



Adoption of POS Technology in MSMEs: A Case Study of Ecoprint Forum, Purbalingga

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) are businesses operated by individuals, households, or small organizations, commonly characterized by limited annual turnover, assets, and number of employees. A significant issue among MSMEs is the lack of separation between business and personal finances, leading to ineffective financial management and the absence of professional systems. This challenge often results in difficulties in tracking inventory and transaction data accurately. In response to this issue, this community engagement project aims to implement a Point of Sale (POS) application as a practical solution for improving financial and operational efficiency within MSMEs. The initial implementation was conducted with a partner MSMEs in Purbalingga, Alima Makmur, which operates in retail paint. To further evaluate the benefits and adaptability of the POS system, the implementation was extended to members of the Ecoprint MSMEs Forum in Purbalingga. The results show that 4 out of 5 MSMEs successfully adopted and independently operated the POS application. This study contributes to the growing body of knowledge on digital adoption in micro-enterprises and provides practical implications for enhancing business sustainability through simple technological interventions.

Keywords: Digitalization; Ecoprint; MSMEs; Point of Sale; Technology Adoption

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in national economic development, particularly in developing countries such as Indonesia (Onyeje et al., 2020; Shelly et al., 2020; Juminawati et al., 2021; Reswita et al., 2021; Endris, & Kassegn 2022). These businesses, often established by individuals, households, or small teams, are characterized by low capital investment, limited workforce, and relatively modest operational scales. In Indonesia, micro-enterprises are officially defined as those with an annual turnover not

exceeding IDR 300 million and total assets under IDR 50 million, excluding land and buildings (Sholicha & Oktafia, 2021). Despite their economic importance, MSMEs frequently face operational and financial constraints that hinder scalability and sustainability (Harvie, 2019; Sahoo & Thakur, 2022; Alfarizi et al., 2023).

One of the major challenges confronting MSMEs is the lack of formal financial management systems (Awoyemi & Makanju, 2020; Maheshkar & Soni, 2021; Mittal & Raman, 2021; Rajamani et al., 2022; Saifurrahman & Kassim, 2023; Nareswari et al.,

2023). In many cases, business finances are merged with personal funds, making it difficult to track business performance objectively (Suyadi et al., 2018; Bessi re et al., 2019; Zetzsche et al., 2020). Without structured bookkeeping and inventory systems, these enterprises risk inefficiencies that could affect profitability and long-term viability (Zhu et al., 2020; Bondarenko et al., 2021; Shi, 2021). Over time, as transaction volumes increase, the absence of digital tools becomes a serious liability, resulting in difficulties in monitoring inventory, sales, and profit margins (Oyewo, 2021).

The implementation of digital tools, such as Point of Sale (POS) applications, has emerged as a potential solution to address these issues (Prihatiningtias & Wardhani, 2021). A POS system is generally designed to facilitate sales transactions, manage inventory data, and provide financial reporting in real time. These systems offer significant advantages for small businesses seeking to enhance accuracy, reduce manual work, and improve operational transparency (Derman et al., 2018). However, despite their potential, mainstream POS applications are often not aligned with the practical realities of MSMEs in rural or semi-urban environments.

Prior studies have identified limitations in existing POS systems, particularly in relation to the evolving needs of MSMEs (Hendrawan et al., 20). As consumer behavior changes and digitalization expands, MSMEs require systems that support online sales, Cash on Delivery (COD) transactions, courier integration, virtual warehousing, and synchronization of offline and online transactions (Murdiani, Yudhana, & Sunardi, 2020; Purnama et al., 2021; Fuadi & Diniyanto, 2022). Unfortunately, most commercially available POS systems lack these features or offer them in fragmented ways, leading to inefficiencies and additional costs for integration.

Additionally, most existing solutions are proprietary and do not offer open-source alternatives. This raises concerns about data security, accessibility, and vendor lock-in—

especially among MSMEs that may not have the technical or financial resources to maintain long-term licensing agreements (Arsa & Nugraha, 2020). The unavailability of adaptable, community-driven software tools limit MSMEs' ability to customize features based on their operational needs and business models (Van Damme et al., 2022).

