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Empowering Economic Growth in Balongdowo Village, Sidoarjo, East Java: Pioneering a Digital Tourism and Marketing Initiative

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ABSTRACT Balongdowo Village in Sidoarjo Regency, East Java, is the largest producer of Kupang (small clams) and has significant potential for economic advancement through seafood-based micro, small, and medium enterprises (MSMEs). However, limited digital literacy and the absence of an integrated marketing platform have hindered local product promotion beyond the regional level. This community service program aims to empower the village's economic sustainability by introducing digital tourism and marketing innovations. The program specifically focuses on developing a digital marketing ecosystem and establishing a village information system (VIS) portal to promote local products and tourism potential. The implementation method involved two interconnected activities: (1) training and mentoring MSMEs on e-commerce management through platforms such as Shopee and Tokopedia, including digital product photography and online transaction handling; and (2) developing and training local operators to manage the Balongdowo VIS portal using WordPress-based technology. The activities were carried out through focus group discussions (FGDs), workshops, seminars, and hands-on mentoring from May to October 2024. The results demonstrated improved digital competencies among local business owners, the successful creation of online stores for Kupang-based products, and the operational launch of the official Balongdowo Village website. These outcomes have enhanced digital visibility, expanded market access, and improved public service information systems. In conclusion, this initiative effectively promotes Balongdowo's transformation into a self-sufficient digital village model. The integration of digital marketing and village information systems provides a sustainable framework for rural economic empowerment and serves as a replicable model for other potential digital villages across Indonesia.

INDEX TERMS Digital marketing, village information system, e-commerce, community empowerment, rural economic development

I. INTRODUCTION

Balongdowo Village, located in Candi District, Sidoarjo Regency, East Java, is widely recognized as the largest producer of Kupang (small clams) and has a long-standing reputation for its seafood-based micro, small, and medium enterprises (MSMEs). Despite abundant natural and human resources, the economic potential of the village remains underutilized due to limited access to digital technology, inadequate marketing strategies, and the absence of an integrated information system. Most local entrepreneurs continue to rely on traditional sales models that restrict their customer base to local markets, resulting in limited income growth and low competitiveness in the digital economy era [1], [2]. These challenges highlight the urgent need for a structured intervention to foster digital transformation and economic empowerment in rural communities such as Balongdowo.

In the context of national development, Indonesia's government has promoted the "Smart Village" and "Digital Village" initiatives as part of the broader agenda to

accelerate rural digitalization and bridge the urban-rural technological divide [3], [4]. Recent studies emphasize that integrating digital marketing, e-commerce, and information systems in rural development can enhance transparency, improve public services, and support sustainable economic growth [5]–[8]. Digital marketing, in particular, has transformed the way MSMEs operate by enabling producers to reach wider audiences, reduce operational costs, and strengthen brand visibility [9], [10]. Moreover, the adoption of Village Information Systems (VIS) has proven effective in improving data management, service delivery, and citizen engagement in rural governance [11], [12].

Although several community empowerment programs have been implemented in Indonesia, most remain fragmented and lack digital integration [13], [14]. Many rural development projects still focus on physical infrastructure rather than human capacity and digital literacy enhancement [15], [16]. Consequently, there is a significant research and practical gap in developing a holistic model that combines digital marketing training for MSMEs with the

implementation of a village information system to support economic and governance transformation. Previous studies on digital villages in China, India, and Kenya indicate that the success of rural digitalization depends on simultaneous capacity building, system design, and stakeholder collaboration [17]–[20]. However, localized studies in the Indonesian context remain limited, especially regarding their application to MSME development in coastal villages like Balongdowo.

Therefore, this study aims to strengthen the economic sustainability of Balongdowo Village through a community service program that integrates digital marketing and digital village development. Specifically, the project focuses on empowering local MSMEs to market Kupang-based products via e-commerce platforms such as Shopee and Tokopedia, while simultaneously developing a Village Information System (VIS) portal to showcase local potentials and public services.

The main contributions of this study are threefold. First, it introduces a replicable digital empowerment model for MSMEs in rural areas, combining entrepreneurship training with practical e-commerce implementation. Second, it establishes a sustainable VIS portal that enhances transparency and access to information for local governance and tourism promotion. Third, it provides empirical evidence on how community-based digital transformation can drive economic resilience, social participation, and innovation at the village level.

This article is organized as follows. Section II discusses the methods and implementation steps, including the design of training, system development, and evaluation strategies. Section III presents the findings and discussion of the digital marketing and VIS outcomes. Section IV concludes with a summary of the key achievements, limitations, and recommendations for future replication of the digital village model in other rural communities.

