

Optimizing Smart Villages through National KKN-PMM Collaboration: Community Empowerment in Kapanewon Patuk, Gunungkidul

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Abstract

The Community Service Program (Kuliah Kerja Nyata/KKN) is an implementation of the Tri Dharma of Higher Education in the field of community engagement. This article reports the implementation of the 2026 Period II National KKN-PMM collaboration between Warmadewa University and Gadjah Mada University in Kalurahan Patuk and Kalurahan Bunder, Kapanewon Patuk, Gunungkidul Regency, Special Region of Yogyakarta. The program was conducted for six weeks, from 20 June to 9 August 2026, under the theme "Optimizing Smart Villages to Promote Community Self-Reliance through Global Innovation." The implementation methods comprised observation, interviews, program formulation, activity implementation, monitoring, and evaluation. The work programs were grouped into thematic and non-thematic programs covering economic empowerment, education, digital literacy, environmental management, health, and livestock development. The implementation results indicate improved community understanding and skills in MSME financial management, digital marketing, plastic-waste utilization, children's literacy, digital legal awareness, and livestock-group capacity. Cross-institutional and interdisciplinary collaboration served as a catalyst for knowledge transfer and the application of appropriate technology to strengthen rural community self-reliance.

Keywords: Collaborative KKN, Smart Village, Community Self-Reliance, Global Innovation, Community Empowerment

Article History

Received: 2026-07-13

Revised: 2026-08-15

Accepted: 2026-09-07

Vol 3 Issue 3 2026

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Page: 75 - 81

INTRODUCTION

The Community Service Program (Kuliah Kerja Nyata/KKN) represents a tangible implementation of the Tri Dharma of Higher Education, particularly in the field of community engagement. Through this program, students move beyond theoretical classroom learning and engage directly with social realities. Such experiences cultivate students' sensitivity in identifying community conditions, listening to residents' aspirations, and jointly seeking appropriate solutions to local problems. In this period, the KKN program gained additional value through collaboration with students from Gadjah Mada University (UGM). Bringing together students from two higher education institutions created a combination of academic perspectives, cultural diversity, and a spirit of mutual cooperation that enriched the community-assistance approach (Kim et al., 2019).

This collaborative KKN program was organized around the theme "Optimizing Smart Villages to Promote Community Self-Reliance through Global Innovation." The smart village concept does not simply refer to installing sophisticated technology in rural areas; rather, it concerns how communities and local governments can use new ways of thinking, open information, and accessible technologies to facilitate everyday life (Salazar, 2012). Global innovation, meanwhile, refers to the selective adoption of good practices from broader contexts, such as digital marketing for MSMEs, systematic recording of village potential, and clean and sustainable environmental conservation practices (Romanelli et al., 2021).

The community-service area was located in Kapanewon Patuk, Gunungkidul Regency, Special Region of Yogyakarta, covering four principal padukuhan: Gluntung and Ngandong in Kalurahan Patuk, and Kemuning and Bunder in Kalurahan Bunder. The area is characterized by fertile landscapes, hilly terrain, agricultural and plantation resources, and the well-known Wanagama forest conservation area.

Community life is strongly shaped by close social relations and the enduring tradition of mutual cooperation (Seyfi et al., 2023).

Despite its considerable potential, preliminary field observations identified several areas requiring collaborative assistance. These included uneven use of information technology and digital media among micro, small, and medium enterprises (MSMEs), the need to strengthen systems for recording local potential and padukuhan administrative services, and unequal access to educational facilities and support for school-age children. Awareness of household waste sorting and management also required improvement, alongside the need for family-health education and continuous monitoring of child growth and development (Dangelico et al., 2017).

Accordingly, the collaborative KKN program was positioned as a facilitator and community partner rather than as an external actor seeking to change local arrangements unilaterally (Ludwig & Sassen, 2022). The synergy between students' academic knowledge and local wisdom provided the basis for formulating practical smart-village work programs. The initiative was expected to establish a foundation for sustainable development in Gluntung, Ngandong, Kemuning, and Bunder, supporting community self-reliance that is adaptive to modern innovation while retaining local cultural roots.

The smart village concept integrates the use of information and communication technology with the development of local potential. It extends beyond technological infrastructure by emphasizing community empowerment so that local resources can be managed independently, innovatively, and sustainably (Kusumastuti et al., 2024). In this context, smart villages encompass interconnected economic, social, educational, health, and environmental dimensions (Sara et al., 2020).

