International Journal of Engagement and Empowerment
p-ISSN: 2798-0154 | e-ISSN: 2798-0146
Vol. 5, No. 2, August 2025
https://doi.org/10.53067/ije2.v5i2

DIGITAL AND APPROPRIATE TECHNOLOGY-BASED WOMEN'S ECONOMIC EMPOWERMENT: COLLABORATIVE COMMUNITY ENGAGEMENT OF UNIBA KKM STUDENTS WITH WOMEN COMMUNITIES IN DALUNG VILLAGE

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Abstract
Digital transformation and the application of appropriate technology are pivotal in supporting women's economic empowerment, particularly among household-based micro, small, and medium enterprises (MSMEs). This community engagement program, conducted by the KKM Group 03 students of Universitas Bina Bangsa (UNIBA) in Dalung Village, Serang City, combined two key initiatives: (1) Socialization of MSME Digitalization for members of the Darussalam Women's Religious Study Group, and (2) Introduction of Appropriate Technology (AT) for the Red Chili Women Farmer Group (KWT). The program aimed to enhance digital literacy among women entrepreneurs, introduce social media-based marketing strategies, and promote simple innovations such as gravity-fed automatic irrigation tools and eco-enzyme production. The outcomes indicated improved understanding, skills, and enthusiasm among participants in utilizing technology to support their businesses and household farming activities. This program serves as a multidisciplinary collaborative model for community empowerment, replicable in similar contexts.
Keywords: MSME Digitalization, Appropriate Technology, Women Empowerment, Eco-Enzyme, Community Service, UNIBA KKM

INTRODUCTION

Household-based Micro, Small, and Medium Enterprises (MSMEs) play a vital role in sustaining local economies, particularly as a source of supplementary income for women. Women entrepreneurs running micro-scale home businesses often face significant challenges, especially in utilizing digital technologies to expand their market reach and enhance product competitiveness. This has become a major issue in the current digital era where technology is a key driver of business growth.

Meanwhile, women farmer groups (Kelompok Wanita Tani or KWT) who cultivate small plots of land also face complex problems, particularly regarding labor efficiency and organic waste management. Limited resources and small-scale farming often restrict their productivity in meeting family food needs and local market demands. Therefore, simple and easy-to-apply solutions are urgently needed to address these challenges.

Appropriate Technology (AT) that is affordable, simple, and easy to operate emerges as a promising alternative to improve labor efficiency and productivity among women farmers. The application of AT can help optimize organic waste management into valuable resources while supporting household food security. Such technological innovations are expected to create sustainable positive impacts.

Recognizing these issues, Group 03 of the KKM students from Universitas Bina Bangsa initiated a collaborative community service program. This program focuses on two main areas:

economic empowerment through MSME digitalization and the implementation of environmentally friendly AT innovations for women farmer groups. This dual approach aims to comprehensively address community challenges and empower local potentials.

In implementation, this activity not only aims to transfer knowledge and skills related to digital technology and AT but also to build capacity and motivation among micro-entrepreneur women and farmer groups. This is crucial for enabling them to independently manage their businesses and optimize available resources, thereby ensuring business sustainability and family welfare.

With this background, the community service is expected to make a tangible contribution to improving the quality of life for the women in the Ulu Lapao-Pao village. Through MSME digital empowerment and the application of appropriate technology, the community is better equipped to face the challenges of the digital era while preserving environmental sustainability and household food security.

LITERAURE REVIEW

Women's Economic Empowerment through Digital Technology

Women's economic empowerment involves enhancing their ability to access economic resources and optimize their business potential. In the digital era, information and communication technology (ICT) plays a crucial role in expanding market access and improving the competitiveness of women-led MSMEs (Kabeer, 2016). According to Heeks, Foster, and Nugroho (2019), MSME digitalization enables micro-entrepreneurs to reach broader customers and enhance marketing efficiency at relatively low costs. Moreover, the use of social media as a promotional platform can increase brand awareness and build customer loyalty (Kapoor et al., 2021). However, challenges such as limited digital literacy and access to technology must be addressed to ensure effective digital empowerment (World Bank, 2020).

