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Workshop on the Emergence of Agentic AI in Financial Technology and Entrepreneurship Development

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ABSTRACT

The rapid development of Agentic Artificial Intelligence (AI) and blockchain technology has transformed the global financial and entrepreneurial landscape, posing both opportunities and challenges for young entrepreneurs. This community service activity aimed to enhance the digital literacy and innovation capacity of 100 student entrepreneurs from Universitas Syiah Kuala by introducing practical applications of Agentic AI in financial technology and business development. The activity was conducted in the form of an online workshop, utilizing a service-learning approach, and facilitated by an expert in information systems. The program included knowledge transfer, case studies, and interactive discussions on the implementation of Agentic AI in business decision-making, financial automation, and digital trust. The results showed significant improvement in participants' understanding and readiness to adopt such technologies, with marked increases in awareness, interest, and motivation toward innovation. This activity demonstrates an effective model for supporting inclusive entrepreneurship and accelerating the achievement of sustainable development goals through technological empowerment.

1. Introduction

The rapid digital transformation across global economies has ushered in a new era of intelligent systems that exhibit autonomy, contextual awareness, and adaptive decision-making—

collectively termed Agentic Artificial Intelligence (AI) (Kumar et al., 2024; Ogbu, 2023). Unlike traditional AI that relies on static programming or passive learning, agentic AI refers to systems with the capacity to proactively make decisions, adapt in real time, and interact purposefully with their environment (Lubis et al., 2025; Paulose et al., 2025). These capabilities are increasingly redefining the landscape of financial technology (FinTech) and entrepreneurship, offering scalable solutions for risk modeling, fraud detection, customer engagement, and personalized financial services.

Across various sectors, businesses have started integrating agentic AI frameworks like SmartGenie CoPilot, enabling autonomous automation in operations from financial analytics to strategic planning (Paulose et al., 2025). Similarly, big data-driven AI models are playing a pivotal role in identifying governance issues within family businesses and enhancing transparency (Dejun et al., 2024). As AI agents grow more proficient, their presence in entrepreneurial ecosystems is becoming indispensable—particularly for startup environments where agility and adaptive learning are key to success (Pasha, 2024).

However, despite these advancements, access to such technologies remains highly uneven. Startups and student entrepreneurs in developing nations, including Indonesia, often lack the resources, infrastructure, and capacity to deploy these advanced tools, creating a significant digital divide (Sudirman, 2025). This reality poses a challenge not just for individual economic success but for broader goals tied to inclusive innovation and sustainable development. The student entrepreneurial ecosystem in Indonesia, including Universitas Syiah Kuala, is brimming with potential (Halim, Fadhil, et al., 2024; Halim, Kesuma, et al., 2024; Mulyany et al., 2022, 2023). Numerous students are actively launching micro-enterprises in sectors ranging from digital products to creative economy services. However, these efforts are constrained by limited exposure to cutting-edge technological paradigms, particularly AI-based automation and analytics tools.

A primary challenge is the gap between educational exposure and real-world entrepreneurial tools (Weng et al., 2022). While students may be familiar with basic digital marketing or financial accounting, they lack structured access to agentic AI applications that can automate business decisions, predict market trends, or offer adaptive customer experiences (Allil, 2024; Aryal, 2021; Vdovichena et al., 2024). Additionally, the entrepreneurial activities tend to operate on manual, intuition-based decision-making rather than data-driven approaches. This problem reflects broader issues of technological literacy, insufficient innovation infrastructure, and a lack of mentorship regarding ethical and adaptive AI adoption in small-scale ventures (Hulugh & Ikeh, 2025).

This situation directly aligns with several Sustainable Development Goals (SDGs), particularly: SDG 4: Quality Education – Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities. SDG 8: Decent Work and Economic Growth – Promoting sustained, inclusive and sustainable economic growth, full and productive employment. SDG 9: Industry, Innovation, and Infrastructure – Building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation. By enabling entrepreneurial students to access and utilize agentic AI frameworks, community service can contribute to closing digital divides and enhancing the socio-technological resilience of young innovators.

