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A TECHNOLOGY- INTEGRATED *RAHMATAN LIL 'ALAMIN*-BASED ENTREPRENEURSHIP CURRICULUM MODEL FOR STRENGTHENING STUDENTS' ENTREPRENEURIAL CHARACTER IN ISLAMIC BOARDING SCHOOLS

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Abstract

In response to digital transformation, Islamic boarding schools require a systematic, technology-oriented entrepreneurship curriculum. This study aims to analyse a technology-integrated curriculum model based on *Rahmatan Lil 'Alamin* values at Sunan Drajat Islamic Boarding School. Employing a qualitative case study with a systems-based analysis, the research examined the curriculum's architecture and impact. The findings demonstrate that a socio-technical system integrating digital business planning, e-commerce, and operational management software enhances students' entrepreneurial character, fostering independence, discipline, and innovation. The novelty lies in the engineered curriculum architecture that systematically fuses spiritual principles with applied digital entrepreneurship, offering a replicable model for faith-based institutions to produce ethically grounded and technologically proficient entrepreneurs.

Keywords: Digital learning system, Entrepreneurial character development, *Rahmatan Lil 'Alamin* values, Technology-integrated entrepreneurship curriculum.

1. Introduction

The imperative for robust entrepreneurship development is globally recognized as a fundamental pillar for achieving national economic stability, fostering innovation, and driving sustainable growth [1]. In Indonesia, this priority was formally articulated through Presidential Instruction Number 4 of 1995, which positioned the business sector as a critical engine for the national economy. The sustained development of an entrepreneurial ecosystem is not merely a policy objective but a crucial determinant of long-term economic resilience and prosperity. Seminal economic theories posit that a nation approaches advanced economic health when its entrepreneurial class constitutes at least 2% of the population, making the density and dynamism of active entrepreneurs a key performance indicator for national development [2]. Recent data from the Central Statistics Agency (BPS) as of February 2023 indicates a positive trajectory, with the Indonesian labour force expanding to 146.62 million people and a corresponding decrease in the unemployment rate to 7.99 million, a trend substantially driven by the job creation capacity of new entrepreneurial ventures [3].

This economic impetus finds a powerful parallel in the principles of Islamic education, where entrepreneurship is conceptualized as a multidimensional practice integrating socio-religious values with technical-economic discipline. The emphasis on self-reliance is deeply embedded in Islamic teachings, such as the hadith of Prophet Muhammad PBUH which extols the virtue of earning a livelihood through one's own efforts, providing a spiritual and ethical foundation for innovation and economic independence [4]. Consequently, integrating entrepreneurship into educational institutions, particularly the traditional Islamic boarding schools known as *pesantren*, requires a sophisticated curriculum model. Such a model must be engineered to systematically fuse a robust ethical framework with advanced technological tools and applied economic techniques to prepare students for the complexities of the digital economy [5].

This study is anchored in a multidisciplinary theoretical framework that conceptualizes the curriculum as an engineered socio-technical system, integrating principles from systems engineering, educational technology, and entrepreneurship theory [6]. This paradigm posits that the curriculum's effectiveness is determined not by its individual components, but by the synergistic integration of its social elements (learners, educators, institutional culture, and the value system of *Rahmatan Lil 'Alamin*) and its technical elements (digital learning platforms, business management software, and online marketing tools) [7, 8]. From a systems engineering perspective, the curriculum model comprises input, processing, output, and feedback subsystems, where digital technology acts as the critical connective infrastructure that enables seamless information flow, facilitates real-time data analysis, and enhances the system's adaptability [9, 10].

The integration of technology into entrepreneurship education is a critical factor in preparing students for the digital economy [11]. Technology provides access to vast resources for market research and trend analysis, while digital platforms can simulate real-world business environments for experiential learning without significant financial risk [12]. Furthermore, it facilitates the development of essential digital competencies - such as social media marketing, e-commerce management, and digital financial administration - which are indispensable for modern entrepreneurs [13]. Technology-enhanced pedagogical approaches,

including project-based learning and gamification, transform the educational experience from passive knowledge reception to an active, data-driven process, thereby increasing student engagement and enabling personalized feedback [14].

