

Implementation of IPOS 4.0 for Entrepreneurship Learning for Environmental Sanitation Students

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ABSTRACT

The rapid development of digital technology has encouraged educational institutions and student cooperatives to adopt integrated financial management systems to improve transparency, accuracy, and operational efficiency. However, many campus-based cooperatives still rely on manual bookkeeping, which is prone to delays, inconsistencies, and limited financial analysis capacity. This study aims to analyze the effectiveness of implementing the IPOS PRO digital bookkeeping application at KOPMA Magetan Campus Environmental Sanitation, focusing on improvements in sales recording, inventory management, and profit-loss reporting. A participatory action research (PAR) design was employed, consisting of planning, acting, observing, and reflecting stages. Data were collected through direct observation, documentation of manual and digital financial reports, and evaluation of student performance during system operation. The results show that the implementation of IPOS PRO significantly enhanced the accuracy and speed of transaction recording, enabling real-time updates and reducing human error compared to manual methods. Inventory management became more transparent and synchronized, as stock levels were automatically updated with each transaction, minimizing discrepancies between physical and recorded stock. Profit and loss reporting also improved, with the system generating automated and more comprehensive financial summaries based on integrated sales, purchase, and stock data. Additionally, the use of IPOS PRO strengthened students' digital literacy and practical entrepreneurial skills, although several challenges remained, including difficulties in stock synchronization, inconsistent data input, and limited understanding of digital financial reports. In conclusion, the IPOS PRO application improves transaction accuracy, stock transparency, and financial reporting while enhancing students' digital literacy, although continuous training and technical support are still required.

Keywords: digital bookkeeping, IPOS PRO, inventory management, financial reporting, student cooperative, digital literacy

INTRODUCTION

The rapid acceleration of digital innovation in recent years has fundamentally reshaped the operational landscape of modern entrepreneurship, particularly in the areas of financial administration, inventory control, and business decision-making. Within small enterprises and student-managed cooperatives, manual bookkeeping practices remain prevalent despite their well-documented limitations. These traditional methods often rely heavily on handwritten records, fragmented documentation, and human memory, making them vulnerable to delays in transaction entry, transcription errors, mismatches between physical stock and recorded inventory, and difficulties in producing timely, structured, and analytically meaningful financial reports. Such constraints not only reduce the accuracy and reliability of financial data but also hinder transparency, accountability, and the ability of managers to make informed strategic decisions based on real-time business conditions [1].

As digital transformation becomes increasingly central to economic competitiveness, the adoption of integrated digital tools has emerged as a critical solution to these challenges. Point of Sale (POS) applications, in particular, have gained prominence for their ability to automate routine administrative tasks, streamline transaction processing, and provide comprehensive financial insights. IPOS PRO 4.0 represents one such digital platform designed to support end-to-end business operations, offering features such as automated sales and purchase recording, real-time stock monitoring, barcode-based inventory tracking, and instant generation of profit-and-loss statements. These capabilities not only reduce the burden of manual data entry but also enhance operational efficiency, minimize human error, and strengthen the digital literacy skills required for entrepreneurship in the contemporary digital economy. For university students, who are expected to master both managerial and technological competencies exposure to such systems is particularly valuable in preparing them for future professional environments [2].

At the Magetan Environmental Health Campus, the student cooperative KOPMA Kesling Jaya has adopted IPOS PRO as part of its initiative to modernize business operations and improve financial governance. This transition from manual to digital bookkeeping provides a unique opportunity to evaluate the practical benefits and challenges associated with implementing a digital POS system in a student-run business context. The cooperative's experience offers insights into how digital tools can enhance transaction accuracy, improve stock transparency, reduce discrepancies in financial reporting, and support more systematic and data-driven decision-making. Furthermore, assessing the implementation process allows for the identification of operational barriers, user adaptation issues, and areas where additional training or system refinement may be required to ensure sustainable digital integration within the cooperative's workflow [3].

