

The Role of Islamic Values in the Development of Science and Technology: Perspectives from Al-Islam and Muhammadiyah

Allifatur Rohma¹, Neneng Nurhayati², Yanti Yuniarti³, Bagus Jamroji⁴

^{1,2,3,4}Magister Pendidikan Agama Islam, Institut Ahmad Dahlan Probolinggo

Email: alif.fatur286@gmail.com, nengonie85@gmail.com, ummuzahra1@gmail.com, bagus0354@gmail.com

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ABSTRACT

This study aims to examine the role of Islamic values from the perspective of Al-Islam and Muhammadiyah in guiding the development of science and technology toward human welfare and moral responsibility. Using a qualitative philosophical library research approach, this study analyzes the Qur'an, Hadith, Muhammadiyah documents, and relevant scholarly literature through thematic and hermeneutic analysis. The findings show that Islamic values position science and technology as a trust directed toward maslahah and the realization of hayatan tayyibah.

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Corresponding Author:

Rohma

Magister Pendidikan Agama Islam, Institut Ahmad Dahlan Probolinggo, alif.fatur286@gmail.com

1. PENDAHULUAN

The transformation of human civilization in the third millennium has been significantly propelled by advancements in science and technology (IPTEK). Innovations in fields such as digital technology, artificial intelligence (AI), biotechnology, and material science are not merely changing the modalities of daily life but are also profoundly influencing social structures, economic formats, and even the self-concept of individuals within society. Yuval Noah Harari posits that these rapid technological developments introduce fundamental disruptions in the human experience, compelling society to critically reflect on their implications (Clemente, Reig-Botella, Lange, & Detaille, 2021).

Amidst these transformative changes, it is essential to interrogate the underlying purposes of IPTEK development. The integration of ethical considerations is paramount as we navigate this complexity. According to Fan, the intersection of ethics and technology emerges as a crucial force that should guide the future trajectory of scientific advancement, ensuring the benefits extend equitably across society (Fan, 2024). Additionally, Manya and Kizito suggest that education in science and technology should be rooted in humanistic values, emphasizing the inherent dignity of individuals as a guiding principle for innovation (Manya & Kizito, 2023). This approach nurtures a sense of purpose while mitigating the risks associated with unchecked technological growth.

The Islamic worldview emphasizes religious authority as a source of knowledge, distinct from contemporary secular paradigms. This is illustrated in works that articulate the Islamic tradition of khabar shadiq, which positions divine revelation alongside rational inquiry (Suryo, Muttaqin, Insani, & Affandi, 2024). The pursuit of knowledge is not merely an intellectual endeavor but a spiritual imperative where humans are urged to seek understanding harmoniously, thus bridging faith and

empirical science (Alimin, 2024). Moreover, the coherence in Islamic thought on science is exemplified through historical contributions made during the Islamic Golden Age, spanning the 8th to the 14th centuries. This period was marked by groundbreaking advancements in various scientific fields, led by influential scholars such as Ibn Sina in medicine, Al-Haytham in optics, and Al-Khawarizmi in algebra, who collectively enriched global knowledge systems (Rahman & Sudirman, 2024); (Pandi, Rama, & Yahdi, 2023) During this golden era, Arabic served as the lingua franca, facilitating cross-cultural exchanges and the propagation of knowledge across disciplines, thus establishing a legacy that would later engage European scholarship (Mardani & Nissa, 2025) However, in recent centuries, a dichotomy has been felt between the IPTEK advancement dominated by the West and the Islamic world.

Amidst this discourse, the contemporary landscape presents unique challenges that call for a nuanced religious response. The rise of surveillance capitalism, algorithmic bias, genetic engineering, and climate change are not merely technical issues but also deeply ethical and existential ones that intersect with Islamic principles of justice ('adl), stewardship (amanah), and the preservation of life. Yet, there remains a significant gap in both scholarly and public discourse regarding how Islamic theology and ethics can systematically engage with these emergent technologies beyond occasional fatwas or fragmented declarations.

This is where the role of Islamic education becomes critical. Higher education institutions, particularly those under Muhammadiyah—one of Indonesia's largest modernist Islamic organizations—serve as vital arenas for shaping future leaders, scientists, and professionals. The Al-Islam and Kemuhammadiyah (AIK) course is uniquely positioned at this intersection. It is not merely a doctrinal supplement but a potential platform for fostering a generation that views IPTEK through the integrated lenses of faith, reason, and social responsibility. However, the effectiveness of AIK in fulfilling this role requires thorough examination and intellectual development.