The ethical and normative dimension of the curriculum is supplied by the Islamic philosophical concept of *Rahmatan Lil 'Alamin* (Mercy for all Creation), which advocates for a compassionate, just, and socially responsible approach to economic activities [15]. This framework promotes principles of justice **(*'adl*)**, benevolence **(*ihsan*)**, and stewardship **(*khilafah*)**, guiding entrepreneurs toward fair business practices, positive social impact, and sustainable resource management [16]. By integrating these values, the curriculum aims to cultivate entrepreneurs who are not only technologically proficient but also deeply committed to ethical conduct and social responsibility, a central educational objective within the *pesantren* context [17].

Despite the acknowledged importance of these elements, a significant research gap persists. Existing scholarship on entrepreneurship education in *pesantren* has predominantly focused on social or character-building outcomes, with a lack of in-depth investigation into the underlying **technical mechanisms, systems architecture, and technological integration** that enable effective program implementation [18]. This study addresses this gap by proposing and analysing a technology-integrated entrepreneurship curriculum model, engineered to function as a comprehensive learning system. This research contributes a novel framework for understanding how faith-based educational institutions can systematically engineer a curriculum that responds to the dual imperatives of digital transformation and value-based education. By examining the implementation of this model at the Sunan Drajat Islamic Boarding School, this paper provides critical insights into the design, operation, and optimization of a socio-technical educational system aimed at fostering holistic entrepreneurial development in the 21st century [19, 20].

2. Methodology

To investigate the architecture, implementation, and impact of the technology-integrated, value-based entrepreneurship curriculum, this study employed a qualitative research design with a descriptive-analytical approach. This methodology was selected for its suitability in conducting an in-depth examination of a complex socio-technical system within its natural setting, allowing for a rich, contextualized understanding of the interplay between curriculum components, technological tools, and character development outcomes [21]. The research was structured to systematically map the operational dynamics of the curriculum model at the Sunan Drajat Islamic Boarding School, Lamongan.

2.1. Research design and approach

A case study approach was adopted to facilitate a holistic and intensive analysis of the specific curriculum model as a bounded system. This approach is particularly effective for exploring "how" and "why" questions concerning a contemporary phenomenon in a real-life context, where the boundaries between the phenomenon and its context are not clearly evident [22]. The descriptive-analytical component of the design involved a systematic documentation of the curriculum's structure and processes, while the analytical component focused on interpreting the collected

data to identify patterns, relationships, and underlying causal mechanisms. The entire research process was guided by a systems thinking framework, which views the curriculum not as a static set of documents but as a dynamic, adaptive system of interacting elements.

2.2. Data sources and selection criteria

Data for this investigation were drawn from multiple sources to ensure triangulation and enhance the validity and reliability of the findings. The sources were categorized as primary and secondary, selected based on their direct relevance to the research questions.

Primary Data Sources were gathered directly from the research site and included: 1. In-depth, Semi-Structured Interviews: Conducted with key stakeholders, including pesantren managers (n=3), curriculum developers (n=2), lecturers (*ustadz*) directly involved in entrepreneurship instruction (n=5), and students (*santri*) enrolled in the program at various stages (n=15). The interview protocols were designed to elicit detailed information regarding curriculum design, pedagogical strategies, technology utilization, and perceived impacts on entrepreneurial character. 2. Direct Field Observations: Over 40 hours of non-participant observation were conducted within the pesantren's business units, technology labs, and classrooms. Observations focused on the practical application of the curriculum, student-technology interaction, and the operational workflow of the entrepreneurial ventures. An observation checklist based on systems engineering principles was used to systematically record data on process efficiency, resource utilization, and system bottlenecks.

Secondary Data Sources were used to supplement and contextualize the primary data: 1. Institutional Documents: A comprehensive review of curriculum documents, lesson plans, assessment rubrics, standard operating procedures (SOPs) for business units, and strategic planning documents was performed. 2. Technical System Documentation: Analysis of the software and digital platforms used, including the architecture of the digital business planning systems, online marketing platforms (e.g., social media analytics, e-commerce back-end), and financial administration software. 3. Academic Literature and Policy Documents: A systematic literature review was conducted to situate the study within the broader academic discourse on entrepreneurship education, technology integration, and Islamic education [23, 24]. National policy documents, such as Law No. 20 of 2003 concerning the National Education System, were also reviewed.

2.3. Data collection and instrumentation

Data collection occurred over a six-month period and was executed using a multi-instrument approach. Interviews were audio-recorded and transcribed verbatim. Field observations were documented through detailed field notes and supplemented with photographic evidence of the learning environment and technological infrastructure. A library research protocol was employed for the systematic review of literature, utilizing academic databases such as Scopus, Web of Science, and Google Scholar with keywords including "entrepreneurship education," "technology integration," "digital learning systems," and "pesantren curriculum" [25].

