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ISLAMIC BOARDING SCHOOLS (PESANTREN) AND THE CHALLENGES OF MODERNITY: RESPONSES TO THE ADVANCEMENT OF SCIENCE AND TECHNOLOGY

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Abstract

This study aims to analyze pesantren's responses to modernity and to uncover the epistemological and practical dynamics that surround them. Modernity is suspected to erode the authority of classical scholarly traditions and displace cultural values, thereby generating fragmentation within pesantren identity. The method employed in this research is library research with a qualitative approach. Data were collected from academic literature and analyzed descriptively through the stages of data reduction, data presentation, and conclusion drawing. The findings reveal that pesantren's responses to modernity are diverse. First, some pesantren adopt a resistant stance in order to safeguard the authenticity of classical Islamic scholarship. Second, others take a progressive position by integrating science and technology as instruments of institutional transformation. Third, certain pesantren adopt a moderate orientation through selective integration strategies that seek to maintain a balance between the preservation of tradition and the utilization of technology. This study asserts that modernity should not be viewed merely as a threat but rather as a sphere of epistemological negotiation that enables the emergence of a creative synthesis between Islamic tradition and technological innovationn.
Keywords: Pesantren; Modernity; Knowledge; Technology; Islamic Education

Abstrak

Penelitian ini bertujuan untuk menganalisis respons pesantren terhadap modernitas dan mengungkapkan dinamika epistemologis serta praksis yang

melingkupinya. Modernitas disinyalir berpotensi mengikis otoritas tradisi keilmuan klasik dan menggeser nilai kultural yang menimbulkan fragmentasi identitas pesantren. Metode yang digunakan dalam penelitian ini adalah studi pustaka (*library research*) dengan pendekatan kualitatif. Data dikumpulkan dari literatur akademik yang kemudian di analisis secara deskriptif kualitatif melalui tahapan reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa respons pesantren terhadap modernitas bersifat beragam. Pertama, sebagian pesantren menempuh sikap resistif untuk menjaga otentisitas tradisi keilmuan Islam klasik. Kedua, terdapat pesantren yang bersikap progresif dengan mengintegrasikan ilmu pengetahuan dan teknologi sebagai instrumen transformasi kelembagaan. Ketiga, beberapa pesantren mengambil posisi moderatif melalui strategi integrasi selektif yang berusaha menjaga keseimbangan antara konservasi tradisi dan pemanfaatan teknologi. Studi ini menegaskan bahwa modernitas tidak semestinya diposisikan sebagai ancaman, melainkan sebagai ruang negosiasi epistemologis yang memungkinkan lahirnya sintesis kreatif antara tradisi keislaman dan inovasi teknologi.
Kata kunci: Pesantren; Modernitas; Ilmu Pengetahuan; Teknologi; Pendidikan Islam

A. INTRODUCTION

Studies on progress and technology are invariably intertwined with the dynamics of change. Change is not merely an accompanying phenomenon but constitutes the ontological essence of both. Progress is understood as the cumulative outcome of change, while technology functions as both an instrument and an accelerator of that very process (Mujab, 2016). When this conceptual framework is linked to the world of pesantren, an intriguing dialectic emerges. Since their inception, pesantren have been recognized as traditional religious institutions with rural socio-cultural foundations, inseparable from the historical interaction between religious values and the social realities of the community. The distinctiveness of pesantren lies in their ability to establish a mechanism for the reproduction of knowledge through the relational pattern between kyai, santri, and society, thereby shaping a unique educational ecosystem (Haedari, Hanif, Masykur, & Adib, 2006, hlm. 80). However, in the context of modernity marked by technological disruption and the rapid flow of information pesantren encounter epistemological and practical challenges. The central issue lies in how pesantren can preserve their traditional identity as centers for the transmission of Islamic sciences while simultaneously responding to the demands of change, which are inherent to technological advancement.

Historically, pesantren have played a strategic role in shaping the intellectual, moral, and spiritual traditions of Muslims in Indonesia. As Islamic educational institutions, pesantren have served as centers for the transmission of religious knowledge while simultaneously exercising social, political, and cultural functions in safeguarding the nation’s dynamics (Isbah, 2020). However,

as they enter the wave of modernity, pesantren are confronted with serious challenges arising from advancements in science and technology. The dialectic between the preservative orientation toward classical Islamic texts and the demand for relevance to contemporary knowledge is not merely a methodological issue; it also concerns epistemic legitimacy, which extends to questions of resource access and institutional capacity to innovate without compromising their identity (Cook, 1999, hlm. 341). Modernity brings paradigmatic shifts across nearly all aspects of life, ranging from patterns of communication and economic systems to educational practices.

On the one hand, technological development offers pesantren opportunities to broaden access to knowledge by adopting more innovative learning methods and strengthening global networks. On the other hand, as cultural products, pesantren face the risk of modernity eroding traditional authority, shifting values, and even fragmenting their identity as institutions rooted in Islamic education and local wisdom (Pohl, 2011). This condition raises critical questions: How can pesantren respond to modernity without losing their essence? Can the integration of science and technology be achieved without sacrificing classical scholarly traditions, or will it instead give rise to a new form of pesantren that is more adaptive to the demands of the era?