KKN is a university-based community-engagement program undertaken as part of the Tri Dharma of Higher Education. It is designed to provide students with direct learning experiences in identifying, analyzing, and addressing real-world problems. Through KKN, students not only apply knowledge acquired in university but also strengthen their abilities to cooperate, adapt, and collaborate across disciplines (Safari et al., 2023).

The collaboration between Warmadewa University and Gadjah Mada University in implementing the National KKN-PMM represents an academic synergy that enriches the community-engagement approach. The combination of disciplinary backgrounds, cultures, and working methods from two institutions enables broader knowledge transfer for both students and communities (Sara et al., 2021). The collaboration also provides students with opportunities to work in diverse teams, strengthen communication skills, and expand professional networks (Sancaya & Saputra, 2024).

Community empowerment based on local potential emphasizes the identification and optimization of resources owned by local communities. This approach positions communities as development actors rather than objects, making programs more relevant, applicable, and sustainable. In the context of KKN in Kapanewon Patuk, local potential includes agriculture, plantations, MSMEs, tourism, and the strong social capital of mutual cooperation (Altassan, 2023).

METHODS

The National KKN-PMM collaboration between Warmadewa University and Gadjah Mada University employed a participatory and collaborative approach. Students did not act as parties instructing the community, but as facilitators and partners working alongside residents. The implementation methods comprised the following stages:

- 1) Observation and Situation Analysis: This stage identified the geographic and demographic conditions, local potential, and problems in Kalurahan Patuk and Bunder. Observation was conducted through direct site visits and interviews with kalurahan officials, community leaders, and MSME actors.
- 2) Coordination and Interviews: Coordination was conducted with kalurahan officials, community leaders, MSME actors, and community groups to identify residents' actual needs and aspirations. The results served as a basis for formulating targeted work programs.

- 3) Work-Program Formulation: Based on the collected data, the work programs were grouped into thematic programs aligned with the main KKN theme and non-thematic programs supporting broader community needs. The thematic programs covered economic strengthening, digital technology utilization, education, environmental management, health, and livestock development, whereas the non-thematic programs addressed community needs outside the primary thematic focus.
- 4) Program Implementation: Programs were delivered through workshops, socialization sessions, practical training, direct mentoring, digital-content production, and the provision of facilities. Implementation involved KKN students, residents, village officials, schools, MSME actors, and relevant community groups.
- 5) Monitoring and Evaluation: Monitoring and evaluation were conducted to ensure that programs proceeded as planned and generated sustainable benefits. Follow-up activities included continued mentoring, completion of financial-reporting tables, and joint evaluation with relevant stakeholders.

RESULT AND DISCUSSION

The implementation of KKN-PMM in Kapanewon Patuk generated a range of programs with direct community benefits. The programs were organized into several major areas:

Economic Strengthening and MSME Digitalization. The MSME sector was one of the main focuses of the KKN program. The "Smart Village Finance" program was held on Tuesday, 14 July 2026, at Pendopo Ismaya, Kalurahan Patuk Office, under the theme "Strengthening MSME Financial Reporting toward an Independent Village." The activity involved 20 MSME actors from Kalurahan Patuk and featured a lecturer from the Faculty of Economics and Business, Warmadewa University, as the resource person. The materials covered the importance of business financial records, preparation of simple financial statements, separation of personal and business finances, and practical financial-report preparation (Ferwati et al., 2021). The activity improved participants' understanding of orderly and systematic financial management. Participants not only received theoretical material but also practiced simple financial recording based on the conditions of their respective businesses. As a follow-up, KKN students provided mentoring through monitoring and completion of participants' financial-reporting tables (Saputra et al., 2024).

To broaden market reach, the "KLIK-DESA: One Click, a Million Potentials" program was implemented through visits to MSMEs in Gluntung, Ngandong, Kemuning, and Bunder. The KKN team conducted interviews, gathered product information, and produced photo and video documentation. The materials were subsequently developed into promotional content published through the Warmadewa University KKN Instagram and TikTok accounts as well as the MSMEs' own social-media channels. Several MSMEs also received banners as additional promotional media. The program was intended to encourage MSME actors to continue using digital media independently for marketing and to strengthen business competitiveness (Kirimtat et al., 2020).

Education, Literacy, and Legal Awareness. In education, the "Smart English Village" program was conducted on 20-21 July 2026 at SD Negeri Patuk 2 and SD Negeri 1 Bunder. The program targeted elementary-school students and covered basic vocabulary, greetings, and introductions. Learning was delivered interactively through direct practice, ice-breaking activities, and educational games, providing students with opportunities to learn and use English in an enjoyable environment (Bhuiyan et al., 2022).