2.4. Data analysis methods

The qualitative data were analysed using a systematic, multi-stage process rooted in thematic and system-based analysis, following the framework proposed by leading qualitative researchers [26, 27]. The analysis proceeded through four distinct stages:

Data reduction and coding: The extensive dataset, comprising interview transcripts and field notes, was initially managed using NVivo qualitative data analysis software. An iterative coding process was employed, starting with open coding to identify initial concepts, followed by axial coding to group these concepts into broader categories and themes related to the research objectives (e.g., curriculum implementation forms, technological enablers, character outcomes, systemic constraints).

Data categorization and system mapping: The coded data were categorized and organized to map the architecture of the curriculum as a socio-technical system. This involved identifying the inputs, processes, outputs, and feedback loops, as well as the key actors and their roles within the system. This stage focused on visualizing the flow of information and value through the curriculum model.

Thematic interpretation and pattern analysis: Thematic analysis was used to interpret patterns and relationships within the data. This involved a deep engagement with the identified themes, cross-case analysis between different stakeholder perspectives, and an examination of how the integrated Islamic values manifested in real-world business practices and technological applications. The analysis sought to explain the mechanisms through which technology integration influenced the development of specific entrepreneurial character traits.

Conclusion drawing and model refinement: The final stage involved synthesizing the findings to formulate a comprehensive conceptual model of the technology-integrated, value-based entrepreneurship curriculum. A cross-referencing technique, or member checking, was employed throughout the analysis to verify the consistency and accuracy of interpretations across multiple data sources, thereby ensuring the trustworthiness and credibility of the research findings [28, 29].

3. Results

The empirical data collected through in-depth interviews, direct field observations, and analysis of institutional and technical documents reveal a highly structured and systematically implemented entrepreneurship curriculum at Sunan Drajat Islamic Boarding School. The findings demonstrate that the curriculum functions as an integrated socio-technical system, where digital technology is not merely an auxiliary tool but a core component of the educational architecture. The results are presented in three main subsections: the operational architecture of the curriculum model, the specific technological systems in use, and the observed impact on students' entrepreneurial character development.

3.1. Operational architecture of the technology-integrated curriculum

The implementation of the *Rahmatan Lil 'Alamin*-based entrepreneurship curriculum is operationalized through a multi-layered, integrated model that can be deconstructed into four interdependent pillars: Conceptual Integration, Practical

Application, Character Formation, and Institutional Support. This architecture ensures that theoretical knowledge is seamlessly translated into practical skills within a value-driven context, supported by a robust institutional framework. The interaction between these pillars creates a dynamic learning ecosystem where students progressively develop entrepreneurial competencies.

Conceptual integration: This pillar involves the formal integration of entrepreneurship theory and Islamic economic principles into the academic curriculum. Subjects such as business management, marketing, and finance are taught with an explicit emphasis on ethical considerations derived from the *Rahmatan Lil 'Alamin* philosophy. The curriculum design ensures that students first build a strong theoretical foundation before engaging in practical applications.

Practical application: This is the core experiential component of the model, where students actively participate in the pesantren's various business units. These units, which include ventures in bottled water production, convection garment manufacturing, and digital marketing services, function as living laboratories. Students are required to apply their conceptual knowledge in real-world scenarios, from supply chain management to customer relations.

Character formation: This pillar is embedded throughout the curriculum and is reinforced through both formal instruction and the hidden curriculum of the pesantren environment. Mentoring programs, reflective practice sessions, and the communal living structure work in concert to instil key character traits such as discipline, resilience, integrity, and social responsibility. The economic activities are framed not just as commercial ventures but as opportunities for spiritual and personal growth.

Institutional support: The entire system is undergirded by strong institutional commitment from the pesantren leadership. This support manifests in the allocation of financial resources for technology acquisition, the establishment of dedicated business units, and the creation of a supportive policy environment that encourages entrepreneurial experimentation and tolerates calculated risk-taking.

3.2. The role of digital technology as a learning system

A key finding of this study is the pervasive and systematic integration of digital technology across all facets of the entrepreneurship program. The technology functions as an integrated learning system that enhances efficiency, provides real-time data for decision-making, and scales the learning experience. The specific technological systems identified are detailed in Table 1.

