

Islamic Ethics in Student-Led Stingless Beekeeping

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ABSTRACT

This paper presents a faith-integrated, student-led stingless beekeeping initiative at the International Islamic University Malaysia (IIUM), illustrating how Islamic ethical principles can enrich sustainability education and entrepreneurship. Conducted under the Mahallah Ruqayyah Representatives Committee (MRC) with guidance from interdisciplinary mentors, the project has been successfully sustained for six years (2019-present), providing students with experiential learning in hive management, product innovation, and ethical entrepreneurship. Core Islamic values, ihsan (excellence), amanah (moral responsibility), barakah (multiplication of goodness), and khalifah (environmental stewardship) were embedded throughout the learning process. Data triangulated from project documentation, reflective journals, and mentor evaluations indicated that 85% (n = 34) of participants affirmed the project's effectiveness in linking scientific knowledge with Islamic ethics. Mentor feedback identified five key challenges: inconsistent student motivation (M = 4.1), lack of technical competency (M = 4.0), and environmental variability (M = 3.8) were rated as the most significant, while limited training time (M = 3.0) and communication gaps (M = 2.6) were of moderate concern. Despite these constraints, the initiative demonstrated that integrating Qur'anic principles into experiential learning fosters holistic character development, sustainability awareness, and ethical entrepreneurship among students.

Keywords: Ethical entrepreneurship, experiential learning, Islamic ethics, stingless beekeeping, student-led

1. INTRODUCTION

Stingless beekeeping (*meliponiculture*) plays a vital role in sustaining biodiversity and enhancing pollination services, both of which are foundational to resilient ecosystems and agricultural productivity. In recent years, the practice has gained renewed interest for its ecological and socio-economic value, particularly in tropical regions [1,2]. Within the Malaysia educational landscape, academic and research institutions have initiated numerous stingless beekeeping projects related to biodiversity and sustainability; however, these efforts frequently remain siloed within disciplinary boundaries, limiting their educational and community impact [3].

Lacking in structured platforms that foster interdisciplinary collaboration among students, educators, and practitioners in the field of stingless beekeeping. This limitation reduces opportunities for experiential learning, innovation, and the cultivation of entrepreneurial mindsets. Furthermore, academic programs in Malaysia have yet to systematically document initiatives that holistically integrate Islamic knowledge, particularly Quranic and Hadith studies, with scientific disciplines such as engineering, biomedical, and agricultural sciences in the context of stingless beekeeping. Advancing such integration could lead to educational approaches that are both scientifically rigorous and grounded in Islamic ethical principles, thereby enriching the agricultural sector with faith-informed principles [4-5].

This paper presents the experience of a student-led initiative under the Mahallah Ruqayyah Representatives Committee (MRC) at International Islamic University Malaysia (IIUM) that successfully integrates stingless beekeeping into campus life through interdisciplinary collaboration, student engagement and capacity building, entrepreneurship and innovation, and the integration of Islamic values.

2. LITERATURE REVIEW

Stingless beekeeping has gained global recognition for its diverse benefits in enhancing biodiversity, strengthening food security, and supporting rural livelihoods, with studies extensively addressing its technical, ecological, and commercial dimensions, including hive design, honey quality, and market potential [1-2,6-7]. Within an interdisciplinary framework, stingless beekeeping transcends its agricultural role to serve as a platform for holistic education and ethical innovation [8-9], aligning with UNESCO's [10] emphasis on education grounded in local values and community participation and Al-Attas' [11] perspectives on Islamic environmental ethics and human stewardship.

Although there is a growing discourse on faith-based sustainability frameworks, the integration of Islamic epistemology, particularly concepts such as *khalifah* (stewardship), *amanah* (trust), and *ihsan* (excellence), into experiential learning and entrepreneurship education remains underdeveloped [4-5,11]. Previous research has emphasized the importance of combining *Naqli* (revealed) and *Aqli* (rational) knowledge to foster a holistic worldview and value-based learning environment [12]. In this context, the Qur'anic references [13] to bees in *Surah An-Nahl* (16:68-69) provide rich metaphors for order, cooperation, and healing, offering a natural foundation for integrating ecological science with Islamic ethical education.

