



Single-Operator Cashier for Efficiency: Designing a Point of Sale and Inventory Management System for the Warkop Hidayah MSME in Tuban

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ABSTRACT

Purpose: This study designs an inventory management model and a Point of Sale (POS) cashier system for Warkop Hidayah, a micro-enterprise coffee stall in Tuban, East Java, in order to address weak inventory control and the absence of transaction records, which prevent accurate sales tracking and hamper operational effectiveness.

Method: The study combines a qualitative case study with Design Science Research Methodology (DSRM) and a Waterfall System Development Life Cycle (SDLC). Data were collected through interviews with the owner, who runs the business alone, direct observation, and documentation of prototype screenshots and system exports. The sales and payment processes were modelled with a Logical Model, a Level 0 Data Flow Diagram (DFD) with process descriptions, decision tables, decision trees, and Business Process Model and Notation (BPMN), and a web prototype was built with JavaScript, HTML, and CSS.

Findings: Warkop Hidayah kept no records of its business activities; the owner handles all operations and transactions without employees, purchase receipts are discarded, and QRIS receipts go into the owner's personal account. The models specify product and order management, payment processing (cash and non-cash via QRIS or transfer), automatic stock deduction, and receipts and reports. The prototype already shows numbered transaction records, cash payment with change calculation, automatic stock deduction with a low-stock indicator, a dashboard, and Excel export, using test data; QRIS and transfer flows, printing, access control, and full SAK EMKM statements are still under development.

Implication: The design offers a practical, low-cost path for single-operator micro-enterprises to move from memory-based operation to traceable transaction and stock records that can later support SAK EMKM-based financial statements, while showing that some controls, such as separating business and personal accounts, depend on the owner's decisions rather than on software. The design also supports SDG 5 (gender equality) and SDG 8 (decent work and economic growth) by giving a woman-owned micro-enterprise a low-cost digital recording tool.

Originality: The study combines a comprehensive set of visual modelling tools (Logical Model, DFD, decision tables, decision trees, and BPMN) with an AI-assisted web development toolchain to design a POS system tailored to an independently managed micro culinary business, and it distinguishes explicitly between what has been modelled, what has been designed, and what has been implemented.

Keywords: point of sale, POS system, SAK EMKM, coffee stall MSME, SDG 5, SDG 8.

JEL Classification: L26, L83, M15, M41.

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1. INTRODUCTION

Micro, small, and medium enterprises (MSMEs) are one of the sectors that play an important role in supporting economic activity in Indonesia. Their sustainability is influenced by the ability of owners to manage resources and financial information effectively. However, most micro-entrepreneurs in various regions still face fundamental challenges in administration, in recording daily sales, and in monitoring inventory, all of which are still carried out manually (Perpatih et al., 2025). These conditions often cause discrepancies between physical and financial records and a high risk of human error. Accounting systems tailored to the characteristics of the business can improve recording accuracy and reduce errors in manual processes (Aprilia et al., 2025), and SAK EMKM can serve as the reference for preparing MSME financial information (Ayem et al., 2024; Handayani & Suryaningrum, 2021).

Similar problems are faced by micro-enterprises such as Warkop Hidayah, a coffee stall located in Tuban, East Java. Warkop Hidayah is a culinary business that sells packaged drinks, snacks, and a popular dish known as buffet-style *seblak*. It has a fairly high volume of daily transactions, and its varied products with fast inventory turnover call for an orderly recording system. However, Warkop Hidayah has never kept any records, and all of its operations are handled by the owner alone, without employees. This makes it difficult for the owner to monitor stock availability in real time, to control cash inflows and outflows, and to evaluate sales performance objectively.

The case also relates to the Sustainable Development Goals (SDGs) adopted by the United Nations (2015). Warkop Hidayah is owned and run single-handedly by a woman from her home, and its customers already pay mostly through QRIS. Providing such an owner with an affordable digital recording tool is in line with SDG 5 (gender equality), in particular target 5.5 on women's full and equal participation in economic life and target 5.b on the use of enabling technology to promote the empowerment of women. Orderly transaction and stock records are also a precondition for the formalisation and growth of micro-enterprises and for their access to financial services, which are the concerns of targets 8.3 and 8.10 of SDG 8 (decent work and economic growth). Designing a system that a single operator can actually use, rather than one that presumes a team of staff, is therefore relevant both to the business and to these broader goals.

To address these problems, a Point of Sale (POS) cashier system can be used to record sales and cash receipts in a more structured way and to strengthen control over cash receipts (Chusnia et al., 2025). A POS system not only records cash and non-cash payments (such as QRIS and transfers) but can also update inventory data automatically each time a sale occurs. To ensure that the design can be implemented properly and fits operational needs, a systematic modelling approach is required (Suryaningrum, 2024; Aprilia et al., 2025). This includes a Logical Model to map data and processes, a Data Flow Diagram (DFD) to show the movement of data between entities, decision tables and decision trees to specify the rules for product availability and payment validation, and Business Process Model and Notation (BPMN) to visualise the cross-actor workflow (Nuzulita et al., 2020; Ismanto et al., 2020; Perpatih et al., 2025).

This study focuses on designing a POS cashier system and inventory management using a Logical Model, DFD, decision tables, decision trees, and BPMN tailored to the actual conditions at Warkop Hidayah in Tuban. The system is intended to accommodate independent daily transaction recording, to control the movement of merchandise, and to present concise sales summaries for the owner. The main contribution is an applicable operational blueprint that can be used directly without the complexity of formal accounting software. The scope is limited to the recording of sales, inventory management, and the payment flow handled by the owner, and excludes taxation.

2. LITERATURE REVIEW

2.1 Literature Review and Research Focus

An accounting information system (AIS) is an integrated structure that collects, records, stores, and processes financial transaction data to produce information relevant to operational and managerial decisions (Abubakar et al., 2025; Kurniawan & Juniarto, 2022). In MSMEs, particularly in the culinary sector, an AIS plays a crucial role in controlling daily cash flows and managing raw-material inventory so as to avoid leakage and operational waste (Puspitawati et al., 2024; Rosmayati et al., 2023). Contingency theory in management accounting explains that the effectiveness of an AIS design depends on the dynamics of the external business environment and on the internal capabilities of the entity (Habayahan et al., 2025). For informal micro-enterprises with a simple organisational structure, an AIS therefore cannot impose a rigid and complex framework; it must be adaptive and flexible and must prioritise ease of use for the owner (Novita & Wulanditya, 2020; Simanjuntak et al., 2025).