The program results showed that students participated enthusiastically and became more active during the learning process. Games and direct practice helped them understand basic vocabulary and expressions. The activity also created opportunities for students to speak more confidently and strengthen their self-confidence in using English.

To promote reading interest, the "Reading Corner" program was established at the neighborhood security post (Pos Kamling) in RT 11, Ngandong. KKN students provided bookshelves, reading tables, and other supporting facilities. Book collections were obtained through cooperation with a library,

enabling residents to use the facility as a space for reading, discussion, and social interaction. The program was expected to strengthen literacy culture while optimizing the function of the Pos Kamling as a useful public space.

Awareness of digital ethics was promoted through the "Cyber Law 101: Think Before You Click" program, conducted on Friday, 17 July 2026, at SMAN 1 Patuk. The activity targeted Grade XII students as active social-media users. Materials included an introduction to Indonesia's Electronic Information and Transactions Law (UU ITE), social-media ethics, cyberbullying, misinformation, and online fraud or phishing. The activity was delivered interactively through presentations, case studies, discussion, and question-and-answer sessions (Eltweri, 2021).

Implementation results showed strong student enthusiasm. Students actively asked questions and discussed issues related to social-media use. Through the activity, they developed a better understanding of ethical communication in digital spaces and recognized that certain online actions may have legal and social consequences (Ardhana & Puspitasari, 2023; Kelly & Windia, 2019).

Environmental Management and Community Empowerment. Environmental issues received significant attention during the KKN program. The "Eco Craft" initiative converted plastic waste into ecobricks, which were then used as materials for waste bins while supporting garden arrangement in Kalurahan Patuk. The activity provided a practical example of waste management through plastic-waste reuse. Residents, kalurahan officials, and groups involved in environmental-cleanliness activities directly observed how plastic waste could be transformed into materials with practical value (Singh et al., 2020; Yu et al., 2020).

The "Taman Menghias Plastik" program was implemented in Ngandong, Kalurahan Patuk, by involving residents in collecting, processing, and reusing plastic waste as garden decorations. The activity aimed to reduce plastic waste while producing decorative items with practical and aesthetic value. The program resulted in garden ornaments made from used plastic, contributing to environmental beautification while reducing unmanaged waste.

In addition, a socialization program on producing aromatherapy candles from used cooking oil, known as JELITA, was conducted with the Kemuning youth organization. The activity provided residents with new skills for converting household waste into products with economic value. Similar activities were also carried out in Ngandong and Gluntung for the wider community. The outputs included useful and marketable aromatherapy candles as well as increased public understanding of used cooking-oil utilization.

Health and Food Security. In the health sector, the "Healthy Generation Free from Stunting" program provided education to pregnant women, breastfeeding mothers, and mothers of toddlers on adequate nutrition and appropriate parenting. The activity aimed to improve understanding of the risks and early prevention of stunting. Socialization on proper meat handling was also provided to women in Ngandong and Gluntung to strengthen household food safety.

To support food security, socialization on family medicinal plants (TOGA) and planting practices was conducted at SD Negeri 2 Bunder. Grade IV students were introduced to types of herbal plants and practiced planting TOGA seedlings. The activity resulted in herbal seedlings being planted at the school and improved students' understanding of the benefits of natural medicinal plants (Dewi & Saputra, 2026).

Livestock and Livestock-Waste Management. In the livestock sector, the programs "Livestock Group Development through Grooming Socialization" and "Livestock Waste Handling and Biosecurity" were implemented for residents of Bunder who raise cattle and goats. Materials included socialization and practice of eco-enzyme-based grooming for tick prevention and animal hygiene, as well as waste management and livestock-pen biosecurity. The activity increased residents' understanding of the importance of pen hygiene and proper livestock-waste management.

Other Supporting Programs. In addition to the main programs, several supporting initiatives were implemented to address community needs. These programs included:

