



Strengthening Digital Financial Literacy and Perpetual Inventory Recording for BUMDes Tumang Managers in Cepogo, Boyolali

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ABSTRACT

Background: BUMDes Tumang Cepogo operates several business units, including waste-management services, financial services, logistics, and maggot cultivation. However, its managers still face limitations in financial literacy, inventory recording, and cost-based pricing, which affect the accuracy of financial information and business decision-making.

Contribution: This community service program aimed to strengthen the digital financial literacy of BUMDes managers and introduce perpetual inventory recording through a Microsoft Excel-based template. The program also supported managers in identifying production-cost components and developing more accurate pricing decisions for maggot pellet products.

Method: The program was conducted over four months in 2026 and involved five BUMDes managers. The activities included a needs assessment, development of a Microsoft Excel template, education on digital financial literacy and fraud prevention, training in recording purchase and sales transactions, simulations of stock cards and production-cost calculations, and evaluation through observation and practical assignments. Because no pre-test or post-test was administered, the outcomes were reported descriptively by comparing conditions before and after the mentoring program.

Results: The participants were able to simulate transaction entries in Microsoft Excel, interpret changes in inventory balances, and prepare more structured production-cost estimates. The initial production cost of maggot pellets, calculated based on material and energy costs, was IDR 7,452/kg. After simulated allocations for labor, equipment depreciation, packaging, marketing, and transportation were included, the estimated full production cost increased to IDR 11,252/kg. At a selling price of IDR 12,000/kg, the estimated operating margin was only approximately 6.23%, indicating the need to reassess production scale, cost efficiency, and selling prices.

Conclusion: The program improved participants' ability to perform simulated digital financial recording, monitor inventory balances, and calculate production costs more systematically. However, the perpetual inventory method remained at the practice stage and

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had not yet been routinely implemented in daily operations. Further mentoring is therefore required to ensure consistent use of the template and to enable the resulting data to support BUMDes managerial decision-making.

INTRODUCTION

Village-Owned Enterprises (Badan Usaha Milik Desa, BUMDes) are local economic institutions that manage assets, services, and local potential to generate economic benefits for rural communities. BUMDes performance is shaped not only by the existence of business units but also by managers' ability to separate transactions, maintain orderly supporting documents, compile cost information, and use financial data in decision-making [1]. These challenges become increasingly important when a BUMDes operates several business units with different transaction characteristics.

The need to strengthen financial literacy in rural areas remains significant. The 2025 National Survey of Financial Literacy and Inclusion showed that the financial literacy index in rural areas was lower than in urban areas. This finding underscores that access to financial services must be accompanied by the skills to understand benefits, costs, risks, security, and transaction recording [2]. At the enterprise level, the combination of financial and technological literacy supports sustainability, sound decision-making, and the ability to manage business information [3–5].

Cepogo Village, Boyolali Regency, has economic potential in metal crafts, livestock farming, highland agriculture, tourism, and waste management. BUMDes Tumang Cepogo has developed waste collection and sorting services, BRILink financial services, logistics, community radio, and Black Soldier Fly (BSF) larvae cultivation. The waste-management unit serves approximately 750 members, while organic waste is used as feed for BSF larvae. This potential creates opportunities to diversify products into fresh larvae, dried larvae, and feed pellets.

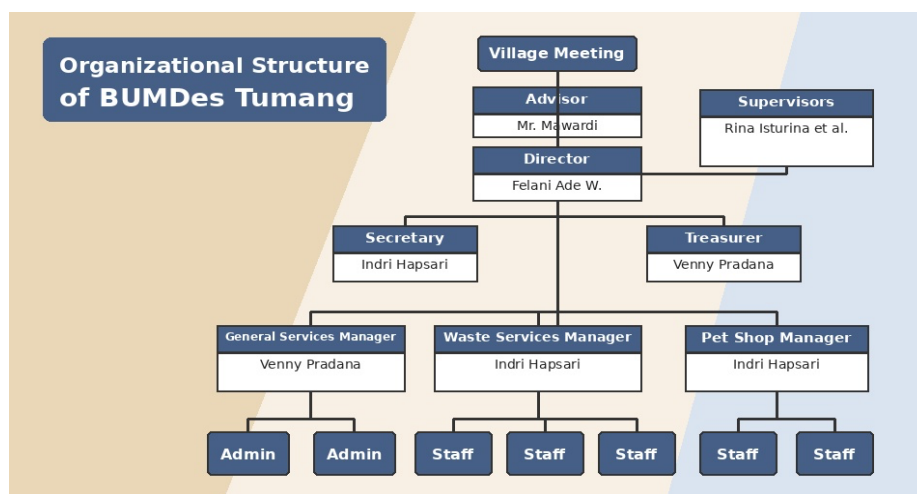


Figure 1. Organizational structure of BUMDes Tumang Cepogo

Figure 1 shows the division of responsibilities among the supervisory board, director, secretary, treasurer, and unit managers. This division of functions requires a consistent flow of