The current body of literature emphasizes a transformative shift in the FinTech ecosystem due to agentic AI (Acharya et al., 2025; Bollineni, 2025; Paleti, 2024). Theoretical

frameworks such as agency theory and digital transformation theory are frequently used to analyze how AI impacts financial decision-making, reduces agency costs, and improves corporate governance (Jiang et al., 2024; Zhong & Song, 2025).

Studies on AI-based enterprise risk management indicate that AI algorithms effectively reduce uncertainty in high-risk business environments and improve strategic agility—especially for startups operating with limited capital (Jiang et al., 2024). Moreover, AI adoption in green innovation has demonstrated how machine learning can support decision-making in constrained environments, fostering sustainability (Zhong & Song, 2025). These findings suggest that agentic AI is not merely a supportive tool, but a strategic enabler for micro-entrepreneurs seeking sustainability and scalability.

From a community service perspective, previous initiatives involving AI workshops often focused on basic digital skills or algorithm training (Azis & Safitri, 2024; Mulawarman et al., 2025; Rahman & Kusmayanti, 2024). However, few have explicitly addressed agentic AI within a practical FinTech and entrepreneurship framework. In addition, based on previous community service articles, it shows an increase in partner knowledge after training was conducted by the university in the context of community service (Halim, Hanidah, et al., 2024; Halim, Novindra, et al., 2024; Hanidah et al., 2024; Hibatullah et al., 2021; Majid et al., 2021; Rivani et al., 2024; Riyaldi, Halim, Firdaus, et al., 2024; Riyaldi, Halim, Nurdin, et al., 2024; Riyaldi, Syahrizal, et al., 2024; Sari et al., 2024; Yusrizal et al., 2024). The current program distinguishes itself by combining: (1) Exposure to smart agent-based systems for personalized business decision-making; (2) Interactive workshops linking theory with the real needs of student entrepreneurs; (3) Mentorship from an academic practitioner actively researching agentic AI applications. This convergence of pedagogy and real-world tools represents a novel framework for community engagement in higher education.

Despite the growing awareness of AI in education, there is a critical delay in translating these technologies into student-run enterprises. Many entrepreneurial students lack access not just to AI systems, but to localized examples and hands-on practice that demonstrate how agentic AI can enhance their business processes—from automating invoice generation to tailoring product recommendations.

This implementation gap is significant, especially when compared with student-led ventures in developed economies that routinely integrate AI for logistics, finance, and customer analytics. Moreover, the ethical dimension of AI is often missing in public discourse, leaving student entrepreneurs unaware of challenges such as algorithmic bias, data privacy, and system accountability. The situation demands a localized, action-oriented, and interdisciplinary intervention that merges ethical literacy, entrepreneurial practice, and technological skills.

This community service program represents a novel intervention by integrating agentic AI training directly into entrepreneurship development workshops. Uniquely structured in collaboration with multiple academic and innovation units—including Unit Kegiatan Financial Technology Universitas Syiah Kuala, Fakultas Rekayasa Industri Telkom University, Pusat Riset Komunikasi Pemasaran, Pariwisata, dan Ekonomi Kreatif Universitas Syiah Kuala, Inkubator Kewirausahaan Universitas Syiah Kuala, and Program Studi Ekonomi Islam Fakultas Ekonomi dan Bisnis Universitas Syiah Kuala—the program introduces real-world AI applications using contextual business simulations, live demos of agentic decision-making systems, and ethical AI frameworks.

Unlike general digital literacy efforts, this workshop goes beyond awareness-raising and aims to empower student entrepreneurs to deploy agentic AI tools immediately in their ventures. These include AI-driven chatbots, predictive sales models, and market segmentation algorithms, integrated within a user-friendly and ethically guided framework.

The speaker, Muharman Lubis, B.IT., M.IT., Ph.D.IT., brings cutting-edge insights as Chairman of Magister Sistem Informasi, Fakultas Rekayasa Industri, Telkom University, providing both theoretical depth and applied guidance.

The primary objective of this activity is to strengthen the technological literacy and entrepreneurial capacity of students through applied exposure to agentic AI tools. Specifically, the initiative aims to: (1) Improve students' understanding of agentic AI principles relevant to their business models; (2) Provide hands-on training in using AI applications for financial forecasting, customer service automation, and digital branding; (3) Develop a community of ethically conscious student entrepreneurs capable of leveraging AI for inclusive innovation.