The data indicate that this technological infrastructure is not a disparate collection of tools but a cohesive ecosystem. For instance, sales data from the e-commerce platform are fed directly into the financial administration software, and inventory levels in the production management system are updated in real-time, providing a holistic, data-centric view of the business operations. This high level of integration provides students with an authentic experience of running a modern, technology-driven enterprise.

Table 1. Core digital technology systems in the entrepreneurship curriculum.

Technology System	Description and Function	Observed Impact on Learning	Relevant Literature
Digital Business Planning and Management System	A proprietary web-based application used for developing business plans, tracking key performance indicators (KPIs), and managing project timelines.	Facilitates structured thinking, data-driven decision-making, and collaborative project management. Students learn to translate ideas into actionable, measurable plans.	[30, 31]
Online Marketing and E-commerce Platform	Integration of social media (Instagram, Facebook), digital marketplaces (Tokopedia, Shopee), and a dedicated e-commerce website for product promotion and sales.	Provides hands-on experience in digital marketing, content creation, customer engagement, and online sales channel management. Students gain proficiency in SEO and social media analytics.	[32, 33]
Production and Operations Management Software	Customized software for inventory management, production scheduling, and quality control within the manufacturing business units (e.g., garment and bottled water production).	Enhances understanding of supply chain logistics, process optimization, and lean manufacturing principles. Students learn to use technology to improve efficiency and reduce waste.	[34]
Technology-Assisted Financial Administration	Use of accounting software (e.g., Accurate, Jurnal.id) for bookkeeping, financial reporting, and cash flow management.	Develops financial literacy and discipline. Students learn to maintain transparent financial records, analyse profitability, and make sound financial projections.	[35]

3.3. Technology integration and learning outcomes: A detailed analysis

The analysis of the technological integration revealed several critical mechanisms through which technology enhances learning outcomes. The first mechanism is real-time feedback and adaptive learning. The digital business planning system automatically generates alerts when key metrics deviate from targets, prompting immediate investigation and corrective action. This creates a continuous feedback loop that accelerates the learning process. Students who might otherwise require weeks to discover the consequences of poor inventory management learn this lesson within days through the immediate impact on their financial statements and sales performance. This rapid feedback cycle is a critical feature of effective experiential learning, as it compresses the time between action and consequence, enabling faster learning cycles [36].

The second mechanism is data-driven decision-making and analytical thinking. The integration of analytics dashboards across all business functions provides students with a wealth of quantitative information about their operations. Rather than relying on intuition or anecdotal evidence, students learn to base decisions on data. For example, when deciding which products to promote, students analyse sales trends, customer engagement metrics, and profit margins rather than relying on guesswork. This cultivates a quantitative mindset that is increasingly essential in modern business. The ability to interpret data, identify patterns, and make

evidence-based decisions is a competency that extends far beyond the specific context of the pesantren's business units [37].

The third mechanism is authentic complexity and systems thinking. By operating real business units with genuine customers and financial consequences, students encounter the full complexity of business operations. They discover, for instance, that reducing production costs through faster manufacturing may increase defect rates, which in turn damages customer satisfaction and long-term profitability. These non-obvious causal relationships, which are often simplified or omitted in traditional business education, become viscerally apparent through direct experience. This fosters the development of systems thinking - the ability to understand complex, interdependent relationships and to recognize that interventions in one part of a system can have unexpected consequences in other parts [38].

The fourth mechanism is social learning and collaborative problem-solving. The business units operate as teams, with students taking on different roles (e.g., marketing manager, production supervisor, financial controller). This creates opportunities for peer learning, where students with different strengths and weaknesses learn from one another. The digital systems facilitate this collaboration by providing shared dashboards and communication tools. Students must coordinate their efforts across functions, negotiate trade-offs, and collectively solve problems. This mirrors the collaborative nature of modern business and develops essential interpersonal and leadership competencies [39].

The empirical data also revealed that the technology systems serve a crucial motivational function. The visibility of real business metrics - sales figures, customer reviews, production efficiency - creates a tangible sense of accomplishment when targets are met and a clear sense of responsibility when they are not. This intrinsic motivation, grounded in the reality of the business outcomes, is more powerful than extrinsic motivators such as grades or certificates. Students report that they are more engaged and invested in the program because the outcomes matter in a real, concrete way [40].