information so that transactions from each unit can be consolidated and accounted for. However, the initial assessment showed that inventory recording and cost calculation in the business units were still basic, were not linked to stock cards, and were not routinely used as the basis for pricing.



Figure 2. Facilities and waste-management processes at BUMDes Tumang Cepogo

Figure 2 shows the waste-management and sorting facilities. The high volume of activities generates data on receipts, material usage, products, and sales that need to be recorded periodically. Without structured records, discrepancies between accounting records and physical inventory are difficult to trace.



Figure 3. Sorting organic materials and cultivating maggots as a zero-waste business unit

Microsoft Excel was selected because it is readily available, accessible, does not require a subscription fee, and can be adapted to the managers' capabilities. Studies on digital bookkeeping indicate that simple tools such as spreadsheets can improve recording consistency, separate cost components, and present financial information when supported by appropriate templates and mentoring [6,7]. In this program, digitalization did not refer to developing a complex information system, but to designing a simple recording template that links item data, purchases, sales, inventory balances, and production-cost calculations.

Based on these conditions, the program aimed to: (1) improve managers' understanding of digital financial literacy and the risks associated with financial services; (2) introduce perpetual inventory recording through Microsoft Excel; (3) train managers to identify cost components and prepare a production-cost simulation for maggot pellets; and (4) establish a basis for follow-up toward routine recordkeeping. The program's main contribution lies in integrating financial education, a low-cost digital template, and business analysis based on local potential.

IMPLEMENTATION METHOD

The program was conducted at BUMDes Tumang in Cepogo Village, Boyolali Regency, over four months in 2026. The participants were five managers involved in the management and recordkeeping of the business units. A participatory education approach was used through short lectures, case discussions, demonstrations, guided exercises, and mentoring.

Table 1. Program stages, activities, and outputs

Stage	Main activities	Tools/Instruments	Outputs
Preparation and assessment	Securing permission, interviews, observation of recording practices, and needs identification	Interview guide and observation notes	Map of problems and training needs
Template design	Development of a Microsoft Excel template and sample transactions	Laptop, Microsoft Excel, item data, and simulated transactions	Templates for product master data, purchases, sales, stock cards, and production-cost calculation
Training	Digital financial literacy, transaction security, and fraud prevention	Presentation materials and case examples	Basic understanding of safe digital financial services
Practice	Entering purchases and sales, updating inventory, and calculating production costs	Perpetual inventory Excel template	Simulation of transaction recording and inventory balances
Evaluation	Observation of practice, review of worksheets, and reflective discussion	Observation checklist and practical assignment	Descriptive comparison of baseline conditions and final achievements
Handover and follow-up	Handover of the template and implementation recommendations	Excel file and brief guide	Plan for gradual use and continued mentoring

Digital tools applied

The Microsoft Excel template was designed with a simple workflow. The workbook consisted of: (1) instructions for use; (2) product master data containing item codes, item names, units, and prices; (3) purchases; (4) sales; (5) stock cards; (6) an inventory summary; and (7) a production-cost simulation. Basic formulas were used to total incoming and outgoing transactions and display inventory balances. Participants were not required to understand programming or complex formulas; the training focused on accurate data entry, consistent item codes, and verification of balances against supporting transaction documents.

Workflow for Using the Perpetual Inventory Microsoft Excel Template

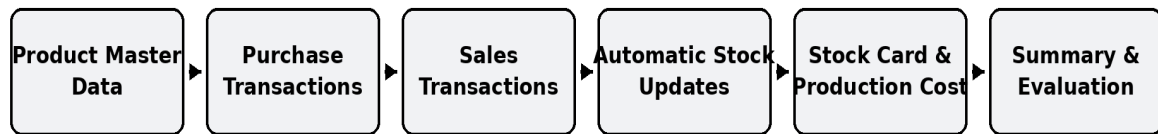


Figure 4. Workflow for using the perpetual inventory Microsoft Excel template

Under the perpetual method, each purchase increases the inventory balance, whereas each sale or use of materials decreases it. Inventory information can therefore be viewed immediately after a transaction is recorded. The workflow in Figure 4 also links inventory data to production-cost calculations so that pricing is not based solely on estimates.