In micro culinary businesses, the integration of the point of sale at the cashier's desk with real-time inventory management is a key determinant of operational efficiency. Puspitawati et al. (2024) and Natividad et al. (2024) argue that the quality of management accounting information systems is closely related to the efficiency of inventory management in food and beverage businesses. When a sale is processed, an integrated system automatically deducts the corresponding items from stock, so that the cashier has accurate visibility of stock at the counter. This reduces the risk of sudden stockouts and prevents order cancellations caused by uncertainty about what is available (Natividad et al., 2024; Simanjuntak et al., 2025). Furthermore, digital recording has been shown to eliminate classic weaknesses of micro-enterprises, such as lost receipts, overlapping records, and the mixing of personal and business cash (Faradila et al., 2025; Itan & Meiviana, 2024; Novita & Wulanditya, 2020).

Developing an effective accounting system for micro-enterprises requires a structured approach to logical modelling and system engineering. Tools such as the Waterfall System Development Life Cycle (SDLC), BPMN, DFD, and decision trees can map the flow of transaction documents, the relationships between actors, and business logic precisely before coding begins (Kurniawan & Juniarto, 2022; Ratnawati & Rahayu, 2021). Studies of technology adoption in regional culinary MSMEs show that acceptance by first-time digital users is influenced more by perceived value, habit, and the simplicity of the user interface than by the richness of features (Murti & Suzan, 2026; Yanto et al., 2025). For micro-enterprises in regions such as Tuban Regency, training and assistance in the use of affordable applied systems are key strategies for transforming traditional financial management into digital management (Hariyanti et al., 2024). Web-based POS systems for MSMEs have also been shown to automate sales recording and reporting (Sudrajat & Aryanny, 2023) and to support inventory management and financial performance (Putri et al., 2025).

Based on this theoretical review and previous studies, the research focus is formulated as follows.

RF: How can a Point-of-Sale cashier system integrated with inventory management be designed and prototyped to address the weaknesses of memory-based recording and stockouts at the Warkop Hidayah MSME in Tuban, and which of its designed functions have been implemented?

The conceptual framework of this design-oriented qualitative study describes how the operational problems at Warkop Hidayah are resolved. The initial condition of the partner, characterised by memory-based transaction recording, discarded purchase receipts, and unclear stock balances, is addressed through the Waterfall SDLC and logical modelling (BPMN, Level 0 DFD, decision trees, and decision tables). The process continues with a web-based toolchain (Gemini, Google Stitch, Antigravity, GitHub, and Vercel) to produce an integrated POS and stock control application. The synthesis of these conceptual relationships and the design flow is presented in Figure 1.

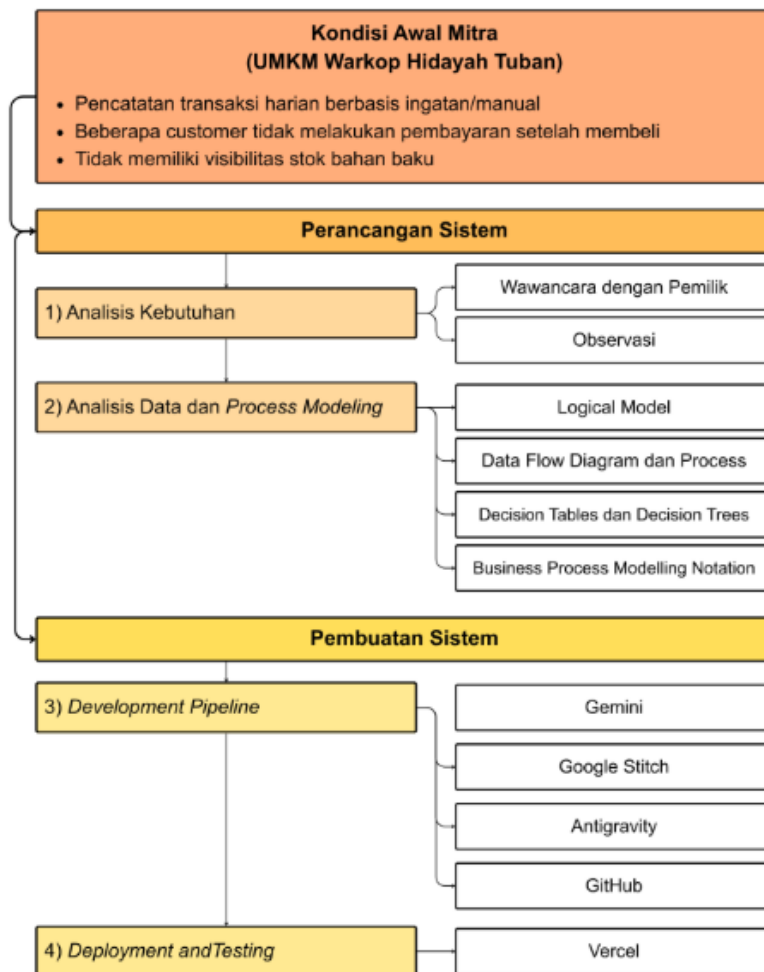


Figure 1. Research Framework

Source: Compiled by the authors (2026) – in Bahasa Indonesia and English

The first stage identifies the partner's initial condition. At this stage, several operational problems were found: daily transactions are recorded from memory or not at all, some customers take snacks without paying (revenue leakage), and there is no visibility of the remaining stock of materials.

Based on these problems, the research proceeds to the system design stage, which consists of two steps. The first is requirements analysis, for which data were collected through interviews with the owner and field observation. The second is data analysis and process modelling, in which the system's mapping and logic are designed using a Logical Model, a DFD with process descriptions, decision tables and decision trees, and BPMN.

The final stage is system construction, which focuses on the technical execution of the software. It begins with a development pipeline integrated with Gemini, Google Stitch, and Antigravity and supported by a GitHub repository. Once the application is built, it is deployed and tested using the Vercel hosting service to ensure that the system can run and be used properly.

