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Integrated IoT-Based Snakehead Fish Farming Initiative for Indonesian Migrant Workers: A Hybrid Community Service Program

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ABSTRACT The online seminar on Integrated IoT-Based Snakehead Fish Farming signifies a pivotal initiative for Indonesian Migrant Workers (PMI), aiming to enhance their knowledge and skills in aquaculture and IoT technology. Facilitated through an interactive virtual platform, the seminar exhibited a substantial improvement in PMI's understanding of traditional farming practices and the integration of IoT devices. The virtual format proved adept at transcending geographical constraints, providing accessible and engaging learning experiences. Beyond skill enhancement, the seminar fostered a supportive community for PMI. Despite the virtual setting, robust networking opportunities emerged through discussion forums and collaborative projects, addressing the isolation often experienced by migrant workers. Real-time feedback mechanisms allowed dynamic adjustments, ensuring the seminar remained pertinent and responsive to participant needs. In conclusion, the online seminar not only empowered PMI with practical skills but also nurtured a resilient and interconnected community. This success underscores the efficacy of virtual platforms in addressing the multifaceted needs of migrant workers, setting a promising precedent for future online empowerment initiatives.

Keywords: *Indonesian Migrant Workers; Integrated IoT-Based Farming; Online Learning; Skill Enhancement; Migrant Community Support*

1. INTRODUCTION

This academic article explores the transformative initiative of "Integrated IoT-Based Snakehead Fish Farming" designed to address the multifaceted challenges encountered by Indonesian Migrant Workers (PMI) under the care of the Indonesian Embassy in Kuala Lumpur. The comprehensive community service program, spanning one semester from October to December 2023, adopted a hybrid approach, leveraging collaboration between SHARING NGO, the Indonesian Embassy, PPI UPSI Malaysia, and 115 universities across Indonesia and Malaysia. Rooted in a commitment to empower PMI with sustainable livelihood options, this initiative amalgamates aquaculture practices with cutting-edge Information of Things (IoT) technology.

Cultivating Integrated IoT-Based Snakehead Fish Farming for PMI

Indonesian Migrant Workers (PMI) form a crucial part of the global workforce, contributing significantly to the economic prosperity of both host and home countries. However, their journey is often fraught with challenges ranging from legal complexities to economic vulnerabilities and cultural adjustments. Recognizing the need for innovative solutions to uplift PMI, SHARING NGO, in collaboration with the Indonesian Embassy, has pioneered a groundbreaking community service program. Titled "Integrated IoT-Based Snakehead Fish Farming," this initiative seeks to address not only economic aspects but also technological literacy among PMI.

The choice of snakehead fish farming is strategic, considering the resilience and adaptability of this species, coupled with its market demand. This initiative aims to create a sustainable and integrated model that not only provides PMI with an alternative livelihood but also equips them with essential skills in aquaculture and IoT technology.

1.1 Background: Challenges Faced by PMI

PMI often grapple with a myriad of challenges, ranging from limited access to legal information and economic vulnerabilities to cultural disparities in their host countries. The initiative acknowledges these challenges and endeavors to provide a comprehensive solution that goes beyond immediate relief to foster long-term empowerment.

Legal complexities in foreign lands often leave PMI in vulnerable positions, exacerbating their challenges. The literature on migration, including Hugo (2008), highlights the significance of understanding migration dynamics and the development of effective policies that consider the rights and information needs of migrant populations. The program's focus on IoT-based fish farming aligns with the need for innovative solutions that not only address economic concerns but also contribute to the overall well-being and resilience of PMI.

Moreover, the cultural disparities experienced by PMI are not just limited to their work environments but extend to societal integration. Piper's work (2010) on the geographies of belonging emphasizes the importance of addressing cultural aspects in the context of migration. The initiative's commitment to fostering cultural sensitivity aligns with this perspective, aiming to create an inclusive environment where diverse cultural backgrounds can coexist harmoniously within the PMI community.