Evaluation and success indicators

The evaluation did not use a pre-test or post-test. Accordingly, this article does not claim percentage-based improvements. Evaluation was conducted through process observation, review of practical assignments, and a comparison of conditions before and after mentoring based on the operational indicators in Table 2. An outcome was classified as “achieved in simulation” when participants could complete the required steps with guidance and obtain correct results in the worksheet. Routine implementation in BUMDes operations was not used as a success indicator because, at the end of the program, the template was still being used only for practice.

Table 2. Program evaluation indicators

Indicator	Evaluation method	Achievement criteria
Understanding of digital financial literacy	Case discussion and question-and-answer session	Able to explain benefits, costs, risks, and warning signs of unsafe services
Use of the Excel template	Observation of practical assignments	Able to open the template, select worksheets, and enter data in the appropriate columns
Perpetual inventory recording	Review of simulated transactions	Purchases increase stock and sales decrease stock without producing illogical balances
Production-cost calculation	Review of the cost worksheet	Able to identify materials, energy, labor, depreciation, packaging, marketing, and transportation
Readiness for implementation	Reflective discussion	A template and preliminary task assignments are available; routine use still requires mentoring

RESULTS AND DISCUSSION

1. Needs assessment and partner coordination

Initial coordination was conducted with the village government and BUMDes managers to agree on the program focus. The assessment identified three main problems: transaction

recording was inconsistent across units, inventory was not tracked through stock cards, and maggot product prices were still based primarily on estimated material costs. Managers also needed greater awareness of digital financial-service security because the BUMDes processes payment transactions and works with external parties.



Figure 5. Coordination, brainstorming, and joint problem mapping with the partner

The documentation in Figure 5 not only shows the implementation of the activity but also illustrates the problem-validation process. Information provided by the managers was used to determine the template structure, sample transactions, and cost components relevant to the maggot unit.

2. Digital financial literacy and Microsoft Excel training

The financial literacy material covered the separation of business and personal finances, the importance of transaction evidence, the use of financial information in decision-making, verification of service-provider legality, personal-data protection, and warning signs of fraud. This approach was relevant because digital financial literacy involves not only the ability to use applications but also the ability to assess risks and make safe decisions [4,8].

During the practical session, participants used Microsoft Excel to complete product master data, record purchases, record sales, and read balances on stock cards. Figure 6 shows the use of laptops and spreadsheet worksheets during the mentoring session. Excel enabled the partner to begin with technology that was already available before considering more complex accounting applications.



Figure 6. Practice in financial and inventory recording using Microsoft Excel

The observations showed that participants were able to follow guided simulations and understand the relationship between transaction entries and changes in inventory balances. This achievement cannot yet be interpreted as full implementation because the template had not been used routinely for daily transactions. The finding highlights the importance of gradual adoption: introduction, practice, guided use, and finally independent use. Simple digital bookkeeping is more likely to be accepted when the tool matches users' needs and does not impose an excessive administrative burden [6,7].

3. Comparison of conditions before and after mentoring

Table 3. Changes in conditions based on observations and practical assignments

Aspect	Initial condition	Achievement after mentoring	Status
Transaction recording	Recorded simply and inconsistently across units	An Excel format with standardized columns and codes is available and has been tested using simulated transactions	Achieved in simulation

Aspect	Initial condition	Achievement after mentoring	Status
Inventory	No stock card was available to update the balance for each transaction	Participants can enter purchases and sales and read inventory balances	Achieved in simulation
Pricing	Maggot product prices were determined based on estimates	Material, energy, and non-material cost components began to be identified in the production-cost worksheet	Achieved in simulation
Digital financial literacy	Understanding of transaction security and fraud risks was not yet structured	Participants can discuss service legality, data security, and warning signs of risky transactions	Achieved descriptively
Operational implementation	Digital perpetual inventory recording had not been used	The template is available, but its use remains at the practice stage and is not yet routine	Not fully achieved

Table 3 shows that the changes demonstrable at the end of the program were the availability of a tool and the ability to perform simulations, rather than an increase in quantitative scores. This presentation was chosen to avoid claims unsupported by pre-test and post-test instruments. Medium-term impacts should be measured through consistent use of the template, agreement between recorded balances and physical stock, reporting accuracy, and the use of data in management meetings.