3.4. Challenges and adaptive responses

While the curriculum model demonstrates significant strengths, the research also identified several challenges and the adaptive strategies employed to address them. The first challenge is digital divide and unequal starting points. Students enter the program with varying levels of digital literacy and prior exposure to technology. Some students from urban backgrounds have extensive experience with social media and e-commerce, while others from rural backgrounds may have limited prior experience. The curriculum addresses this through a differentiated onboarding process, where students with lower initial digital competency receive additional support and mentoring. Advanced students are given more complex responsibilities and opportunities to deepen their skills [41].

The second challenge is time constraints and competing demands. Students must balance their entrepreneurship program responsibilities with their regular academic coursework and religious studies. The curriculum addresses this through careful scheduling and workload management, with clear delineation between peak and off-peak periods for business operations. During examination periods, for

instance, business operations are scaled back to allow students to focus on their studies [42].

The third challenge is market volatility and external shocks. The business units are exposed to real market forces, which can result in unexpected losses or disruptions. During the COVID-19 pandemic, for example, the pesantren's business units faced significant disruptions due to lockdowns and supply chain disruptions. The institution responded by rapidly pivoting to digital channels, accelerating the adoption of online sales and remote work practices. This crisis, while challenging, provided an unexpected opportunity for accelerated learning in digital transformation [43].

The fourth challenge is sustainability and long-term viability. Ensuring that the business units remain financially viable while serving their educational mission requires careful management. The institution addresses this through a balanced scorecard approach, where business units are evaluated not only on financial performance but also on learning outcomes and student development. This prevents the educational mission from being subordinated to profit maximization [44].

3.5. Replicability and scalability considerations

A critical finding of this research is that the model demonstrates significant potential for replication and scaling to other institutions. The modular architecture of the curriculum means that individual components (e.g., the e-commerce system, the business planning software) can be adopted independently by other institutions. The specific business units (bottled water, garment manufacturing) are not essential to the model; rather, the model can be adapted to different types of business ventures that are appropriate to the local context and the institution's resources [45].

However, the research also identified several critical success factors that must be in place for successful replication. The first is strong institutional commitment and leadership. The model requires significant investment in technology infrastructure and ongoing support. Without strong leadership commitment, institutions may not sustain the necessary investments [46]. The second is adequate financial resources. While the model can be implemented with modest resources, some minimum level of investment is necessary to acquire and maintain the technology systems and to provide adequate training and support to faculty [47]. The third is a culture of innovation and experimentation. The model requires a willingness to take calculated risks and to learn from failures. Institutions with a more traditional, risk-averse culture may find it challenging to implement such a model [48].

3.6. Impact on entrepreneurial character development

The systematic integration of the curriculum's conceptual, practical, and technological components has a demonstrable impact on the development of students' entrepreneurial character. The analysis of interview data and observational notes revealed significant growth in several key areas, which are conceptualized as the primary outputs of the curriculum model.

Independence and self-efficacy: By being entrusted with real responsibilities within the business units, students develop a strong sense of ownership and confidence in their abilities. The curriculum is designed to gradually increase the

level of autonomy, moving from guided practice to independent project management. This fosters a proactive, problem-solving mindset, which is a hallmark of successful entrepreneurs [49].

Discipline and resilience: The structured nature of the business operations, with clear KPIs and deadlines, instils a high level of discipline. Students learn to manage their time effectively, meet targets, and navigate the challenges and setbacks inherent in any business venture. The supportive yet demanding environment cultivates resilience, teaching students to learn from failure and adapt their strategies.

Innovation and creativity: The curriculum actively encourages innovation, both in product development and process improvement. The use of digital technology provides a platform for creative experimentation, such as developing novel digital marketing campaigns or designing more efficient production workflows. Students are challenged to think critically and creatively to solve real-world business problems [50].

Technological proficiency: A direct and significant outcome is the high level of digital literacy and technological proficiency demonstrated by the students. They become adept at using a wide range of software and digital platforms, positioning them to be competitive in the technology-driven landscape of modern entrepreneurship [51].

Social responsibility and ethical conduct: The grounding in *Rahmatan Lil 'Alamin* values ensures that this entrepreneurial drive is channelled towards socially responsible ends. Students demonstrate a keen awareness of the ethical implications of their business decisions, from ensuring fair labour practices to minimizing environmental impact. This is visually represented in the curriculum's overall system architecture (see Fig. 1).