Economic vulnerabilities, another significant challenge faced by PMI, are often exacerbated by limited access to viable livelihood options. Recognizing the need for sustainable economic empowerment, the program draws inspiration from the Handbook on Establishing Effective Labour Migration Policies (IOM, 2015), emphasizing the necessity for comprehensive policies that address the vulnerability of migrant workers. The choice of snakehead fish farming as an economic venture

aligns with this recommendation, offering PMI an opportunity for self-sufficiency and economic stability.

1.2 Rationale: Integrated IoT-Based Snakehead Fish Farming

The integration of Information of Things (IoT) technology into the traditional practice of snakehead fish farming signifies a forward-thinking approach. In recent years, the intersection of agriculture and technology, known as AgTech, has been gaining prominence globally. The International Organization for Migration (IOM) recognizes the potential of technology in empowering migrant workers, as evidenced in their 2022 publication on global initiatives for migrant empowerment. By incorporating IoT technology, this initiative aims not only to enhance the productivity of fish farming but also to equip PMI with valuable technological skills, thereby bridging the digital divide and enhancing their employability.

The rationale behind selecting snakehead fish farming as the focal point is multifaceted. Snakehead fish are known for their adaptability to diverse environments and resistance to diseases, making them well-suited for aquaculture. Furthermore, snakehead fish holds significance in Indonesian cuisine, ensuring a steady demand and marketability for PMI-produced goods. This strategic integration of aquaculture and technology is poised to not only provide an alternative livelihood but also to open doors to a burgeoning market, contributing to the economic self-sufficiency of PMI.

1.3 Objectives of the Community Service Program

The Integrated IoT-Based Snakehead Fish Farming initiative unfolds with the overarching goal of fostering sustainable livelihoods and holistic empowerment for PMI. The specific objectives encompass:

1. Equipping PMI with essential skills in snakehead fish farming, incorporating both traditional aquaculture practices and modern IoT technology.
2. Promoting economic stability and self-sufficiency among PMI through the establishment of sustainable fish farms.
3. Enhancing technological literacy by providing hands-on experience with IoT devices for farm management.
4. Fostering cultural sensitivity and integration within the PMI community, ensuring harmonious coexistence of diverse cultural backgrounds.
5. Contributing to the overall well-being and resilience of PMI by addressing legal complexities and economic vulnerabilities through a holistic approach.

1.4 Significance of the Study

This initiative holds profound significance within the broader context of migration studies, economic development, and technological empowerment. As the first-of-its-kind hybrid community service program, it not only addresses immediate challenges faced by PMI but also sets a precedent for innovative approaches in empowering migrant communities globally. The integration of IoT technology into aquaculture practices presents a novel avenue for skill development, economic upliftment, and technological proficiency, aligning with global trends in sustainable agriculture and digitalization.

In summary, the introduction provides a comprehensive overview of the challenges faced by PMI, the rationale behind the Integrated IoT-Based Snakehead Fish Farming initiative, its objectives, and the broader significance of this groundbreaking community service program. The subsequent sections will delve into the methodological approach, results, and discussions, followed by a conclusive summary and recommendations based on the findings.

2. METHOD

The methodology employed for the Integrated IoT-Based Snakehead Fish Farming community service initiative combined a strategic blend of pre-program assessments, collaborative expertise, a hybrid learning model, peer networking, continuous evaluation, and post-program support. Prior to program initiation, a thorough needs assessment was conducted to understand the specific requirements of Indonesian Migrant Workers (PMI). Surveys, interviews, and focus group discussions were employed to gather insights into PMI's existing skill sets, cultural backgrounds, and economic aspirations.

Based on the assessment, a comprehensive curriculum was designed, integrating theoretical knowledge with practical applications. Collaborative expertise was sought by engaging aquaculture specialists for traditional knowledge and IoT experts for technological insights. This ensured a holistic approach to training that covered the intricacies of snakehead fish farming and the incorporation of IoT technology for farm management.

