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Engineering the Islamic Education System in an Effort to Transform to Face the VUCA Era

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ABSTRACT

This study is motivated by the challenges of the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era, which demands that Islamic education systems transform to remain adaptive and relevant. This research aims to analyze how the Islamic education system at Khalafiah Islamic Boarding Schools in South Kalimantan is being engineered to respond to rapid and complex changes. The study uses a descriptive qualitative approach and field research methods, involving foundation administrators, kiai, mudhir/mudhirah, asatidz, students, and other pesantren academics as research subjects. The study collected data through observation, interviews, and documentation, then analyzed them through data reduction, classification, presentation, and interpretation to reach conclusions. The findings reveal that the engineering of the Islamic education system is implemented through several strategic efforts, including updating the vision and mission, integrating the curriculum, transforming learning methods, developing educator capacity, improving evaluation systems, and strengthening infrastructure and technology. Supporting factors include curriculum integration, strong community support, adaptive vision and mission, strategic location, adequate facilities, and economic independence. Meanwhile, inhibiting factors include limited human resources and technology, cultural challenges, limited facilities, and difficulties balancing tradition and innovation. These efforts are reflected in improved student competence, enhanced mental resilience, the development of an innovative culture, the expansion of the pesantren's role, and the assurance of educational quality. However, potential risks include losing institutional originality, disparities in human resources and facilities, and possible goal disorientation. These findings suggest the need for a balanced, sustainable educational transformation that preserves core Islamic values while embracing innovation.

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INTRODUCTION

The VUCA (Volatility, Uncertainty, Complexity, Ambiguity) era describes the conditions of the modern world that are full of rapid change, uncertainty, and complex challenges that affect almost all aspects of life, including education (Akbarjono et al., 2024). Uncertain global changes require educational institutions to update their systems and approaches to remain relevant and able to prepare an adaptive generation (Arrosyid et al., 2025; Faishal, 2024; Ma'arif & Arif, 2026; Mariyani et al., 2026; Mispani et al., 2026; Supriyanto et al., 2025) Islamic boarding schools as traditional Islamic educational institutions are inseparable from this demand, because their role is very strategic in shaping the character and competence of students to face the development of the times (Ardianto et al., 2026; Basri et al., 2026; Budiyono et al., 2024). Transformation in the Islamic education system is an urgent need to ensure that pesantren are able to function as a solution, progressive, and still gain the trust of the community (Abas et al., 2025; Baihaqi et al., 2023; Fahriany & Wahyunengsih, 2025; Miftahuddin et al., 2024) Education system engineering includes strengthening management, developing an integrated curriculum, innovating learning methods and strategies, utilizing information technology, improving the quality of infrastructure, and strengthening hidden curriculum that brings fundamental values for the formation of student character (Aziz et al., 2025; Dewi et al., 2025; Hartiani & Kosasih, 2026; Hasanah & Husna, 2025) This change is expected to produce graduates who are ready to face the demands of modern society without losing the Islamic identity and culture of the pesantren.

Portraits of micro challenges are beginning to be seen at the Khalafiah Islamic Boarding School in South Kalimantan, especially related to differences of views among the academic community. Some parties want to maintain the education system that has been running, while others encourage reforms according to the needs of the current society. This situation was identified through an initial exploration of several stakeholders from the foundation, ustadz, foundation trustees, and community representatives involved in three Khalafiah Islamic Boarding Schools, namely Al Falah Banjarbaru, Darul Hijrah Putri Batung Martapura, and Darul Ilmi Liang Anggang Banjarbaru. The results of the initial interviews through short messages showed that the most widely carried out form of education system engineering was the strengthening of the hidden curriculum through the development of extracurricular activities, computer-based exams, *tahfizh* programs of the Qur'an and Hadith, tamyiz, qira'ati, tilawati, and calligraphy. Transformation efforts are also seen in the yellow book learning method, which no longer only uses the pattern of badungan and sorogan, but is enriched by contemporary methods. Al Falah applies the Amtsilati method, Darul Ilmi develops the Tamyiz method, while Darul Hijrah strengthens the learning of tahfizh mufradat. This engineering shows that there is an effort to harmonize the tradition of Islamic boarding schools and the demands of the modern era.

Previous studies have emphasized the importance of transforming Islamic education systems through management strengthening, curriculum integration, innovation in learning methods, and the utilization of information technology (Faizin, 2024; Jubba et al., 2022; Mursidah & Nadhir, 2025; Warisno et al., 2025). These studies highlight that such transformations are essential to ensure the sustainability and competitiveness of pesantren (Hasanah et al., 2026; Mustikamah et al., 2025). Nevertheless, existing research tends to focus more on conceptual frameworks and general strategies, with limited attention to empirical practices of education system engineering at the institutional level, particularly in specific regional contexts. As a result, there is still a gap in understanding how pesantren practically negotiate the balance between tradition and innovation in facing the VUCA era. This research addresses this gap by focusing on the Khalafiah Islamic Boarding Schools in South Kalimantan, namely Al Falah Banjarbaru, Darul Hijrah Putri Batung Martapura, and Darul Ilmi Liang Anggang Banjarbaru. Initial qualitative findings indicate the emergence of micro-level challenges, particularly differences in perspectives among stakeholders regarding whether to maintain traditional systems or pursue reforms. At the same time, there are observable efforts in education system engineering, such as strengthening the hidden curriculum through extracurricular activities, implementing computer-based examinations, and developing Qur'anic and language-based programs

including tahfizh, tamyiz, qira'ati, tilawati, and calligraphy. The purpose of this study is to describe and analyze the engineering of the Islamic Education system in an effort to transform to face the VUCA Era in the Khalafiah Islamic Boarding School in South Kalimantan.