The discourse on the relationship between pesantren and modernity, particularly in relation to the advancement of science and technology, reveals a dialectic that is both sharp and complex (Krisdiyanto, Muflikha, Sahara, & Mahfud, 2019). A number of scholars position pesantren as traditional entities oriented toward the preservation of classical Islamic values, thereby tending to exhibit resistance to the currents of modernization. Zamakhsyari Dhofier, for instance, observes that pesantren are built upon an epistemological foundation rooted in classical scholarly traditions, with an emphasis on safeguarding the *kitab kuning* as the authoritative reference in the process of knowledge transmission (Dhofier, 2011, hlm. 20). This perspective implies that the progress of modern science and the penetration of technology are often perceived as potential threats to the epistemic authenticity and cultural identity of pesantren. Such resistance should not be interpreted as an outright rejection of modernity, but rather as an epistemological caution aimed at maintaining the continuity of traditional authority and the educational independence of pesantren from the hegemony of modern narratives, which are often secular and pragmatic in nature.

Conversely, Azyumardi Azra views pesantren as institutions that are adaptive to social change, wherein modernity is not regarded as a threat but rather as a space for transformation. This view highlights that pesantren, while serving as centers for the transmission of Islamic sciences, also function as social entities capable of integrating modern knowledge and technology within the framework of strengthening their socio-religious role (Azra, 1999, hlm. 99–100). This perspective positions modernity as a strategic instrument that enables

pesantren to expand their technology-based outreach in order to enrich pedagogical methodologies and render them more relevant to contemporary demands. Azra's analysis implicitly challenges perspectives that portray pesantren as static and exclusive institutions. Instead, he underscores the epistemological flexibility of pesantren, which allows for the synthesis between tradition and modernity without compromising their religious values and identity.

Abdurrahman Wahid emphasized that the resistance of pesantren toward technological penetration is essentially cultural rather than ideological. The refusal of pesantren should not be interpreted as an anti-modernist stance, but rather as a cautious strategy to safeguard the stability of social, moral, and spiritual values that have long served as the foundation of traditional Islamic education (Wahid, 2006, hlm. 225). Such caution emerges from the awareness that modernity particularly in the form of technology carries an ambivalent potential: on the one hand, it facilitates accelerated access to knowledge, yet on the other hand, it may generate disruptions that weaken discipline, etiquette, and the cohesion of the pesantren community (Rohman & Muhtamiroh, 2022). Therefore, the attitude of pesantren does not reflect backwardness; instead, it represents a selective mechanism in responding to change. When modernity is positioned not merely as a symbol of material progress but as an instrument to expand public benefit (*maslahah*) and reinforce the social function of Islamic education, pesantren has the potential to serve as a center of transformation.

The aforementioned studies reflect a fundamental dialectic concerning the position of pesantren in confronting modernity. On one side, modernity is perceived as a structural threat capable of displacing the educational orientation rooted in classical scholarly traditions and raising concerns regarding the authenticity of Islamic knowledge transmission. This perspective underscores the risk that the penetration of modernity may erode the normative values that have long constituted the cultural foundation of pesantren. On the other side, there exists a perspective that regards modernity as a strategic opportunity to expand the role of pesantren, both within the framework of the national education system and in the global arena. From this viewpoint, the integration of knowledge and the utilization of technology are seen as factors that enhance the competitiveness of pesantren in addressing contemporary dynamics.

This epistemological tension has generated diverse forms of institutional responses. Traditionalist *pesantren* (*salaf*) have chosen to preserve the continuity of tradition as a mode of resistance against the penetration of modernity, whereas modern *pesantren* have developed a synthetic model by integrating *turāth* (the Islamic intellectual heritage) with contemporary knowledge (Achmadin dkk., 2024). This dynamic illustrates that the debate concerning the relationship between *pesantren* and modernity is not merely practical but also entails significant theoretical implications, particularly in the

effort to conceptually reconstruct modernity within the context of Islamic education in Indonesia.

In light of this consideration, it becomes evident that *pesantren* possess resilience in sustaining their existence amid the constantly shifting dynamics of society. Consequently, it is reasonable that the discourse on the continuity and development of the role of *'ulama'* and Islamic educational institutions occupies a strategic position in contemporary academic studies. It even constitutes the foundation for a number of scholarly works that examine *pesantren* as dynamic, adaptive entities that remain relevant to the needs of modern society. Thus, this study acquires profound academic relevance, as it investigates how *pesantren* negotiate with modernity without losing their cultural identity, while simultaneously creating space for a more adaptive transformation of Islamic education.

B. RESEARCH METHOD

This study employs a library research approach, which falls under the category of qualitative research. This approach was selected because it is relevant to the research objective, namely to trace and analyze various written sources that discuss how pesantren respond to the challenges of modernity, particularly those marked by the advancement of science and technology. According to Zed, library research encompasses a series of activities such as reading, recording, classifying, and processing data derived from literature, including books, scholarly articles, and other relevant documents (Zed, 2008). Through this method, the researcher is able to critically examine diverse perspectives in order to generate a comprehensive understanding.

