build valid and relevant knowledge. The implementation of both approaches has been proven to improve students' concept understanding, social skills, self-confidence, and communication and collaboration skills in social studies learning (Aswira dkk., 2025; Cuenca, 2021; Labay & Cordero, 2025).

Bacon's idea of the importance of empirical experience is in line with the contextual learning paradigm that emphasizes the link between theory and social practice. Contextual learning helps students understand

the relevance of subject matter to everyday life, so that knowledge is not only memorized, but also internalized and applied in real situations (Mansur & Amrin, 2023; Prastuti dkk., 2020; Ramadhani & Fadhilla, 2024). The integration of empirical principles in social studies learning is proven to strengthen the relevance of the material to the reality of students' lives, while fostering motivation, active participation, and more meaningful learning outcomes. In addition, this approach encourages the development of 21st century skills such as critical thinking, problem solving, communication, collaboration, and adaptation to complex social dynamics (Phinla dkk., 2025; Talia & Airlanda, 2025).

Thus, the integration of empirical principles by Bacon with the contextual learning paradigm in social studies not only strengthens the methodological foundations of modern social science, but also becomes a strategic basis for the formation of a generation that thinks scientifically, reflective, creative, and adaptive to social change in the global era. Bacon's epistemological legacy that emphasizes observation, experience, and empirical verification is proven to remain relevant in building an educational model that fosters critical awareness and scientific character of students.

CONCLUSION

Francis Bacon marks an important milestone in epistemological reform that gave birth to modern science through inductive methods and empirical approaches that place experience and observation as the basis of knowledge. This study shows that Bacon's principle of empiricism not only forms the basis for the natural sciences, but also provides methodological direction for the birth of modern social sciences that are rational, objective and measurable. Scientifically, this study emphasizes Bacon's contribution in building a scientific paradigm based on verification and freedom of thought from bias, while practically, his principles are relevant in the development of inquiry-based social studies learning and real experiences to foster students' critical and scientific thinking skills. The strength of this research lies in its ability to link classical thought with contemporary scientific contexts, while its limitations lie in the conceptual nature of the study, so further empirical research is needed to test the application of Bacon's ideas in modern social and educational practices. Bacon's intellectual legacy confirms that the progress of science and civilization must be based on a balance between rationality, empirical experience, and moral responsibility to humanity.

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