4. Production-cost simulation and preliminary feasibility of maggot pellets

The production-cost analysis was conducted to help managers shift from estimate-based pricing to calculations based on cost components. Prices for maggots, rice bran, and corn, as well as the selling-price range, were obtained through market surveys, interviews with managers, and checks with local shops or suppliers. The values in Table 4 represent an estimate for one formulation batch that produces approximately 1.55 kg of pellets.

Table 4. Estimated material and energy costs for one batch of maggot-pellet formulation

Component	Quantity	Price basis	Total
Fresh maggots	0.8 kg	Rp 6,000/kg	Rp 4,800
Rice bran	0.7 kg	Rp 6,000/kg	Rp 4,200
Shelled corn	0.15 kg	Rp 7,000/kg	Rp 1,050
Electricity/oven and pellet machine	–	Estimated use	Rp 1,500
Total material and energy costs	Output ±1.55 kg	–	Rp 11,550

Based on Table 4, the initial material and energy cost was $\text{Rp } 11,550 \div 1.55 \text{ kg} = \text{Rp } 7,452/\text{kg}$. This figure cannot yet be considered the full production cost because it excludes labor,

equipment depreciation, packaging, marketing, and transportation. To illustrate the effect of previously unrecorded costs, a conservative scenario was prepared in Table 5. The additional costs are simulation assumptions and must be validated using actual production records.

Table 5. Simulation of full production cost per kilogram

Cost component	Estimated cost per kg	Description
Materials and energy	Rp 7,452	Result of the formulation calculation
Labor	Rp 1,500	Allocation of production labor
Machine/oven depreciation	Rp 500	Allocation of asset use per kg
Packaging	Rp 1,000	Simple pouch/label
Marketing	Rp 300	Sales promotion and communication
Transportation	Rp 500	Allocation for local procurement/distribution
Estimated full production cost	Rp 11,252	Sum of all components

Table 6. Sensitivity of selling price to estimated margin

Selling price/kg	Full production cost/kg	Estimated profit/kg	Margin on sales
Rp 12,000	Rp 11,252	Rp 748	6.23%
Rp 13,000	Rp 11,252	Rp 1,748	13.45%
Rp 14,000	Rp 11,252	Rp 2,748	19.63%

The sensitivity analysis shows that the 38% margin reported in the initial manuscript reflected only the difference between the selling price and material-and-energy costs; it was therefore overly optimistic when described as net profit. After the additional costs were included, a price of Rp 12,000/kg generated only a very narrow margin. BUMDes should consider a selling price of Rp 13,000–Rp 14,000/kg, purchasing materials in larger quantities, improving drying-process efficiency, using more economical packaging, or increasing the production scale. Pricing decisions must still consider nutritional quality, farmers' purchasing power, and competitors' feed prices.

5. Program limitations and sustainability

The program had three limitations. First, it involved only five participants, so the results cannot be generalized to all BUMDes. Second, there was no pre-test or post-test; the impacts were reported based on observation and practical work. Third, the perpetual inventory template was used only during training, while the non-material cost data in the production-cost simulation were not derived from actual production records. Follow-up activities should therefore include an operational trial of at least three months, reconciliation of physical inventory with stock cards, recording of labor time and equipment use, and evaluation of production-cost accuracy.

Sustainability can be supported by appointing one recordkeeping administrator, backing up files regularly, using consistent item codes, and conducting monthly reviews by the treasurer

or director. Once Excel-based practices are stable, BUMDes can assess the need to migrate to an accounting application that provides access controls, audit trails, and cross-unit reporting. This gradual approach is important to ensure that digitalization genuinely strengthens governance rather than merely replacing manual ledgers with digital files.

CONCLUSION

The four-month community service program conducted in 2026 involved five BUMDes Tumang Cepogo managers and produced a Microsoft Excel template for simulating perpetual inventory recording and calculating the production cost of maggot pellets. Based on observations and practical assignments, participants were able to follow the purchase-and-sales data-entry workflow, interpret changes in inventory balances, identify cost components, and discuss the risks associated with digital financial services. These achievements remained at the simulation stage and did not yet demonstrate routine implementation. The cost analysis showed an initial material and energy cost of Rp 7,452/kg, while the estimated full production cost, based on the additional-cost scenario, was Rp 11,252/kg. At a selling price of Rp 12,000/kg, the estimated margin was only 6.23%; therefore, managers need to validate actual costs, improve efficiency, and review the selling price. Further mentoring is required to ensure consistent use of the template, reconciliation of physical stock, and use of financial data in BUMDes decision-making.

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