The article documents and analyzes the design, implementation, and impact of the workshop as a model of integrated AI-based community service in higher education. It aims to contribute to the academic discourse by: (1) Advancing scientific and technological understanding of how agentic AI can be adapted to small-scale entrepreneurial contexts within developing nations; (2) Supporting the achievement of SDGs, particularly those focused on education, economic development, and digital equity. By presenting this article, the authors hope to inspire further community-driven models that merge AI literacy, entrepreneurship education, and sustainability goals—transforming students not just into business owners, but into digitally empowered change-makers.

2. Methods

This community service activity targeted 100 entrepreneurial students from Universitas Syiah Kuala, each of whom was actively engaged in building and managing early-stage business initiatives. These students represented various sectors, such as creative industries, digital services, halal food, and education-based entrepreneurship. Many of them operated within the university's entrepreneurial ecosystem, such as student cooperatives or startup incubators. Their strong motivation to adopt technological innovation in business made them an ideal demographic for the introduction of agentic artificial intelligence (AI) as a solution to digital transformation challenges in micro and small enterprises. Participants were not passive beneficiaries; they were actively engaged in the pre-assessment, core workshop activities, and post-event reflections, ensuring the co-creation of knowledge and practical applications.

Several institutional collaborators supported the implementation of this service. The keynote speaker was Muharman Lubis, B.IT., M.IT., Ph.D.IT., an expert in digital transformation and intelligent systems, currently serving as the Chairman of Magister Sistem Informasi, Fakultas Rekayasa Industri, Telkom University. In addition to the resource person, a team of facilitators from Universitas Syiah Kuala—comprising lecturers from Program Studi Ekonomi Islam Fakultas Ekonomi dan Bisnis Universitas Syiah Kuala, Pusat Riset Komunikasi Pemasaran, Pariwisata, dan Ekonomi Kreatif Universitas Syiah Kuala, Inkubator Kewirausahaan Universitas Syiah Kuala, and Unit Kegiatan Financial Technology Universitas Syiah Kuala—acted as co-moderators and facilitators. A dedicated team from the university's Entrepreneurship Incubator also contributed by assisting students in practical follow-up sessions. In total, around 12 stakeholders were involved: 1 keynote speaker, 5 academic facilitators, 3 business incubator

mentors, and 3 technical/administrative staff who handled Zoom coordination, breakout rooms, and documentation.

The implementation method adopted in this activity followed the Service Learning approach (Agus Afandi et al., 2022). This pedagogical model integrates community-based engagement with academic learning, allowing participants to reflect critically and apply conceptual knowledge to real-world problems. The implementation stages began with a pre-event needs assessment, wherein students completed an online questionnaire that mapped their digital literacy, business needs, and expectations for AI adoption. This was followed by collaborative content preparation, where facilitators developed learning materials including interactive case studies, simulation templates, and a participant module that introduced agentic AI concepts in business contexts.

The main workshop was conducted virtually on February 20, 2025, from 09.00 to 12.00 WIB via Zoom. The session opened with an orientation on the relevance of AI technology in achieving Sustainable Development Goals (SDGs), followed by the keynote lecture that explored agentic AI in entrepreneurial finance. The workshop proceeded with interactive demonstrations where students engaged in guided group work using AI business simulation templates. A facilitated breakout discussion allowed participants to draft problem-solving scenarios involving AI applications in their ventures. In the final stage, each student submitted a reflective action plan on how they would apply the insights from the workshop to enhance their business models, followed by an opportunity to access one-on-one mentoring with the university's incubation team.

The primary scientific and technological innovation introduced in this workshop was the concept and application of agentic artificial intelligence. Unlike traditional AI systems that rely on pre-set algorithms, agentic AI systems are characterized by autonomy, contextual intelligence, adaptability, and the ability to perform continuous goal-oriented interaction. The workshop exposed students to real-world use cases such as personalized financial behavior analytics, AI-based chatbots for micro-businesses, customer journey prediction, and real-time inventory monitoring. The technology was intentionally presented through low-code and no-code platforms so that students with minimal technical backgrounds could still experiment and innovate using AI tools in their enterprises.