وَأَوْحَىٰ رَبُّكَ إِلَى النَّعْلِ أَنِ اتَّخِذِي مِنَ الْجِبَالِ بُيُوتًا وَمِنَ الشَّجَرِ وَمِمَّا يَعْرِشُونَ

And your Lord inspired the bees: "Make your homes in the mountains, the trees, and in what people construct",

ثُمَّ كُلِي مِن كُلِّ الثَّمَرَاتِ فَاسْلُكِي سُبُلَ رَبِّكِ ذُلُلًا يَخْرُجُ مِنْ بُطُونِهَا شَرَابٌ مُّخْتَلِفٌ أَلْوَانُهُ فِيهِ شِفَاءٌ لِلنَّاسِ إِنَّ فِي ذَلِكَ لَآيَةً لِّقَوْمٍ يَتَفَكَّرُونَ

And feed from the flower of any fruit you please and follow the ways your Lord has made easy for you. "From their bellies comes forth liquid of varying colours, in which there is healing for people. Surely, this is a sign for those who reflect".

Surah An-Nahl (68-69)

Despite these philosophical and scriptural foundations, there remains a lack of empirical models demonstrating how Islamic principles can be operationalized through interdisciplinary, student-led sustainability projects such as stingless beekeeping. Addressing this gap, the present study explores the Mahallah Ruqayyah stingless beekeeping initiative at IIUM as a faith-driven, experiential educational model that integrates sustainability, innovation, and ethical entrepreneurship.

3. METHODOLOGY

3.1 Research Design

This study employs a mixed-methods approach, combining qualitative and quantitative techniques to examine how interdisciplinary collaboration, faith-based values, and entrepreneurial thinking are integrated within the stingless beekeeping initiative led by the MRC at IIUM [14-15].

3.2 Data Collection

Documentation from the MRC and the Kelulut Research Group was analysed to compile data on project milestones, activities, achievements, and challenges. To evaluate outcomes from the learners' perspective, reflective journals were collected from 40 MRC members, focusing on four key dimensions: interdisciplinary learning, integration of Islamic ethical values, technical competence, and entrepreneurial readiness. Complementing this, mentors' feedback was obtained through a Likert-scale survey, in which they ranked five major challenges encountered throughout the project's implementation period (2019–2025).

4. RESULTS AND DISCUSSION

4.1 Faith-driven Experiential Learning

The project timeline in Figure 1 demonstrates a structured progression beginning with the signing of a Memorandum of Understanding (MoU) in 2019 between the MRC as the project implementer and the Kelulut Research Group as the mentor. Despite the disruption caused by the Movement Control Order in 2020, the initiative quickly regained momentum, attracting educational tourism visits and invitations to share best practices in stingless beekeeping with local communities. Subsequent milestones included institutional recognition through the hosting of World Bee Day celebrations in 2022 and 2024, and entrepreneurial innovation marked by the development of skincare products in 2023. From 2024 onwards, the project has continued to receive steady edu-tourism visits from industries, schools, government agencies, and universities, demonstrating its sustained educational, social, and economic relevance.

This trajectory illustrates how an experiential, faith-based initiative can evolve into a living educational laboratory, cultivating student competencies in interdisciplinary collaboration, ethical leadership, and enterprise within a real-world sustainability context [9,16]. Specifically, the initiative's integration of Islamic ethical concepts such as *khalifah* (stewardship) and *amanah* (trustworthiness) with hands-on beekeeping and product development supports the emerging discourse on faith-based sustainability education, which advocates for the infusion of spiritual and moral values into scientific and entrepreneurial practice [11, 17].



Figure 1. Stingless Beekeeping Project Milestone at Mahallah Ruqayyah.

The timeline from 2019 to present day reflects the project’s sustained growth from its establishment and early experimentation to a mature, interdisciplinary collaboration that integrates student engagement and capacity building, entrepreneurship and innovation, and Islamic values in campus-based sustainability practice.

4.2 Integration of Islamic Values in Practice

Table 1 illustrates the five guided questions used in the post-project survey administered to 40 participating MRC members during their respective tenures, designed to assess faith integration, technical confidence, and entrepreneurial readiness. Notably, 92.5% (n=37) agreed that hands-on learning enhanced their learning experience, and 90% (n=36) felt that the mentoring technique was effective in supporting their growth as student entrepreneurs. Furthermore, 85% (n=34) of respondents reported that the project helped them to connect scientific practice with Islamic values.