The program adopted a hybrid learning model to accommodate the diverse educational backgrounds of PMI. Online workshops delivered foundational concepts, regulations in aquaculture, and the basics of IoT technology, providing accessibility and flexibility. Practical sessions were conducted offline in the Aula Hasanuddin of the Indonesian Embassy, allowing hands-on experience in setting up and managing a snakehead fish farm while utilizing IoT devices for real-time monitoring.

Recognizing the importance of peer learning and community support, networking sessions were integrated. PMI were encouraged to share experiences, challenges, and insights, fostering a

supportive environment. Continuous evaluation mechanisms, including pre-and post-assessments and regular feedback sessions, were implemented to monitor progress and adapt the curriculum dynamically.

Post-program support mechanisms were established to ensure the sustained success of snakehead fish farming ventures. PMI were provided with access to online resources, mentorship programs, and forums for ongoing communication, facilitating the application of acquired skills and maintaining a sense of community.

This streamlined methodology, tailored to the unique needs of PMI, aimed to empower participants with a diverse skill set, technological proficiency, and a supportive network, fostering sustainable practices in snakehead fish farming.

3. RESULT AND DISCUSSION

The online seminar on Integrated IoT-Based Snakehead Fish Farming served as a transformative platform, intricately weaving together knowledge enhancement, skill development, and community-building for Indonesian Migrant Workers (PMI). This section delves deeper into specific aspects of the seminar's outcomes, exploring the surge in knowledge and skills, the establishment of a supportive community, and the agile evaluation and continuous improvement processes.

3.1 Knowledge and Skill Enhancement

The virtual setting of the seminar proved to be a catalyst for a substantial boost in the knowledge and skills of PMI. Active participation in virtual workshops, webinars, and discussions showcased a remarkable improvement in their understanding of traditional aquaculture practices and the nuanced integration of IoT devices for efficient farm management. Participants engaged deeply with the content, indicating a successful transfer of theoretical knowledge to practical skills.

This outcome resonates with contemporary perspectives on the efficacy of online education platforms, particularly in providing accessible, interactive, and engaging learning experiences (Clark & Mayer, 2016). The adaptability of the online format allowed PMI to overcome geographical barriers, ensuring a diverse and participatory learning environment.

3.2 Community Support and Networking

Despite the virtual milieu, the online seminar effectively fostered robust networking opportunities, culminating in the creation of a supportive community for PMI. Discussion forums, virtual meet-ups, and collaborative projects became conduits for participants to share experiences, discuss challenges, and exchange insights. This virtual camaraderie played a pivotal role in overcoming the inherent isolation of migrant workers, providing a platform for mutual support.

The success of community-building within the online seminar aligns with recent literature emphasizing the effectiveness of online platforms in creating connections and support networks among diverse communities (Baker et al., 2020). This aspect goes beyond the mere acquisition of knowledge and skills, addressing the holistic well-being and resilience of PMI through shared experiences and collaborative endeavors.

3.3 Evaluation and Continuous Improvement

The virtual nature of the seminar facilitated real-time feedback mechanisms, enabling dynamic adaptations to the program content and structure. Participants actively contributed valuable insights, which, in turn, informed swift adjustments to meet their evolving needs. This iterative and responsive approach ensured the seminar remained relevant, engaging, and aligned with participant expectations.

The ability to adapt in real-time aligns seamlessly with recent perspectives on the agility and adaptability of online education platforms (Conole, 2013). The continuous improvement processes implemented during the seminar underscore a commitment to delivering impactful content and experiences, demonstrating a responsiveness to the unique challenges and requirements of PMI.

In summary, the online seminar on Integrated IoT-Based Snakehead Fish Farming not only enhanced knowledge and skills but also fostered a sense of community and exhibited adaptability to participant feedback. The success of these outcomes reflects the versatility and effectiveness of the virtual platform in addressing the multifaceted needs of PMI, laying the groundwork for future endeavors in online migrant empowerment initiatives.