METHODS

This study employs a qualitative research design with a case study method, as outlined by Creswell (2018), emphasizing an in-depth understanding of social phenomena in their natural setting. The research was conducted directly in three Khalafiah Islamic Boarding Schools in South Kalimantan, namely Al Falah Banjarbaru, Darul Hijrah Putri Batung Martapura, and Darul Ilmi Liang Anggang Banjarbaru. The fieldwork took place over a specified period (menyesuaikan waktu penelitian Anda), during which the researcher was actively involved in observing daily educational practices and institutional dynamics related to the engineering of the Islamic education system in facing the VUCA era.

Data were collected through three main techniques: observation, in-depth interviews, and documentation. Observations were carried out by directly examining learning activities, institutional management, and student development programs to capture real conditions in the pesantren environment. In-depth interviews were conducted semi-structurally with key informants, including foundation administrators, kiai, mudhir/mudhirah, asatidz, and students, to explore their perspectives and experiences regarding educational system transformation. Documentation techniques involved collecting relevant institutional records, such as curriculum documents, program reports, photos, and policy archives, to support and validate the findings obtained from observations and interviews.

The selection of informants was carried out purposively, based on their roles and involvement in the education system within the pesantren. Data analysis followed the qualitative analysis model of Miles et al. (1992) , which includes three stages: data reduction, data presentation, and conclusion drawing. Operationally, data reduction was conducted by selecting and simplifying field data relevant to the research focus, followed by organizing the data into thematic categories. Data were then presented in a descriptive narrative to facilitate interpretation. Finally, conclusions were drawn using a deductive approach by linking empirical findings with existing theories on educational transformation, ensuring the validity and consistency of the results.

FINDINGS AND DISCUSSION

Findings

Engineering the Islamic Education System in an Effort to Transform to Face the Vuca (Volatility, Uncertainty, Complexity and Ambiguity) Era in Islamic Boarding Schools in South Kalimantan

The findings of this study indicate that the engineering of the Islamic education system in Khalafiah Islamic Boarding Schools in South Kalimantan represents a concrete response to the challenges of the VUCA era, which demands adaptability, complexity management, and continuous transformation. The transformation is evident in the revision of institutional vision and mission, curriculum integration, and modernization of teaching methods while still preserving core Islamic values. One informant from the foundation management emphasized that such changes are unavoidable in order to maintain institutional relevance. He stated,

> *"Pesantren cannot rely solely on traditional systems anymore because the world is changing very rapidly, so we must adapt without abandoning Islamic values"* (Interview with Foundation Administrator, 2025).

In terms of curriculum development, the study found that integration between religious and general sciences has begun to be implemented gradually, including the strengthening of digital literacy and 21st-century skills. This is supported by the statement of one of the Islamic teachers who explained that learning is no longer limited to classical Islamic texts but also incorporates technological competencies and practical skills. He stated,

> *"Now students are not only required to read classical Islamic books, but also to operate technology and understand modern needs such as AI and digital literacy"* (Interview with Asatidz, 2025).

Furthermore, the adoption of learning methods such as Amtsilati, Tamyiz, and vocabulary-based Qur'anic learning reflects an effort to balance tradition with innovation.

Transformation is also evident in the strengthening of the hidden curriculum through extracurricular activities and language habituation programs. One mudhirah explained that the use of Arabic and English in daily communication, along with memorization programs, plays a crucial role in shaping students' character and competencies. She stated,

> *"We encourage students to use Arabic and English in their daily life because it helps build their confidence for the future"* (Interview with Mudhirah, 2025).

In addition, programs such as Qur'an memorization (tahfizh), qira'ati, tilawati, and information technology training have become integral components of student development in facing global challenges.

Regarding infrastructure and learning facilities, the pesantren have experienced significant development, including the establishment of computer laboratories, the implementation of digital-based learning, and computer-based evaluation systems. One of the administrators stated that modernization of facilities is a crucial part of educational transformation. He explained,

> *"We have started using computer-based examinations and providing computer laboratories so that students become familiar with technology from an early stage"* (Interview with Mudhir, 2025).

This demonstrates that the pesantren are not only focusing on spiritual development but also on preparing students for technological advancement.