3. RESEARCH METHOD

3.1 Research Design

This study uses a qualitative approach within the Design Science Research Methodology (DSRM) framework, integrated with the Waterfall System Development Life Cycle (SDLC) (Peffer et al., 2007; Ratnawati & Rahayu, 2021). A qualitative case study was chosen to explore in depth the natural setting,

business flow, and actual operational constraints faced by the partner (Sugiyono, 2019; Yin, 2018). The DSRM framework and the Waterfall SDLC were used as structured guides for designing, building, testing, and documenting a technological artefact in the form of a web-based accounting information system (Peffer et al., 2007; Simanjuntak et al., 2025). The Waterfall design was carried out sequentially through four main stages: (1) needs analysis, (2) logical system modelling, (3) system engineering and cloud deployment, and (4) operational testing and usability evaluation (Kurniawan & Juniarto, 2022). At the time of writing, stages (1) to (3) had been carried out, and stage (4) was scheduled but not yet completed.

3.2 Sample and Data Collection

The study focuses on Warkop Hidayah, a micro-enterprise in Tuban Regency, East Java, which is managed independently by the owner without external labour. Warkop Hidayah was chosen because it represents a traditional micro culinary business at the stage of first-time technology adoption, which previously operated conventionally without a technology-based cashier system or structured bookkeeping (Hariyanti et al., 2024). The methods, instruments, and focus of data collection are summarised in Table 1. Primary data were collected through an in-depth interview with the owner about the ordering flow, cash and QRIS payment mechanisms, and the practice of discarding purchase receipts (Faradila et al., 2025). A group interview was held once online and followed up through WhatsApp. Direct observation was used to understand how transactions are processed at the counter and how stock is checked (Puspitawati et al., 2024). Because the business keeps no purchase receipts or written cash records, documentation consisted of the prototype screenshots and the Excel export files generated by the system, dated 3 October 2026, which were used to assess the status of each feature (Rosmayati et al., 2023). Research ethics were maintained through informed consent, voluntary participation, and confidentiality of the business's internal financial data (Abubakar et al., 2025).

Table 1. Data Collection Methods and Instruments

Data collection	Type of data	Source/subject	Focus of information collected
Interview	Primary	Owner and manager of Warkop Hidayah	Sales transaction flow, payment system (cash/QRIS), procurement of materials, discarded receipts, and required system features
Direct observation	Primary	Cashier counter and kitchen operations	Order processing practice, cashier calculations, interaction between the cashier and stock, and daily technology use
Documentation	Secondary	Prototype screenshots and Excel export (3 October 2026)	Features visible in the prototype, transaction records, stock data, and report components (test data)

Source: Compiled by the authors (2026)

3.3 Data Analysis

Data analysis and system engineering were carried out in stages, covering project planning, logical accounting modelling, AI-assisted coding, and operational evaluation. The sequence follows the framework in Figure 1, and the instruments used at each stage are summarised in Table 2. Project management analysis began with a zero-cost operational and technical feasibility study, a SWOT analysis, a schedule estimate using a Gantt chart, and a budget analysis. The logical system model was built using BPMN to map the current (as-is) and proposed (to-be) business flows, a Level 0 DFD for transaction data flows, and decision trees and decision tables to model the business rules for product availability and payment processing (Novita & Wulanditya, 2020). The software toolchain was developed using JavaScript, HTML, and CSS through the integration of Gemini, Google Stitch, Antigravity, GitHub, and Vercel. System testing is planned as an operational validation at the Warkop Hidayah counter to measure the accuracy of stock deduction and the ease of use for a first-time user (Murti & Suzan, 2026; Natividad et al., 2024).

Table 2. Logical Modelling and Software Engineering Toolchain

Instrument category	Tool/platform	Main function in system engineering
Logical modelling	BPMN (Business Process Model and Notation)	Visualises the comparison between the manual (as-is) workflow and the proposed digital (to-be) workflow
Logical modelling	Level 0 DFD (Data Flow Diagram)	Maps transaction data flows between the cashier, the owner, the POS modules, and the database
Logical modelling	Decision tree and decision table	Model the business rules for product availability and payment processing
Toolchain and coding	Gemini (Google AI)	Prompt engineering, specification of system logic, and validation of the accounting architecture
Toolchain and coding	Google Stitch	User-interface design and layout stitching (UI/UX)
Toolchain and coding	Antigravity	AI-based coding agent
Toolchain and coding	GitHub	Version control system and source-code repository
Toolchain and coding	Vercel	Cloud deployment platform
Programming languages	JavaScript, HTML, CSS	Web application code for front-end and logic

Source: Compiled by the authors (2026)

4. RESULTS AND DISCUSSION

4.1 Results

4.1.1. Business Profile

Warkop Hidayah is an independent micro-enterprise that operates from the owner's home and is managed directly by Mrs Diah Sulistyoningrum without external staff. It is open every day from 08.00 to 24.00 Western Indonesian Time. Its products include coffee, instant drinks, herbal drinks, *seblak*, and various snacks. In addition to food and drink, Warkop Hidayah offers entertainment facilities, namely PlayStation rental, karaoke, and a floor-seating area for customers. Customers pay immediately after ordering, either in cash or via QRIS, with QRIS currently dominant.

"We sell coffee and drinks here. Drinks like Good Day Freeze, and herbal drinks too. There is also food like seblak, and snacks. There are lots of them here, all kinds of snacks." (Owner)

All of the operations of Warkop Hidayah are carried out by the owner alone, without employees.

"Oh, this is my own business, so everything is done by me myself; there are no employees. It opens at eight in the morning and closes at midnight." (Owner)

Inventories of drinks and *seblak* ingredients are bought for cash, while some ingredients, such as *pentol* (meatballs) and *sempol* (chicken sticks), are made in-house. Net daily income is estimated at IDR 300,000 to IDR 400,000, with drinks as the main source of revenue.

"For a day, the net estimate is between three hundred and four hundred thousand rupiah, because we are open from morning until night. Drinks are on average five thousand rupiah, some are eight thousand. Seblak is at least ten thousand. Some customers choose their own fillings, which can reach thirty or forty thousand per portion. There are also seblak packages for ten to fifteen thousand." (Owner)

Operating costs include ingredients, electricity, and Wi-Fi; there is no rent because the business uses the owner's own premises. The business is supported by one car, one motorcycle, three freezers, and one refrigerator.