To support the successful execution of this activity, several tools and instruments were utilized. These included instructional slide decks, a detailed participant module, and an AI Business Design Template used during the group simulation. Zoom's features, including breakout rooms, chat logs, and polling, were optimized to maintain active engagement. Pre- and post-workshop surveys were administered via Google Forms to collect quantitative data on learning gains and participant satisfaction. The workshop also utilized reflective mini-essays and scenario planning documents as qualitative tools for evaluating knowledge application.

Data collection during the activity employed both quantitative and qualitative techniques. The pre-workshop survey gathered baseline data on participants' understanding of AI, their business status, and their expectations. Post-event surveys measured changes in knowledge, perceived usefulness of the workshop, and levels of engagement. Qualitative data were collected through observation notes by facilitators, reflective essays submitted by students, and chat interactions during the session. This multi-method approach allowed for triangulation of data, ensuring a comprehensive understanding of the workshop's outcomes.

The indicators of success in this community service activity were defined through a combination of output and outcome measures. First, attendance was considered successful if at least 90 out of 100 registered participants completed the full session. Second, improvement in AI-related literacy was assessed through the difference in pre- and post-test scores. Third, the quality and feasibility of business ideas generated during the workshop served as an indicator of applied learning. Fourth, participant satisfaction was measured via a Likert-scale survey, with success defined as $\geq 85\%$ of participants rating the experience as “satisfactory” or above. Finally, follow-up engagement was measured by the number of students expressing interest in further mentoring. For data analysis, descriptive statistics were applied to survey responses to evaluate changes in participants’ knowledge and satisfaction levels. Frequency distributions, means, and standard deviations were used to summarize participant feedback. Qualitative data from reflective essays and facilitator notes were analyzed using thematic content analysis to identify recurring insights and practical applications of agentic AI. Zoom interaction logs (e.g., polls, Q&A activity, chat transcripts) were reviewed to assess engagement and concept uptake in real time.

Through this structured and collaborative implementation strategy, the workshop successfully combined theoretical concepts with practical application, enabling student entrepreneurs to explore innovative ways to harness AI in their business development processes. The use of Service Learning as the guiding method ensured that the intervention was both academically grounded and community-responsive.

3. Result and Discussion

In the community service activity titled *"Workshop on the Emergence of Agentic AI in Financial Technology and Entrepreneurship Development"*, the keynote speaker, Muharman Lubis, B.IT., M.IT., Ph.D.IT., highlighted how *Agentic Artificial Intelligence (AI)* is revolutionizing the domains of financial technology (fintech) and digital entrepreneurship (Figure 1). Agentic AI refers to a form of artificial intelligence that not only executes static commands but also demonstrates autonomous decision-making capabilities, contextual learning from historical data, and proactive strategy execution. In fintech applications, this technology plays a pivotal role in real-time investment analysis, automated monitoring of blockchain-based smart contracts, and the generation of financial reports using natural language processing and generative AI tools.



Figure 1. Presentation by Muharman Lubis, B.IT., M.IT., Ph.D.IT.

This implementation is supported by flexible, modular technology architectures such as those developed by Microsoft via Azure AI Studio. These infrastructures include high-security systems, decentralized data storage for financial transactions, and sandboxing environments to ensure safe AI code execution. With such foundations, Agentic AI enables hyper-personalized financial services based on user behavior and anomaly detection, opening substantial opportunities for young entrepreneurs to harness the power of advanced technologies in their ventures.