Supporting and Inhibiting Factors Affecting the Engineering of the Islamic Education System in Transformation Efforts to Face the Vuca Era (Volatility, Uncertainty, Complexity and Ambiguity) in Islamic Boarding Schools in South Kalimantan

The findings of this study indicate that the engineering of the Islamic education system in Khalafiah Islamic Boarding Schools in South Kalimantan is strongly influenced by both supporting and inhibiting factors in responding to the VUCA era. On the supporting side, curriculum integration between formal education (MTs and MA) and pesantren-based religious education has become a key strength. This integration enables students to acquire both general knowledge and deep Islamic understanding in a balanced manner. One informant from the school management explained that this integration is essential to maintain relevance in the modern era, stating,

> *"We combine the formal curriculum with the pesantren curriculum so that students are not only strong in religious knowledge but also competitive in general sciences"* (Interview with Foundation Administrator, 2025).

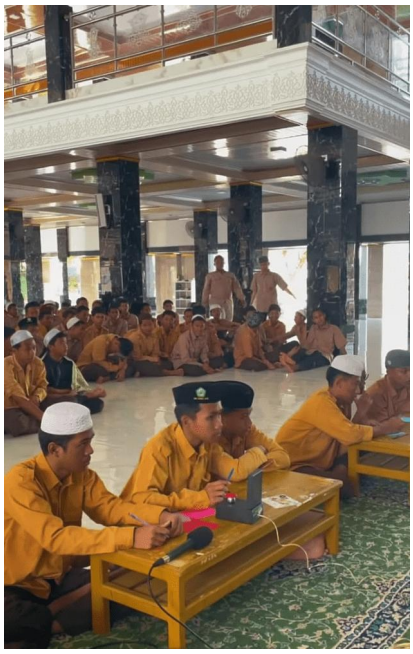

Figure 1. Quiz Competition at Darul Ilmi Islamic Boarding School

Another important supporting factor is strong community trust and social support. The pesantren in this study—Darul Hijrah Puteri, Darul Ilmi, and Al Falah Banjarbaru—are recognized as reputable Islamic educational institutions with long-standing credibility. This reputation strengthens parental confidence in sending their children to these institutions. A community representative emphasized this trust by stating,

> *"We believe these pesantren are able to shape good character and also prepare students for future challenges, that is why many parents still choose them"* (Interview with Community Representative, 2025).

In addition, the adaptive vision and mission of the pesantren also serve as a strong foundation for transformation. The institutions aim to produce graduates who are not only religiously grounded but also intellectually capable and globally competitive.

Supporting factors are also reinforced by strategic location, availability of facilities such as language and computer laboratories, and a degree of economic independence that allows pesantren to innovate without excessive external dependency. One educator highlighted the importance of infrastructure in supporting learning innovation, stating,

> *"With language labs and computer facilities, we can slowly introduce students to modern learning systems and digital skills"* (Interview with Asatidz, 2025).

These conditions collectively create an environment that supports gradual transformation toward a more adaptive Islamic education system.

However, the study also reveals several inhibiting factors that challenge the engineering process of the Islamic education system. One of the most significant issues is the limitation of human resources, particularly in terms of the number and competence of teaching staff. An educator noted this constraint by stating,

> *"Sometimes we face difficulties because the number of teachers is not sufficient compared to the number of students, which affects learning effectiveness"* (Interview with Mudhir, 2025).

In addition, limited use of information and communication technology (ICT) in some aspects of learning and administration remains a challenge, even though efforts toward digital transformation have begun.

Cultural resistance also emerges as an inhibiting factor, particularly concerns that modernization may weaken traditional pesantren values. Some stakeholders express caution in adopting rapid changes. One senior teacher stated,

> *"We are careful not to let modernization erase the identity of the pesantren, because tradition is our strength"* (Interview with Senior Ustadz, 2025).

Furthermore, the challenge of balancing tradition and innovation remains a central issue, especially in maintaining classical learning methods such as bandongan and sorogan while introducing modern pedagogical approaches. External challenges, such as negative stigma toward pesantren and the need for facility improvement, also contribute to the complexity of transformation.

The Impact of Islamic Education System Engineering in Transformation Efforts to Face the Vuca (Volatility, Uncertainty, Complexity, and Ambiguity) Era on Islamic Boarding Schools in South Kalimantan

The findings of this study indicate that the engineering of the Islamic education system in Khalafiah Islamic Boarding Schools in South Kalimantan produces significant positive impacts in responding to the challenges of the VUCA era. One of the main impacts is the improvement of students' competencies through the integration of religious education with general knowledge, foreign languages, and digital literacy skills. Students are not only trained in classical Islamic sciences but also equipped with relevant 21st-century skills such as digital literacy and basic technological competencies. One informant stated,

> *"Now students are prepared not only in religious knowledge, but also in digital skills so they can compete in the future world of work"* (Interview with Asatidz, 2025).

This reflects the orientation of pesantren education toward producing more adaptive and competitive graduates.