II. METHOD AND IMPLEMENTATION

A. STUDY DESIGN

This study was conducted under the Village Development Program (PPDM) scheme, designed as an applied participatory action research (PAR) approach emphasizing collaboration between researchers, local authorities, and community members. The study adopted a prospective and experimental community-based design, focusing on the integration of digital marketing strategies and the development of a Village Information System (VIS) to improve the economic sustainability of micro, small, and medium enterprises (MSMEs) in Balongdowo Village, Sidoarjo Regency, East Java. The program was carried out from May to October 2024.

B. STUDY SETTING

The study took place in Nitikan Village, located in the Plaosan. The target population included Balongdowo Village residents directly involved in MSME operations, local government staff, and village information system operators. A purposive sampling technique was employed to select participants who met the inclusion criteria of active participation in local economic activities, willingness to engage throughout the

intervention, and access to digital devices such as smartphones or laptops.

A total of 35 participants were selected, consisting of 20 MSME owners, 5 village officials, 5 youth digital volunteers, and 5 students from the Health Polytechnic of the Ministry of Health Surabaya. This sampling ensured diversity of perspectives while maintaining manageability for training and evaluation. Participation was voluntary, and written informed consent was obtained prior to involvement.

C. PARTICIPANTS AND SAMPLING METHOD

A total of 35 participants were selected, consisting of 20 MSME owners, 5 village officials, 5 youth digital volunteers, and 5 students from the Health Polytechnic of the Ministry of Health Surabaya. This sampling ensured diversity of perspectives while maintaining manageability for training and evaluation. Participation was voluntary, and written informed consent was obtained prior to involvement.

D. MATERIALS AND EQUIPMENT

Materials and tools used in this study included:

1. Hardware: laptops, smartphones, and digital cameras for multimedia content creation and data entry.
2. Software: WordPress CMS for VIS development, Canva for product content design, and Microsoft Excel for data management and monitoring.
3. Internet Connectivity: village-provided Wi-Fi infrastructure to support online sessions and website maintenance.
4. Training Media: printed manuals and digital presentation slides explaining e-commerce setup and website management.

All materials were selected to ensure accessibility and cost-effectiveness for replication in other rural contexts [22].

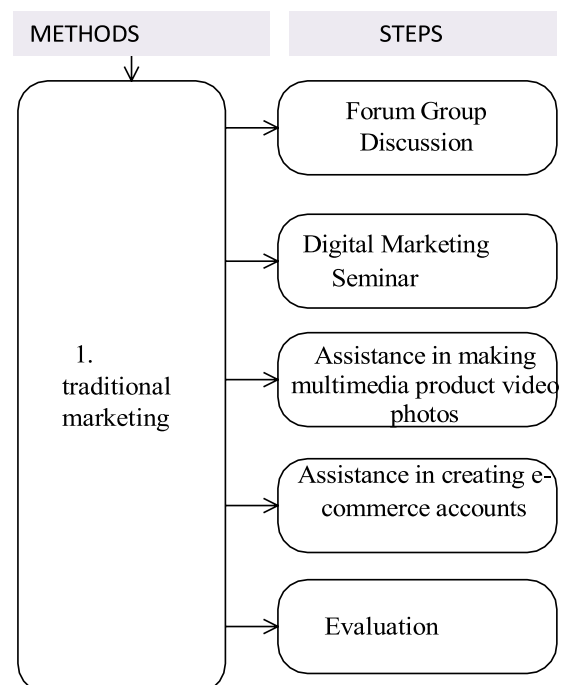


FIGURE 1. Method of implementation of community service activities

Followed by the implementation of **FIGURE 1** assistance with PPDM members and students in producing multimedia documents (photos and videos) of processed products that can attract consumers. Presentations in digital marketing with material Digital marketing includes various strategies to promote products, services or brands using digital platforms and media. Here are some things that are generally conveyed in digital marketing regarding the creation, dissemination, and promotion of relevant, informative, and interesting content to attract audience attention [10][11]. Types of content include blogs, videos, infographics, podcasts, and others. And also, the use of Social Media Marketing where businesses can promote products or services through social media platforms such as Facebook, Instagram, Twitter, LinkedIn, and others