The integration of Islamic values into the stingless beekeeping project was intentionally embedded at every stage, aligning with IIUM’s mission of Islamisation of knowledge [4-5]. From project inception, students were introduced to the concept of *khalifah* as the theological basis for environmental stewardship. Throughout the implementation of the project, students were introduced to Quranic references such as Surah An-Nahl (16:68-69) [13], which guided project themes and informed ethical choices. Consistently, activities ranging from hive management, honey harvesting, bottling, packaging, to skincare product development, sales and community awareness programmes were linked to core *Islamic* values, such as *ihsan* (highest standard), *amanah* (moral responsibility), and *barakah* (multiplication of goodness). These principles helped students to internalise entrepreneurship not just as profit-seeking, but as an ethical obligation (*fard kifayah*) with communal benefit, as highlighted in previous studies, the importance of integrating Islamic spirituality in science and innovation education [11-12].

Table 1 Post-Project Survey on Student-Led Stingless Beekeeping at Mahallah Ruqayyah (2019-2025)

Questions	Agree/ Strongly Agree (%)	Frequency (n=40)	Mean Score	SD*
Q1: Did the project help you connect scientific knowledge with Islamic values?	85.0	34	0.85	0.36
Q2: Did you feel confident applying technical skills (e.g., hive design, honey testing) despite a lack of technical experience?	77.5	31	0.78	0.41
Q3: Did the mentoring support your growth as a student entrepreneur?	90.0	36	0.90	0.30
Q4: Do you feel more prepared to contribute to ethical entrepreneurship in the future?	87.5	35	0.88	0.32
Q5: Was engaging directly with the beekeeping project enhance your learning experience?	92.5	37	0.92	0.27

SD*: Standard Deviation

The bar chart in Figure 2 illustrating the mean scores and standard deviations across the five key reflection items reveals a consistently strong level of student engagement and perceived benefit from the stingless beekeeping initiative rooted in Islamic values and entrepreneurial practice.

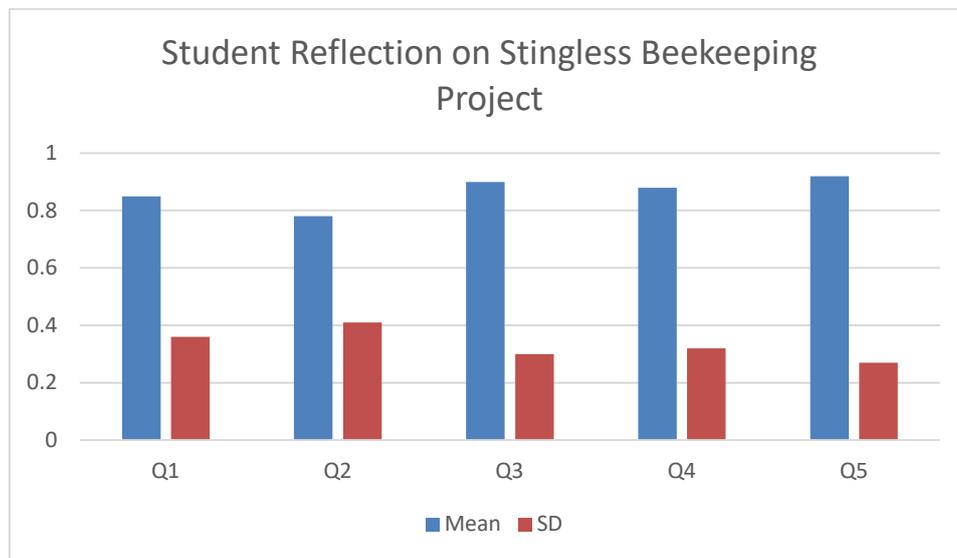


Figure 2. Student reflection on stingless beekeeping project.

Overall mean scores are high, ranging from 0.78 to 0.92 on a scale from 0 to 1, indicating that most students strongly agreed with the reflective statements. The highest mean (0.92) was for Q5, showing overwhelming agreement that hands-on participation in the beekeeping project enriched learning, highlighting the power of experiential education. Q2 had the lowest mean (0.78), suggesting that while most students felt confident in technical skills, some lacked prior exposure or training. Standard Deviations (SDs) are relatively low (0.27 to 0.41), indicating a strong level of agreement among respondents with only slight variation.