Another important impact is the strengthening of students' mental resilience. The internalization of Islamic values such as patience, sincerity, and discipline has become a psychological foundation for students in facing uncertainty and rapid change. A senior educator explained,

> *"The strongest strength of our students is their mentality; they are trained to be patient, disciplined, and sincere in facing challenges"* (Interview with Senior Ustadz, 2025).

In addition, the engineering process has contributed to the creation of an innovative educational culture within pesantren. Leaders and educators continuously develop new learning models and management strategies that encourage adaptability and institutional progress.

The transformation also expands the role of Islamic boarding schools beyond traditional religious education institutions. Pesantren are now increasingly positioned as centers of civilization that contribute to various fields such as economics, social development, and technology without losing their Islamic identity. One foundation administrator emphasized this shift by stating,

> *"Pesantren today are not only places to study religion, but also institutions that prepare students to contribute to society in many fields"* (Interview with Foundation Administrator, 2025).

This demonstrates that pesantren are becoming more open, dynamic, and relevant in responding to societal needs in the VUCA era.

However, the study also identifies several challenges that need to be anticipated. One of the main concerns is the potential loss of originality of pesantren identity due to excessive modernization. Some stakeholders express concern that traditional values may be weakened if not carefully managed. A pesantren leader noted,

> *"We must be careful so that modernization does not erase the traditional values that are the identity of pesantren"* (Interview with Mudhir, 2025).

Another challenge relates to disparities in human resources and facilities, although this issue has been relatively well managed in the studied institutions. Additionally, there is a risk of goal disorientation if educational transformation overly emphasizes general competencies while neglecting core religious education values.

Table 1. Summary Table of Pesantren Transformation Findings in the VUCA Era

Research Dimension	Key Aspects / Findings	Indicators / Real Implementation	Supporting / Inhibiting Factors
Engineering of the Educational System (Transformation)	Curriculum Integration & Method Modernization	• Revision of institutional vision-mission to be adaptive. • Integration of formal curriculum (MTs/MA) with pesantren religious curriculum. • Incorporation of digital literacy, AI, and 21st-century skills. • Innovative methods: Amtsilati, Tamyiz, and vocabulary-based Qur'anic learning.	• Supporting: Adaptive vision, community/parental support. • Inhibiting: Challenges in balancing classical methods (bandongan/sorogan) with modern approaches.
Strengthening Hidden Curriculum & Facilities	Language Culture & Tech Infrastructure	• Daily habituation of Arabic and English communication. • Tahfizh (memorization), qira'ati, tilawati, and IT training programs. • Establishment of computer laboratories and computer-based testing (CBT).	• Supporting: Strategic location, language/computer labs, economic independence. • Inhibiting: Limited human resources (teaching staff quantity and competence), uneven ICT utilization.
Supporting & Inhibiting Factors	Internal-External Support vs. Operational Constraints	• Supporting: High social trust and reputation of the pesantren (Darul Hijrah Puteri, Darul Ilmi, and Al Falah Banjarbaru). • Inhibiting: Cultural resistance (concerns over losing traditional identity), negative stigma, facility disparities.	• Mitigation Strategy: Careful management to ensure modernization does not erase core pesantren values.
Impacts of Transformation	Competency Enhancement & Mental Resilience	• Graduates possess a balance of religious knowledge, foreign languages, and digital skills. • Strengthening students' mental resilience through patience, discipline, and sincerity. • Expansion of the pesantren's role as a center of civilization (economy, social, technology).	• Anticipated Risks: Potential goal disorientation if modernization is overemphasized, and concerns over losing original identity.

Discussion

Engineering the Islamic Education System in an Effort to Transform to Face the Vuca (Volatility, Uncertainty, Complexity and Ambiguity) Era in Islamic Boarding Schools in South Kalimantan

The era of VUCA (Volatility, Uncertainty, Complexity, Ambiguity) has become an inevitable reality in various sectors, including education. Volatility refers to rapid and unpredictable changes; uncertainty is the difficulty of predicting the future; complexity is the number of interrelated factors; and ambiguity is the ambiguity of meaning or information. This condition demands a fundamental transformation of the education system, including the Islamic education system, to be relevant and able to produce adaptive and competent graduates.

The Islamic education system, especially in traditional institutions such as Islamic boarding schools and madrasas, still faces significant challenges in responding to the demands of the VUCA Era (Tiya, 2025). A curriculum that tends to be normative and oriented to memorization is one of the obstacles that reduces the optimization of 21st century skill development, such as critical thinking, problem-solving, creativity, and adaptability. The next challenge is related to the limitations of infrastructure and the application of technology in learning. Many Islamic educational institutions in various regions have not fully integrated technology systematically in the teaching and learning process (Barnett-Itzhaki et al., 2023; Kurniawan et al., 2024; Siswadi et al., 2025, 2026)

Khalafiah Islamic Boarding Schools such as Darul Hijrah Puteri, Darul Ilmi, and Al Falah have begun to overcome these obstacles through the provision of computer laboratories, the use of information technology-based media in learning, and the implementation of computer-based evaluations. This effort strengthens students' digital literacy and increases their readiness to face the needs of the modern world of work (Azzahra et al., 2026; Hidayat et al., 2026; Nirmala et al., 2025; Priyantoro et al., 2026; Saepurohman et al., 2025). The development of teachers' professionalism in mastering innovative learning methods is also a major concern and has been responded to by these Islamic boarding schools through increasing qualifications and relevant pedagogical training (Am et al., 2026; Assalihee et al., 2024; Musa et al., 2024; Nurwahyuni & Za, 2025; Tihabsah et al., 2024).