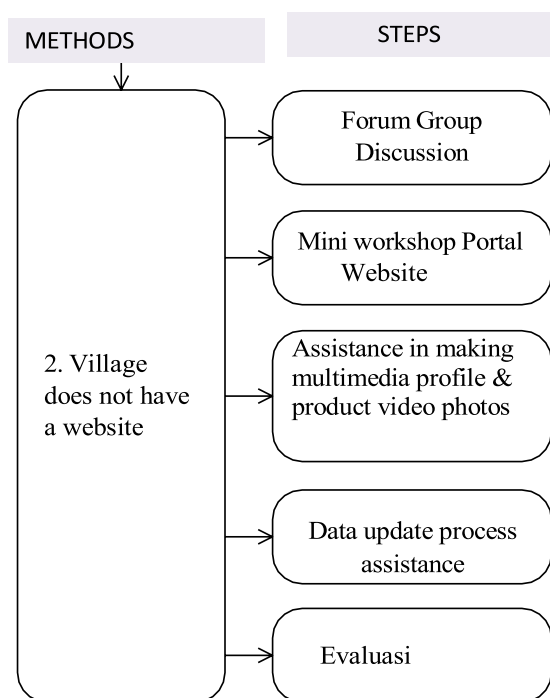


FIGURE 2. Method of implementation of community service activities

As well as in **FIGURE 2**, managing and publishing content in accordance with the characteristics and needs of the audience on each platform. In this activity, the manager of the online marketing business from Shopee campus was also invited. Furthermore, assistance was provided to partners by the pengabmas team for the account registration process, uploading products, and handling the sales process in several e-commerce. The last step is to evaluate the buying and selling process in e-commerce during the PPDM activity period together with partners, lecturers and students to see the independence of residents in developing digital marketing.

E. IMPLEMENTATION

This project involved two primary intervention components, executed in parallel and supported by mentoring sessions

1. DIGITAL MARKETING DEVELOPMENT

The first intervention aimed to enhance the digital marketing capacity of MSME owners. The procedure consisted of four stages:

- Needs Assessment and Focus Group Discussion (FGD): Conducted to identify participants' digital readiness, marketing barriers, and training expectations.
- Digital Marketing Workshop: Delivered by invited experts from Shopee Campus Indonesia and local digital practitioners. The sessions covered topics such as e-commerce registration, product photography, digital branding, and online sales management through platforms including Shopee, Tokopedia, and Bukalapak.
- Mentoring and Practice: Participants received one-on-one guidance in creating digital content, uploading product listings, and managing online transactions.
- Evaluation: Participants' progress was assessed through observation of e-commerce activity, completeness of product profiles, and transaction simulations.

This structured training model was aligned with national MSME digitalization strategies that emphasize skill transfer and self-sufficiency [23], [24].

2. VILLAGE INFORMATION SYSTEM (VIS) DEVELOPMENT

The second intervention addressed the absence of an integrated digital governance system in Balongdowo Village. The steps included:

- Requirement Analysis: Conducted with village officials to identify information management gaps and data accessibility challenges.
- Website Development: The research team developed a WordPress-based VIS portal containing modules for village profiles, MSME directories, tourism potential, and administrative services.
- Training of Operators: Village staff were trained on login procedures, data entry, multimedia uploading, and system maintenance to ensure long-term usability.
- System Testing and Evaluation: The portal was piloted for two weeks and refined based on operator and user feedback.

The resulting portal, accessible via <https://balongdowosda.id/>, enhances transparency, accessibility, and promotion of local economic potential [25], [26].

F. DATA COLLECTION INSTRUMENTS AND PROCEDURE

The main data collection instrument was a structured questionnaire developed by the research team and validated by subject experts. The instrument consisted of four domains: knowledge, attitude, action (practice), and understanding. Each domain included 10–15 items in the form of multiple-choice and Likert-scale questions.

Questionnaires were administered directly before and immediately after the intervention. The validity of the questionnaire was assessed through content validation by three senior lecturers in environmental health. The reliability test using Cronbach's Alpha yielded a coefficient of 0.87, indicating good internal consistency [15].

G. DATA ANALYSIS

Data collection employed mixed methods: qualitative and quantitative approaches to ensure comprehensive evaluation.

1. Qualitative Data: Obtained through FGDs, interviews, and documentation of training sessions, focusing on participant perceptions and digital competence development.
2. Quantitative Data: Derived from pre- and post-intervention assessments, including the number of MSME products uploaded online, website traffic metrics, and digital literacy scores.

Descriptive statistics were applied to measure improvement in digital literacy and marketing performance. Qualitative data were analyzed thematically to interpret behavioral and perceptual changes related to technology adoption [27].

H. ETHICAL CONSIDERATIONS

This study received ethical approval from the Health Polytechnic of the Ministry of Health, Surabaya. All participants signed informed consent forms before data collection. Confidentiality and anonymity were strictly maintained. Sensitive information such as business financial data or personal identification was excluded from publication. Participants retained full control of their online store accounts and website content created during the project

III. RESULTS

The implementation of Community Service was carried out in the hall of Balongdowo Village Hall, Candi District, Sidoarjo Regency, East Java. The implementation of Community Service activities is carried out as many as 2 different activities but are interconnected with each other, namely through the creation of a village service information system and the development of UMKM marketing through digital carried out in parallel.