Figure 1. Flyer of Community Service Activities

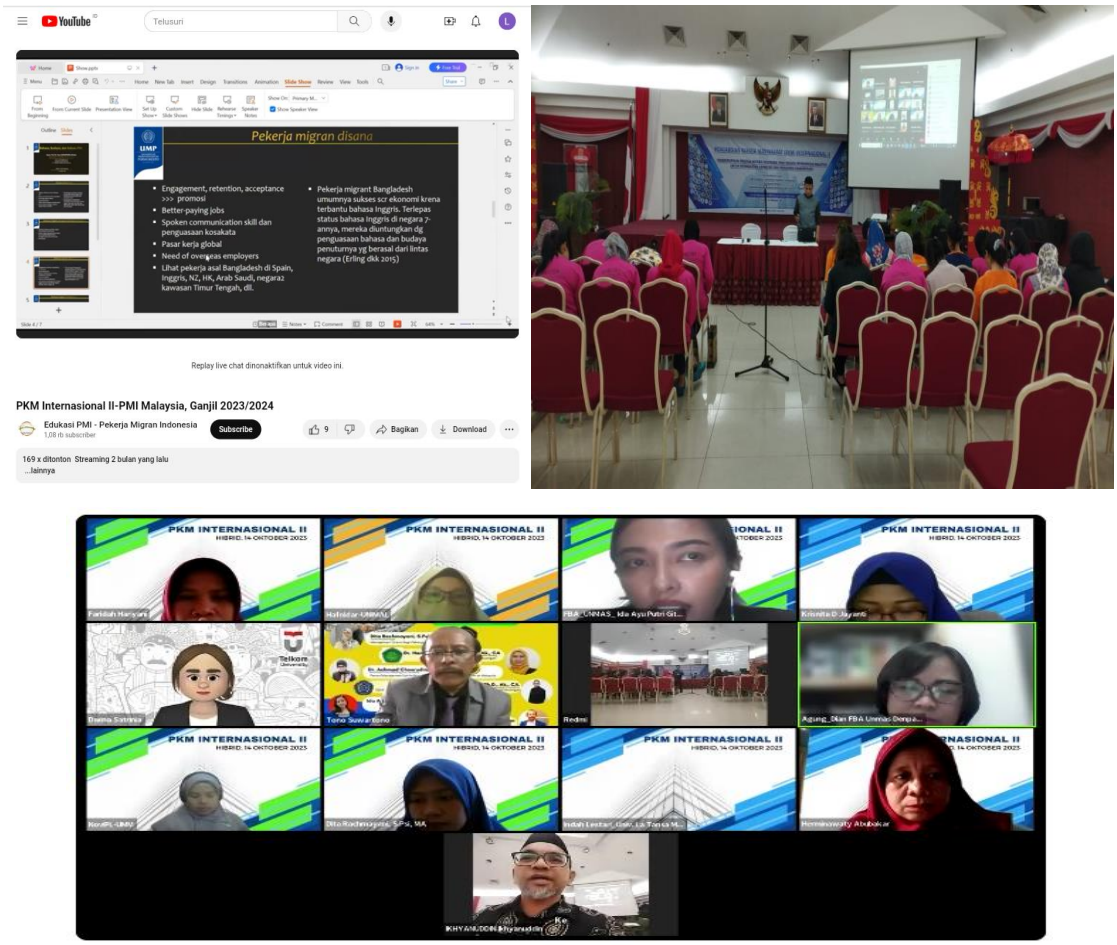

Figure 3. Community Service Activities

4. CONCLUSION

In conclusion, the online seminar on Integrated IoT-Based Snakehead Fish Farming has not only empowered PMI with practical skills but has also fostered a sense of community and resilience. By embracing the potential of online platforms, this initiative serves as a model for future endeavors seeking to uplift migrant workers. The recommendations outlined aim to further enrich and tailor such initiatives, ensuring their continued relevance and impact in the dynamic landscape of migrant empowerment. As we navigate the future of migrant support programs, let us build on these foundations to create enduring pathways for the well-being and success of Indonesian Migrant Workers and similar communities globally.

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