The purpose of this study is to evaluate the efficiency of the IPOS PRO application in supporting the operational activities of KOPMA Kesling Jaya at the Diploma III Sanitation Study Program, Magetan Campus. Specifically, the study examines the accuracy of purchase and sales bookkeeping, the effectiveness of stock management, and the quality of profit-and-loss reporting generated through the IPOS PRO system [4].

METHODS

This study was conducted in 2024 at the Environmental Health Campus in Magetan, East Java, Indonesia, as part of an institutional initiative to strengthen students' digital entrepreneurship competencies. The research took place within the Environmental Sanitation Study Program, where entrepreneurship courses are integrated into the academic curriculum. The setting was selected because the program had recently introduced the IPOS PRO (IPOS 4.0) digital application as a learning tool to enhance students' understanding of business management and digital bookkeeping processes.

The study employed a descriptive action research design consisting of four iterative cycles—planning, acting, observing, and reflecting. This design was chosen to allow continuous improvement across cycles while enabling researchers to document changes in students' entrepreneurial performance as they engaged with the IPOS PRO application. Each cycle involved structured instructional activities, hands-on digital practice, and reflective evaluation to capture both the learning process and the development of entrepreneurial potential over time.

The research subjects were students enrolled in entrepreneurship courses within the Environmental Sanitation Study Program. Participants were selected using purposive sampling based on two criteria: (1) active enrollment in entrepreneurship-related coursework and (2) willingness to participate in the study and engage in repeated action-research cycles. These students served as both learners and active users of the IPOS PRO system, making them suitable for evaluating the application's pedagogical and entrepreneurial impact.

The study examined several key variables related to digital entrepreneurship performance. These included:

- 1) Sales transactions, measured through students' ability to record and process sales accurately within the IPOS PRO interface.
- 2) Purchasing activities, assessed by evaluating the completeness and correctness of purchase entries in the system.
- 3) Stock management, measured through the accuracy of inventory updates, alignment between digital records and simulated stock, and students' ability to track stock movements.
- 4) Profit-loss reporting, evaluated through the correctness of automatically generated financial reports and students' interpretation of these outputs.
- 5) Students' comprehension of digital entrepreneurship, measured using structured questionnaires assessing knowledge, confidence, and perceived usefulness of digital bookkeeping tools.

Data collection employed multiple techniques to ensure comprehensive documentation of the learning process. Observations were conducted during each action-research cycle to monitor students' engagement and performance while using the application. Questionnaires captured students' perceptions, understanding, and self-reported challenges. Documentation of digital transaction reports generated by IPOS PRO provided objective evidence of students' accuracy and consistency in performing business tasks.

Data analysis was carried out using descriptive methods. Quantitative findings were summarized in tables and graphs to illustrate patterns in transaction accuracy, stock management performance, and financial reporting outcomes across cycles. Qualitative observations and narrative descriptions were used to contextualize students' learning progress, identify recurring challenges, and highlight indicators of entrepreneurial development. Together, these analytical approaches provided a holistic understanding of how the IPOS PRO application supported the enhancement of digital entrepreneurship skills.

RESULTS

Planning

During the planning stage, the research team, together with KOPMA administrators and supervisors identified the initial conditions of the manual bookkeeping system, which frequently resulted in delays and inaccuracies in financial data. A digital transformation plan was subsequently developed using the IPOS PRO application. This plan included identifying key stakeholders, designing the program flow (socialization, training, and phased implementation), and developing standard operating procedures (SOPs) along with an activity schedule. This stage produced a comprehensive work plan and a transition timeline from manual to digital bookkeeping, which served as the foundation for program implementation.

Acting

The implementation phase began with program socialization for KOPMA administrators and students, followed by technical training on the use of the IPOS PRO application for recording sales, purchases, inventory, and profit-loss reports. During the initial phase, a dual system (manual and digital) was used to validate data consistency before transitioning fully to the digital system. Students were directly involved as application operators on a rotating basis, while lecturers and the support team provided supervision and technical assistance. All activities, including transaction outputs and digital reports were documented for evaluation in the subsequent phase.