Appropriate Technology Supporting Food Security and Agricultural Productivity for Women Farmers

Appropriate Technology (AT) refers to innovations tailored to local needs that are affordable, easy to operate, and environmentally friendly (Danish & Ul Hassan, 2019). Applying AT in women farmer groups can improve labor efficiency, reduce physical workload, and boost household agricultural productivity (FAO, 2018). Examples include simple automatic irrigation tools and organic liquid fertilizers such as eco-enzyme produced from household waste, which help increase crop yields and reduce waste (Smith & Thompson, 2020). This technological approach not only promotes environmental sustainability but also strengthens local food security and the welfare of women managing farming activities (UN Women, 2019).

Figure 1 Implementation of all activities

METHODS AND PROCEDURES

Location and Period

The community service program was conducted in Dalung Village, Cipocok Jaya Subdistrict, Serang City, Indonesia, during the period from July to August 2025. The program comprised two main activities:

1. MSME Digitalization Socialization
2. Appropriate Technology Introduction for Women Farmer Groups (KWT)

Participants

The program engaged the following participants:

1. Twenty-five members of the Darussalam Women's Religious Study Group, who are active in household-scale MSMEs producing eggplant and cassava chips.
2. Twenty members of the Red Chili Women Farmer Group (KWT) of Dalung Village.

Implementation Team

The implementation team consisted of:

- KKM Group 03 students from Universitas Bina Bangsa (UNIBA)
- A Field Supervising Lecturer (Dosen Pembimbing Lapangan / DPL)
- Community partners: Darussalam Women's Religious Study Group and Red Chili KWT

Activity Stages

A. MSME Digitalization Socialization

1. Conducting a needs assessment and identifying the challenges faced by MSME actors in digitalizing their business.

2. Introducing participants to various social media platforms and online marketplaces that can serve as digital storefronts.
3. Providing training on digital marketing strategies, including product photography, caption writing, and branding techniques.
4. Facilitating hands-on practice by guiding participants in creating business accounts and uploading products online.
5. Offering consultation and ongoing mentoring to support the setup and optimization of digital storefronts.

B. Appropriate Technology (AT) Socialization for Women Farmer Groups (KWT)

1. Educating participants about the concept of Appropriate Technology (AT) with specific adaptation to the needs of the KWT.
2. Delivering practical training on the construction and operation of gravity-fed automatic irrigation tools suitable for small-scale farming.
3. Conducting workshops on eco-enzyme production using household organic waste as raw material.
4. Demonstrating the application of irrigation tools on the KWT's farming plots and the use of eco-enzymes as a natural liquid fertilizer.
5. Monitoring the use of introduced technologies and evaluating their impact on the efficiency and productivity of farming activities.

RESULTS OF ACTIVITIES AND DISCUSSION

Empowering MSME Digitalization for Darussalam Women's Religious Study Group

The digitalization workshop conducted for the Darussalam Women's Religious Study Group yielded promising results in enhancing participants' understanding and capabilities in utilizing digital platforms for marketing their MSME products. Before this training, most members primarily depended on traditional sales channels such as face-to-face selling and word-of-mouth within their immediate social circles. This limitation restricted the growth potential and market reach of their businesses.

Following the workshop, participants gained valuable insights into how popular digital platforms, including Instagram and WhatsApp Business, can serve as effective virtual storefronts to showcase their products. Through demonstrations and interactive sessions, they learned to navigate these platforms confidently, understanding essential features that facilitate product visibility and customer engagement.

One notable outcome was the improvement in promotional content quality through simple photography techniques. Training emphasized the use of natural lighting and basic composition principles, enabling participants to create visually appealing images without needing expensive

equipment or professional skills. This practical skill immediately enhanced the attractiveness of product posts, making them more likely to capture potential buyers' attention.

The hands-on segment allowed participants to create actual business accounts and upload their products online. Many successfully established digital profiles under personalized branding efforts, such as "Mak Yati's Eggplant Chips," a local brand identity that fosters a sense of ownership and pride. This branding initiative not only helped differentiate their products but also reinforced the cultural and community values associated with their offerings.

Throughout the program, participants demonstrated growing enthusiasm and confidence to independently manage their digital marketing activities. Several expressed intentions to expand their digital presence further by exploring additional social media tools and engaging with wider networks. The mentorship and consultation sessions played a critical role in sustaining motivation and addressing technical challenges, ensuring that participants felt supported beyond the initial training phase.

Appropriate Technology Innovations for Red Chili KWT

The socialization of Appropriate Technology (AT) for the Red Chili Women Farmer Group (KWT) introduced practical, low-cost solutions tailored to the group's agricultural needs. The program focused on empowering participants to apply innovations that could directly enhance farming productivity and efficiency while being environmentally sustainable.