A. MARKETING FIELD

Starting from holding a Forum Group Discussion (FGD) on 25 April 2024 with home industry players, MSMEs and cadres to capture the problems and initial understanding of the Balongdowo Village community related to e-commerce. FGD on digital marketing is a very useful platform to promote knowledge, exchange of ideas, and collaboration between digital marketing professionals, thus allowing FGD Participants to stay informed about the latest developments in the industry[12]. The outcome of this FGD was a discussion of the latest trends and developments in digital marketing, such as the adoption of new technologies, or shifts in consumer behaviour. Also obtained as a result of the discussion were effective Digital Marketing strategies, including the utilisation of social media[10][5]. The FGD activities were documented in the form of meeting minutes.



FIGURE 3. Photo with the Head of Balongdowo Village after the Forum Group Discussion for Community Service activities in Balongdowo Village.

The next step in **FIGURE 3.** is to prepare materials and organise e-commerce-based digital marketing training to increase sales of Balongdowo village products. In this case, we invited experts who could explain the importance of digital marketing, and also the provisions that must be adhered to by market players. So that experts are also invited in the management of the steps taken are to determine the date, time, and place of training. Followed by submitting a request to the resource person. it is in accordance with the availability of the invited experts, and the material that will be taught to the participants. This should include the importance of digital marketing and the provisions that must be adhered to by market players.

The Community Service Team ensures that the FGD participants have relevant materials and can explain comprehensively about the importance of digital marketing and the provisions that must be adhered to[13]. They created promotional materials for the training, including posters, brochures, and online announcements. Open registration for Balongdowo villagers and business owners who want to join the training before the training day. After the training, the experts and speakers have access to the FGD participants to measure the success of the training and to gather feedback from participants. After the training, there is good documentation of the event, including the notes provided in the training to all participants. After the training, it is expected that business actors will stay in touch with the invited resource persons to answer questions and provide additional support if needed.

On 16 May 2024, assistance was provided with PPDM members and students in producing multimedia documents (photos and videos) of processed products that can attract consumers. Presentations in digital marketing with material Digital marketing includes various strategies to promote products, services or brands using digital platforms and media[15].



FIGURE 4. The opening of the Rintisan Desa Wisata and Digital Marketing seminar and workshop at the PKK Room in Balongdowo Village, Sidoarjo.

Here are some things that are generally conveyed in digital marketing in **FIGURE 4** regarding the creation, dissemination, and promotion of relevant, informative, and interesting content to attract audience attention[3]. Types of content include facebook, blogs, videos, infographics, podcasts, and others. And also, the use of Social Media Marketing where businesses can promote products or services through social media platforms such as Facebook, Instagram, Twitter,

LinkedIn, and others. As well as also in managing and publishing content in accordance with the characteristics the needs of the audience on each platform. Assistance to partners by the pengabmas team for the account registration process, uploading in this activity, the manager of the online marketing business from Shopee campus was also invited.



FIGURE 5. Implementation of the Rintisan Desa Wisata and Digital Marketing seminar and workshop in the PKK Room Balongdowo Village, Sidoarjo



FIGURE 6. Delivery of material from Shopee campus digital marketing resource persons, and handling the sales process in several e-commerce the Rintisan Desa Wisata and Digital Marketing seminar and workshop.

Seminar and workshop in **FIGURE 5** and **FIGURE 6** activities provide the best opportunity for participants to be actively involved in the process of making photos and videos of processed products. FGD participants were given guidance and practical training on photography and videography techniques.

The resulting multimedia documents are expected to be able to promote processed products well and attract consumers' attention. Participants get an in-depth understanding of the requirements and process of applying for certification required for processed products. In the Digital Marketing presentation session, participants were taught about digital marketing, including strategies and to promote products and services through digital platforms and media [10]. The speakers explained the importance of relevant, informative, and engaging content in digital marketing, as well as the types of content that can be used such as facebook, blogs, videos, infographics, and others [6].

Participants were also taught about the utilisation of Social Media Marketing, which is how businesses can promote products or services through social media platforms such as Facebook, Instagram, Twitter, LinkedIn, and others. Another resource person, an online marketing business manager from Shopee campus, provided insight into the experience and best

practices in managing and publishing content that is in accordance with the characteristics and needs of the audience on each platform.

This activity was very useful and provided valuable insights to participants in terms of product development, certification, and digital marketing [16]. Participants are expected to apply the knowledge gained in supporting the development of processed products in Balongdowo Village. The documentation of the activity is at the following link: <https://urlis.net/fotopengabPPDM>.



FIGURE 7. Presentation of material from the Konsultan dan Pengembang Penjualan Digital Marketing, Mr. Ali Saleh, S.iKom at the Rintisan Desa Wisata and Digital Marketing seminar and workshop.

In the **FIGURE 7** evaluation stage, the buying and selling process in e-commerce is carried out during the PPDM activity period together with partners, lecturers and students to see the independence of residents in developing digital marketing.