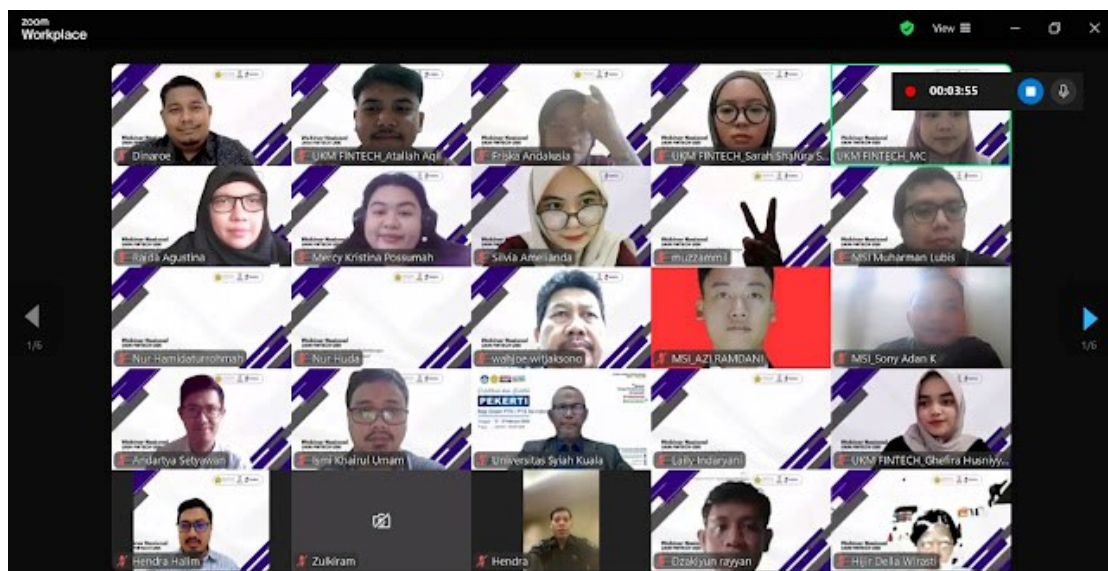


Figure 2. Workshop participant documentation

This workshop was attended by 100 students from Syiah Kuala University who are actively involved in entrepreneurial initiatives (Figure 2) (Figure 3). Using a *service-learning* approach, the participants were not passive listeners but were encouraged to engage in active discussion and reflect on the application of Agentic AI technologies within their individual

business contexts. Observational data and group discussions indicated a notable increase in participants' understanding of Agentic AI concepts, fintech mechanisms, and the integration of blockchain in entrepreneurship. The following Table 1 summarizes the indicators measured before and after the activity.

Table 1. Improvement indicators before and after the activity

Indicator	Before the Activity	After the Activity
Understanding of Agentic AI concepts	23%	91%
Knowledge of fintech-blockchain integration	30%	85%
Awareness of business automation potential	34%	88%
Interest in adopting AI in business	41%	93%

Source: Primary Data, Processed (2025)

The significant improvement in all indicators illustrates the effectiveness of this program in bridging the technological literacy gap—a major challenge faced by student entrepreneurs today. It also aligns with the objectives of SDG 8 (*Decent Work and Economic Growth*) and SDG 9 (*Industry, Innovation, and Infrastructure*).

These findings are consistent with prior research indicating that digital literacy programs and the introduction of innovative technologies can significantly enhance digital readiness among young entrepreneurs (Hasan et al., 2024; Mirhabibi et al., 2025; Mohamad et al., 2025; Neumeyer et al., 2020). Numerous studies have emphasized that AI and blockchain form the technological backbone of modern digital financial systems, offering efficiency, transparency, and resilience against data manipulation (Aakula et al., 2024; George, 2023; Martinez et al., 2024; Rane et al., 2023).