Observing

Table 1 present the manual purchase report and the digital purchase report generated using the IPOS PRO application. The figure shows that students are capable of entering customer data, selecting products, and printing transaction receipts. However, some students still require guidance, particularly regarding application speed and navigation of the transaction menu. Table 2 illustrates the bookkeeping process prior to the use of the IPOS PRO application. Sales records were maintained manually, which often resulted in delays in financial reporting, difficulties in stock tracking, and inconsistencies in sales documentation. The digital sales bookkeeping process after the implementation of IPOS PRO. Transaction recording is conducted digitally and in real time. The system generates detailed reports, including per-transaction sales, inventory movements, and automated financial summaries. The manual stock recording system used at the Magetan Campus Environmental Sanitation Cooperative. The manual system only recorded the number of incoming and outgoing items without detailed transaction logs or automatic synchronization with sales and purchase data. The stock bookkeeping process after the implementation of IPOS PRO. Stock updates are more accurate and integrated with every sales and purchase transaction. The system automatically updates stock levels in real time, minimizing discrepancies between records and physical inventory, increasing efficiency, and reducing the potential for human error.

Table 3 shows the manual profit and loss reporting system before the implementation of IPOS PRO. Manual reports typically contained only simple summaries of total sales, total purchases, and estimated profits. The digital profit and loss reporting process after using IPOS PRO. The

Table 1. Manual purchase report at KOPMA Magetan Campus Environmental Sanitation

No	Date of purchase	Amount of money (IDR)
1	Monday, 01 January 2024	350,000
2	Monday, 15 January 2024	250,000
3	Monday, 29 January 2024	300,000
4	Monday, 05 February 2024	340,000
5	Monday, 19 February 2024	420,000
6	Friday, 08 March 2024	260,000
7	Friday, 22 March 2024	350,000
8	Monday, 08 April 2024	430,000
9	Monday, 22 April 2024	460,000

Table 2. Manual sales report at KOPMA Magetan Campus Environmental Sanitation

No	Month	Amount of money (IDR)
1	January	954,000
2	February	796,000
3	March	653,000
4	April	956,000

Table 3. Manual Profit and Loss Report at KOPMA Magetan Campus Environmental Sanitation

No	Month	Purchase (IDR)	Sales (IDR)	Gross profit (IDR)	Capital goods (IDR)
1	January	900,000	1,253,000	353,000	1,025,000
2	February	780,000	1,134,000	354,000	905,000
3	March	610,000	1,341,000	731,000	735,000
4	April	790,000	1,526,000	736,000	915,000

system integrates sales, purchase, and stock movement data to automatically generate detailed profit and loss reports, including income, expenses, remaining stock, and net profit.

Reflecting

The reflection phase was conducted after the planning, implementation, and observation stages of using the IPOS PRO application at the Magetan Campus Environmental Sanitation Cooperative (KOPMA). This phase aimed to evaluate the overall process, identify successes and challenges, and formulate recommendations for program sustainability. Based on observations, the implementation of the IPOS PRO application significantly improved the accuracy and speed of transaction recording, facilitated real-time inventory management, and produced more systematic profit and loss reports compared to manual bookkeeping. Students also gained practical experience in digital entrepreneurship, which is highly relevant to current business demands.

DISCUSSION

The findings of this study indicate that the implementation of the IPOS PRO application at KOPMA Magetan Campus Environmental Sanitation substantially enhanced the effectiveness of bookkeeping across several key domains, including sales documentation, inventory management, and profit-loss reporting, when compared to traditional manual methods. These improvements reflect not only the technical advantages of digital systems but also their pedagogical value in strengthening students' digital entrepreneurship competencies. A more detailed explanation of these findings, supported by comparisons with previous studies, is presented below.