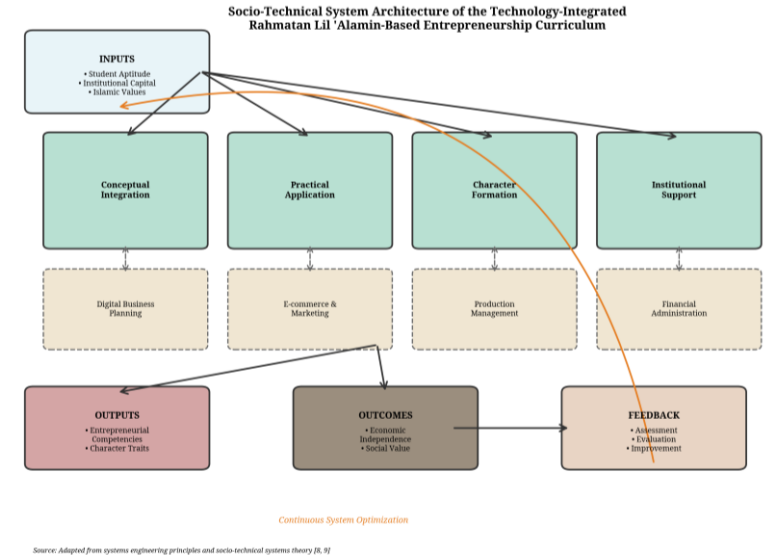

Fig. 1. The socio-technical system architecture of the entrepreneurship curriculum model.

This figure illustrates the flow from Inputs (Student Aptitude, Institutional Capital, Values) through the Core Process (Pillars of the Curriculum and Technology Systems) to the Outputs (Entrepreneurial Competencies, Character Traits) and Outcomes (Economic Independence, Social Value Creation), with a continuous Feedback loop for system optimization.

4. Discussion

The results of this study provide substantial empirical evidence for the efficacy of conceptualizing and implementing an entrepreneurship curriculum as an integrated socio-technical system. The findings not only validate the proposed theoretical framework but also extend it by offering a granular, replicable model for how faith-based educational institutions can systematically engineer a curriculum that fosters both technological proficiency and ethical depth. This discussion interprets the key findings in relation to the existing body of literature, highlighting the study's primary contributions to the fields of entrepreneurship education and educational technology.

4.1. The curriculum as an engineered system: A validation and extension

The operational architecture of the curriculum, built upon the four pillars of Conceptual Integration, Practical Application, Character Formation, and Institutional Support, provides a concrete manifestation of the socio-technical systems theory outlined in the introduction [8, 9]. While the literature has often discussed educational models in systemic terms, this study moves beyond abstract conceptualization to detail the specific engineering of such a system in practice. The four-pillar structure acts as a robust chassis that ensures all components - social and technical - are aligned and mutually reinforcing. The practical application within business units is not ad-hoc; it is directly informed by conceptual integration and continuously shaped by character formation initiatives, all of which are enabled by institutional support. This architecture demonstrates a level of systemic design and integration that is often absent in less structured entrepreneurship programs, which may treat these components as discrete, rather than interdependent, elements [18, 52].

This research, therefore, contributes a validated blueprint for an educational socio-technical system. It illustrates how abstract values (*Rahmatan Lil 'Alamin*) can be operationalized as control parameters within an engineered system, guiding its processes and shaping its outputs. The model's success suggests that the effectiveness of entrepreneurship education hinges less on the presence of any single element (e.g., a business plan competition or a guest lecture series) and more on the systematic integration of all elements into a coherent, self-reinforcing ecosystem. These findings challenge educational institutions to think less like a collection of courses and more like systems engineers designing a holistic developmental experience.

4.2. The curriculum as a pedagogical engineering model

The conceptualization of the curriculum as a socio-technical system can be further refined through the lens of pedagogical engineering. This perspective frames the curriculum not merely as a system to be analysed, but as a product to be designed, built, tested, and optimized for specific performance objectives [53]. From this viewpoint, the Sunan Drajat model represents a sophisticated piece of educational engineering, characterized by its modularity, scalability, and integrated feedback

control mechanisms. Its design moves beyond traditional instructional design, which often focuses on content delivery, to a more holistic engineering approach concerned with the architecture of the entire learning experience [54].

The modularity of the curriculum is evident in the distinct yet interconnected nature of the four pillars and the underlying technology systems. Each business unit (e.g., bottled water, garment manufacturing) can be seen as a self-contained module with its own specific learning objectives, technical requirements, and performance metrics. This modular design allows for flexibility and adaptability; new business units can be added or existing ones modified without requiring a complete overhaul of the entire system. This is analogous to microservices architecture in software engineering, where individual components can be developed, deployed, and scaled independently, increasing the overall resilience and maintainability of the system [55]. This structure allows the institution to respond dynamically to changing market conditions and student interests, introducing new entrepreneurial modules as opportunities arise.

