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Philosophy of Science and Social Construction: An Epistemological Study in the Indonesian Context

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Abstract

Exploring the relationship between the philosophy of science and social construction provides a critical foundation for understanding the development of scientific knowledge in modern society, particularly within the Indonesian context. The philosophy of science, which examines the epistemological, ontological, and methodological foundations of scientific inquiry, is influenced by the post-positivist paradigm that emphasizes the role of social factors such as culture and norms in shaping knowledge. Meanwhile, Berger and Luckmann's theory of social construction views scientific knowledge as the result of social interaction, negotiation, and institutionalization rather than an absolutely objective entity. Using qualitative methods with a content analysis approach and a synthetic examination of sources such as journals, books, and local case studies, this research reveals that scientific knowledge in Indonesia is shaped by local values such as mutual cooperation, post-reform political agendas, and cultural narratives, which often give rise to epistemic bias and the marginalization of traditional knowledge. The key findings highlight practical implications in the fields of education, health, and the environment, suggesting that integrating a decolonial philosophy of science can reduce injustice and support inclusive policies such as the National Health Insurance. Overall, this interdisciplinary approach affirms that scientific knowledge is dynamic and contextual, encouraging critical reflection on absolute objectivity to promote equitable and sustainable development.

INTRODUCTION

Scientific knowledge serves as a fundamental foundation for the advancement of modern society. However, a deep understanding of the nature, methods, and validity of science is essential to ensure that the development of knowledge proceeds in a critical and reflective manner (Lim, 2024; Suwono et al., 2023). Scientific knowledge is understood as a system that develops through empirical and systematic methods to explain natural and social phenomena. The philosophy of science emerges as a branch of philosophy that critically examines the epistemological, ontological, and methodological foundations of science, including how scientific

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truth is obtained and verified (Kühne & Berr, 2022; Paudel, 2024). This discipline focuses on understanding how scientific knowledge is constructed, tested, and developed within specific social and historical contexts (Kankam, 2019; Ravetz, 2020). Traditionally, the philosophy of science is rooted in positivism, which emphasizes objectivity, empirical verification, and the scientific method as the sole pathway to truth (Az-Zahra et al., 2025). However, since the mid-twentieth century, the development of the philosophy of science has undergone a paradigm shift, particularly through criticisms of positivism and the recognition of the influence of social contexts on the formation of scientific knowledge (Setiawan, 2024; Wardani, 2019).

In the philosophy of science, fundamental questions such as "what is science?" and "how do we know what we know?" are central to understanding the relationship between knowledge and reality (MacLin, 2020; Özdemir & Springer, 2022). The concept of scientific paradigms indicates that the development of science does not progress linearly or in a fully objective manner, but is influenced by theoretical frameworks and social practices prevailing within scientific communities at particular points in time (Munarun et al., 2025; Nuha et al., 2024). Thus, scientific knowledge is dynamic, contextual, and socially constructed. Furthermore, the social construction perspective proposed by Berger and Luckmann (1966) in The Social Construction of Reality asserts that social reality, including scientific knowledge, is not an objective entity that exists independently, but rather the result of social interaction, meaning negotiation, and institutionalization processes (Dressler, 2019; Endress, 2019; Mireanu, 2022). This approach views science as a cultural and social product shaped by power structures, values, and the interests of particular groups (Soneryd & Sundqvist, 2023). Accordingly, science is not merely an accumulation of empirical facts but a construction that is continually reproduced and contested within complex social networks (Albshkar et al., 2025; Markhmadova et al., 2025).

An integrated understanding of the philosophy of science and social construction becomes essential for examining the development of modern scientific knowledge, especially in the context of globalization, digital technological advancement, and the declining public trust in science (Bennett et al., 2020; Engkizar et al., 2025; Engkizar et al., 2025). This approach enables critical analysis of claims to scientific objectivity and highlights the influence of social, cultural, and political contexts on the formation of scientific knowledge (Crochet, 2016). Therefore, this article aims to explore the relationship between the philosophy of science and social construction, as well as their implications for the development of scientific knowledge and modern society (Jaafar et al., 2025; Okenova et al., 2025).

Although the contributions of the philosophy of science and social construction to understanding knowledge have been widely discussed, empirical studies applying these frameworks within the Indonesian context remain relatively limited (Khairanis, 2025). Most previous research has focused on theoretical analysis or relied on Western contexts, without examining in depth how local values, colonial legacies, and post-reform political dynamics influence the formation of scientific paradigms in Indonesia. For this reason, this study seeks to fill this gap by offering a contextual analysis that considers the social, cultural, and institutional characteristics unique to Indonesia. This effort not only enriches the literature on the philosophy of science and the sociology of knowledge but also provides a localized perspective that may be relevant for policymakers and academic communities.