B. THE INFORMATION SYSTEM FIELD

The implementation of this Community Service was carried out through several steps, such as Licensing, Problem Survey, Socialisation of work programs, Process of Website Development and Village Administration and Information Systems, and Village Operator Training.

1. EXPLAINING AND ASKING FOR PERMISSION

This is the main stage in Community Service activities carried out in order to obtain permission to carry out activities in Balongdowo Village, especially from the This is done so that important formulations related to the digitalisation of village information can be carried out optimally [17].

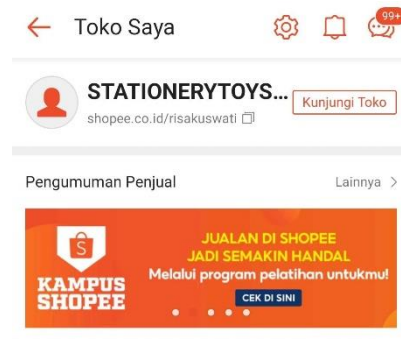


FIGURE 6. Group photo of speakers, organisers, and seminar participants

One of the **FIGURE 8**. participants who successfully set up an online shop on Shopee after attending at the Rintisan Desa Wisata and Digital Marketing seminar and workshop.

The method used is a direct discussion between the Community Service Team in Balongdowo Village and the parties involved, such as the Lurah and kelurahan staff, and the general village community.

2. PROBLEM SURVEY

A problem survey was conducted to find the core problems surrounding digitalisation in Balongdowo Village. This activity was conducted through an interview method with the Village Head and Village Apparatus. Based on the method, several fundamental problems were found in the context of digitalisation, such as Inaccessibility of Balongdowo village website, the absence of a digital platform that provides access to information about Balongdowo, and the use of conventional methods in storing village government data.

After obtaining the problems surrounding digitalisation, the Balongdowo Village Community Service Team designed in detail the implementation of the program. The creation of a Forum Group Discussion (FGD) was carried out through a discussion method between the Balongdowo Village Community Service Team. Through these discussions, the Digital Village Program was created as a solution to the problem of digitalisation in Balongdowo Village. Later, the main actors of the Digital Village will be directed to village officials, especially in the village operator section. Some of the key activities of this programme include population census data, road maps, and village profiles into a digital platform, and training village officials for programmed sustainability.

3. WEBSITE DEVELOPMENT PROCESS AND VILLAGE ADMINISTRATION AND INFORMATION SYSTEM

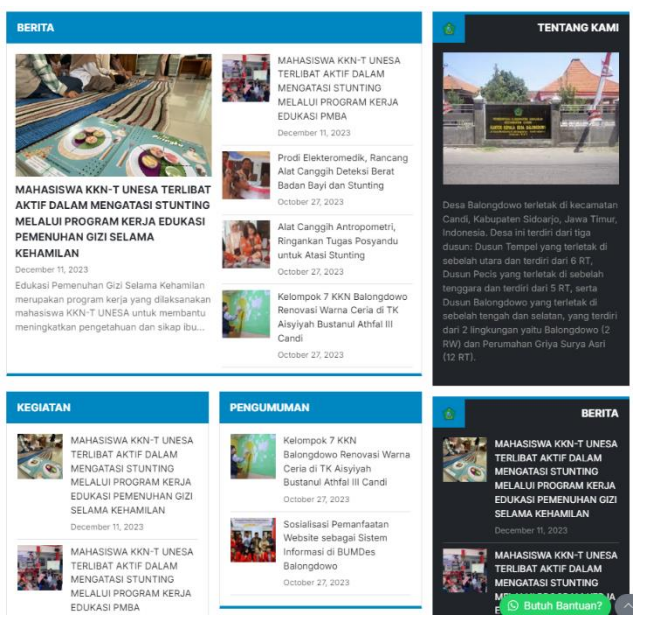
The next stage of the Digital Village work programmed is the creation of the Village Website and information system. Both platforms have different functions and levels of information confidentiality [3]. The village website is a platform that can contain a collection of village information in the form of text, images, sound, or video. The information can range from village profiles to entrepreneurial potential [18]. However, the easy access to this platform that can be done by the entire community makes certain information such as the NIK data of residents cannot be entered due to data confidentiality [13]. Meanwhile, service information system is a platform to manage, analyse, and present village data and information based on information technology. It contains specific data on villagers, such as members per family, the NIK of all family members, data on recipients of government assistance, and so on. Therefore, the level of confidentiality of information in service information system is relatively high and access to this platform is also limited to village officials only [19].

