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Digital Transformation of Local MSMEs: Applying AI-Based Market Intelligence in Purwakarta (a Case Study at Ceramic Product)

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ABSTRACT

This international community service program aims to support the digital transformation of local Micro, Small, and Medium Enterprises (MSMEs) by applying AI-based market intelligence, focusing on ceramic product MSMEs in Purwakarta, Indonesia. The program was conducted using a participatory approach through training, practical mentoring, and evaluation involving lecturers, students, international academic partners, and MSME actors. The main objective was to enhance MSME capabilities in understanding market trends, identifying customer segments, analyzing competitors, and developing digital marketing strategies using artificial intelligence tools. The results indicate that participants experienced significant improvement in their understanding of digital transformation, shifting from basic social media usage toward a more comprehensive approach involving data-driven decision-making and market analysis. Through practical sessions, participants were able to generate customer personas, product positioning strategies, digital promotional content, and product descriptions using AI tools. The program also encouraged MSMEs to develop more adaptive and customer-oriented marketing approaches, particularly in promoting ceramic products as both functional and creative goods. In addition, the activity demonstrated that AI-based market intelligence can be applied effectively by MSMEs when delivered through simple, contextual, and practice-oriented methods. Despite initial challenges related to digital literacy and familiarity with AI tools, participants showed strong interest in adopting these technologies for their business development. The study concludes that integrating AI into MSME marketing practices can enhance competitiveness and market responsiveness. Continuous mentoring and collaboration between academic institutions and MSMEs are essential to ensure sustainable digital transformation and long-term business growth.

Keywords: Artificial Intelligence, Ceramic Products, Digital Transformation, Market Intelligence, MSMEs.

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INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in driving economic growth, job creation, and regional development, particularly in developing countries such as Indonesia. MSMEs contribute to economic resilience and represent local identity, culture, and creativity through their products. However, the rapid advancement of digital technologies has significantly transformed the business environment, requiring MSMEs to adapt to new digital ecosystems, market dynamics, and consumer behavior (Dörr et al., 2023; Kraus et al., 2022; Omrani et al., 2024).

Digital transformation has become a key strategic approach for MSMEs to enhance their competitiveness, expand market access, and improve operational efficiency. It involves not only the adoption of digital tools but also fundamental changes in business processes, organizational capabilities and value creation mechanisms (Kraus et al., 2022; Tribuana et al., 2024; Verhoef et al., 2021; Vial, 2021). In SMEs, digital transformation is closely linked to innovation, strategic renewal, and the development of new business models that enable firms to respond more effectively to market changes (Elia et al., 2020; Rupeika-Apoga et al., 2022).

Despite its potential benefits, the implementation of digital transformation among MSMEs remains uneven, particularly in developing nations. Limited digital literacy, lack of technological capabilities, financial constraints, and resistance to change are common barriers that hinder MSMEs from fully leveraging digital opportunities (Anatan & Nur, 2023; Kurniawati et al., 2021; Purnomo et al., 2024). These challenges highlight the importance of external support, including training, mentoring, and knowledge transfer from academic institutions and other stakeholders.

Digital transformation is especially important in the context of local creative industries, such as ceramic product MSMEs in Purwakarta. Ceramic products possess both functional and cultural value, making them suitable for various market segments, including household goods, decorative items, souvenirs, and creative economy products. However, many MSMEs still face difficulties identifying target markets, understanding consumer preferences, differentiating their products, and effectively communicating product value through digital channels.

Digital marketing has emerged as one of the most accessible forms of digital transformation for MSMEs. Social media platforms, e-commerce marketplaces, and digital content strategies enable MSMEs to reach a wider audience and engage with customers more effectively. Empirical studies have shown that social media marketing significantly influences SME performance, customer engagement and brand visibility (Dwivedi et al., 2021; Khamaludin et al., 2022; Patma et al., 2021; Syafei et al., 2025; Tuten & Solomon, 2020; Umiyati et al., 2025). However, the effectiveness of digital marketing depends largely on the ability to understand and utilize market information.