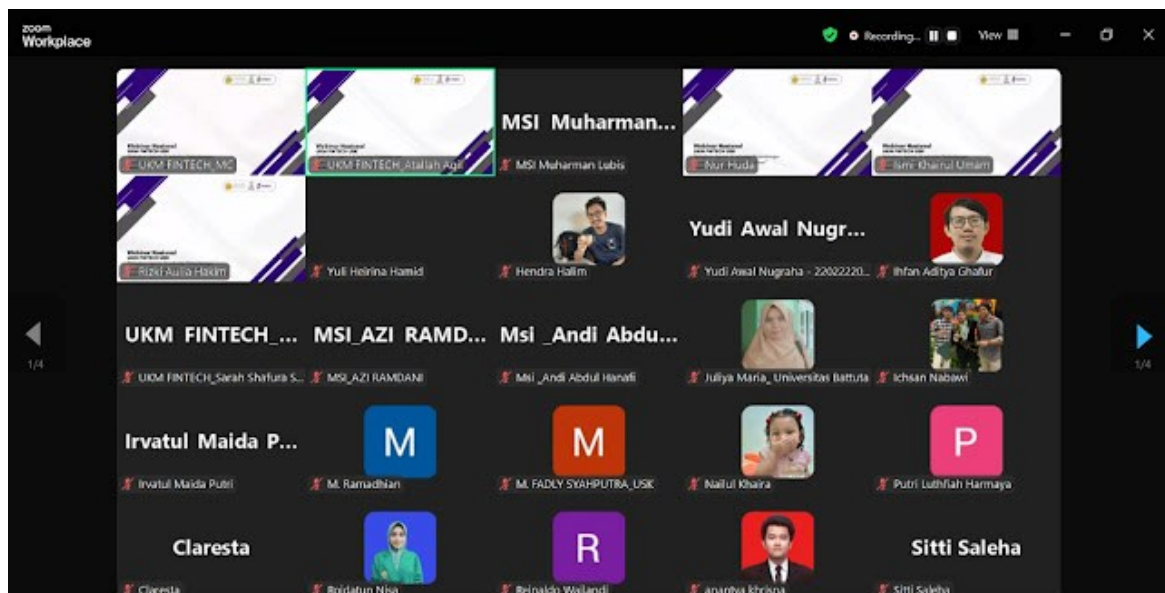


Figure 3. Workshop participant documentation

Theoretically, Agentic AI combines machine learning, automated reasoning, and personalized decision-making—evolving beyond traditional AI models (Russell & Norvig, 2016). Within the context of community service, this workshop represents one of the first initiatives to introduce the Agentic AI paradigm to student entrepreneurs in Indonesia.

Unlike general digital literacy programs, this initiative focused on practical applications such as automated financial reporting, risk analysis, and digital contract validation. As such, it can serve as a *best practice* model for other community service programs in higher education institutions.

Despite its success, the program encountered several challenges:

1. Internet Connectivity – Some participants experienced unstable connections during the Zoom-based session, which disrupted interactive engagement.
2. Knowledge Gaps – A portion of the students lacked foundational knowledge of AI and blockchain, requiring more time for basic conceptual explanation.
3. Technology Readiness – Although interest in adoption was high, many students did not yet possess the digital infrastructure necessary to implement AI in their businesses.

These limitations are not due to the inadequacy of program planning but reflect broader systemic issues affecting student entrepreneurs, as also highlighted in the Rupeika-Apoga et al. (2022) findings on digital readiness among SMEs.

This initiative contributes directly to several Sustainable Development Goals:

- SDG 8 (Decent Work and Economic Growth): Through the promotion of automation and AI-based efficiency in student-run enterprises.
- SDG 9 (Industry, Innovation, and Infrastructure): By encouraging the use of frontier technologies in campus-based entrepreneurship.
- SDG 4 (Quality Education): By delivering technology literacy through a participatory service-learning methodology.

From an academic standpoint, the activity strengthens the foundation for future research on the application of Agentic AI in digital entrepreneurship and fills a critical gap in community engagement practices involving cutting-edge technologies.

4. Conclusion

This community service initiative successfully achieved its objective of empowering the pesantren community—particularly students and educators—with practical skills in sustainable organic waste management and biotechnological transformation. Through a series of hands-on training sessions, participants were not only able to produce eco-enzyme (EE) but also process it into value-added products, specifically eco-friendly dishwashing soap. Quantitatively, the program resulted in the fermentation of approximately 100 kg of organic waste into 342.5 liters of EE, which was subsequently utilized in the production of EE-based dishwashing liquid. The outcomes of this activity highlight the significant potential of pesantren as agents of change in promoting community-based sustainability practices.

This initiative demonstrates the active role of Islamic educational institutions in advancing environmental literacy and green entrepreneurship, particularly in rural areas. The program also contributes to the achievement of several Sustainable Development Goals (SDGs), including SDG 6 (Clean Water and Sanitation) through the use of non-toxic cleaning agents; SDG 12 (Responsible Consumption and Production) by reducing and repurposing organic waste; SDG 13 (Climate Action) by mitigating greenhouse gas emissions through proper waste management; and SDG 15 (Life on Land) by utilizing fermentation residues as organic liquid

fertilizer. Looking ahead, similar programs may be further developed by improving product quality, such as incorporating natural fragrances to enhance user acceptance, conducting continuous product testing, and expanding distribution channels to maximize the community's economic impact.

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