4. DESA BALONGDOWO WEBSITE OPERATOR TRAINING

At this stage, the Community Service Team provides teaching or socialisation to village officials (Village operators) in the management of the latest village website that has been created by us, where the socialisation of village website management aims to make village officials more advanced, considering that this Balongdowo village where the officials themselves have

very little knowledge in information especially related to technology issues. The enthusiasm of Balongdowo village operators themselves tends to be high, where they hope to use the website so that Balongdowo village itself can be more advanced and can be seen transparently by Balongdowo village residents themselves especially and for the entire community.

The training was conducted using the online method at one of the village officials' residences. Some of the things that were explained in this stage were about login steps to the website and service information system platform of Balongdowo Village, mechanisms for editing the Balongdowo Village website 2, and mechanisms for using the Balongdowo Village website and informatic system.



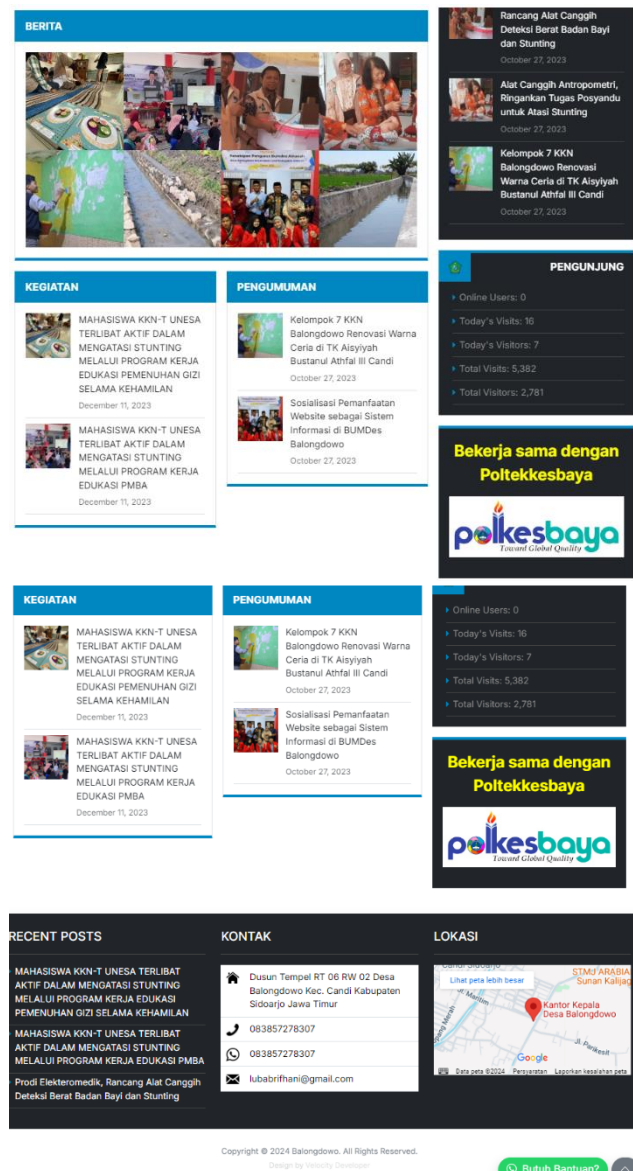


FIGURE 9 View of the Desa Balongdowo website portal at <https://balongdowo-sda.id/>

Evaluate from FIGURE 9, the development of the information system portal during and after the PPDM activities together with partners, lecturers and students to see the independence of the community in developing the village information system [20]. This evaluation should be a tool to enable the development of a more effective village information system portal and increase community independence in the use of information technology. It can also help assess the positive impact of the PPDM programme on the overall development of the village. After the trial use of the Balongdowo village website portal, the PPDM team and the Balongdowo village website operators discussed the findings, identifying the achievements and challenges faced by the villagers in developing the village information system.

The Pengabmas team also provided recommendations and suggestions for improvements based on the evaluation results, making recommendations for improvements if needed. This could include suggestions for further training or additional support to the website operators. Here we also receive feedback to the villagers on the evaluation results, provide

explanations of achievements and provide encouragement to continue to improve self-reliance in the development of the village information system [21].

IV. DISCUSSION

A. INTERPRETATION OF RESULTS

The implementation of digital marketing training and the establishment of the Village Information System (VIS) in Balongdowo Village yielded significant progress in strengthening the local economy and digital capacity of micro, small, and medium enterprises (MSMEs). The study demonstrated that through structured mentoring, practical workshops, and collaborative engagement between local stakeholders, the community successfully transitioned from conventional marketing practices to a digital-based system.

The ability of MSME actors to independently operate e-commerce platforms such as Shopee and Tokopedia, supported by visually appealing multimedia content, marked a substantial shift in entrepreneurial behavior and technological adoption. The establishment of the VIS portal (<https://balongdowo-sda.id/>) provided a centralized platform for information management, integrating public services, MSME directories, and tourism promotion. This aligns with the concept of a "smart village" ecosystem, where digital tools are utilized to enhance transparency, participation, and governance efficiency [30]. The dual focus of this project economic digitalization and information system development contributed to both capacity building and sustainable innovation at the village level.