Another issue observed in earlier implementations is the lack of context-specific customization. MSMEs are diverse and operate in varied sectors, requiring solutions that are tailored to their workflow and scale (Piesse et al., 2022; Allal-Ch rif et al., 2022). Previous research has often focused on the technical aspects of POS systems without thoroughly investigating the user adoption process, training needs (Prihatiningtias & Wardhani, 2021), and post-implementation outcomes, particularly among non-tech-savvy users in local industries such as crafts, textiles, or agro-based businesses (Derman et al., 2018).

This study aims to address these gaps by implementing a contextually adapted, open-source POS system among members of the Ecoprint MSMEs Forum in Purbalingga, Indonesia. Unlike prior studies that focus solely on technical development, this research emphasizes the practical usability of the application, the support mechanisms required for successful adoption, and the impact on business practices. By working closely with local MSMEs, the research captures insights from real-world users, which adds relevance and practical value to the study. The novelty of this research lies in its approach: implementing a low-cost, adaptable POS solution in collaboration with MSME stakeholders and evaluating its effectiveness through user experience and operational improvements. The key objective is to assess whether the POS application meets the transactional and financial recording needs of small businesses, thereby supporting digital transformation among micro-entrepreneurs. This study not only contributes to the literature on digital adoption in MSMEs but also offers scalable

models for technology-enabled development at the grassroots level.

METHODS

This study adopts a participatory action research (PAR) approach, combining elements of community engagement and applied technology implementation. The research was conducted in collaboration with members of the Ecoprint MSMEs Forum in Purbalingga, Indonesia, who served as the primary community partners. The goal was to introduce, implement, and evaluate the adoption of a customized Point of Sale (POS) system in real-world micro-enterprise environments.

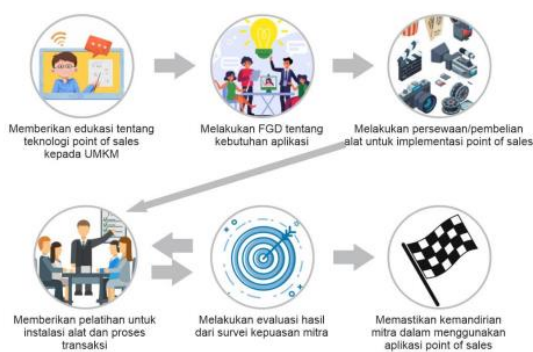


Figure 1. Point of Sales Application Implementation Method

The implementation process consisted of six structured phases (See Figure 1). First, an introductory seminar was conducted to educate participating MSMEs about the concept, functions, and potential benefits of POS technology. This phase aims to provide foundational knowledge and raise awareness among participants regarding the relevance of digital tools in business operations.

The second phase involved a Focus Group Discussion (FGD) with MSMEs managers and operators. This interactive session was designed to identify specific transaction types, workflow preferences, and technical expectations, ensuring that the POS system could be tailored to suit each MSME's operational needs. The insights gathered informed the customization of software features and user interfaces.

In the third phase, necessary hardware and software tools were prepared and offered to the MSMEs partners. The main components included a thermal receipt printer, and a lightweight POS software application designed for small business use. The choice of tools prioritized affordability, simplicity, and offline functionality to match the capacity and context of the users.

The fourth phase consisted of a series of hands-on training sessions, divided into three sequential modules: (1) introduction to the POS hardware and software, (2) data entry and inventory setup, and (3) transaction processing and use of e-catalogs. These training modules were conducted on-site and included demonstrations, guided practice, and Q&A sessions. Participants were encouraged to simulate real transactions using their own product data.

Following the training, the fifth phase focused on performance evaluation and satisfaction assessment. A structured survey was distributed to the participating MSMEs to measure their level of satisfaction, perceived usability, and perceived impact of the POS system. The survey included both quantitative (Likert-scale) and qualitative (open-ended) questions. Additional training support was provided for participants who indicated difficulties or dissatisfaction.

The final phase involved monitoring for independent system usage, where the research team observed whether MSMEs partners were able to operate the POS system autonomously. Observations were made through the examination of e-catalog entries, transaction records, and periodic check-ins with each business owner. This phase served to validate long-term adoption and determine whether the digital transition was sustained post-training.

Data was collected throughout all phases in the form of survey responses, observation notes, FGD transcripts, and usage logs from the POS system. The data were then analyzed using a mixed-methods approach. Quantitative data

from surveys were processed using descriptive statistical analysis, while qualitative feedback and observations were coded thematically to identify patterns, challenges, and success factors related to the implementation process.