To overcome these challenges, a systematic and planned engineering of the Islamic education system is needed. This engineering does not mean abandoning Islamic values, but reconstructing, the vision and mission as well as the goals, curriculum, evaluation methods and approaches, and even learning media and facilities to be in harmony with the needs of the times (Amalia, 2026; Amalia et al., 2025; Hussain, 2025; Isnaeni et al., 2025; Junaedi et al., 2025)

Transformation in the world of Islamic education is not just a change of terms or administrative improvements. This process is a fundamental change that unites Islamic values with the needs of modern humans (Aslihah & Wasehudin, 2023; Ib et al., 2026; Lisnawati et al., 2026) The direction of change seeks to produce a generation of students who are strong in mastering religious knowledge, have broad academic abilities, and are ready to compete and contribute on a global scale. Pesantren as an Islamic educational institution needs to have a clear direction of change so that it is not only the guardian of tradition, but also the center of the development of science and civilization (Andriani et al., 2026; Martanti et al., 2026; Ratnasari et al., 2026).

Vision is the foundation that determines the strategic direction of a pesantren. A strong vision serves as a civilization compass that guides the entire learning process, curriculum development, character, and institutional culture (Rudiyanto et al., 2024). Khalafiyah Islamic boarding schools such as Darul Hijrah Puteri, Darul Ilmi, and Al Falah have shown seriousness in formulating a vision and mission that is in line with the demands of the VUCA era. The three Islamic boarding schools strive to combine Islamic scientific heritage with a more progressive technology-based education pattern and intellectual approach.

Pesantren that implement a vision like this has the potential to become the birthplace of a generation that is ready to follow the rapid changes in the VUCA era. A structured curriculum, strengthening Qur'anic values-based character, and the use of technology as a learning tool allow the educational process to develop more responsive, innovative, and meaningful. The main goal is to

produce students who are able to face the complexities of the times while bringing Islamic values as a guideline in every step of life.

One of the main steps is the integration of the curriculum between religious and general sciences The curriculum needs to be redesigned to not only focus on religious studies, but also include subjects relevant to global needs, such as data literacy, artificial intelligence (AI), digital entrepreneurship, and soft skills (communication, collaboration, and leadership) (Ahadiyah et al., 2024; Chairawati et al., 2026; Dalughu et al., 2026; Humaida et al., 2026). Similarly, Khalafiah Islamic boarding schools such as Darul Hijrah Puteri, Darul Ilmi and Al Falah Banjarbaru also use this approach so that it will produce graduates who have a balance between spiritual and intellectual intelligence.

There is a connectionist theory put forward by Smith & Mac Gregor, who views that in learning as a connection (the relationship between stimulus and response) (Shahini, 2025). This relationship is in how a person responds; in this case the response is the need for a transformation of the pesantren. Meanwhile, the stimulus is the VUCA era that must be accepted, not avoided. The response of pesantren to this era is by transforming the curriculum from pure salafiah to khalafiah, creating hidden curriculum creativity, creating a cottage atmosphere by using English and Arabic as a conversation language other than Indonesian. The yellow book learning system uses the current method, namely the quick method of reading the yellow book. Modern dormitory system equipped with modern facilities and so on.

According to Vignato and Saniotis in their writings, Islamic boarding schools are able to transform in the form of concern for the environment and natural disaster management (Kasanah et al., 2023). The pesantren does not only focus on the management of the learning environment, but also pays attention to ecological aspects as part of their moral and spiritual responsibilities. Concern for the environment is a manifestation of Islamic values that place humans as caliphs on earth (Asrori et al., 2025; Hasnadi & Inayatillah, 2022) This attitude is evident in various Islamic boarding schools in Indonesia, including Islamic boarding schools in Aceh that show a strong commitment to environmental recovery after the tsunami. They rebuilt the learning space while strengthening ecological awareness through greening, land restoration, and environmental education programs for students and the surrounding community.

Research on khalafiah pesantren also reveals that attention to ecology is not just a discourse, but has been integrated in the pesantren management system. One of the real examples can be seen at the Darul Hijrah Putera Martapura Islamic Boarding School. This institution won the Kalpataru award in 2021, a national-level award in the field of environment. The award was given to its founder, KH. Zarkasyi Hasbi (Alm), for his success in implementing the agrosilvofishery approach and building a climate-oriented pesantren area. The system developed combines agriculture, forestry, and fisheries in one integrated ecosystem to create a productive, green, and sustainable pesantren environment.