These findings indicate that community-based digital transformation can effectively stimulate rural economic resilience when coupled with localized training and continuous mentoring. The integration of participatory approaches ensured that the project outcomes were not externally imposed but collaboratively developed, resulting in greater community ownership and sustainability. This outcome supports previous studies emphasizing that participatory digital empowerment contributes to rural autonomy and local innovation [31].

Moreover, post-evaluation feedback revealed that most participants gained confidence in using digital tools, managing online stores, and responding to customer feedback. The training modules not only improved technical competence but also enhanced entrepreneurial mindsets. This observation corroborates prior findings from digital literacy programs in rural India and China, where community-level ICT capacity significantly improved market accessibility and income diversification [32], [33]. Hence, the Balongdowo initiative validates the effectiveness of integrated digital education as a foundation for rural economic advancement.

B. COMPARISON WITH SIMILAR STUDIES

The results of this study are consistent with previous international and domestic research on digital village development and community-based marketing innovation. Studies in Southeast Asia and Africa have shown that implementing e-commerce training programs within rural settings leads to measurable improvements in sales

performance, visibility, and financial independence among MSMEs [34]. Similarly, research by Zhang et al. [35] in China demonstrated that the success of rural digitalization relies on combining digital infrastructure development with human resource capacity building. This study reflects that principle by not only providing technological tools but also fostering human competence to manage them effectively.

In the Indonesian context, the Balongdowo project aligns with initiatives such as the “Smart Kampung Banyuwangi” and “Desa Digital Bandung,” which integrate e-governance with local economic empowerment. However, unlike these government-driven programs, the current project was community-initiated and executed through a participatory model involving academia, local authorities, and residents. This bottom-up approach offers a replicable framework emphasizing inclusivity, collaboration, and sustainability rather than dependency on external funding [36].

Another point of convergence lies in the integration of a Village Information System with digital marketing. Previous studies focused primarily on administrative digitalization without direct economic application [37]. By merging these two aspects, the Balongdowo model provides a unique dual-impact approach enhancing both governance transparency and entrepreneurial visibility. This duality represents a new dimension of rural innovation, bridging governance reform and economic development through digital synergy.

Nevertheless, the outcomes also contrast with some earlier research highlighting the difficulties in sustaining digital interventions due to technological constraints and inadequate human resources [38]. In contrast, this study observed a relatively high level of engagement and adaptability among participants, facilitated by local mentorship and student involvement. This finding suggests that sustained supervision and knowledge transfer from academic institutions can mitigate the common barriers to long-term digital adoption in rural settings.

Additionally, while many digital empowerment programs in developing countries emphasize gender inclusion and youth engagement, this study primarily focused on MSME actors without disaggregating outcomes by gender or age. Although both men and women participated equally, future research should incorporate gender-responsive digital training models to ensure equitable benefits. Comparative evidence from studies in Bangladesh and Kenya reveals that gender-sensitive interventions significantly enhance participation and empowerment outcomes [39]. This consideration could further refine and contextualize future digital village programs in Indonesia.

C. LIMITATIONS, WEAKNESSES, AND IMPLICATIONS

Despite the success of the Balongdowo digital empowerment initiative, several limitations must be acknowledged. First, the study was conducted within a single village, which limits the generalizability of the findings to other regions with differing socioeconomic contexts. Rural communities with less developed internet infrastructure or lower literacy levels may encounter greater obstacles in replicating this model. Second, while digital marketing adoption increased, the study did not

conduct a quantitative assessment of revenue growth or customer retention, which could have provided a more objective measure of economic impact. Third, the VIS portal is still in its early operational phase, and its long-term maintenance depends on consistent engagement and technical updates by village operators.

Another weakness relates to technological dependency. Continuous system maintenance and server management require stable connectivity and technical support, which may pose sustainability challenges in the absence of institutional partnerships. As emphasized by recent studies on rural ICT projects, long-term digital success depends on both technological sustainability and governance continuity [30], [33]. Hence, institutional collaboration with local universities or private technology firms is recommended to provide periodic system updates and capacity reinforcement.

Moreover, although digital marketing training improved individual competencies, the behavioral shift toward sustained online entrepreneurship remains gradual. Some participants expressed difficulties in maintaining regular content updates and managing online orders due to time constraints and limited digital literacy. These challenges mirror findings from other digital MSME projects, which reveal that motivation and long-term mentorship are crucial to sustaining online business activity [31], [35]. Establishing peer-to-peer learning groups or local digital ambassadors could help address this limitation and foster a self-learning ecosystem.