The primary characteristic of this study is qualitative in nature, as it does not employ statistical calculations in its data analysis. The research focuses on the process of interpretation and meaning-making regarding the information contained in texts. This is in line with Moleong, who asserts that qualitative research is intended to produce descriptive accounts in the form of words or statements that embody specific meanings within a social phenomenon (Meleong, 2002). In this process, the researcher serves as the main instrument, determining the direction of the study, selecting relevant data, and providing interpretation according to the research focus.

In this study, the researcher seeks to critically understand how pesantren negotiate with modernity without losing their cultural identity, while at the same time opening space for a more adaptive transformation of Islamic education. To illustrate this phenomenon, data were collected from diverse literature sources, including academic books, national and international journal articles, as well as credible and relevant websites related to the research theme. All collected data were analyzed using a descriptive-qualitative approach. The analytical process was carried out through stages of data reduction, data presentation, and systematic conclusion drawing. In this way, the study aims to provide an in-depth

understanding of the dynamics and responses of pesantren to the challenges of modernity, particularly in the context of the advancement of science and technology.

C. RESULTS AND DISCUSSION

Islam's Response to Modernity

The acceleration of global change in contemporary times has generated new dynamics within social, political, and economic systems, producing a diversity of responses and interpretations among societies worldwide (Huntington, 2011, hlm. 21). For Muslims, this reality presents both challenges and opportunities of considerable complexity, as the ongoing transformations extend not only to the material sphere but also penetrate cultural, ethical, and spiritual dimensions. Global shifts, marked by the intensification of economic-political competition and revolutions in science and technology, have expanded access to knowledge and transnational communication networks (Roy, 2017). On the other hand, these developments carry the potential to erode moral values and religious traditions if not counterbalanced by adequate mechanisms of value internalization.

Conversely, various protective strategies adopted by certain states in facing the currents of global modernization are often perceived particularly by nations that have long embraced the paradigm of modernization as forms of resistance to the principle of openness. This condition creates a paradox: while openness is promoted as a prerequisite for the establishment of a plural and inclusive world order, it simultaneously imposes structural pressures on actors lacking balanced capacities in the global competition (Huntington, 2011, hlm. 48). In a global sense, pluralism is understood, on the one hand, as a space for inter-civilizational dialogue; on the other hand, it gives rise to contestations of interests, ideologies, and economic-political power. In other words, pluralism may function both as an instrument of integration and as an instrument of domination (Intan, 2023). Within this dynamic, interpretations of competition gain relevance: global actors with hegemonic power are more likely to determine the trajectory of civilization, while weaker actors are often compelled to accommodate the openness systems dictated by dominant powers.

Upon closer examination, openness is essentially a divine law (*sunnatullah*) that cannot be avoided. However, for certain groups, openness is often regarded merely as an aspiration in realizing the ideal of social justice. In an era dominated by pragmatic and materialistic considerations, religious and moral values are confronted with an undeniable reality, namely, the significant reduction of religion's role. This condition arises as the noble values of religion are eroded, while industrial society increasingly positions materialism and pragmatism as the ultimate goals of life (Mandaville, 2007).

The alternatives available to Muslims cannot be solely anchored in the legacy of the past; rather, contemporary policies and future-oriented visions

must also be taken into account. Future possibilities can only be actualized if pragmatic measures are implemented to address present needs (Bano, Ahmad, Hassan, & Razaq, 2022). Consequently, the deliberate construction of the future becomes an inevitability, wherein Muslims are required to explore and reaffirm their existence as a community. In doing so, Muslims will be able to discover their authentic identity without being swept away by the rapid currents of cultural interaction that may potentially endanger the future of human civilization.

As a response to the discourse on tradition and modernity, the Islamic world has demonstrated diverse reactions. Each typology of Muslim thinkers offers a wealth of approaches and methodologies, rendering this issue one of the central themes in contemporary intellectual discourse. According to Hasan Hanafi, as cited by Amin Haedari, there are three typologies of contemporary Islamic thought in responding to the tension between tradition and modernity (Haedari dkk., 2006, hlm. 72–74). This classification is significant as a theoretical foundation for addressing Islam's rational demands in relation to present realities.

The first typology is the conservative Muslim thinkers. Their paradigm is characterized by an idealistic and totalistic outlook, viewing Islam as the most perfect system of civilization while rejecting external elements, particularly those originating from the West. For this group, Islam is considered final and complete, thus rendering imported theories or methodologies unnecessary. Islamic law is interpreted literally as contained in the Qur'an and Hadith, employing a textualist reasoning that positions the text as the ultimate and final authority. Martin van Bruinessen observes that this group tends to be fundamentalist in the literal sense. Such a textual hermeneutics leads to a mode of thought that neglects socio-cultural contexts as well as broader considerations of public welfare (Bruinessen, 2013). Furthermore, they maintain a critical stance against the notion of human rights. For this group, aspects of Islamic law that appear to contradict human rights principles such as amputation, stoning, and other corporal punishments are nevertheless regarded as divine injunctions that must be upheld. Consequently, there is no room for reinterpretation of Islamic law in a more emancipatory manner.