"We do not pay rent because the place is our own house. The expenses are for buying stock, electricity, and Wi-Fi. For shopping I use the car or the motorbike, and the drinks and frozen fillings are kept in the freezers and the fridge." (Owner)

4.1.2. Problem Identification

The interview showed that transactions and inventory at Warkop Hidayah are managed simply and are not documented in writing. Sales are paid directly in cash or via QRIS, but there is no structured sales record. In addition, receipts for purchases of ingredients are not kept, and neither the purchase history nor the stock is recorded in writing. As a result, information on transactions, purchases, and inventory is not documented as a basis for managing the business.

“There are no receipts. After shopping, that is it, the receipt is thrown away.” (Owner)

When asked about recording further, the owner said:

“Yes, because I do everything myself.” (Owner)

Besides the lack of purchase documentation, QRIS payments are received into the owner's personal bank account, as Mrs Diah explained:

“Straight into my personal account.” (Owner)

The owner has, however, physically separated the cash of the different business units, and she mentioned that snacks are occasionally taken without being paid for because customers serve themselves.

“The money from the warkop, from the PlayStation, and from karaoke I keep in separate places. But for snacks, sometimes people take them themselves and forget to pay, and I only realise later.” (Owner)

Several problems therefore form the basis of the system design. The main ones are the absence of sales records, the absence of structured recording and monitoring of inventory, and the failure to keep purchase receipts as documentation. In addition, QRIS payments go into the owner's personal account, so there is no dedicated business account. Although the owner physically separates cash between business units, this condition still makes it difficult to monitor and manage the business's finances in a structured way. Table 3 maps these problems to system requirements and design features.

Table 3. Mapping of Problems, Requirements, and Design Features

Problem	Requirement	Design feature	Status
Sales are not recorded per transaction	Transaction record with number, time, items, payment method, and total	Cashier module and transaction history	Visible in test data
No stock records	Automatic stock deduction, manual adjustment, and low-stock indicator	Stock module	Visible in test data
No summary of business results	Sales summary and simple reports	Dashboard, Excel export, and simple income statement	Visible in test data
Purchases without receipts	Recording of purchases and acquisition cost	Not yet part of the prototype	Not yet available
QRIS funds go to a personal account; snacks occasionally unpaid	Separation of accounts and control over snack transactions	Outside the scope of the POS	Not resolved by the prototype

Source: Compiled by the authors (2026)

4.1.3. Planning of the Web POS Development Project

The development of the web-based POS for Warkop Hidayah was planned through several stages: project management, a feasibility study, a SWOT analysis, budgeting, and scheduling. This planning was used to assign responsibilities and to determine development requirements, the resources needed, and the stages of project implementation.

Development requirements were adjusted to Warkop Hidayah's operations, especially its transaction and inventory practices. According to the interview, the business accepts cash and QRIS payments, with QRIS used more frequently.

"Here you can pay cash or use QRIS. Nowadays most people use QRIS." (Owner)

The plan also took into account the owner's practice of buying stock for cash.

"We do not buy stock on credit; we pay cash when we shop. The stock is drinks and sausage fillings for buffet seblak. So we stock everything. Some seblak fillings we make ourselves, like sempol and pentol." (Owner)

On this basis, the POS design was directed at recording payment transactions and managing inventory in line with Warkop Hidayah's operations.

Project management assigned responsibilities to a project leader, an analysis division, a creative division, and an implementation division. The project leader coordinated activities and monitored implementation. The analysis division was responsible for project management documents, the feasibility study, and the analysis of financial and operational data requirements. The creative division handled the SWOT analysis, the Gantt chart, business process modelling, and the design of the user interface and user flow. The implementation division was responsible for the budget, system testing, and the user guide. All members were involved in interviews, data collection, coordination, writing the article, revising the project, and handing the system over to the MSME, so that each stage had a clearly responsible person.

The feasibility study considered economic, technical, legal, operational, and schedule aspects. Economically, the project used existing devices, so no large investment in additional hardware was required. Technically, the system was designed to run on several devices and to support digital information processing. Operationally, it was designed to link transaction recording with inventory management and financial information. The legal aspect considered the use of legal software and the security of business data, and the schedule aspect considered completing development in planned stages without disrupting Warkop Hidayah's operations.

The SWOT analysis showed that Warkop Hidayah's strengths include diversified sources of income, no rent, the use of QRIS, and in-house production of some ingredients. Its weaknesses are the absence of integrated accounting records, suboptimal stock management, and relatively high electricity costs. Opportunities include digitalising transaction records, automating reports, and managing business information in a more structured way. Threats include rising ingredient prices, competition from similar businesses, dependence on the owner, and the potential for unrecorded revenue.

"The electricity is quite high because of the freezers, the PlayStation, and the karaoke, and the shop is open until midnight. Prices of ingredients also keep going up, so I need to know which items really bring in money." (Owner)

The budget shows that project costs relate not only to system development but also to documentation, printing and archiving, team coordination and meetings, and a contingency fund. The total of IDR 554,000 is a planned budget and is not used to claim that all of these costs have been incurred. Based on this planning, a project budget was prepared as an estimate of the funds required, as shown in [Table 4](#).

The Gantt chart was used to organise the stages and timing of the development project ([Figure 2](#)). According to the schedule, activities started in the first week, on 26 August 2026, with the selection of the MSME, followed by interviews and data collection in the second and third weeks. Weeks four to six focused on project management documents, the feasibility study, the SWOT analysis, the budget, system modelling, and writing the article. Weeks seven and eight were devoted to project revisions and refinement of the models.

Table 4. Budget Plan for the Web POS Development Project

Component	Volume	Unit price	Total
Development and design			
AI Pro subscription	2 months	IDR 77,000	IDR 154,000
User guide module	1 document	–	–
Printing and physical archive (2 copies)			
Printing of module and report	2 copies	IDR 50,000	IDR 100,000
Archive folders and stationery	2 sets	IDR 20,000	IDR 40,000
Delivery of documents to the MSME	1 trip	IDR 25,000	IDR 25,000
Coordination and meetings			
Zoom meetings (free account)	4 sessions	–	–
Team internet data	5 people	IDR 35,000	IDR 175,000
Contingency			
Contingency fund	–	IDR 60,000	IDR 60,000
Grand total			IDR 554,000

Source: Compiled by the authors (2026)