This kind of management model shows that pesantren are able to transform into environmental education centers as well as role models for the community. Students not only learn Islamic books and sciences, but also understand how to take care of the earth through direct practice (K. Anwar & Susminingsih, 2024). This integrative approach reflects that modern pesantren can be a pioneer of the sustainability movement that is in line with Islamic teachings and the needs of today's environment.

Learning methods need to move from a teacher-centered pattern to an approach that places students as the main subject of learning (student-centered). This shift allows students to be actively involved, develop curiosity, and build critical thinking skills (Nisa et al., 2024). Active learning models such as collaborative projects, case studies, guided inquiry, and problem-based learning play a major role in encouraging intellectual independence while improving the ability to solve real problems.

The use of educational technology (EdTech) is also a strategic component in learning transformation (Firmansyah & Jiwandono, 2022). E-learning, online discussion platforms, interactive applications, and the use of virtual reality-based simulation media are able to create a learning experience that is more interesting, adaptive, and relevant to the times. Technology not only serves as a tool, but also as a bridge that connects learning materials with the real world that students face (Awaluddin et al., 2021).

Khalafiah Islamic boarding schools such as Darul Hijrah Puteri, Darul Ilmi, and Al Falah have begun a transformation step towards more participatory and modern learning. The application of computer laboratories, the use of digital media in the delivery of materials, and the implementation of technology-based evaluations reflect the commitment of these Islamic boarding schools in preparing students to be able to compete in the global era. The integration between traditional pesantren methods and modern pedagogical innovations presents a learning model that not only maintains the roots of Islamic science, but also opens up a wide space for the development of 21st century competencies (Ibrahim & Mukhsin, 2025).

Teacher capacity development is one of the main pillars in the educational transformation process. Teachers play a role as a driving force for change so that their quality greatly determines the success of the implementation of an education system that is adaptive to the demands of the VUCA era (Hanifa & Ibrahim, 2025). Investment in improving educator competencies is needed through continuous training, including innovative teaching methods, digital literacy, mastery of learning technologies, and understanding the characteristics of global change (Triyunita et al., 2025). Educators need to have responsive pedagogical skills, not only delivering material, but also guiding students in the process of thinking, finding concepts, and developing reflective and creative skills.

The role of teachers today has evolved from information centers to facilitators, mentors, and collaborators in the learning process. These changes demand broader interpersonal and professional competencies, including the ability to build a dialogical, inclusive learning environment and encourage students' active participation. Teachers are required to be able to read students' needs, provide constructive feedback, and design learning that stimulates higher-level thinking skills (Marhamah & Zikriati, 2024).

Khalafiah Islamic Boarding Schools such as Darul Hijrah Puteri, Darul Ilmi, and Al Falah show a strong commitment to improving the quality of educators. The majority of teachers and ustadzah have a minimum educational qualification of S1, and some have completed S2 or even S3 studies. These academic qualifications are valuable capital in developing a more professional learning process and relevant to the demands of the times. The existence of competent educators provides space for the application of more progressive learning innovations so that pesantren are able to produce students who excel intellectually, spiritually, and competitively in various fields (Musaddad & Sudarsono, 2025).

Several Islamic educational institutions such as Khalafiah Islamic boarding schools such as Darul Hijrah Puteri, Darul Ilmi and Al Falah have started these engineering steps. Likewise, the findings for example, the Nurul Jadid Islamic Boarding School in Paiton, East Java, has integrated entrepreneurship and computer training programs into its curriculum, allowing students to have practical skills. Similarly, some aliyah madrassas in urban areas have started using blended learning systems that combine face-to-face classes with online learning. However, the implementation challenges remain great, especially for institutions that have limited resources. Collaboration with governments, the private sector, and non-governmental institutions is urgently needed to provide financial, technical, and strategic support.

Engineering the Islamic education system is a must in the VUCA era. This transformation must include curriculum reorientation, the adoption of innovative learning methods, and investment in teacher capacity building. By doing this engineering, Islamic educational institutions will not only maintain their relevance, but also be able to produce a generation of Muslims who are not only noble and have strong religious knowledge, but are also resilient and ready to face the complexities of the modern world.

According to Ziebek, the existence of Islamic boarding schools from the beginning shows that there is involvement in solving problems that exist in the community, open to suggestions and input from the community, even in its construction, both physically and in its management, it always involves the role of the community. The charismatic figure of Kiyai makes the pesantren a strategic position as an Islamic educational institution that grows and develops in the midst of society (Albadarin et al., 2024; Hamdanah et al., 2025; Ma`arif et al., 2025, 2026; Nasith, 2024; Paisun et al., 2025). In Manfred Ziemik's

research, he provides an account of how the institutional development of Islamic boarding schools is autonomous, but does not close itself to openness, including in changes and curriculum development. The pesantren modernizes with the initiative that arises from the pesantren itself, then in the end, the modernization of the pesantren triggers itself to make the best contribution to the environment from the theoretical findings that the engineering of the Islamic education system in Islamic boarding schools is not something taboo but indeed a must. It is not uncommon to find in Islamic boarding schools the involvement of psychologists and counseling guidance teachers in the educational process, affiliated curriculum and ministries of religion, alternative learning methods and current strategies, modern facilities such as dormitories with modern equipment, modernly managed cafes and stalls, sophisticated IT media.