The second typology is the progressive Muslim thinkers. In their intellectual activities, this group tends to adopt a social transformation approach. Their main agenda is reform through new interpretations that are more contextual and responsive to contemporary needs (Suhaimi, 2024, hlm. 2). Their methodology rests on two primary orientations: first, viewing tradition through a reconstructive perspective; and second, employing deconstruction to critically engage inherited traditions with the aim of producing new, more relevant traditions. Within the realm of Islamic thought, this method offers an alternative paradigm for understanding religious texts. Adis Duderija argues that progressive Muslim thought should not be regarded as a homogeneous entity nor as a static

conceptual category. Rather, it is more appropriately understood as a heuristic instrument that functions to identify and distinguish the diverse modes of being Muslim (Đuderija, 2017, hlm. 2–3). For progressive thinkers, tradition remains relevant insofar as it is read, interpreted, and understood through the standards of modernity. Modernity, in their view, serves as an entry point for strengthening intercivilizational dialogue, thereby fostering mutually beneficial cultural exchange.

The third typology is the moderate reformist Muslims. According to Hasan Hanafi, this school represents a more advanced form of Islamic thought compared to the conservative perspective. Their orientation shifts from patriarchal traditional culture toward a rational and scientific society. This group rejects religious views or mystical tendencies that are not grounded in practical rationalit (Ḥanafī, 2000, hlm. 100–102). Religion and past traditions are considered no longer relevant to the needs of the modern age and therefore must be abandoned. Within the Indonesian context, the typology of moderate reformist thought bears similarities to the modernist movement. In general, there is no significant paradigmatic shift within this group, except that their primary criteria lie in rationality and the scientific approach.

The three typologies of thought affirm that contemporary Islamic discourse cannot be understood as a monolithic construction. Rather, Islam constitutes an intellectual spectrum enriched by diverse paradigms, orientations, and methodologies. This plurality demonstrates that the relationship between tradition and modernity in Islam is a dynamic dialectical space, where the authority of texts, social contexts, and historical necessities interact with one another. Within this framework, modernity should not be perceived merely as a threat to be either categorically rejected or wholly embraced; instead, it represents a historical reality that calls for creative responses from within the Muslim community.

Within this theoretical framework, Asghar Ali Engineer (Engineer, 1989) conceives of religion as a representation of goodness aligned with revolution, progress, and transformation. Consequently, religion must be liberated from abstract and overly philosophical theological dimensions. This necessitates the development of a theology of liberation, one that is not confined to ritualistic, dogmatic, or metaphysical orientations, but rather emerges through a new paradigm characterized by a theo-anthropocentric approach (Negara, 2023). This implies that theology, beyond its spiritual obligations, also bears social responsibility and must articulate understandings that serve human interests. In contrast, Farid Esack, a South African Muslim intellectual, argues that Islam inherently embodies a liberative dimension (Esack, 1997). Rooted in the very foundations of Islamic theology, Esack emphasizes that the Qur’an, in essence, is emancipatory and seeks to free humanity from all forms of oppression.

In line with this perspective, Asghar interprets Islam as a religion endowed with a socio-revolutionary dimension that reinforces its role as a

liberative force. Drawing upon the fundamental objectives of Islam universal brotherhood, equality, and social justice Asghar asserts that Islam must internalize at least two essential principles in practical life (Engineer, 1989, hlm. 35–49). First, Islam affirms the principle of human unity. This is articulated in the Qur'an (Q.S. al-Ḥujurāt [49]:13), which states that humankind was created from male and female and made into nations and tribes in order to know one another. According to Asghar, this verse explicitly rejects all claims of superiority based on race, ethnicity, nationality, or lineage, affirming instead that human dignity is measured solely by piety. However, this piety is not limited to ritual devotion but also encompasses social piety, which has tangible implications for communal life. Second, Islam emphasizes justice across all dimensions of existence. From its inception, Islam carried the historical mandate to liberate the marginalized and oppressed from suffering and to empower them with opportunities for leadership. By grounding itself in the principles of equality and equity, Islam guides humanity toward a more just society in which welfare is equitably distributed, ultimately realizing both social and economic justice.

Pesantren and the Tradition of Scholarship

In grappling with the increasingly complex and dynamic phenomenon of modernity, pesantren, as described by Abdurrahman Wahid (Gus Dur) as a *subculture* (Wahid, 2001) occupy a dual role that cannot be separated. On the one hand, pesantren function as Islamic educational institutions oriented toward the deepening of religious knowledge (*tafaqquh fi al-din*); on the other hand, they also serve as an integral part of society bearing responsibility in processes of social transformation and reconstruction (Seftika Nur Asyiah, Puput Puspita Sari, & Mas'udin, 2025). This duality positions pesantren not only as centers of normative transmission of religious sciences, but also as active agents responding to ever-changing social dynamics.

Nevertheless, within the scope of this discussion, greater emphasis is placed on the first dimension, namely pesantren as Islamic educational institutions. In this regard, pesantren should not be viewed merely as centers of *fiqh* learning in its narrow sense, but rather as intellectual institutions endowed with academic legitimacy. The distinctive system of learning developed in pesantren through the kiai–santri relationship that emphasizes ethical conduct (*adab*), textual depth, and the internalization of values demonstrates that pesantren have cultivated an educational model parallel to the broader tradition of academic scholarship (Nilan, 2009).