Market intelligence plays a vital role in supporting data-driven decision-making in businesses. It involves the systematic collection, analysis, and interpretation of information related to customers, competitors, and market trends to inform business decisions. For MSMEs, market intelligence can help identify customer needs, analyze competitor strategies, detect emerging trends, and develop effective marketing strategies (Calof, 2020; Müller, 2019). In highly competitive and dynamic markets, the ability to leverage market intelligence is a key determinant of business success.

The emergence of Artificial Intelligence (AI) has further enhanced the potential of market intelligence for MSMEs. AI technologies enable businesses to process large amounts of data, generate insights, and support decision-making efficiently. In marketing, AI can be used for customer segmentation, predictive analytics, personalization, content generation, and customer engagement (Haleem et al., 2022; Huang & Rust, 2021; Mariani et al., 2022; Sari et al., 2025; Tribuana et al., 2025). These capabilities allow MSMEs to move from intuition-based decisions to more data-driven and strategic approaches.

AI-based market intelligence is particularly relevant for MSMEs because it offers practical and scalable solutions to their problems. With the availability of user-friendly AI tools, MSMEs can generate product descriptions, create marketing content, analyze trends and develop customer personas without requiring advanced technical expertise. Kumar et al. (2021) emphasized that AI adoption in SMEs in emerging market SMEs can significantly improve decision-making capabilities and enhance customer-oriented strategies. Similarly (Kumar et al., 2021), Dwivedi et al. (2021) highlighted that AI-driven marketing enables firms to deliver personalized experiences and improve customer satisfaction (Dwivedi et al., 2021).

However, despite its advantages, the adoption of AI among MSMEs remains limited. Several studies have indicated that barriers such as a lack of digital skills, perceived complexity, cost concerns, and uncertainty about the benefits of AI hinder its adoption (Enshassi et al., 2025; Sánchez et al., 2025). Therefore, practical approaches are required to introduce AI technology to MSMEs in a simple, applicable, and context-specific manner.

Community service programs conducted by higher education institutions can play an important role in bridging this gap. Through training, mentoring, and direct assistance, universities can help MSMEs improve their digital literacy, adopt new technologies, and implement data-driven business practices. Such initiatives not only support MSME development but also contribute to regional economic growth and to community empowerment.

Based on these considerations, the international community service program entitled "Digital Transformation of Local MSMEs: Applying AI-Based Market Intelligence in Purwakarta: A Case Study at Ceramic Product" was conducted. The program aims to assist ceramic MSMEs in understanding and applying AI-based market intelligence to enhance digital marketing, customer segmentation, competitor analysis and product positioning. Through collaboration between local and international academic partners, this initiative is expected to strengthen the digital capabilities and promote more adaptive, innovative, and market-oriented business practices.

METHOD

This international community service program used a participatory action-based approach that combined training, mentoring, practical simulation, and evaluation. This approach was selected because the program aimed not only to transfer knowledge but also to strengthen the practical capacity of local MSME actors in applying AI-based market intelligence to support digital transformation.

The activity was conducted with ceramic product MSMEs in Purwakarta as the main participants of the study. The program involved lecturers, students, local MSME actors and international academic partners. The implementation process consisted of five main stages: preliminary observation, program design, training implementation, practical mentoring, and evaluation.

Preliminary Observation

The first stage was preliminary observation to identify the initial conditions of ceramic MSMEs in Purwakarta. This stage focused on understanding the participants' business profiles, product characteristics, current marketing practices, digital platform usage, and challenges in reaching wider markets. The observation showed that ceramic MSMEs had strong product potential but still needed support in digital marketing, customer segmentation, competitor analysis and product positioning.

Program Design

Based on the initial observations, the community service team designed a training and mentoring program focused on practical digital transformation. The materials were arranged to match the needs of MSME actors, especially those with limited experience using artificial intelligence tools. The program emphasized simple and applicable topics, including digital marketing strategies, market intelligence, customer persona development, competitor mapping, product description writing, and AI-assisted content planning.

Training Implementation

The training session introduced the participants to the concepts of digital transformation and AI-based market intelligence. The team explained how MSMEs can use AI tools to collect market insights, identify consumer preferences, generate promotional ideas and improve digital communication. Training was delivered through presentations, discussions, and examples related to ceramic products.