- 1) "Ronda Ilmu": evening group-learning activities for children.
- 2) "Tutoring with Children at Melati Library": interactive learning assistance for children from kindergarten to junior high school.
- 3) "Calistung Ceria": assistance in reading, writing, and basic arithmetic for kindergarten and elementary-school children.
- 4) "Raih Mimpi: Early Introduction to Future Aspirations": educational activities introducing children to different aspirations and occupations.
- 5) "Healthy Exercise with the Elderly Posyandu": physical-fitness and social activities for older adults.
- 6) "Community Clean-Up with Ngandong Residents": a mutual-cooperation activity to clean the local environment.
- 7) "Inter-RT 8-12 Volleyball Tournament": a sports event designed to strengthen solidarity among young people.
- 8) "Development and Installation of School Safety Signs": production and installation of directional and safety signage in the school area.
- 9) "Optimizing Information on Village Potential through Google Maps": field mapping and updating public-facility points on Google Maps.
- 10) "My Waste, My Responsibility": household-scale education on separating organic and inorganic waste.
- 11) "Simple Household Composter Development": education and practical training on creating composters to reduce organic waste.
- 12) "Algorithm Literacy for Digitally Vulnerable Groups": education on how social-media algorithms operate.
- 13) "Pet Friend Socialization: Learning about Animals while Learning English": interactive learning about pets combined with basic English education.

CONCLUSION

The National KKN-PMM collaboration between Warmadewa University and Gadjah Mada University in Kapanewon Patuk made tangible contributions to the community. The implemented programs addressed several community needs, including MSME capacity strengthening, digital promotion, literacy and education, environmental management, legal awareness, and health.

- 1) The KKN-PMM work programs were formulated on the basis of community conditions and needs and were grouped into thematic and non-thematic programs. The thematic programs covered community economic strengthening, digital technology and literacy, education, environmental management, health, livestock development, and the use of locally available resources, while the non-thematic programs addressed needs beyond the main KKN theme.
- 2) Program implementation involved students together with residents, kalurahan governments, MSME actors, schools, community groups, and other relevant parties. This participation was important because KKN activities focused not only on delivering information but also on practice, mentoring, and the use of facilities that could continue to benefit the community.
- 3) In the economic sector, Smart Village Finance strengthened MSME actors' understanding of business financial recording, simple financial statements, and the separation of personal and business finances. The activity involved 20 MSME actors in Kalurahan Patuk and was followed by mentoring, monitoring, and completion of financial-reporting tables.
- 4) The KLIK-DESA program supported MSME promotion through digital media by visiting MSMEs in Gluntung, Ngandong, Kemuning, and Bunder, collecting product information and visual documentation, and developing promotional content for KKN and MSME social-media channels.
- 5) In education and literacy, Smart English Village at SD Negeri Patuk 2 and SD Negeri 1 Bunder used direct practice, ice-breaking activities, and educational games to improve students' understanding of basic English vocabulary and expressions while strengthening confidence in communication.

- 6) The Reading Corner program, developed on the basis of field observations and community proposals in RT 11 Ngandong, provided bookshelves, reading tables, and supporting facilities at the Pos Kamling, with book collections obtained through library cooperation for reading, discussion, learning, and social interaction.
- 7) In the environmental sector, Eco Craft and Taman Menghias Plastik demonstrated practical plastic-waste reuse. Eco Craft converted plastic waste into ecobricks for waste bins and environmental arrangement, while Taman Menghias Plastik transformed used plastic into garden decorations.
- 8) In legal literacy and digital safety, Cyber Law 101 at SMAN 1 Patuk introduced Grade XII students to the UU ITE, social-media ethics, cyberbullying, misinformation, and phishing through presentations, case studies, discussion, and question-and-answer sessions.
- 9) Overall, the KKN-PMM programs enabled students to apply their knowledge and skills to activities directly related to community needs. The programs strengthened MSME capacity, digital promotion, education and literacy, environmental management, legal awareness, and basic English skills, while also reinforcing interaction and collaboration between students, communities, and relevant stakeholders.

Recommendations. To support program sustainability, the following recommendations are proposed:

- 1) For Kalurahan Governments: Continue using and maintaining facilities developed through the KKN program, particularly the Reading Corner, ecobrick waste bins, and Melati Library garden arrangement. Support should also be continued for MSME strengthening through simple financial recording and digital promotional media introduced during the program.
- 2) For the Community: MSME actors are encouraged to maintain orderly business financial records and continue using digital media to introduce and promote their products. Residents are also encouraged to preserve and use the facilities provided through KKN, particularly the Reading Corner and environmental-cleanliness facilities, and to continue reducing and reusing waste, especially plastic waste, through the simple practices introduced during the program.
- 3) For Future National KKN-PMM Students: Conduct more in-depth observation and needs identification before formulating programs so that activities correspond to community conditions and priorities. Programs that have generated benefits may serve as a basis for follow-up initiatives, while intensive coordination with kalurahan governments, residents, schools, MSME actors, and other stakeholders should be maintained from planning through evaluation to improve program direction and reduce activity overlap.

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