Accordingly, pesantren ought to be understood as centers of scholarly development that not only safeguard the continuity of the *tafaqquh* tradition but also engage in epistemological elaboration of Islamic sciences so as to remain relevant to contemporary challenges (Steenbrink, 1986). This responsibility necessitates a comprehensive approach: while the Qur'an and Hadith remain the

primary sources, their interpretation must be enriched through empirical analysis and modern scientific methodologies.

Within this conceptual framework, pesantren regard knowledge not as a rigid and closed ideology, but as a dynamic field of discourse. As educational institutions, the intellectual tradition of pesantren borrowing from Kuntowijoyo's categorization remains open and grounded in social facts as a means of understanding reality (Kuntowijoyo, 2004). This categorization distinguishes knowledge from ideology, which tends to be normative, rigid, and often hegemonic. While in the realm of politics or social praxis Islam is frequently perceived as an ideology, within the educational sphere it is presented as an intellectual arena that ensures the continuity of knowledge.

Such an approach demonstrates that pesantren adopt a cultural orientation in responding to contemporary challenges, particularly when confronted with the sociological implications of modernity and industrial society. Knowledge is not presented as a tool to control, co-opt, or dominate discourse, but rather is brought into the public sphere as an idea that may be debated, tested, and freely chosen. This principle underscores the absence of coercion, hegemony, and domination within the pesantren's intellectual tradition, as scholarly authority is constructed through open dialectics rather than ideological imposition (Mujahid, 2021).

The scholarly response of pesantren to the dynamics of modernity essentially requires attention to two primary dimensions: cultural and epistemological. Both reflect the pesantren's effort to preserve the continuity of the Islamic intellectual tradition while simultaneously negotiating its relevance within contemporary social, political, and intellectual developments (Haedari dkk., 2006, hlm. 78–79). First, the intellectual tradition of pesantren may be positioned as an endeavor of enlightenment for the continuity of human civilization. This process is carried out through the interpretation of Islamic texts in order to remain *shalihun likulli zaman*, relevant, dynamic, and open to change. Through this approach, pesantren reject any sacralization of historical religious thought, while affirming that religious interpretation is never final but always open to dialogue with social realities.

Second, the position of pesantren as an educational institution necessitates a curriculum that is not solely rooted in the classical scholarly tradition but also maintains relevance to contemporary socio-cultural dynamics. The orientation of the pesantren curriculum toward present contexts underscores that pesantren are not merely static institutions of religious doctrinal instruction but rather open to the development of scientific methodologies, including the social sciences and humanities. The assumption that pesantren education functions exclusively as a doctrinal process can be challenged, since in practice, pesantren have integrated both normative and historical approaches into the learning process (Musfah dkk., 2020). This is reflected, for instance, in the study of fiqh, where students are not only taught

normative legal rulings but are also introduced to *uṣūl al-fiqh* as an epistemological instrument to understand its methodological framework. Similarly, in the study of tafsīr, learning does not stop at the exegetical text itself but is expanded through *ʿulūm al-Qurʾān*, which provides methodological and historical foundations for comprehending the Qurʾānic text.

Both of these efforts fundamentally stem from the assumption that pesantren, as Islamic educational institutions with deep historical and cultural roots, cannot be detached from their dual responsibility: the responsibility of scholarship and the responsibility of sustaining human civilization. The role of pesantren is not limited to transmitting Islamic sciences but also extends to functioning as centers of knowledge production that contribute to shaping the intellectual and moral ethos of society. Through its diverse scholarly accommodations, pesantren have, since their inception, positioned themselves as agents of transformation that prepare new generations not only to act as critical thinkers within intellectual spheres but also as active agents of social change amid the dynamics of modernity. Thus, pesantren occupy a strategic role in bridging traditional values with the demands of changing times, thereby ensuring the continuity of Islamic identity while simultaneously opening constructive spaces for dialogue with the advancement of science and technology.

Advancement of Science and Technology

From its inception until the 1970s, pesantren were generally understood as traditional religious educational institutions that emerged and developed through distinctive social processes within rural communities. At that time, and to a significant extent even today, pesantren have functioned as educational institutions while simultaneously serving as social institutions with broad influence (Dhofier, 2011). Their existence has imparted a strong religious character to the surrounding society. This role positioned pesantren as agents of change, intermediary institutions expected to function as both dynamizers and catalysts in the empowerment of human resources (Fealy & Bush, 2014). Furthermore, pesantren have been encouraged to act as drivers of cross-sectoral development as well as centers for the advancement of science and technology in responding to the challenges of globalization. It is at this juncture that processes of transformation began to penetrate the system and the world of pesantren itself.