The evaluation system uses computers and the management of the pesantren environment that pays attention to a harmonious and neatly organized environmental ecosystem, even students who are skilled in using IT media. The evaluation system in Islamic boarding schools, both Darul Hijrah Puteri, Darul Ilmi and Alfalah, is in accordance with the evaluation qaedah, where there are formative, subsumative and summative evaluations. The types of evaluations applied are both oral and written as well as deeds or practicums. An evaluation system like this certainly produces qualified alumni, not only mastering the cognitive aspects but also psychomotor and affective aspects who are of course ready to face the VUCA Era.

An Appropriate and Comprehensive Islamic Education Evaluation System in Welcoming the VUCA Era. The VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era demanded that the education system, including Islamic education, adapt. Proper and comprehensive evaluations are essential to ensure graduates are prepared for global challenges. The evaluation system is no longer enough to measure memorization or knowledge, but must include the holistic aspects that make up the kamil (whole human being).

The environment of Islamic boarding schools, the development of media and learning facilities is a strategic step to integrate Islamic scientific traditions with the demands of the times. This effort not only aims to improve students' understanding, but also equip them with 21st century skills. The Darul Hijrah Puteri Islamic Boarding School, Darul Ilmi Islamic Boarding School and Al Falah Banjarbaru City have done this. According to Dr. H. Achmad Zayadi, M.Pd., educational innovation in Islamic boarding schools must be able to answer the challenges of technological disruption without eroding the noble values of Islamic boarding schools. Aspects of Media Development and Learning Facilities.

According to H. Taufiqurrahman, Lc., M.Hum., this development also serves as an effort to instill creative, critical, and collaborative character in students. This shows that innovation in Islamic boarding schools is not only about technology, but also about character formation that is relevant to global needs.

The development of media and learning facilities in Islamic boarding schools is an important strategy to bridge the Islamic scientific tradition with the challenges of modern education, especially in the midst of the rapid flow of technology (Yusuf & Ali, 2025). The use of digital devices, representative learning spaces, and the integration of technology in the curriculum strengthen the learning ecosystem that encourages creativity and collaboration among students. This approach shows that the transformation of pesantren does not stop at the provision of facilities, but involves the formation of a new learning culture that is more adaptive, reflective, and productive. The modernization of learning facilities not only answers the demands of globalization, but also builds a solid foundation of character so that students are able to play a wider role in social, intellectual, and professional life.

Supporting and Inhibiting Factors Affecting the Engineering of the Islamic Education System in Transformation Efforts to Face the Vuca Era (Volatility, Uncertainty, Complexity and Ambiguity) in Islamic Boarding Schools in South Kalimantan

The engineering of the Islamic education system in Khalafiah Islamic Boarding Schools in South Kalimantan is influenced by a combination of supporting and inhibiting factors in responding to the challenges of the VUCA era. One of the strongest supporting factors is curriculum integration between

formal education (MTs and MA) and the traditional pesantren curriculum that focuses on classical Islamic texts (yellow book studies). This integration enables students to gain a balanced competence between religious knowledge and general academic understanding. In addition, strong community support also plays an important role, as these pesantren—Darul Hijrah Puteri, Darul Ilmi, and Al Falah Banjarbaru—have long-standing reputations and high levels of public trust, which encourage continuous enrollment and institutional sustainability. The adaptive vision and mission of the pesantren further strengthen this transformation, as they aim to produce a generation that is both religiously grounded and intellectually capable of facing future challenges. Supporting factors are also reinforced by strategic location, adequate learning facilities such as language and computer laboratories, and a level of economic independence that allows the institutions to innovate without heavy external dependency.

However, the transformation process is also faced with several inhibiting factors that require careful attention. One of the main challenges is the limitation of human resources, particularly the availability and competence of teaching staff, which can affect the effectiveness of learning and student development (Permatasari & Tandiayuk, 2023). In addition, the limited use of information and communication technology (ICT) in some aspects of learning and administration remains a challenge in keeping pace with digital transformation. Cultural concerns also emerge, particularly fears that modernization may erode traditional Islamic values that have long been the identity of pesantren. Although facilities are relatively available, some infrastructure still requires improvement and expansion to better support technology-based learning. Social dynamics also pose challenges, including negative stereotypes toward pesantren that are sometimes associated with radicalism, which can affect institutional image. The most complex challenge, however, lies in maintaining a balance between tradition and innovation, especially in preserving classical teaching methods such as bandongan and sorogan while simultaneously adopting modern educational approaches required in the VUCA era.