These findings reflect the project's success in aligning scientific activity with Islamic ethics, supporting the view that incorporating moral and religious elements strengthens student motivation and engagement, especially in values-based education [5]. Experiential learning environments that integrate theory and practice have also been shown to foster deeper learning and student satisfaction [4]. Moreover, the mentoring approach adopted in this study reflects the principles of Naqli-Aqli integration [12]. The evidence presented supports the broader argument that field-based, faith-integrated education has the potential to transform abstract ethical principles into actionable practices [3-4, 8].

4.3 Knowledge Transfer and Learning Impact

The success of the stingless beekeeping initiative at IIUM was strongly supported by a structured knowledge transfer process that connected academic expertise, technical guidance, and student participation. The collaboration between the Kelulut Research Group as the mentor and the Mahallah Ruqayyah Representatives Committee (MRC) as the implementer facilitated a dynamic two-way exchange of knowledge, combining scientific understanding of meliponiculture with ethical and practical student-led application. According to Nonaka and Takeuchi's [18] knowledge creation model, effective learning occurs through the continuous conversion of tacit and explicit knowledge. This was evident in how students learned tacit hive management skills through observation and practice, later transforming them into explicit knowledge shared with peers during training and edu-tourism activities.

The process was further enhanced by experiential and collaborative learning mechanisms, aligning with Kolb's [19] experiential learning theory, which emphasizes active experimentation and reflection. Students were encouraged to document their experiences, discuss challenges, and propose product innovations, transforming knowledge into creative outputs such as stingless bee-based skincare products. This practical engagement not only improved technical competency but also deepened ethical awareness, reflecting the integration of *ihsan* (excellence) and *amanah* (responsibility) in their work [10-11].

The initiative's success can be attributed to several factors: (i) consistent mentorship from interdisciplinary experts, (ii) a faith-driven framework that provided moral motivation and collective purpose, and (iii) sustained institutional support that enabled continuity despite external challenges such as the COVID-19 lockdown. Previous studies affirm that faith-based learning environments enhance motivation, ethical conduct, and social cohesion, which are essential to successful community and entrepreneurship-based projects [4-5]



Figure 4. Knowledge transfer in stingless beekeeping at Mahallah Ruqayyah IIUM.

The knowledge transfer process in the IIUM stingless beekeeping initiative followed a cyclical model of mentorship → experiential learning → reflection → dissemination → innovation → institutionalization, integrating Islamic values (*ihsan*, *amanah*, *khalifah*) with experiential and collaborative learning principles. This model demonstrates how faith-based experiential learning fosters sustainable knowledge creation and long-term project continuity [10-11, 18-19].