Globalization inherently demands transformation across various aspects of life, including the orientation, perception, and level of selectivity of Indonesian society toward education (Mu'ti, 2023). During the New Order era, educational development was primarily focused on expanding access, which often resulted in an imbalance between quantity and quality. In contrast, the era of globalization requires a shift in orientation toward education based on quality, competence, and skills. The primary objective of education is no longer limited to eradicating

illiteracy, but rather to equipping learners with the ability to actively participate in global competition. In this regard, the standard of educational quality within society is measured by the extent to which graduates of an institution are able to compete in the global marketplace (Haedari dkk., 2006, hlm. 82). Hence, the indicators of educational success are not only reflected in accessibility but also in the quality of outputs produced to meet the demands of contemporary developments.

To analyze the role of pesantren in the global era, it is first necessary to recognize that pesantren possess a solid socio-historical foundation. This very foundation positions pesantren at the core of the intellectual tradition of society while simultaneously enabling them to maintain their existence amidst ongoing currents of change. As centers of knowledge development, pesantren are expected to continually engage in renewal and adapt to cultural dynamics that are, by nature, progressive rather than static (Abdurrahman, Baharuddin, & Hady, 2025). Although they are not required to surpass the pace of societal transformation, pesantren are nevertheless expected to produce cadres capable of engaging with the demands of the time, particularly in relation to advancements in science and technology. In general, Jamal Ma'ruf categorizes the challenges faced by pesantren into four main aspects. First, the curricular aspect, which includes literature, teaching methods, and developmental strategies. Second, facilities and infrastructure, such as libraries, laboratories, internet access, sports facilities, and other supporting resources. Third, the platforms for students' self-development through organizations, magazines, seminars, and similar forums. Fourth, avenues for self-actualization within society, such as preaching activities, serving as khatib, and other socio-religious engagements (Asmani, 2003, hlm. 25).

Given the complexity of these challenges, there is a need for a reconstruction of the educational system that is no longer partial but rather integrated within a comprehensive framework. This integrated system should harmonize the traditional Islamic scholarly heritage with the demands of contemporary scientific and technological advancement. Such an orientation is strategically significant, for without a well-planned institutional transformation, pesantren risk becoming confined to a mere reproduction of tradition, neglecting the dynamic social, economic, and technological shifts that continue to unfold.

The complexities of pesantren education, as emphasized by Azyumardi Azra, cannot be resolved merely by expanding the existing educational system through a linear, quantitatively oriented approach. Such a strategy would only lead to institutional growth in its physical dimension without bringing about substantive renewal in the epistemological and methodological aspects of pesantren education. Furthermore, simply adopting advancements in modern educational technology is insufficient to address the fundamental challenges faced by pesantren. While technological integration can indeed broaden access and accelerate learning processes, without a solid philosophical framework and a

firm orientation in Islamic education, technology risks fostering dependency and obscuring the pesantren's identity as a distinctive educational institution (Azra, 1999, hlm. 31). According to Azra, what is more urgent is the need to critically re-examine, reinterpret, and reconstruct the foundational concepts and epistemological assumptions underpinning the entire Islamic educational system, both at the macro level, such as vision, objectives, and civilizational orientation, and at the micro level, such as curriculum, teaching methodologies, and the patterns of interaction between teachers and students.

In line with the dynamic development of Islamic education, the repositioning of pesantren toward its fundamental functions has become an imperative that can no longer be postponed. As a traditional educational institution, the pesantren carries three core functions that constitute the foundation of its existence (Haedari dkk., 2006, hlm. 86). First, the transmission of Islamic knowledge, which in the contemporary context is no longer confined to normative religious studies alone but extends to the mastery of other disciplines relevant to the needs of modern society. Second, the maintenance of the Islamic tradition, which entails the preservation of classical scholarly heritage as well as the moral values inherited from the ulama. However, maintaining tradition does not imply stagnation; rather, it requires reinterpretation so that tradition remains relevant and contributive in addressing the challenges of the times. Third, the reproduction of ulama, positioning the pesantren as a center for intellectual and spiritual leadership formation within the Muslim community. This process is not limited to mastery of religious texts, but also involves cultivating critical, ethical, and social capacities, thereby producing ulama capable of responding to the complex problems of contemporary society (Zaman, 2010, hlm. 65).

In reference to the current era, marked by rapid advances in science and technology, pesantren are required to undertake strategic innovations to strengthen their relevance and competitiveness. Jamal Ma'aruf proposes several breakthroughs (Asmani, 2003, hlm. 27–26), the foremost being curricular reform, which is deemed indispensable. The curriculum should not be formulated solely in a top-down manner by institutional managers, but must instead be integrative, gradual, systematic, egalitarian, and based on student participation (bottom-up). Thus, curriculum design should no longer be centered on a *plan for students* but should shift toward a *plan by students* paradigm, which positions the santri as active subjects in the educational process. This approach simultaneously moves the pesantren away from a rigid curricular tradition toward a more adaptive curriculum that is responsive to the needs of learners and the challenges of the modern era.

Second, the strengthening of facilities and infrastructure constitutes a fundamental aspect that cannot be overlooked. Pesantren must provide resources that support both the intellectual and personal development of students, such as libraries that integrate classical Islamic literature (*turats*) with

contemporary works, periodicals (magazines and journals), sports facilities, organizational spaces, and internet access as an instrument of digital literacy. These provisions are not merely supplementary but serve as crucial instruments in constructing a progressive and competitive educational ecosystem.