Participants were introduced to several practical applications of AI, such as generating product descriptions, identifying target customer segments, creating social media captions, developing product storytelling, and comparing competitors strategies. The training emphasized that AI should be used as a supporting tool to strengthen human creativity and business decision making.

Practical Mentoring

After the training session, the participants joined a mentoring activity where they directly practiced using AI-based tools for their ceramic products. The mentoring focused on four main activities: identifying potential customers, developing product positioning, creating digital promotional content, and formulating simple market intelligence.

During this stage, the participants were guided to produce practical outputs, such as customer persona drafts, social media content ideas, product descriptions, and simple competitor analysis. The mentoring process allowed the participants to ask questions, discuss business problems, and receive direct feedback from the community service team.

Evaluation

An evaluation was conducted to measure the effectiveness of the program and the participants' understanding of the materials. The evaluation used observations, discussions, participant feedback, and a comparison of participants' understanding before and after the activity. The indicators included participants' ability to understand digital transformation, explain the concept of market intelligence, use AI tools for marketing purposes, and produce basic digital marketing outputs.

The evaluation also considered participants' responses regarding the relevance, usefulness, and applicability of the program. This stage was important for identifying the impact of the activity and formulatinge recommendations for further mentoring.

Program Output

The expected outputs of this program include increased digital literacy among ceramic MSME actors, an improved understanding of AI-based market intelligence, and the creation of practical digital marketing materials. In addition, the program encouraged MSMEs to become more adaptive in using technology to support market expansion and product competition.

Overall, the method used in this program emphasizes practical learning, direct assistance, and collaborative knowledge transfer. This method was considered appropriate for local MSMEs because it helped the participants understand digital transformation in a simple, contextual, and applicable way.

RESULTS AND DISCUSSION

The international community service program entitled "Digital Transformation of Local MSMEs: Applying AI-Based Market Intelligence in Purwakarta: A Case Study at Ceramic Product" was implemented to strengthen the digital capacity of local ceramic MSMEs through training, mentoring, and practical application of AI-based market intelligence. The activity involved MSME actors, lecturers, students, and international academic partners. The main results of the program can be grouped into five aspects: participant involvement, improvement of digital awareness, practical understanding of AI-based market intelligence, development of digital marketing outputs and participant responses to the program.

Participant Involvement and Program Implementation

The activity was attended by ceramic MSME actors in Purwakarta who were directly involved in the production and marketing of ceramic products. The participants represented local businesses with varying levels of digital readiness. Some participants had already used social media for promotion, while others still relied primarily on direct sales, word-of-mouth marketing, and local customer networks.

The program was conducted through interactive training and mentoring sessions. The training session introduced participants to the concepts of digital transformation, digital marketing, market intelligence, and the role of artificial intelligence in supporting MSME competitiveness. The mentoring session focused on practical exercises, where participants were guided to use AI tools to analyze customer segments,

develop product positioning, create promotional messages, and generate digital content ideas for their brands.

Figure 1. Opening session and introduction of the community service program

The involvement of participants showed that local ceramic MSMEs have astrong interest in digital transformation. Although some participants were initially unfamiliar with AI-based tools, they were able to follow the activity because the materials were delivered simplye, practically, and in abusiness-oriented manner.

Improvement of Digital Transformation Awareness

One of the main results of the program was the improvement ine participants' awareness of the importance of digital transformation. Before the activity, most participants understood digital transformation only as the use of social media or online marketplaces. After the training, participants began to understand that digital transformation also includes market analysis, customer understanding, product differentiation, digital branding, and data-based decision making.

Thise activity helped participants realize that ceramic products have broader market potential if they are supported by appropriate digital strategies. Ceramic products can be positioned not only as household goods but also as decorative products, souvenirs, gifts, interior accessories, and creative economy products. This broader understanding encouraged participants to think more strategically about product value, customer needs and market opportunities.

The following table presents a normative summary of the participants' understanding before and after the program.