RESULTS AND DISCUSSIONS

The results of the community service program regarding the implementation of the Point of Sales application are explained in several parts, namely as follows.

Awareness and Engagement of MSMEs Partners

The initial outreach activity was conducted on August 3, 2022, in Purbalingga, involving a socialization session to introduce Point of Sale (POS) technology and identify potential MSMEs partners (see Table 1). This session not only served to disseminate knowledge but also marked the beginning of the engagement and selection process.

Table 1. List of MSMEs' Partners

No	Name of MSMEs' Partners
A	Mbabar Godhong Ecoprint
B	Keenan id
C	Risca Ecoprint
D	Ritifa Ecoprint
E	Ilva Ecoprint
F	Bude Al Ecoprint
G	Ran Dho Ayu
H	UMIQUNIQ

Needs Assessment through Focus Group Discussions

A subsequent Focus Group Discussion (FGD) was held to explore specific needs and expectations of the participating MSMEs (See Figure 2). Through interactive sharing sessions, participants expressed a strong preference for a mobile-based POS application to accommodate greater flexibility. The original POS system was desktop-based, requiring laptops for data entry, which posed a barrier for some businesses. The enthusiastic participation

in the FGD revealed a high level of interest in adopting a more accessible digital solution.



Figure 2. Socialization and FGD

Readiness Assessment and Tool Offering

Following the needs assessment, MSMEs were invited to complete a survey to evaluate their operational readiness for POS implementation. The survey included questions about product volume, stock levels, daily sales, staffing, internet access, and available hardware (see Table 2).

Table 2. List of Questions

No	Questions
1	Number of products
2	Number of stocks in the warehouse?
3	Number of sales per day?
4	Do you have a special employee for cashiers?
5	Do you have a special employee for warehousing?
6	Do you have an internet connection?
7	Do you have a laptop/computer/tablet?

Responses, summarized in Table 3, indicated that while most businesses lacked specialized staff for cashiering or warehousing, the majority had sufficient product volume, internet connectivity, and access to digital devices.

Table 3. Survey Results

	A	B	C	D	E	F	G	H
1	25-49	25-49	25-49	25-49	0-24	0-24	0-24	0-24
2	21-50	0-20	0-20	0-20	51-100	21-50	0-20	21-50
3	0-24	0-24	0-24	0-24	0-24	0-24	0-24	0-24

4	No	No	No	No	No	No	No	No
5	No	No	No	No	No	No	No	No
6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Training and Implementation of POS Application

The training phase began in October 2022, involving five selected MSMEs partners who agreed to proceed with direct implementation (see Table 4).

Table 4. Selected MSMEs Partners

No	Name of MSMEs' Partners
A	Mbabar Godhong Ecoprint
B	Keenan id
C	Ilva Ecoprint
D	Ran Dho Ayu
F	UMIQUNIQ

The training was delivered in three sessions: (1) introduction to hardware and updated mobile-friendly software, (2) product and stock data entry, and (3) cashier transactions and e-catalog operations. The initial sessions of Training 1 and 2 were conducted on the same day, where selected MSMEs partners were introduced to the supporting tools and the post-sale software, which had been developed into a mobile application.

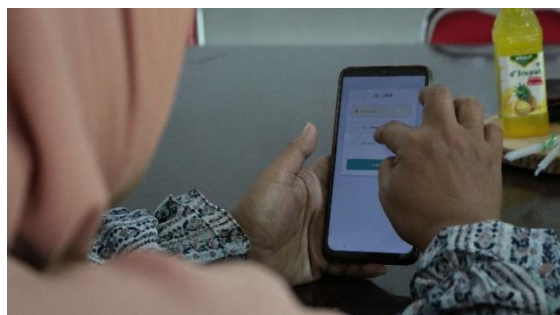


Figure 3. Participants were guided through logging into the system

After an explanation, the partners were asked to directly practice by logging into the post-sale application domain, which had been created with pre-configured accounts. They were

guided to access the post-sale application using Google Chrome. Once the partners successfully logged in using their respective accounts, they were trained on how to convert the post-sale application, accessed through Google Chrome, into a smartphone-installed app using PCA technology. The next session involved hands-on practice for entering product and stock data directly from their smartphones, as shown in Figure 4. Partners were asked to input product data first, followed by stock information as demonstrated in Figure 5.