Kegiatan	Penanggung Jawab	Pekan ke-								8 (2)
		1	2	3	4	5	6	7	8	
		26/8/2026	02/09/2026	09/09/2026	16/09/2026	23/09/2026	30/09/2026	07/10/2026	14/10/2026	
Menentukan UMKM atau Start Up	Ketua Proyek	100%								21/10/2026
Membuat daftar pertanyaan	Ketua Proyek		100%							
Melakukan wawancara dengan pihak UMKM yang dipilih	Seluruh Divisi		100%							
Melakukan pengumpulan data dari hasil wawancara	Seluruh Divisi			100%						
Menyusun Manajemen Proyek	Divisi Analisis				100%					
Membuat Studi Kelayakan Proyek	Divisi Analisis					100%				
Melakukan Analisis SWOT terhadap UMKM yang dipilih	Divisi Kreatif					100%				
Menyusun Anggaran Proyek yang diperlukan	Divisi Pelaksana					100%				
Menyusun Gantt Chart dan Pert Chart	Divisi Kreatif					100%				
Presentasi Hasil Wawancara	Seluruh Divisi						100%			
Koordinasi Rutin tiap Divisi	Seluruh Divisi	100%	100%	100%	100%	100%	100%			
Revisi Proyek DA-2 (Jika terdapat masukan dan saran)	Seluruh Divisi						100%			
Penyusunan Sistem Persediaan dan Kasir ke Digitalisasi Pencatatan	Ketua Proyek						50%	65%		
Penyusunan Teknis tentang Elemen-elemen Sistem	Divisi Analisis						100%			
Pembuatan DFD dan HPMN	Divisi Kreatif						100%			
Penyusunan Artikel berdasarkan data UMKM	Seluruh Divisi							100%		
Presentasi Data dan Process Modeling berdasarkan Hasil Wawancara	Seluruh Divisi							100%		
Revisi Proyek DA-3 (Jika terdapat masukan dan saran)	Seluruh Divisi									
Mengunggah LOA	Seluruh Divisi									

Figure 2. Project Gantt Chart, Weeks 1–8

Source: Compiled by the authors (2026) – in Bahasa Indonesia

Kegiatan	Penanggung Jawab	Pekan ke-									
		9	10	11	12	13	14	15	16	16 (2)	
		28/10/2026	04/11/2026	11/11/2026	18/11/2026	25/11/2026	02/12/2026	09/12/2026	16/12/2026	23/12/2026	
Koordinasi Rutin tiap Divisi	Seluruh Divisi										
Membuat Desain untuk Tata Lembar Kerja dalam bentuk Excel dan Menyusun Chart of Account	Divisi Kreatif										
Mendesain Rumus untuk Perhitungan Akuntansi dan Merancang Alur Sistem Pengguna	Divisi Kreatif										
Implementasi Hasil Wawancara ke dalam COA sesuai UMKM dan Membuat Laporan Keuangan, Perubahan Modal dan Neraca sesuai SAK yang Berlaku	Seluruh Divisi										
Revisi Tugas DA-5, Fitur Penambahan Jenis Barang dan Penghapusan Jenis Barang	Seluruh Divisi										
Penambahan Fitur Safety Stock tergantung Pengguna	Ketua Proyek										
Revisi Tugas DA-6 dan Penambahan Fitur Login	Seluruh Divisi										
Revisi Penyelesaian Laporan Keuangan secara Lengkap dan Menyelesaikan tahap akhir SDLC sesuai SAK yang Berlaku	Seluruh Divisi										
Melakukan Uji Coba terhadap Sistem Akuntansi yang dikembangkan	Divisi Pelaksana										
Menyusun Panduan dan Tata Cara Penggunaan Sistem untuk Pengguna	Divisi Pelaksana										
Penyelesaian dan Evaluasi Sistem	Divisi Pelaksana										
Revisi Akhir Proyek Desain Akuntansi Final	Seluruh Divisi										
Self and Peer Assesment EAS	Seluruh Anggota										
Menyerahkan Sistem untuk Diterapkan dalam UMKM Pengguna	Seluruh Divisi										

Figure 3. Project Gantt Chart, Weeks 9–16

Source: Compiled by the authors (2026) – in Bahasa Indonesia

In weeks nine to sixteen, activities are planned to focus on developing and refining the system, including designing worksheets and the chart of accounts, preparing accounting formulas and financial statements, developing system features, testing, preparing the user guide, evaluation, and handing the system over to the user (Figure 3). The Gantt chart is a plan, so the schedule does not by itself show that all activities have been completed on time.

4.1.4. Data and Process Modelling

The interview provided a picture of the transaction, payment, and inventory flows that form the basis of the data and process models of the POS system. The models consist of a Logical Model, a DFD with process descriptions, decision tables, decision trees, and BPMN. All models at this stage are designs, so the presence of a process in a diagram does not mean that the function has been fully implemented or tested on the website. In the transaction process, customers pay after ordering and there is no credit.

"There is no credit. They order and pay right away, and then we make the food they ordered." (Owner)

The payment methods available are cash and QRIS, with QRIS used more often, as quoted above.

Logical Model. The Logical Model describes all logical functions, data requirements, and entities that interact with the proposed cashier system of Warkop Hidayah (what the system must do). It focuses on the data flows between entities, the functional processes, and the data stores. The model consists of four main processes: recording orders and payments, managing inventory, reconciling transactions, and preparing financial, transaction, and stock reports.

Process 1, Record Orders and Payments, receives order and payment data from customers and menu and price data from the admin/cashier. These data are used to produce a receipt and are stored in D2 (Sales Transaction Records), forming the basis for subsequent processes.

Process 2, Update Stock and Manage Inventory, manages changes in stock on the basis of goods received and goods sold. Warkop Hidayah buys inventory for cash, as the owner stated earlier, but purchase receipts are not kept as documentation:

"There are no receipts. After shopping, that is it, the receipt is thrown away." (Owner)

Process 2 is therefore designed to update D1 (Inventory), so that changes in stock quantities are recorded and can be monitored in the system.

In Process 3, Reconcile Transactions, sales data are matched with cash and bank/e-wallet mutation and payment data to produce reconciliation results. For QRIS transactions, sales proceeds still go into the owner's personal account:

"Straight into my personal account." (Owner)

This condition is the reason for designing a reconciliation process that matches recorded transactions with payments received in cash and through the bank or e-wallet.

All transaction, inventory, and reconciliation data are then used in Process 4, Prepare Financial, Transaction, and Stock Reports, to produce information that the owner can use to monitor the business. The Logical Model thus shows the relationships between entities, processes, and data stores that support transaction recording, inventory management, payment reconciliation, and the provision of information to the owner (Figure 4).