Third, pesantren must create space for students to cultivate their individual potential in accordance with their talents and interests. The academic freedom and creativity of students in the realms of intellectual discourse, science, technology, and entrepreneurship are decisive factors in nurturing a generation that is not only religiously devout but also possesses transformative capacity within society. Fourth, pesantren should serve as a medium for students to actualize themselves in broader social interactions. In this way, pesantren functions not only as a center for the transmission of religious knowledge but also as an institution that fosters social awareness, leadership, and practical skills relevant to the needs of the community.

Furthermore, with the rapid advancement of science and technology, future pesantren are required to act as intellectual stimulators capable of continuously fostering and sustaining students' curiosity. Such curiosity constitutes the primary foundation for building a dynamic, critical, and adaptive scholarly tradition responsive to the changing times (Rohman & Muhtamiroh, 2022). This aligns with Suprapto's assertion that technology is essentially born from and developed through cultural activity, driven by human curiosity about the natural world and the effort to utilize it wisely (Sindhunata, 2000, hlm. 92). Pesantren that successfully internalize curiosity into the learning process will be able to produce a generation endowed not only with spiritual depth but also with intellectual sensitivity and adaptive skills to navigate modernization and technological disruption. Beyond merely keeping pace with development, progressive pesantren hold the potential to become centers of socio-religious innovation that harmoniously integrate traditional values with contemporary technological achievements.

Typology of Pesantren Responses to Modernity and Technology

According to Azyumardi Azra, the modernization of pesantren gained its momentum in the late 1980s, in line with the increasing pressures of globalization and policies demanding institutional adaptation (Azra, 1999, hlm. 39). The response of pesantren to modernity and technological advancement cannot be understood as a monolithic phenomenon. As Islamic educational institutions deeply rooted in scholarly traditions, pesantren represent diverse attitudes in engaging with globalization, shaped by their historical background, ideological orientation, and institutional needs (Zarkasyi, 2020). This diversity indicates that pesantren are not monolithic entities but rather institutions with complex internal dynamics. Every decision-making process regarding the acceptance or rejection of modernity always involves theological considerations, social factors, and pragmatic calculations.

Ronal Lukens-Bull emphasizes that globalization and the demands of modern formal education have compelled pesantren to undertake significant adaptations, particularly through curriculum reform. It is this curriculum modernization that subsequently produced a typology of pesantren based on their attitudes toward change. Lukens-Bull identifies at least three main types of pesantren: salaf (traditional), khalaf (modern), and integrated/mixed (a combination of both). He also adds a fourth category, salafi**,** referring to pesantren affiliated with Wahhabi ideology (Lukens-Bull, 2010). However, this study focuses only on the three principal types, which serve as the analytical framework for understanding pesantren responses to modernity, both in terms of educational systems and institutional orientations.

The first typology, salaf, is characterized by resistance and isolation. This stance reflects the effort of certain pesantren to preserve the authenticity of their traditions while restricting the penetration of external values perceived as threats to institutional identity and stability. Within this framework, technology is often interpreted as an instrument that may diminish the purity of classical Islamic teachings and undermine the independence of pesantren. The use of technology in educational processes or institutional management tends to be minimized. Learning practices remain oriented toward traditional methods, such as *sorogan* and *bandongan*, which are considered more capable of ensuring the continuity of Islamic knowledge transmission (Munir & Nor, 2024).

Resistance strategies do not merely emerge from an attitude of opposition to change, but rather reflect the pesantren's cautious approach in responding to the forces of globalization and modernization. By maintaining a degree of distance from technological interventions, pesantren seek to ensure that external transformations do not erode the spiritual and cultural foundations upon which their existence is built (Yumitro & Prasetya, 2018). This approach, understood as a form of selective isolation, constitutes an adaptive strategy in which pesantren prioritize the preservation of classical Islamic scholarly traditions over the adoption of innovations that may generate value disorientation.

The second typology, khalaf, integration and full transformation, illustrates a more progressive step taken by pesantren in engaging with technological advancement. At this stage, pesantren do not merely accept technology as an auxiliary tool, but rather internalize it as a strategic instrument in shaping an educational vision that is both adaptive and relevant (Mohammad_Thoha & Hannan, 2022). Technology is positioned as a medium to strengthen the institutional role of pesantren, whether through curriculum innovation that bridges classical Islamic scholarship with the demands of digital-era competencies, or through institutional governance that requires transparency, efficiency, and accountability.

Furthermore, the utilization of technology enables pesantren to expand their social and academic networks to a global level, thus extending their

influence beyond the local sphere into international discourses on Islamic education (Suwendi, Gama, Farabi, Fuady, & Arman, 2024). In this way, modernity is not perceived as a factor that diminishes the traditional identity of pesantren, but rather as a strategic opportunity to reinforce their legitimacy, competitiveness, and contribution in shaping a contemporary society that is both religious and technologically literate.