A primary highlight was the successful assembly and installation of gravity-fed automatic irrigation tools. Using recycled plastic bottles and small hoses, KWT members constructed irrigation systems that significantly reduced the time and physical effort required for manual watering. This technology ensured a more consistent and efficient watering schedule, which is critical for optimal crop growth. The accessibility and simplicity of this irrigation system encourage its adoption, especially for farmers managing limited land and labor resources.

The eco-enzyme production workshop was another impactful component of the program. Participants were guided in transforming common household organic waste such as vegetable scraps, fruit peels, and palm sugar into a potent eco-enzyme solution. This organic liquid fertilizer not only enhances soil fertility but also addresses the pressing issue of organic waste management in the community. The positive reception of this workshop reflected participants' awareness of sustainable farming practices and their willingness to adopt eco-friendly innovations.

The practical application of these technologies on KWT farming plots yielded encouraging results. The consistent use of automatic irrigation helped maintain soil moisture more effectively, while the eco-enzyme application improved soil quality, resulting in healthier plants and potentially higher yields. Moreover, the integration of waste management with agricultural input production

demonstrated a circular economy approach at the household level, promoting resource efficiency and environmental stewardship.

Efficiency and Sustainability Impact

The combined introduction of digital marketing for MSMEs and appropriate agricultural technologies for KWT members contributed to multiple efficiency gains. For MSMEs, digitalization opened new market opportunities and enhanced product visibility, which are essential for business sustainability and growth. For farmers, the reduced labor intensity and improved soil management supported better productivity and resource utilization.

Additionally, the program succeeded in raising participant awareness regarding the broader benefits of technology adoption, including environmental conservation and waste reduction. This holistic understanding fosters a mindset that values innovation not only for economic benefits but also for ecological and community well-being.

In conclusion, the community service activities effectively empowered both MSME entrepreneurs and women farmer groups by equipping them with relevant digital and technological skills. These interventions hold promise for long-term positive impacts on local economic resilience, environmental sustainability, and the empowerment of women as key agents of change in their communities.

DISCUSSION

The community engagement program demonstrated that combining digital literacy enhancement with the introduction of appropriate technology can substantially empower women in both entrepreneurial and agricultural contexts.

The digitalization of MSMEs enabled participants to extend their market reach beyond conventional boundaries, aligning with global trends in micro-entrepreneurship digital transformation (Wulandari & Prasetyo, 2022). Additionally, the implementation of simple AT tools directly addressed labor efficiency and sustainable farming practices, which are often overlooked in small-scale agriculture (Wahyuni & Santosa, 2022).

The active involvement of KKM students as facilitators and mentors was a critical success factor. Their role extended beyond delivering knowledge to fostering participant confidence and ensuring the practical applicability of introduced technologies. This hands-on approach aligns with participatory development models that emphasize co-creation and community agency.

Furthermore, the program highlights the importance of integrating eco-friendly practices into community empowerment initiatives, not only to enhance productivity but also to nurture environmental awareness among rural households.

CONCLUSION

The community service program implemented by KKM Group 03 of Universitas Bina Bangsa focused on MSME digitalization and the application of appropriate technology to empower women micro-entrepreneurs and farmer groups. This initiative successfully enhanced participants' capacity to overcome digital challenges in marketing and to improve efficiency in household-level farming activities.

Through a participatory and action-oriented approach, the program ensured active engagement of women in learning and applying new skills. The MSME digitalization component broadened participants' understanding of using social media and online marketplaces, enabling them to create digital storefronts, improve product presentation, and initiate local branding efforts. Meanwhile, the appropriate technology segment introduced practical tools such as gravity-fed irrigation systems and eco-enzyme production, which helped reduce labor intensity, improve soil fertility, and promote sustainable waste management.

The collaboration between students, lecturers, and community groups facilitated knowledge exchange and ongoing support, contributing to the program's relevance and potential sustainability. This empowerment model is adaptable and scalable, offering a viable framework for replication in other communities facing similar economic and environmental challenges. By tailoring interventions to local contexts, future programs can further enhance women's entrepreneurial and agricultural productivity, ultimately fostering stronger, self-reliant communities.

ACKNOWLEDGEMENTS

The authors extend their sincere gratitude to the Darussalam Women's Religious Study Group and the Red Chili KWT of Dalung for their active participation, the KKM Group 03 students for their dedication and creativity, and the Field Supervising Lecturer for the invaluable guidance provided throughout the program.

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