First, the adoption of the IPOS PRO application demonstrated a marked improvement in the accuracy, consistency, and speed of transaction recording. Digital systems enable real-time updates of sales and purchase transactions, thereby minimizing delays and reducing the likelihood of human error—issues that are commonly encountered in manual bookkeeping systems. This aligns with previous research showing that the integration of digital bookkeeping tools among micro, small, and medium enterprises (MSMEs) significantly enhances financial accuracy and operational efficiency, ultimately contributing to increased business revenue and sustainability [7–9]. The real-time nature of digital recording also supports more responsive decision-making, as financial data can be accessed and analyzed without the temporal gaps inherent in manual systems.

Second, the use of IPOS PRO was found to greatly improve students' understanding and monitoring of inventory. The synchronization between physical stock and digital records provides a level of transparency and accuracy that manual methods cannot achieve. This is particularly important in cooperative-based business environments, where stock discrepancies can lead to financial losses and misinterpretation of business performance. Recent studies emphasize that digital transformation in inventory management plays a pivotal role in enabling just-in-time stock practices, reducing waste, and supporting data-driven decision-making processes [10,11]. The IPOS PRO system, by automatically updating stock levels with each transaction, helps prevent stock mismatches and ensures that inventory data remains current and reliable.

Third, beyond transaction and inventory recording, IPOS PRO offers a more comprehensive and integrated profit-loss reporting feature. The application automatically calculates financial outcomes based on recorded sales, purchases, and stock movements, resulting in more accurate and detailed financial evaluations. This is consistent with previous research demonstrating that digital bookkeeping applications enhance users' understanding of cash flow, financial statements, and overall business performance by providing structured and automated financial summaries [12–14]. Such features are particularly beneficial for students, as they provide hands-on exposure to financial management practices that mirror real-world business operations.

However, the successful implementation of IPOS PRO is also influenced by students' levels of digital literacy. Students with higher digital literacy were observed to adapt more quickly to the system, navigate its features more effectively, and produce more accurate digital records. This observation is supported by studies showing that digital literacy and entrepreneurship education significantly influence young people's entrepreneurial performance, technological adaptability, and business decision-making skills [15–18]. Thus, while the application itself offers substantial benefits, its optimal use depends on the users' ability to understand and operate digital tools proficiently.

Despite these advantages, several challenges were identified during the implementation process. Some students experienced difficulties synchronizing stock data, inconsistencies in data input, and limited comprehension of digital financial reports. These challenges mirror findings from previous research indicating that system quality, technical support, and clarity of application features are critical determinants of successful Point-of-Sale (POS) system adoption in small and medium-sized enterprises [19,20]. Without adequate training and ongoing support, users may struggle to fully utilize the capabilities of digital systems, potentially limiting the effectiveness of implementation.

Overall, the findings suggest that the implementation of IPOS PRO not only provides tangible benefits in terms of transaction efficiency, inventory transparency, and financial reporting accuracy but also contributes to the enhancement of students' digital literacy and entrepreneurial readiness. Nevertheless, these benefits must be supported by continuous technical assistance, structured training, and improvements in system usability to ensure long-term sustainability and broader adoption.

CONCLUSION

The implementation of the IPOS PRO application has been proven to improve transaction accuracy, stock management transparency, and the preparation of more comprehensive financial reports. It also enhances students' digital literacy in entrepreneurship, although technical challenges remain in stock synchronization, data input, and interpretation of digital reports. Strengthening digital literacy training and providing continuous technical support are necessary to optimize the benefits of IPOS PRO. Additionally, developing more user-friendly features and integrating digital entrepreneurship learning modules are recommended to improve the effectiveness and sustainability of its implementation in both academic and practical settings.

Ethical consideration, competing interest and source of funding

- Ethical considerations were upheld throughout the study. Participation was voluntary, and informed consent was obtained from all students prior to data collection. Confidentiality of participants' identities and digital records was maintained, and all data were used solely for academic and research purposes. The study adhered to institutional ethical guidelines, ensuring respect for participants' autonomy, privacy, and well-being during the research process
- There is no conflict of interest related to this publication.
- Source of funding is authors.

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