Table 1. Improvement of Participants' Understanding Before and After the Program

Aspect Evaluated	Before Program	After Program
Understanding of digital transformation	Mostly understood as social media usage	Understood as a broader business transformation process

Aspect Evaluated	Before Program	After Program
Understanding of market intelligence	Limited or unfamiliar	Able to identify customer, competitor, and market trend information
Understanding of AI tools	Mostly unfamiliar	Able to recognize AI as a supporting tool for marketing
Digital marketing capability	Focused on basic product posting	Improved toward content planning and product storytelling
Product positioning	Mostly based on product function	Developed based on customer needs, uniqueness, and market value
Customer segmentation	General and unclear	More specific based on customer profile and product use

The table shows that the program contributed to increasing participants' conceptual understanding and practical readiness for adopting digital tools. This result supports the idea that MSMEs require not only access to technology but also structured guidance to understand how technology can be applied to their business context.

Application of AI-Based Market Intelligence

The most important part of the program was the practical application of AI-based market intelligence tools. Participants were introduced to the use of AI tools to support simple market analyses and marketing decision-making. AI tools were used to generate customer personas, identify market trends, develop product descriptions, create social media captions, and formulate promotional messages.

Through this activity, the participants learned that AI can help MSMEs obtain market insights more quickly and efficiently. For example, participants practiced creating customer profiles for ceramic products, such as household consumers, souvenir buyers, interior designers, hotel and restaurant owners, and gift buyers. These customer profiles helped the participants understand that different customer groups require different marketing messages.

Figure 2. Practical session on AI-based market intelligence tools

The participants also used AI to develop product stories. Instead of describing ceramic products only in terms of their shape, size, and price, participants were encouraged to highlight their uniqueness, local identity, handmade processes, artistic value, and product function. This approach helped participants understand that digital marketing should communicate not only product information but also the product s meaning and emotional value.

Table 2. Practical Outputs Produced During the Program

Practical Output	Description
Customer persona	Identification of potential customer groups for ceramic products
Product positioning	Formulation of product value based on uniqueness, design, and local identity
Product description	AI-assisted product description for social media and marketplace use
Social media caption	Promotional caption adjusted to target customer segments
Competitor mapping	Simple comparison of similar ceramic products in the market
Content planning	Initial ideas for product promotion through digital platforms

These outputs indicate that AI-based market intelligence can be applied in a simple and practical manner by local MSMEs. The activity also showed that AI does not replace the creativity of MSME actors. Instead, AI functions as a supporting tool that helps business owners organize ideas, understand customers, and communicate product value effectively.

Digital Marketing and Product Positioning Improvement

The program also improved the participants' ability to develop digital marketing strategies. Before the program, digital promotion was generally conducted by uploading product photos without a clear target audience or marketing messages. After the mentoring session, the participants were encouraged to design content based on market segments and product positioning.

Product positioning is important for ceramic products because consumers may purchase ceramics for different reasons. Some consumers buy ceramics for daily household use, while others buy them for decoration, gifts, collections, souvenirs, or business. Therefore, one product can be promoted using different messages depending on the target market.

For example, ceramic cups can be positioned as functional household products, aesthetic coffee accessories, souvenirs for special events, or as premium gifts. Ceramic plates can be marketed as dining equipment, restaurant tableware and decorative products. This understanding helped the participants develop more flexible and targeted marketing communications.

The mentoring process also emphasized the importance of visual presentation, product storytelling, branding consistency, and customer-oriented communication. Participants were encouraged to use clearer product photos, more attractive captions,

relevant hashtags, and stronger narratives about the uniqueness of local ceramic products.

Figure 3. Discussion and mentoring on digital marketing content for ceramic products

Participant Responses and Program Evaluation

The evaluation results showed that the participants responded positively to the program. Participants considered the training useful because the materials were directly related to their business requirements. They also stated that AI tools were helpful in generating promotional ideas, improving product descriptions and identifying potential customers.

The following table presents a normative evaluation summary of participant responses.