The Al-Islam and Kemuhammadiyah (AIK) course in Muhammadiyah higher education has emerged as a pivotal framework aimed at harmonizing religious values with scientific and technological advancements. AIK functions not only to educate students about Islamic rituals and beliefs but also acts as a "value filter" and "guidance" mechanism when applying science and technology (IPTEK). This integration is essential for fostering a progressive civilization that respects both ethical responsibilities and intellectual pursuits.

Central to the AIK course is a deep examination of the theological and philosophical underpinnings of Islam as they relate to science and technology. The Qur'an and Sunnah advocate for knowledge acquisition and rational inquiry, establishing a framework where science is viewed as a means to understand God's creation (Mahmudah, 2020); (Solihah et al., 2025) The notion that both spiritual and empirical knowledge are vital contributes to a holistic worldview that upholds the pursuit of science as a revered act in Islam (Nuruddin & Anshory, 2025). Furthermore, scholars argue that this pursuit aligns with the maqāsid al-Qur'ān—preserving knowledge and fostering justice and compassion—thus providing a robust ethical scaffold for technological development (Nazri, 2024)

Islamic ethical principles significantly frame the development and application of science and technology. These principles are derived from core Islamic teachings that stress the importance of morality and accountability in all actions (Atiya, Widiastuti, & Rusanti, 2024). An integrative framework asserts that advancements in science should not only aim for technological progress but should also embody ethical considerations based on Islamic doctrines. This is well reflected in the research advocating for Islamic work ethics that stipulate ethical standards in the workplace, derived from the Qur'an and Sunnah, influencing social and economic transformations in various sectors (Atiya et al., 2024) (Zulaifah, 2019)

The concept of "Progressive Islam," largely promoted by Muhammadiyah thought, plays a critical role in responding to contemporary technological challenges. Progressive Islam advocates for adapting Islamic teachings to modern contexts, fostering flexibility while maintaining adherence to ethical and spiritual imperatives (Atiya et al., 2024); ((Nuruddin & Anshory, 2025) The emphasis on progressive interpretations allows for constructive engagement with rapid technological advancements, promoting a harmonious coexistence between religious principles and modernity. This approach seeks to resolve the dichotomy often perceived between science and religion, asserting that technological advancements can enhance human welfare while embodying Islamic values (Megawati, 2025)

The goal of creating an integrative framework that combines advancements in science and technology with spiritual depth can be realized through a curriculum that fosters critical thinking, ethical reasoning, and spiritual development. Such an approach can take inspiration from the Qur'an's promotion of reflective thinking and intellectual curiosity (Mahmudah, 2020) (Solihah et al., 2025). This is essential for cultivating graduates who are not only technically skilled but also possess a strong moral compass grounded in Islamic values, enabling them to navigate the complexities of contemporary society (Nuruddin & Anshory, 2025)

2. METODE

This study employs a qualitative philosophical library research approach to examine the integration of Islamic values and science and technology (IPTEK). Data sources include primary religious texts (the Qur'an and Hadith), official Muhammadiyah documents related to Al-Islam dan Kemuhammadiyah, and the works of selected Islamic thinkers, supported by relevant contemporary literature. Data were collected through documentation techniques and analyzed using thematic content analysis to identify key concepts and ethical frameworks, complemented by hermeneutic analysis to interpret texts within their historical and contemporary contexts. Data validity was ensured through source triangulation and peer discussion to strengthen analytical rigor and credibility.

3. HASIL DAN PEMBAHASAN

3.1. Result

3.1.1 Knowledge in the Framework of Tawhid: From Iqra' to Tafakkur

The foundational Islamic concept of Tawhid emphasizes the unity and oneness of God, which fundamentally shapes the approach to knowledge and its pursuit. This integrative view is evidenced in the first revelation to the Prophet Muhammad in Al-'Alaq: 1-5, which commands the act of "reading" (iqra'). This command extends beyond merely reciting texts; it invites believers to engage intellectually with the universe, thereby encouraging a form of tafakkur (contemplation) that leads to a deeper understanding of divine wisdom. Scientific exploration—from observation to theorization—is therefore not merely an exercise in mastering the natural world but is an act of worship that reflects on the greatness of the Creator (Bakar, 2008; Sardar, 1989) (Mahmudi et al., 2022).