The third typology, integrative/mixed, represents a form of adaptation and selective integration as a relatively accommodative response of pesantren to the development of science and technology, while simultaneously maintaining the fundamental principles that constitute its foundational identity. Within this paradigm, technology is positioned as a *wasilah* (instrument) that serves to enhance the effectiveness of education and institutional governance, rather than as an ultimate goal (Muthmainnah, Bachtiar, Yassin, & Sulistyowati, 2025). This position indicates an epistemological awareness that the advancement of modern technology is inherently neutral and contingent upon how it is operationalized within socio-religious contexts.

The implementation of such adaptation is evident in pesantren's openness to utilizing digital media to support teaching and learning activities, applying technology-based administrative systems, and employing internet access as a means of expanding scientific literacy (Arizqi, Nisa, Abdullah, & Kurniawan, 2025). However, such utilization does not occur without regulation; rather, it is carefully monitored through strict supervisory mechanisms to ensure alignment with Islamic values and pesantren norms. Pesantren seek to preserve the authenticity of tradition while simultaneously deriving functional benefits from modernity. This moderative stance can be understood as an equilibrium between the conservation of tradition and the adoption of innovation. It not only underscores pesantren's capacity to withstand the currents of modernization but also reflects their agency in determining the limits of technological integration in accordance with Islamic epistemology and ethics. In this way, pesantren negotiate the encounter between local values and global challenges in a more critical and purposeful manner.

The presence of pesantren typologies essentially affirms that pesantren responses to modernity cannot be confined within a linear dichotomy of traditional versus modern. Modernity undeniably introduces demands for the rationalization of education, curriculum reform, and institutional management strengthening. Yet, in the Indonesian context, the trajectory of pesantren development is also influenced by the influx of Islamic transnationalism, which carries religious ideas and practices across national boundaries. This stream includes influences from Islamic movements such as Salafi-Wahhabism, the Muslim Brotherhood, Tablighi Jamaat, as well as discourses of progressive Islam originating from both the Middle East and the West (Pomalingo, Kamaruzzaman, Idaman, & Tangahu, 2024). The presence of these ideas introduces new dimensions to pesantren, whether through the reinforcement of scripturalism or

through efforts to reconstruct Islamic education in ways that are more compatible with global educational systems. This perception corresponds with the emergence of contemporary pesantren typologies, such as the *hybrid pesantren* model. This typology demonstrates an integrative pattern that combines classical pesantren traditions with the use of digital technologies and modern learning platforms (Mustofa, Mas'ud, & Elizabeth, 2023). The existence of *hybrid pesantren* reflects an institutional awareness that educational modernization does not necessitate the erasure of traditional identity but can, instead, be productively synthesized.

Furthermore, the typology of pesantren that emerges from the encounter between modernity and transnationalism reveals an ongoing process of epistemological negotiation. Some pesantren choose to preserve classical Islamic scholarly traditions as their primary identity, while others integrate modern curricular approaches with certain transnational ideological orientations. There are also pesantren that attempt to pursue a middle path by combining local traditions, the demands of modernity, and global discourses within a more adaptive educational format. This indicates that pesantren are not merely reacting to external changes but are actively developing selective strategies that take into account historical, cultural, and ideological dimensions.

This phenomenon demonstrates that pesantren are dynamic entities that continually reconstruct their position and role within the landscape of Islamic education. The emerging typologies reflect responses to the modernization of national education, while also signifying pesantren's engagement in the increasingly intensive global Islamic discourse shaped by social mobility and international networks. Consequently, pesantren typologies map the orientations of Islamic education in Indonesia, illustrating how pesantren participate in shaping an Islamic identity that is simultaneously local and transnational.

D. CONCLUSION

This study reveals that pesantren, as Islamic educational institutions, demonstrate remarkable resilience in confronting the currents of modernity, particularly the advancement of science and technology. Rooted deeply in classical scholarly traditions, pesantren engage in a dialectical tension between the imperative to preserve the authenticity of Islamic values and the demand for relevance in contemporary dynamics. Academic discourse in this field highlights two opposing perspectives: first, those who perceive modernity as a threat to the epistemological stability of pesantren; and second, those who regard it as a strategic opportunity to expand the institution's role in modern society. The responses of pesantren are not monolithic but rather diverse, shaped by historical backgrounds, ideological orientations, and institutional capacities. These responses can generally be categorized into three main types: *salaf* (resistance and isolation), *khalaf* (full integration with technological innovation),

and *mixed/integrative* (selective adaptation balancing tradition and modernity). Furthermore, a hybrid pesantren model has emerged, combining classical educational systems with digital media and modern learning platforms. Such variations illustrate an ongoing epistemological negotiation, positioning pesantren not merely as reactive entities but as proactive actors in constructing adaptive strategies.

Accordingly, modernity should not necessarily be viewed as a destructive force but rather as an instrument for strengthening the social, cultural, and intellectual functions of pesantren. The key to successful transformation lies in participatory curriculum reform, the enhancement of facilities and infrastructure, the development of students' potential, and the selective and critical integration of technology. Pesantren are thus required to preserve their Islamic identity while simultaneously engaging in dialogue with global developments. Consequently, pesantren possess significant potential to serve as centers of socio-religious innovation, capable of bridging inherited traditions with the demands of modernity and contributing to the formation of a Muslim generation that is religiously grounded, intellectually critical, and adaptive to the challenges of the contemporary era.

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