Figure 4. MSMEs Partners Entering Data

Continuing from training 1 dan training 2, the final session focused on using the cashier transaction system and distributing the e-catalog. Partners were guided through conducting sales transactions via their smartphones, including printing sales receipts with an external printer and sending them via WhatsApp.



Figure 5. MSMEs partners attempted to process transactions.

Partner Satisfaction Evaluation

At the end of the training, a satisfaction survey was conducted. Feedback indicated that participants found the POS system highly beneficial in managing financial records and inventory with ease. Most respondents

appreciated the mobile accessibility, which allowed them to process transactions and generate receipts from their smartphones, improving both customer experience and internal tracking.

Monitoring of Independent Usage

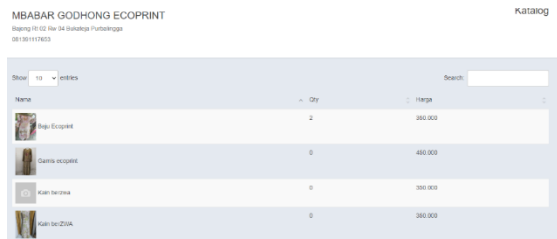


Figure 6. Interface of the E-Katalog

The final phase involved monitoring the partners’ continued use of the application. Observations were made by reviewing updates in their respective e-catalogs. One example is Mbabar Godhong Ecoprint, whose online catalog can be accessed at <https://mbabargodhong-ecoprint.tukupos.com/store>. Among the five trained MSMEs, four continued using the system regularly, as evidenced by the increase in product listings and stock updates compared to the initial training (see Table 5).

Table 5. Monitoring Results of MSMEs Partners

No	Name of MSMEs’ Partners	Monitoring Results
A	Mbabar Godhong Ecoprint	In Progress
B	Keenan id	In Progress
C	Ilva Ecoprint	Not in Progress
D	Ran Dho Ayu	In Progress
F	UMIQUINIQ	In Progress

The results of this study demonstrate that a context-specific, mobile-based Point of Sale (POS) application can significantly improve transaction management and inventory tracking among micro and small businesses. Compared to earlier findings that highlight the challenges MSMEs face in adopting digital tools (Suyadi et al., 2018; Linarti & Hadi, 2018), this study affirms that when technology is adapted to the operational realities of the users—such

as device availability and digital skills—adoption rates increase. The training process, combined with a mobile-friendly design and accessible interface, was key to encouraging self-sufficiency among users.

The study also aligns with the literature emphasizing the need for integrated solutions tailored to MSMEs environments, rather than fragmented, proprietary systems (Murdiani et al., 2020; Arsa & Nugraha, 2020). The feedback from the participating MSMEs suggests that flexibility, ease of access, and autonomy in data handling are among the top priorities for technology adoption. The use of Progressive Web App (PWA) technology to simulate mobile app behavior without requiring app store downloads proved to be a practical and efficient solution.

However, while four of the five MSMEs partners successfully demonstrated independent use of the POS system, one partner lagged in post-training engagement. This indicates that digital readiness is not uniform across MSMEs, and ongoing mentoring may be needed for certain users. This aligns with prior studies noting that digital adoption is influenced not only by system usability but also by organizational culture, user confidence, and follow-up support (Inderawati et al., 2021).

The implications of this research are both practical and theoretical. Practically, it offers a replicable model for implementing POS systems among MSMEs using open-source, customizable tools. Theoretically, it contributes to the growing body of knowledge on digital transformation in micro-enterprises by emphasizing the role of contextual adaptability and community-based implementation. Future research should explore long-term impact, scalability, and integration with broader digital ecosystems such as e-commerce platforms and financial services.

CONCLUSION

It can be concluded that the program successfully enhanced the partners' understanding and independence in using digital technology for transaction recording and inventory management. Participant enthusiasm was evident from the socialization stage to the training phase, with four out of five partners continuing to actively use the application based on monitoring their e-catalogs. However, this study has limitations, including a small sample size, a narrow geographic scope, and a lack of long-term analysis regarding the financial impact of using the system. Therefore, future research is recommended to involve more MSMEs partners from various sectors and regions, with an extended evaluation period, as well as the integration of the POS system with other digital platforms to create a more comprehensive and sustainable business ecosystem.

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