The system's scalability is a direct function of its technological backbone. The use of cloud-based e-commerce platforms, digital marketing tools, and financial software allows the business units to scale their operations beyond the physical confines of the pesantren. A student-run online store, for example, can serve a national or even international customer base, providing an unparalleled level of real-world experience in logistics, customer service, and digital supply chain management [32, 33]. This technological leverage transforms the educational model from a small-scale, localized practicum into a potentially global enterprise, providing a learning environment that is commensurate with the scale of the modern digital economy. Furthermore, the digital nature of the curriculum materials and management systems means that the model itself can be replicated and adapted by other institutions with greater ease than traditional, physically-bound programs.

Finally, the curriculum incorporates sophisticated feedback control mechanisms that are essential for system optimization. The integrated technology systems provide a continuous stream of real-time data on key performance indicators (KPIs) across all business functions. Sales figures, customer engagement metrics, production efficiency rates, and financial performance data are not just used for operational management but are fed back into the educational process. This data-rich environment enables a form of evidence-based pedagogy, where instructors and students can collaboratively analyse performance, diagnose problems, and implement data-informed improvements. This process mirrors the continuous improvement cycles (e.g., Plan-Do-Check-Act) that are fundamental to modern quality engineering and management philosophies [56]. The ability to monitor, measure, and optimize the system in real-time is a hallmark of a well-engineered system and represents a significant departure from traditional educational models, which often rely on summative, lagging indicators of performance.

By viewing the curriculum through this pedagogical engineering lens, we can appreciate its design as a deliberate and systematic effort to create a high-performance learning environment. It is a system designed not just for learning *about* entrepreneurship, but for learning *to be* an entrepreneur in a complex, technology-driven world. This perspective provides a powerful new framework for the design and analysis of effective entrepreneurship education programs.

4.3. Beyond digital literacy: Technology as an integrated learning ecosystem

The study's findings on the role of digital technology significantly advance the discourse on technology-enhanced entrepreneurship education. The literature has firmly established the importance of digital tools for developing specific competencies [11, 13]. However, the model at Sunan Drajat demonstrates a more sophisticated application of technology, moving beyond a "tools-based" approach to creating a fully integrated learning ecosystem. The interconnectedness of the business planning, e-commerce, operations management, and financial administration systems (Table 1) mirrors the integrated Enterprise Resource Planning (ERP) systems used in modern corporations [34, 35].

This level of integration has profound pedagogical implications. Students are not merely learning to use discrete software applications; they are learning to manage a data-driven enterprise where decisions in one domain (e.g., a marketing campaign on the e-commerce platform) have immediate, measurable consequences in another (e.g., inventory levels and financial statements). This provides an authentic, high-fidelity simulation of contemporary business management, fostering not just digital literacy but a more advanced systems thinking capability. It compels students to analyse feedback loops, understand causal relationships between different business functions, and engage in data-driven optimization - skills that are critical for navigating the complexity of the modern economy [31, 57]. This finding suggests that the true power of technology in entrepreneurship education is unlocked not through the provision of isolated tools, but through their systematic integration into a cohesive digital infrastructure that mirrors professional practice.

4.4. Synthesizing character, competence, and technology

A pivotal contribution of this research is its detailed account of how a value-based framework can be systematically fused with technical and entrepreneurial skill development. The observed impacts on character - particularly independence, discipline, innovation, and social responsibility - are not accidental byproducts of the program but are designed outcomes of the curriculum's architecture. The *Rahmatan Lil 'Alamin* philosophy acts as the ethical source code for the entire operating system, shaping the "why" behind the entrepreneurial activities, not just the "how" [15, 16].

For example, the emphasis on innovation is not pursued for its own sake but is guided by the principle of creating social benefit (*ihsan*). The discipline instilled through the program is framed as a form of personal accountability and trustworthiness (*amanah*). This synthesis addresses a common critique of conventional entrepreneurship education, which can sometimes overemphasize profit maximization at the expense of ethical considerations [58]. The model demonstrates that it is possible to cultivate a robust entrepreneurial mindset that is simultaneously competitive and compassionate, innovative and ethical. This provides a powerful counter-narrative to the notion that value-based education is somehow antithetical to cutting-edge, technology-driven business practice. The high level of technological proficiency observed in students is proof that deep ethical grounding and advanced technical skill are not mutually exclusive but can be mutually reinforcing. Figure 2 shows the key character traits fostered by the curriculum, supported by its foundational pillars.