Data Flow Diagram and Process Description. The interview showed that customers pay immediately after ordering and can leave whenever they wish without returning to the counter.

"There is no credit. They order and pay right away, and then we make the food they ordered. So after ordering and paying, we serve the food, and they can go home any time without having to come back to pay." (Owner)

Customers pay using one of the two methods available, cash or QRIS. The Level 0 DFD focuses the model on the cashier transaction flow. It has two external entities, the Cashier and the Printer (Receipt), the printer being a device owned by Warkop Hidayah. The DFD consists of four processes, Manage Product, Manage Order, Process Payment, and Generate Receipt, and three data stores, Menu & Product, Transaction & Detail, and Inventory/Stock (Figure 5).

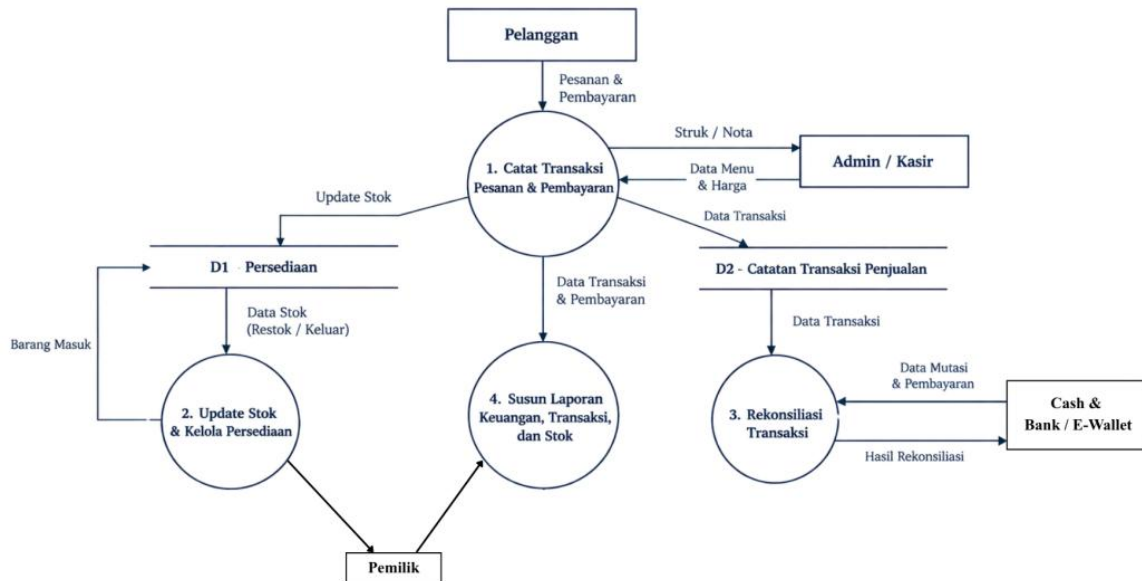


Figure 4. Logical Model of the Proposed POS System for Warkop Hidayah

Source: Compiled by the authors (2026) – in Bahasa Indonesia

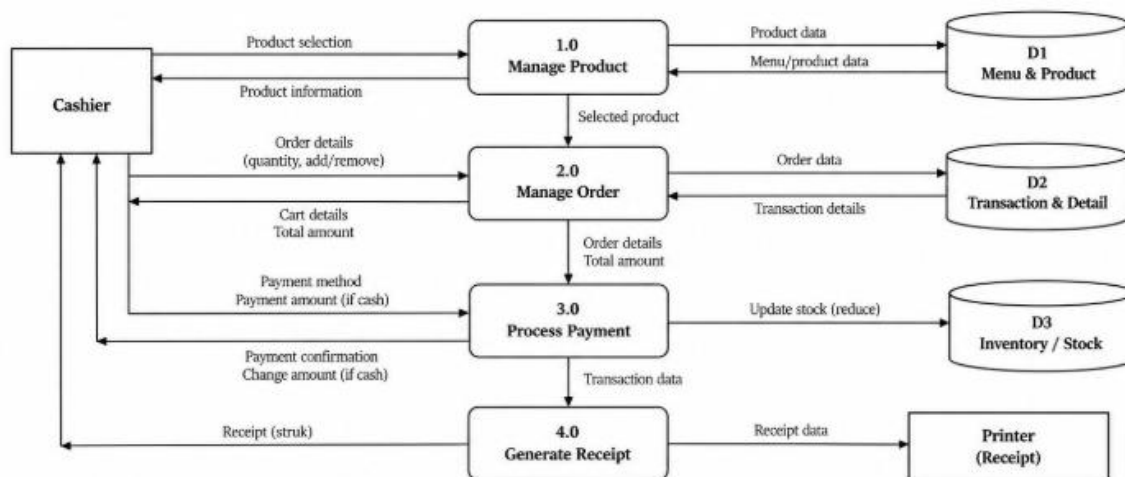


Figure 5. Level 0 Data Flow Diagram (DFD) of the Warkop Hidayah POS System

Source: Compiled by the authors (2026)

In Process 1.0 (Manage Product), the cashier selects a product and the system provides product information, including price and stock availability, from the Menu & Product store. The selected product is passed to Process 2.0 (Manage Order), where the system records the items and quantities ordered, allows items to be added or removed, calculates the total bill, and stores the order in Transaction & Detail. The order details and total are then passed to Process 3.0 (Process Payment). The cashier enters the payment method and, for cash transactions, the amount received. The system processes the payment, calculates change where necessary, and updates the stock of the products sold.

Process 4.0 (Generate Receipt) produces a receipt from the transaction data, passes it to the cashier, and sends the receipt data to the printer. The printer therefore remains part of the output flow of the design. In this DFD, stock is deducted at payment, so products that have merely been placed in the cart do not yet reduce stock. This model is consistent with the function of DFDs in showing the

movement of data between entities and processes (Ismanto et al., 2020; Perpatih et al., 2025). The details of each process are given in Table 5.