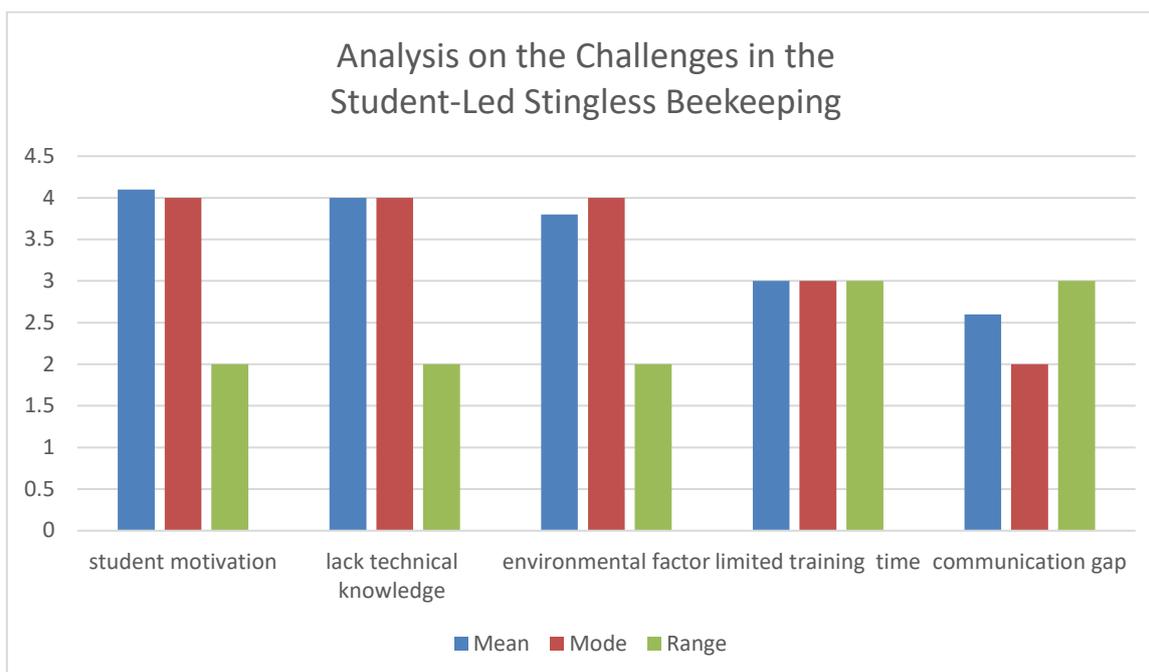
4.4 Challenges and Lessons Learned

The mentors ranked all five challenges listed in Table 2 using a Likert scale ranging from 5 (Very High) to 1 (Very Low). The data reveal that student motivation and technical knowledge gap were perceived as the most significant challenges, each rated “High” or “Very High” by 75% of mentors, with mean scores of 4.1 and 4.0, respectively, indicating consistent concern across respondents. The mode of 4 for both reinforces their prominence as recurring issues. Environmental factors followed closely, also showing a high mean (3.8), suggesting the project’s reliance on outdoor conditions posed practical hurdles. In contrast, time constraints and communication issues received lower concern levels, reflected by lower mean scores (3.0 and 2.6) and the largest range (3), pointing to more diverse perceptions among mentors. Overall, the narrow range in top challenges indicates a shared recognition of critical barriers, particularly in sustaining engagement and building technical confidence, areas that align with existing literature on experiential learning in interdisciplinary community projects [3,9,16].

Table 2 Challenges in the Interdisciplinary Approach to Stingless Beekeeping Led by MRC

Challenges	Very High/High (%)	Mean	Mode	Range
Student Motivation Variance	75%	4.1	4	2
Technical Knowledge Gaps	75%	4.0	4	2
Weather and Environmental Factors	63%	3.8	4	2
Limited Time for Training	38%	3.0	3	3
Communication Gaps	25%	2.6	2	3

The challenges to retaining student motivation were caused by the annual turnover of MRC leadership, which affected project continuity. While structured handovers were in place, varying levels of prior knowledge and commitment among new committee members posed difficulties in maintaining consistent hive care and product marketing. As a key lesson learned, the implementation of biannual refresher training by mentors, along with the continued involvement of the Mahallah Principal as a stable institutional anchor, proved vital in sustaining institutional memory and skill retention across cohorts. Previous studies have similarly reported the importance of capacity-building and leadership continuity in sustaining grassroots initiatives within higher education settings [3,9,17].



The majority of MRC members came from non-scientific academic backgrounds and initially demonstrated low confidence in performing technical tasks such as log maintenance, honey harvesting, and preparation of stingless bee-based skincare products. The lesson learned was the importance of conducting biannual refresher trainings facilitated by Kelulut Research Group, and incorporating hands-on workshops into broader events, such as World Bee Day celebrations. These activities contributed to enhancing students' practical literacy in meliponiculture among the wider student body, not just MRC members, fostering greater volunteer engagement and interdisciplinary learning within the campus community.

5. CONCLUSION

This initiative successfully fostered interdisciplinary collaboration among students, educators, and practitioners, advancing both scientific knowledge and ethical awareness in stingless beekeeping. The project delivered positive educational outcomes, including increased technical confidence, entrepreneurial creativity, and a meaningful integration of Islamic values into practical scientific learning. The initiative has been successfully sustained for over five years through consistent mentorship, reflective learning, and community engagement. Moving forward, strengthening institutional support and establishing structured training modules are essential to address key challenges such as variability in student motivation, gaps in technical knowledge, and environmental unpredictability. These efforts will ensure sustained mentoring, adaptive teaching practices, and the development of climate-resilient strategies for long-term project continuity and educational impact. The experience showcases a replicable educational model that is holistic and ethically grounded, with potential to empower students and enhance sustainability-focused curricula.

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