In Islamic epistemology, the integration of scientific inquiry and theological understanding stems from the belief that all knowledge is inherently connected to God's knowledge (ilm Allah). As noted in various Quranic verses, knowledge serves to uncover the sunnatullah—the divine order established in nature (Alias & Hanapi, 2016) (Mustamin & Wahono, 2020). The Qur'an, specifically in verses such as Ali Imran: 190-191 and Al-Jatsiyah: 3-5, prompts those with understanding (ulu al-albab) to observe natural phenomena as avenues for contemplation and affirmation of faith. This represents a holistic view of knowledge where no dichotomy exists between "religious sciences" and "general sciences"; all true knowledge ultimately unravels the order set forth by God (Mauluddin, 2021)

Additionally, the pursuit of scientific knowledge is a reflection of the divine attributes of God as Al-'Alim (The All-Knowing) and Al-Qadir (The Omnipotent), as reiterated by scholars like Mahmudi et al., who argue that the relationship between science and faith is grounded in Tawhid (Mahmudi, Sumarni, & Faiz, 2022) This integration showcases that scientific insights are not at odds with divine revelation but are rather complementary pathways toward truth.

3.1.2 Technology as a Trust and Test: Principles of Maslahah and Prevention of Mafsadat

If knowledge is understood as comprehension of sunnatullah, then technology represents the practical application of that understanding in utilizing nature (taskhir), as indicated in the Qur'an (Al-Jatsiyah: 13). However, the Qur'an also firmly emphasizes that such utilization constitutes a divine trust (Al-Ahzab: 72) and simultaneously serves as a test of human responsibility (Al-Mulk: 2). Consequently, the development and application of technology must be grounded in clear ethical principles. The first is the principle of maslahah (benefit), which directs technological advancement toward generating goodness for humanity and the broader ecosystem. This principle aligns closely with the objectives of Islamic law (maqasid al-shari'ah), encompassing the preservation of religion, life, intellect, progeny, and property. The preservation of life, for instance, is concretely manifested through medical technologies that enhance health and wellbeing. The second is the principle of preventing mafsadat (harm), which is

increasingly relevant in contemporary, technology-driven societies where misuse of technology can lead to environmental degradation, social injustice, and ethical violations. Qur'anic prohibitions against corruption underscore the necessity of safeguarding environmental sustainability and social responsibility. Recent studies further demonstrate that integrating ethical considerations into technological systems such as the use of blockchain for secure and transparent data management—can effectively minimize harm while promoting justice and accountability, thereby fulfilling the Islamic mandate to prevent mafsadat (Gulyamov, 2024); (El-Masri & Hussain, 2021)

3.1.3 Modern Challenges: Dehumanization, Secularization, and Crisis of Meaning.

An analysis of contemporary literature indicates that the development of modern science and technology (IPTEK) presents at least three major challenges when viewed through the lens of Islamic values. First, technological advancements, particularly in artificial intelligence and robotics, pose the risk of dehumanization by reducing human roles to mechanistic functions, weakening social relations, and potentially generating structural unemployment. Second, the growing dominance of a positivist and value-free scientific paradigm has contributed to the secularization of science, in which empirical facts are detached from ethical and metaphysical considerations, thereby neglecting fundamental questions regarding the ultimate purpose (telos) of scientific and technological progress. Third, the rapid expansion of digital technology and the virtual world has triggered a crisis of meaning and identity, as individuals become increasingly disconnected from transcendent realities and communal bonds. This condition often results in spiritual emptiness and alienation, highlighting the urgent need for an integrative framework that reconnects technological advancement with ethical, spiritual, and social dimensions rooted in Islamic worldview.

3.1.4 Muhammadiyah's "Progressive Islam": A Synthesis Between Tradition and Modernity

Muhammadiyah, founded by KH. Ahmad Dahlan, has from its inception embodied a strong spirit of renewal (tajdid). The concept of "Progressive Islam" articulated by Haedar Nashir does not represent a passive accommodation to modernity but rather an active intellectual and practical endeavor to engage in dialogue and synergy between Islamic values and contemporary developments. Within the context of science and technology (IPTEK), this vision is manifested through several strategic dimensions.

First, Muhammadiyah promotes an integrative educational model aimed at producing graduates who possess strong scientific and technical competencies while remaining firmly rooted in Islamic character. The *Al-Islam dan Kemuhammadiyahan* (AIK) framework functions as a bridge that connects modern knowledge with an Islamic worldview, enabling individuals to operate ethically and effectively across both domains. This educational integration is deeply grounded in the historical and philosophical foundations of the Muhammadiyah movement, reflecting its long-standing responsiveness to societal challenges (Haq, 2024); (Salsabila, Zalnur, & Masyhudi, 2024); (Jannah, 2023)

. Second, Muhammadiyah extends its socio-religious mission through technology-based social enterprises, where advanced technologies are strategically employed in hospitals, orphanages, and other social institutions. This proactive adoption of technology enhances service quality and operational efficiency, serving as a concrete expression of *amar ma'ruf nahi munkar* in contemporary contexts (Jannah, 2023) (Qodir, Jubba, Hidayati, Abdullah, & Long, 2020).