Table 5. Process Description of the Warkop Hidayah POS System

Process no.	Process name	Input	Output	Data store(s)	Description
1.0	Manage Product	Product selection	Product information	D1 – Menu & Product	Provides menu and product data, including price and stock availability
2.0	Manage Order	Order details (quantity, add/remove)	Cart details, total amount	D2 – Transaction & Detail	Records selected items and quantities, allows updates or removal, and calculates the total amount
3.0	Process Payment	Payment method, amount paid (if cash)	Payment confirmation, change (if cash)	D3 – Inventory/Stock	Processes the customer's payment, calculates change (if cash), and updates product stock
4.0	Generate Receipt	Transaction data	Receipt	D2 – Transaction & Detail	Generates and prints the receipt and stores the transaction record

Source: Compiled by the authors (2026)

The process description sets out the relationships between the inputs, outputs, data stores, and functions of each process. Process 1.0 receives a product selection and produces product information. Process 2.0 receives order details, including quantities and the addition or removal of items, and produces cart details and the total bill. Process 3.0 receives the payment method and the amount of cash paid and produces a payment confirmation and change where necessary. Process 4.0 receives transaction data to produce a receipt and store the transaction record. These details reinforce the data flows shown in the DFD.

Decision Tables. The interview provided information on inventory conditions and payment methods that form the basis of the decision rules in the POS system. Inventory consists of drinks and *seblak* ingredients bought for cash, but purchases are not recorded in writing, as the owner explained when describing her shopping and the discarded receipts.

“When a drink runs out, I usually only know when a customer asks for it and the box is empty. Then I tell them it is out and offer another drink.” (Owner)

On this basis, Decision Table 1 specifies the decision rules for product availability (Table 6). Two conditions are considered: whether the product exists in the menu and whether its stock quantity is greater than zero. If the product exists and the stock is greater than zero, it can be added to the cart. If it exists but the stock is not greater than zero, the system shows an out-of-stock notice. If the product does not exist in the menu, the system shows a product-not-found notice. These conditions produce three decision rules.

Table 6. Decision Table 1: Product Availability

Section	Condition/action	R1	R2	R3
Conditions	Product exists in menu	Y	Y	N
	Stock quantity > 0	Y	N	–
Actions	Add product to cart	Y	–	–
	Show out-of-stock notice	–	Y	–
	Show product-not-found notice	–	–	Y

Source: Compiled by the authors (2026)

For payment, customers pay immediately after ordering using cash or QRIS, with QRIS dominant.

“There is no credit. They order and pay right away, and then we make the food they ordered. Here you can pay cash or use QRIS. Nowadays most people use QRIS.” (Owner)

In Decision Table 2 (Table 7), the rules are determined by the payment method and payment status. For cash payments, the system checks whether the amount paid covers the total. If it does, the transaction is completed and the system calculates the change; if not, the system shows an insufficient-

payment notice. For non-cash payments via QRIS or transfer, the system checks whether the payment succeeded. If it did, the transaction is completed; if not, the system shows a payment-failed notice. Decision Table 2 thus produces four rules. Together, the two decision tables specify the rules used by the system to determine actions based on product availability and to process payments based on their method and status.

Table 7. Decision Table 2: Payment Processing

Section	Condition/action	R1	R2	R3	R4
Conditions	Payment method = cash	Y	Y	N	N
	Amount paid $\geq$ total amount	Y	N	–	–
	Payment method = non-cash (QRIS/transfer)	–	–	Y	Y
	Payment successful	–	–	Y	N
Actions	Complete transaction	Y	–	Y	–
	Calculate and give change	Y	–	–	–
	Show insufficient-payment notice	–	Y	–	–
	Show payment-failed notice	–	–	–	Y

Source: Compiled by the authors (2026)

Decision Trees. Based on the interview, Decision Tree 1 (Figure 6) was drawn to detail how a product is checked before it is added to the cart. The system first checks whether the product exists in the menu. If it does, the stock quantity is checked. The product can be added to the cart when the stock is greater than zero; otherwise, an out-of-stock notice is shown. If the product is not found in the menu, the system shows a product-not-found notice.

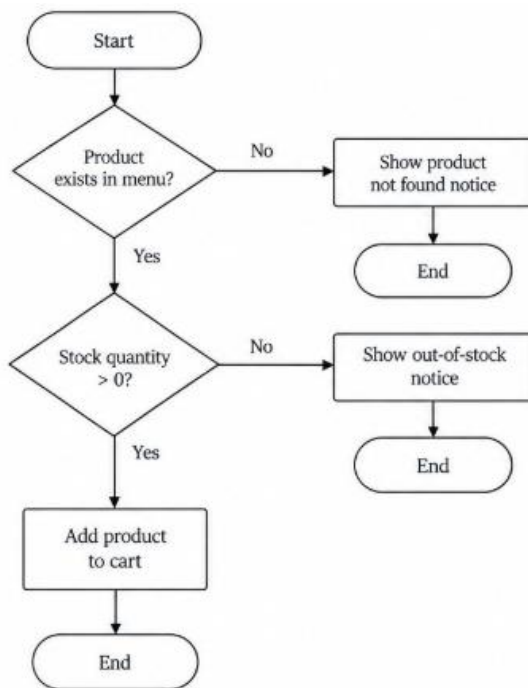


Figure 6. Decision Tree 1: Product Availability

Source: Compiled by the authors (2026)

Decision Tree 2 (Figure 7) shows the branching of the process by payment method. For cash payments, the system checks whether the amount is sufficient before calculating change and completing the transaction. For non-cash payments via QRIS or transfer, the payment is processed and checked for success before the transaction is completed. If the payment conditions are not met, the system shows an error notice. Successful transactions are followed by printing the receipt.