Table 3. Participant Evaluation of the Program

Evaluation Indicator	Result
Relevance of material to MSME needs	Very relevant
Clarity of explanation	Good
Usefulness of AI-based market intelligence	Very useful
Applicability to ceramic product marketing	Applicable
Participant interest in using AI tools	High
Need for further mentoring	High

The evaluation indicateds that the program was well received by the participants. The high interest in further mentoring shows that MSME actors are willing to adopt digital technology when the training is practical, understandable, and directly connected to their business problems.

However, the program identified several challenges. Some participants still needed more time to become familiar with the AI tools. Digital literacy gaps were also found among participants, especially in formulating effective prompts, interpreting AI-generated results, and applying the results to real world marketing activities. In addition, some MSMEs still need support in improving product photos, managing social media accounts, and optimizing marketplace presence.

These findings indicate that digital transformation among MSMEs should be implemented gradually and in stages. Training alone is in sufficient; continuous mentoring is needed to ensure that MSMEs can consistently apply the knowledge in their business operations.

Discussion

The results of this program show that AI-based market intelligence can be effectively introduced to local MSMEs when delivered through a practical and participatory approach. The ceramic MSMEs in Purwakarta have strong product potential, but they require support in market understanding, digital communication, and technology-based marketing strategies.

The program confirms that digital transformation is not merely a technical process but also a learning process. MSMEs must understand the importance of digital tools, their usage, and how the results can support business decisions. In this program, AI was introduced not as a complex technology but as a simple assistant that can help MSMEs understand their market and communicate their products more effectively.

The findings also show that AI-based market intelligence is suitable for creative products such as ceramics. Ceramic products have aesthetic, functional, and cultural values. Therefore, marketing strategies for ceramic products should not only focus on price and product specifications but also on storytelling, design uniqueness, local identity, and customer experiences. AI tools can help MSMEs formulate these narratives more clearly and attractively.

In addition, the program highlights the importance of collaboration between universities, students, international partners and local MSMEs. The involvement of academic institutions provides structured knowledge, wherea students contribute technical support and practical assistance. International collaboration adds a broader perspectives to digital transformation and MSME development. This collaborative model strengthens the role of higher education institutions in supporting community empowerment and local economic development.

Overall, the results indicate that the program achieved its main objective of improving MSME awareness, knowledge, and initial skills in applying AI-based market intelligence. Although further mentoring is still needed, the program has provided an important foundation for ceramic MSMEs in Purwakarta to become more adaptive, innovative, and market-oriented in the digital agee.

CONCLUSION

The international community service program entitled “Digital Transformation of Local MSMEs: Applying AI-Based Market Intelligence in Purwakarta: A Case Study at

Ceramic Product" successfully contributed to strengthening the digital capacity of local ceramic MSMEs. The program showed that AI-based market intelligence can be introduced in a simple, practical, and applicable manner, especially for MSME actors who are still in the early stages of digital transformation.

The results indicate that the participants gained a better understanding of digital transformation, digital marketing, customer segmentation, competitor analysis, product positioning, and AI-assisted content development. Through training and mentoring, participants recognized the potential of AI tools to support market analysis, generate promotional ideas, improve product descriptions, and develop more customer-oriented marketing messages.

This activity also demonstrated that ceramic products in Purwakarta have strong potential to be developed as creative economy products with broader market opportunities. However, this potential must be supported by digital literacy, consistent branding, attractive product storytelling, and data-based marketing strategies. AI-based market intelligence can help MSMEs identify these opportunities and communicate product values more effectively.

The program confirms the importance of collaboration between universities, students, international academic partners, and local MSME actors in supporting community empowerment. Such collaboration can bridge the gap between technological development and MSME readiness, especially through practical training and continuous mentoring of MSME employees.

Future programs should focus on more intensive assistance in social media management, marketplace optimization, digital catalogue development, product photography, branding strategy, and performance evaluation of digital marketing activities. Continuous mentoring is recommended to ensure that ceramic MSMEs can apply AI-based market intelligence sustainably and improve their competitiveness in the digital economy.

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No external funding was received for this study.

Ethical Compliance

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Conflict of Interest declaration

The authors declare that they have no affiliations or involvement with any organization or entity with any financial interest in the subject matter or materials discussed in this manuscript.

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