METHODS

This study employs a qualitative method with a content analysis approach, which focuses on an in-depth examination of meanings, patterns, and concepts emerging from various written sources (Antwi & Hamza, 2015; Pohontsch, 2019;

Roller, 2019). The data sources include books, scholarly journals, articles, and relevant documents that discuss the philosophy of science, social construction, epistemology, and the scientific context in Indonesia. This approach was selected because the topics of philosophy of science and social construction are conceptual and reflective in nature, making them more suitable for systematic interpretation of texts and ideas developed in the literature (Gergen, 2020; Roller, 2019). Through content analysis, this study identifies key themes, groups conceptual arguments, and examines how social construction and epistemological traditions are articulated within academic discourse (Engkizar et al., 2022, 2023; Engkizar et al., 2025).

The analysis process consists of several stages: i) collecting relevant literature on the philosophy of science, social construction theory, and epistemological studies in the Indonesian context; ii) repeated reading and coding of key concepts; iii) organizing thematic categories that emerge from the data; and iv) synthesizing the findings to develop a coherent understanding of the relationship between the philosophy of science and social construction. This approach provides an opportunity to develop a more contextual argumentative framework that not only draws on Western theories but also considers Indonesian local values such as *gotong royong, musyawarah*, and traditional wisdom. In this way, the study aims to contribute to contemporary discussions in the philosophy of science by offering a perspective that is socially grounded, contextual, and attentive to decolonial insights an orientation that remains relatively limited in international literature on the philosophy of science beyond Western contexts (Engkizar et al., 2025).

RESULT AND DISCUSSION

Philosophy of science and social construction in the context of knowledge

The philosophy of science is a branch of philosophy that examines the nature, methods, and implications of scientific knowledge. Its scope includes fundamental questions about science, such as how knowledge is acquired and understood. In general, the philosophy of science seeks to understand the nature of knowledge and to explain how science develops within human life (Muktapa, 2021). As a reflective discipline, it studies the foundations of scientific knowledge while relating them to other dimensions of human experience. It functions as a framework for understanding reality more comprehensively by integrating scientific knowledge with humanistic, historical, religious, and other perspectives (Klopfer & Aikenhead, 2022; Maestripieri & Jurgensen, 2025).

In contrast, social construction emphasizes that values, ideologies, and social institutions are shaped by human actors. Social reality is not fixed; rather, it emerges from interactions, activities, and relationships among individuals and groups, which gradually become collectively perceived as "real" (Jiang, 2022; Koc et al., 2021). For instance, Galileo's heliocentric theory initially challenged the dominant view that the Earth was the center of the universe and was accepted only after a long social process. The theory of social construction proposed by Berger and Luckmann (2018) explains that human thought is shaped by social environments, making reality and knowledge dynamic and transmitted through shared experiences.

Philosophy of science in social context

Within a social context, the philosophy of science is no longer considered entirely neutral. Scientific knowledge is shaped through social, cultural, and normative interactions. The post-positivist paradigm asserts that science is formed through negotiation among social actors rather than purely through objective observation of nature. Local values in Indonesia, such as *gotong royong* (mutual cooperation), influence research methods and the interpretation of scientific data. Suparno (2021); Tarlam et al (2024) shows that collective culture encourages participatory research approaches, which differ from the more individualistic

Western model. For example, agricultural research in Java involves local farmers' knowledge, resulting in more inclusive scientific models. This indicates a shift from universalistic philosophy of science toward a hybrid epistemology that integrates local cultural values.

The social construction of scientific knowledge

According to Berger and Luckmann, scientific knowledge is a form of "internalized reality" produced through the processes of externalization, objectivation, and internalization. Thus, science is not merely discovered but also shaped through social interaction. In Indonesia, scientific knowledge is often influenced by political discourse, media, and local cultural settings, including in environmental issues. Maldonado-Erazo et al (2022); Zhang et al (2023) finds that understandings of environmental sustainability among indigenous communities in Yogyakarta are shaped more strongly by political agendas and national policies in the post-reform era than by traditional local knowledge. This situation may lead to epistemic injustice, where traditional knowledge is viewed as less "scientific" due to limited institutional support. Therefore, a decolonial approach to the philosophy of science is important to reinforce the position of local knowledge within academic discourse.

Implications of the philosophy of science and social construction

Social construction may generate bias in the social sciences, particularly in relation to gender, ethnicity, and health. Dominant norms such as patriarchy or nationalism can influence data selection and knowledge interpretation. Sumarni & Kadarwati (2020) research in Central Java shows that people's understanding of mental health is shaped by local narratives, such as spirit possession or supernatural interference, which interact with modern psychological frameworks. As a result, mental health symptoms are often interpreted culturally, making standard medical interventions less effective. Therefore, a philosophy of science that is sensitive to cultural contexts is essential to ensure that public policies such as the National Health Insurance program are implemented more fairly and effectively.