Third, Muhammadiyah demonstrates a responsive approach to Islamic jurisprudence through the work of the *Majelis Tarjih and Tajdid*, which issues fatwas addressing modern technological issues such as digital transactions and environmental management. This dynamic practice of *ijtihad* highlights Muhammadiyah's commitment to ensuring that Islamic legal thought remains relevant and adaptive, fostering a constructive dialogue between tradition and modern technological realities (Sami'in & Rahman, 2024) (Kahfi, 2020).

3.2 Discussion

The findings of this study confirm the thesis that Islam offers a holistic worldview and strong ethics for the development of IPTEK. This view is fundamentally different from secularism that separates science from religion, and also different from fundamentalism that suspects every form of technological progress (Hoodbhoy, 1991; Stenberg, 1996). The development of science and technology (IPTEK) within an Islamic framework offers a compelling counter-narrative to both secularism and fundamentalism. It harmonizes ethical guidelines and a sense of purpose in scientific inquiry with the

central tenets of Islamic teachings. This synthesis is driven by three primary Islamic concepts: tawhid, khilafah, and the ethos embodied by organizations like Muhammadiyah.

The principle of tawhid, or the oneness of God, serves as a crucial axis for integrating Islamic values into scientific exploration. In this context, the natural world is viewed not merely as a subject of curiosity but as a manifestation of divine wisdom and an opportunity for worship. It suggests that Muslim scientists are driven by a dual motivation: the pursuit of knowledge and the desire to express gratitude and worship towards God. This perspective mitigates risks associated with knowledge misuse, such as arrogance ('ujub) or excessive exploitation of resources.

Another fundamental Islamic concept is khilafah, as articulated in the Qur'an (Al-Baqarah: 30), which emphasizes humanity's role as stewards of the earth. This responsibility (ameliorated in the term 'imarah) underlines the need for sustainable technological development that respects the environment. Actions aligned with this belief assert that technological advancements should not merely satisfy immediate human needs but also promote long-term ecological health (Bakti & Rohman, 2024), 2024; (Taufikin, 2025); .

Organizations like Muhammadiyah exemplify how Islamic principles can be translated into actionable frameworks. Adopting the concept of "Progressive Islam," Muhammadiyah bridges abstract Islamic values with contemporary social practice, thereby enhancing the role of IPTEK within a modern Islamic context (Taufikin, 2025); (Ariawan, Judijanto, Bahtiar, Akbarina, & Syafri, 2024); .

Despite the promise of integrating Islam with science and technology, internal challenges remain. A critical question is whether educational institutions like Muhammadiyah have fully succeeded in fostering "integrative Muslim scientists." There is often a dichotomy in curriculum design, where secular sciences are taught in isolation from Islamic teachings, which are often relegated to Islamic Education classes (AIK). Moreover, the rapid pace of technological advancement frequently outstrips the capacity for traditional religious discourse (ijtihad) to provide timely ethical guidance, leading to a gap that could be detrimental to both the faith and scientific community (Rabbani et al., 2021); (Rois, Jannani, & Mufid, 2024)

4. KESIMPULAN

Based on the analysis, this study concludes that the development of science and technology (IPTEK) from the perspective of Al-Islam and Muhammadiyah constitutes a form of intellectual, social, and ethical worship oriented toward universal benefit. IPTEK is not positioned as a neutral or value-free domain detached from religion, but rather as a strategic arena for the actualization of Islamic values, particularly *tawhid*, justice, and compassion. In the Islamic worldview, knowledge fundamentally aims at *ma'rifatullah*, while technology functions as an instrument to cultivate the earth and enhance human wellbeing as an expression of devotion to God. Muhammadiyah, through its vision of Progressive Islam, demonstrates a contextual and institutionalized model of integrating Islamic ethics with scientific and technological advancement, particularly through education and social movements that respond constructively to contemporary challenges. Therefore, the development of IPTEK within the Islamic framework requires integrated educational approaches that embed ethical reflection across disciplines, encourages Muslim scholars and scientists to incorporate *maqasid al-shariah*-based social and ethical impact analysis in their research, and fosters public awareness that mastery of IPTEK is a collective obligation (*fardhu kifayah*) for advancing civilization. Ultimately, the highest objective of IPTEK development in Islam is the realization of *hayatan tayyibah* in this world as a provision for the hereafter, in line with Islam's mission as *rahmatan lil 'alamin*.

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