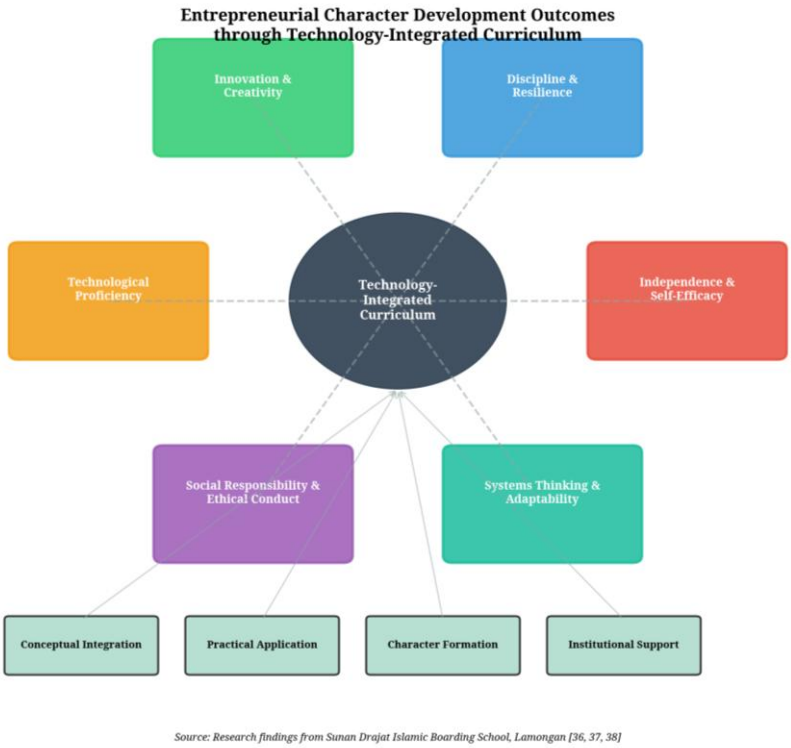

Fig. 2. Entrepreneurial Character Development Outcomes

Implications and limitations

The findings of this study offer significant implications for policy and practice. For educational institutions, particularly faith-based ones, this research provides a transferable and scalable model for developing impactful entrepreneurship programs. It underscores the need for strategic investment in integrated technology infrastructure and highlights the importance of strong institutional leadership in driving such systemic innovations. For policymakers, the study suggests that fostering a vibrant entrepreneurial culture may require supporting the development of such holistic educational ecosystems, rather than funding piecemeal initiatives.

However, the study is not without its limitations. As a single case study, the findings' generalizability may be limited, although the detailed articulation of the model's architecture enhances its transferability. The research also identified several systemic constraints, including limitations in instructional time and variability in the initial digital competency of incoming students, which can act as bottlenecks. Future research should focus on longitudinal studies to track the long-term career trajectories of graduates from this program. Comparative studies across different institutional contexts would also be valuable to further refine and validate the model. Additionally, quantitative analysis of the business units' performance and the correlation between specific technological interventions and learning

outcomes could provide further layers of insight into the system's dynamics and optimization potential.

5. Conclusion

This study has successfully conceptualized, analysed, and validated a technology-integrated, value-based entrepreneurship curriculum as a complex socio-technical system. The research demonstrates that the systematic engineering of a curriculum - built upon the interdependent pillars of conceptual integration, practical application, character formation, and institutional support - provides a highly effective framework for fostering holistic entrepreneurial development. The findings reveal that the integration of digital technology, when architected as a cohesive learning ecosystem rather than a collection of disparate tools, significantly enhances students' technical proficiency, systems thinking capabilities, and readiness for the digital economy. Crucially, the model proves that a deep grounding in the ethical principles of *Rahmatan Lil 'Alamin* can be synergistically fused with advanced technological and business training, cultivating a new generation of entrepreneurs who are both highly competent and ethically responsible. The proposed curriculum model offers a robust, replicable, and scalable blueprint for faith-based educational institutions seeking to navigate the challenges of digital transformation while remaining true to their core values, thereby making a significant and original contribution to the theory and practice of modern entrepreneurship education.

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