In addition, broader studies show that the success of education system engineering in the VUCA era is also influenced by technological development, innovation, human resource competence, and globalization. The use of information and communication technology (ICT) is essential to improve efficiency, effectiveness, and transparency in education management, as well as to strengthen teachers' professional capacity. Innovation is also a key factor, as it enables transformation in curriculum, teaching methods, and assessment systems to produce creative and adaptive graduates (Khan et al., 2025; Maisura et al., 2026). Furthermore, improving the competence of educators and education managers is crucial, as they must be able to analyze both current and future challenges while applying effective educational management strategies (Blegur et al., 2024; Daulay et al., 2024; Msamba et al., 2023; Mukhoiyaroh et al., 2025; Nurjannah et al., 2025). Globalization further accelerates the flow of information and cultural exchange, requiring educational institutions to raise their standards to remain competitive. Therefore, education system reform in the VUCA era must be carried out comprehensively and systematically, ensuring that all components of the education system are aligned with the demands of rapid global change while maintaining core educational values.

The Impact of Islamic Education System Engineering in Transformation Efforts to Face the Vuca (Volatility, Uncertainty, Complexity, and Ambiguity) Era on Islamic Boarding Schools in South Kalimantan

The impact of Islamic education system engineering in Khalafiah Islamic Boarding Schools in South Kalimantan shows significant positive outcomes in responding to the challenges of the VUCA era. One of the most evident impacts is the improvement of students' competencies. Through curriculum transformation that integrates religious education with general knowledge, foreign languages, and digital skills, students are better prepared to face global competition. This condition reflects a shift in pesantren education from a purely religious orientation to a more balanced system that also emphasizes practical and technological competencies required in the modern world.

Another important impact is the strengthening of students' mental resilience. The internalization of Islamic values such as patience, sincerity, discipline, and responsibility serve as a strong psychological foundation for students in dealing with uncertainty and rapid change (Munif, 2025). This character formation becomes a distinguishing strength of pesantren graduates, enabling them to remain stable and adaptive in facing complex life challenges. In addition, the engineering process also contributes to the development of an innovative educational culture within pesantren, where educators and institutional leaders continuously improve learning methods and management systems to align with evolving demands.

Furthermore, the transformation of the Islamic education system expands the role of pesantren beyond traditional religious institutions. Pesantren are increasingly positioned as centers of community development that contribute to various fields, including economics, social affairs, and technology, while still maintaining their Islamic identity (Mubarak et al., 2026). This indicates that pesantren are evolving into adaptive institutions that are capable of responding to societal needs and global developments without losing their core values.

However, this transformation also presents several challenges that need to be carefully managed. One of the main concerns is the potential loss of originality, where excessive modernization may weaken traditional values such as simplicity, sincerity, and the strong emotional bond between kyai and santri. In addition, disparities in human resources and infrastructure, as well as the risk of goal disorientation, may arise if the focus shifts too heavily toward general competencies and neglects the core mission of religious education. These challenges highlight the importance of maintaining a balanced approach in the transformation process.

CONCLUSION

This study's findings show that the engineering of the Islamic education system at Khalafiah Islamic Boarding Schools in South Kalimantan supports strategic transformation in responding to the challenges of the VUCA era. The most significant finding is that this transformation does not merely involve adopting modern educational practices, but occurs through integrating modernization with the preservation of Islamic educational identity. The transformation is reflected in a renewed vision and mission, curriculum integration, innovation in learning methods, strengthened teacher competence, improved evaluation systems, and the use of technology-based learning media and facilities. The study also identifies outcomes that emerged through the research process, including improved student competencies, stronger mental resilience, the development of an innovative educational culture, and the expansion of the pesantren's role into broader social and professional fields. These findings indicate that pesantren can pursue educational transformation while maintaining their distinctive religious values and institutional identity.

This study contributes a contextual perspective on Islamic education system engineering as a mechanism for institutional transformation in the VUCA era. The findings reinforce previous perspectives that educational institutions must adapt their systems, competencies, curricula, and learning practices to respond to rapid environmental changes, while extending this perspective by showing how such adaptation can be implemented within the distinctive institutional and cultural characteristics of Khalafiah Islamic Boarding Schools. This study also offers a more integrated view of pesantren transformation by linking changes in educational vision, curriculum, learning methods, teacher competence, evaluation, and technology use to broader educational outcomes. From this perspective, the study positions Islamic boarding schools not only as institutions that preserve Islamic traditions but also as educational institutions capable of developing adaptive, innovative, and future-oriented systems.

This study has several limitations that should be considered when interpreting the findings. The research was conducted in only three Islamic boarding schools in South Kalimantan, so the findings may not represent the diversity of pesantren across regions and institutional types. The predominantly qualitative approach also limits the generalizability and quantitative measurement of the identified

educational outcomes. At the same time, differences in informant perspectives and institutional conditions may affect the depth and consistency of the interpretation. Future research should therefore include a broader range of Islamic boarding schools across regions and institutional contexts and consider a mixed-methods approach to combine qualitative depth with quantitative measurement. Further research may also examine the long-term effects of educational system engineering on graduate outcomes, particularly employability, leadership capacity, digital competence, and adaptability to changing professional environments. Such research can strengthen the empirical basis for understanding sustainable Islamic education system transformation and support the development of more responsive educational policies in the VUCA era..

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