From a methodological standpoint, the study employed a participatory and descriptive design rather than a randomized experimental model. While this approach was appropriate for community engagement, it restricts causal inference regarding the direct impact of digitalization on income levels. Future studies should consider quasi-experimental designs with control groups or longitudinal evaluations to generate stronger empirical evidence.

Despite these limitations, the implications of the findings are highly significant. First, this study illustrates that the integration of digital marketing and information systems can serve as a replicable model for rural economic empowerment. By combining e-commerce accessibility with transparent governance platforms, local economies can achieve self-reliance and resilience against market fluctuations. Second, the Balongdowo initiative reinforces the importance of multi-stakeholder collaboration involving government, academia, and communities in accelerating rural digitalization. This tripartite approach fosters trust, enhances learning efficiency, and ensures sustainability.

Third, the project demonstrates that human capital development is as vital as technological infrastructure. Investment in digital literacy and continuous mentoring yields greater long-term benefits than one-time equipment distribution. Fourth, the VIS portal offers implications for policy innovation by enabling data-driven decision-making at the village level. With accurate demographic and economic data accessible online, local governments can improve service delivery and resource allocation.

Finally, the Balongdowo model provides a foundation for future expansion into digital tourism. By integrating tourism

mapping, cultural product promotion, and online booking systems, the village could attract visitors and investors, thereby diversifying its economic base. This aligns with global trends emphasizing digital heritage and community-based tourism as drivers of inclusive development [32], [34].

In conclusion, while challenges remain in maintaining system sustainability and participant engagement, the Balongdowo initiative successfully demonstrates that strategic digital empowerment can transform rural economies. The study contributes to the growing literature on digital villages by presenting a practical, participatory model that unites technology, entrepreneurship, and governance. Continued collaboration among stakeholders, coupled with adaptive learning mechanisms, will be essential.

V. CONCLUSION

This community service study aimed to strengthen the economic sustainability of Balongdowo Village, Sidoarjo Regency, through the integration of digital marketing strategies and the establishment of a Village Information System (VIS) as a foundation for a self-sufficient digital village. The intervention sought to empower local micro, small, and medium enterprises (MSMEs) engaged in Kupang-based product industries by enhancing their digital competence and expanding their market access. The findings revealed a substantial improvement in the digital literacy and entrepreneurial capacity of the participants following a six-month program conducted from May to October 2024.

A total of 35 participants, including 20 MSME owners and 5 village officials, successfully completed digital marketing training, and over 85% were able to create active online stores across multiple e-commerce platforms such as Shopee, Tokopedia, and Bukalapak. The number of local products uploaded to online marketplaces increased from fewer than 10 items prior to the intervention to more than 70 products after program completion, reflecting a sevenfold improvement in online market visibility. Concurrently, the official Balongdowo Village portal (<https://balongdowo-sda.id/>) was successfully launched, featuring comprehensive modules on MSME profiles, village tourism potential, and public service information.

The portal received an average of 300 unique visits per week during its initial operation period, demonstrating growing digital engagement from both local residents and external users. These outcomes confirm that participatory digital empowerment and community-based information systems can effectively transform traditional rural economies into more adaptive, transparent, and technology-driven ecosystems. Future works should focus on scaling this model to other villages across East Java and Indonesia, accompanied by longitudinal evaluations to measure long-term economic impacts, income growth, and sustainability of system utilization. Further development may also include the integration of digital tourism mapping, mobile-based public service applications, and continuous mentorship networks to ensure the persistence of digital innovation and rural competitiveness in the evolving digital economy landscape.

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DATA AVAILABILITY

All data generated or analyzed during this study are included in this published article. Additional supporting materials, such as training documentation, website development records, and evaluation datasets, are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTION

All authors contributed substantially to the conception, design, and implementation of the study. Triwiyanto led the project coordination, supervision, and technical development of the Village Information System. Sari Luthfiyah managed community engagement, data collection, and manuscript preparation. Bedjo Utomo was responsible for digital marketing training design and evaluation. Levana Forra Wakidi assisted in data analysis, visualization, and documentation. All authors reviewed, edited, and approved the final version of the manuscript for publication.

DECLARATIONS

ETHICAL APPROVAL

This study received ethical approval from the Ethics Committee of the Health Polytechnic of the Ministry of Health Surabaya, Indonesia

CONSENT FOR PUBLICATION PARTICIPANTS.

All participants involved in this study provided informed consent for participation and agreed to the publication of the research results. Personal and business information was treated confidentially, and any identifying details have been anonymized to ensure privacy and data protection.

COMPETING INTERESTS

The authors declare that there are no financial or personal relationships that could be perceived as potential conflicts of interest in the conduct and publication of this study.

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