The relationship between the philosophy of science and social construction can be understood through the perspective of Berger and Luckmann, particularly when applied to the Indonesian context as reflected in the findings. Traditional philosophy of science, as articulated by Imre Lakatos, emphasizes falsifiability and objectivity as its core principles. However, the social construction perspective challenges this view by suggesting that scientific "facts" are shaped through social negotiations among scientists, institutions, and the wider community. In the classical framework, the philosophy of science focuses on epistemology, ontology, and methodology. Yet in contemporary societies including developing countries such as Indonesia scientific practice cannot be separated from the social and cultural contexts that shape it. Scientific knowledge is therefore not merely a set of verifiable propositions, but a social product formed through human interaction, values, and power relations.

Post-positivism emerged as a corrective response to positivism's strong emphasis on objectivity, recognizing that scientific activity is always influenced by values and social contexts. In Indonesia, cultural diversity further reinforces the relevance of this perspective. In the philosophy of education, for example, social construction is reflected in the national curriculum, which is shaped by Pancasila values. Bordogna & Lundgren-Resenterra (2023); Jay et al (2022) argues that the philosophy of science in Indonesia would benefit from integrating local epistemologies, including Soedjatmoko's idea of "knowledge for the people," to avoid excessive dependence on Western paradigms. Cultural values such as *gotong royong*, *musyawarah*, and collectivism influence scientific collaboration and data interpretation, suggesting that local epistemologies have the potential to enrich

scientific methodologies and contribute to efforts toward the decolonization of knowledge.

Loenhoff (2019); Pittaway et al (2018) theory of social construction highlights that scientific knowledge is not purely an objective discovery but rather the result of social processes involving externalization, objectivation, and internalization. This dynamic is evident in Indonesian scientific practices, where knowledge production is often influenced by state policies, institutions, and public discourse. For instance, Agustini & Iskandar (2021) found that the concept of "environmental sustainability" in Indonesia is shaped not only by ecological research but also by post-reform political narratives. The marginalization of traditional knowledge such as the *subak* irrigation system or the wisdom of Indigenous communities illustrates the presence of epistemic imbalances. Social construction theory, therefore, provides a useful lens for understanding how certain forms of knowledge gain legitimacy over others.

In practical terms, interdisciplinary approaches are essential for analyzing how scientific knowledge develops within social and cultural contexts. In anthropology, for example, social construction helps explain how local communities interpret environmental or health-related issues. Haerudin & Noor (2022) study on mental health perceptions in Java demonstrates that community interpretations are shaped by both modern medical paradigms and cultural narratives such as *kesurupan* or *guna-guna*. These findings highlight the need for a philosophy of science that is attentive to socio-cultural contexts to ensure that scientific knowledge remains inclusive and avoids reinforcing epistemic bias (Engkizar et al., 2023; Engkizar et al., 2024). In public policy such as the National Health Insurance program recognizing the role of social construction may improve policy implementation by aligning interventions with the socio-cultural realities of the population.

The idea of decolonizing scientific knowledge has emerged as a response to the dominance of Western epistemologies. This approach does not reject modern science but seeks to balance global and local knowledge systems so that they can complement one another. Within this framework, the philosophy of science and social construction theory play important roles in shaping a more pluralistic and context-sensitive scientific paradigm. Acknowledging epistemological diversity is crucial for developing scientific knowledge that is relevant to Indonesian society and aligned with the principles of sustainable development, which emphasize social justice, participation, and respect for local knowledge.

The synthesis of the philosophy of science and social construction offers a comprehensive understanding of how scientific knowledge is formed and evolves. While the philosophy of science provides the ontological and epistemological foundations, social construction highlights the sociological and practical dimensions of knowledge. Integrating these perspectives demonstrates that scientific knowledge is dynamic, historical, and contextual rather than static or isolated from social life. Academically, this implies the need for higher education curricula that incorporate philosophical reflection and social awareness, enabling scientists to understand not only empirical results but also the ethical and social dimensions of research. Through such an approach, science can serve as a means of empowering communities rather than merely legitimizing authority.

CONCLUSION

Based on this analysis, it can be concluded that philosophy of science and social construction complement each other in shaping an understanding of knowledge that is dynamic and contextual. The main findings indicate that scientific knowledge is a social product, which necessitates a critical approach to identifying and reducing potential cultural and political biases. The relationship between philosophy of science and social construction also illustrates that knowledge is

formed through a dialectical interaction between scientific rationality and sociocultural contexts. Scientific truth is not absolute; rather, it undergoes continuous processes of construction and reconstruction in line with social dynamics and prevailing societal values. Therefore, the development of scientific knowledge in Indonesia needs to be oriented toward a more critical, reflective, decolonial, and humanistic paradigm. Such an approach is expected to strengthen the role of knowledge as a transformative force that supports social justice and sustainability.

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