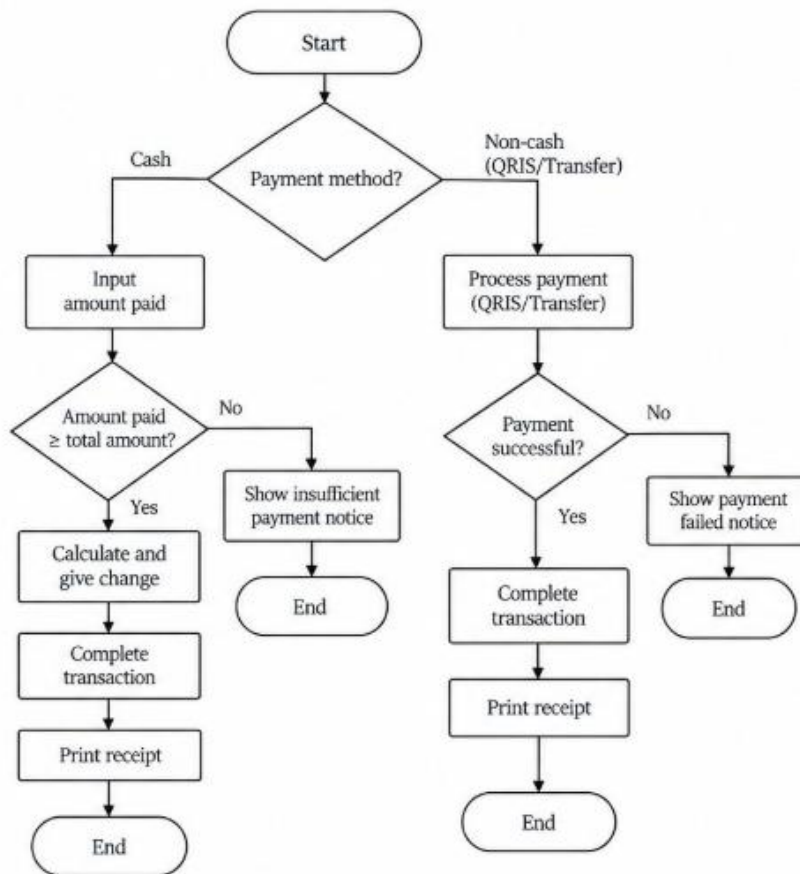


Figure 7. Decision Tree 2: Payment Processing

Source: Compiled by the authors (2026)

Business Process Model and Notation (BPMN). The interview provided a picture of the sales process. Warkop Hidayah sells sachet drinks, bottled drinks, snacks, and buffet *seblak*. All sales take place on the premises on a pay-first basis; the business does not offer credit, so every order is processed and served immediately after payment.

"We sell coffee and drinks here, like Good Day Freeze and herbal drinks, and food like seblak and all kinds of snacks. You can pay cash or QRIS; most people now use QRIS. There is no credit: they order, pay right away, and then we make the food." (Owner)

Selling prices vary with the order. Drinks cost IDR 5,000 to IDR 8,000 per serving, while buffet *seblak* is priced by the quantity and type of fillings chosen by the customer, from IDR 10,000 up to IDR 40,000 per portion.

"Drinks are on average five thousand rupiah, some are eight thousand. Seblak is at least ten thousand. Some customers choose their own fillings, which can reach thirty or forty thousand per portion." (Owner)

The owner has never recorded sales formally or issued written receipts; all transactions and daily cash are managed from memory. This is an important point to address in modelling the sales process. On this basis, the authors depicted the sales process of Warkop Hidayah using BPMN, as shown in [Figure 8](#).

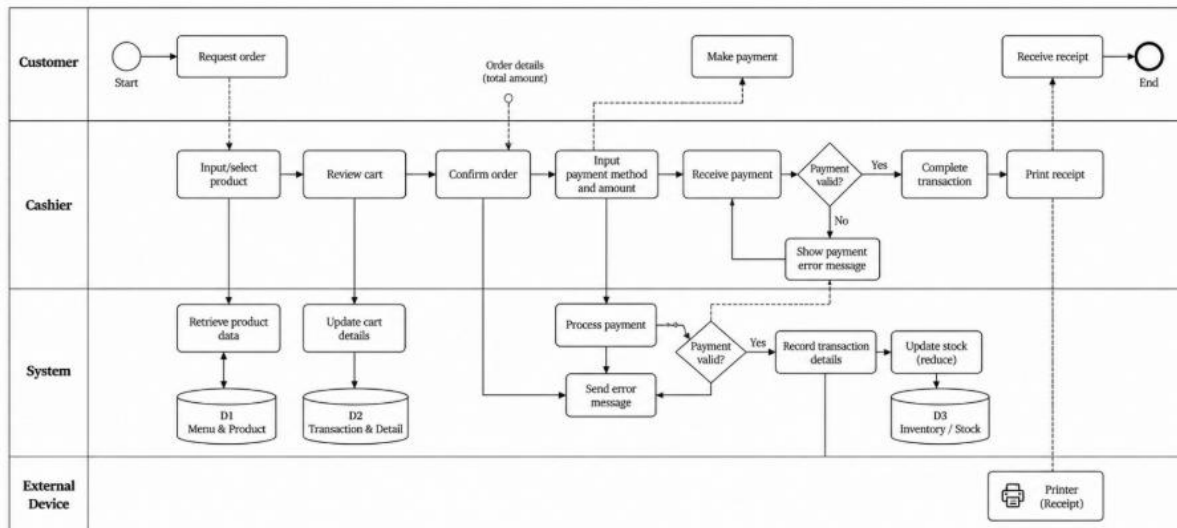


Figure 8. BPMN of the Warkop Hidayah POS System

Source: Compiled by the authors (2026)

The sales process in [Figure 8](#) is divided into four swimlanes: Customer, Cashier, System, and External Device (printer). The process begins when the customer places an order for drinks, snacks, or a portion of buffet *seblak* with the cashier. The cashier enters or selects the products ordered, and the system retrieves the product data from the Menu & Product database (D1). After the cart is reviewed and the transaction details are updated in the Transaction & Detail database (D2), the cashier confirms the total with the customer. The cashier then enters the payment method and amount, and the customer pays in cash or via QRIS. The system processes the payment and checks whether it is valid.

If the payment is invalid (No), the system sends an error message to the cashier's screen so that payment can be repeated. If it is valid (Yes), the transaction is completed, the system records the details in D2 and deducts the stock of finished goods or *seblak* ingredients in real time in the Inventory/Stock database (D3). The cashier then prints the receipt, which is sent to the printer, and the customer receives the physical receipt, completing the transaction. The model focuses on transaction processing in the cashier system; the physical preparation and serving of food and drinks is outside its scope.

4.1.5. Web POS Design and Feature Development Status

The owner's information that all operations are handled by her alone, without employees, was one of the main considerations in designing a POS system that integrates transactions, inventory management, and business information in a single system.

"Oh, this is my own business, so everything is done by me myself; there are no employees." (Owner)

The prototype was developed as a web application using JavaScript, HTML, and CSS. Gemini was used to assist development, Google Stitch for interface design, and Antigravity to support website development. The code is managed on GitHub, and the website is deployed on Vercel. This information describes the development context; the assessment of feature status is based on screenshots and export files dated 3 October 2026. All data shown in the evidence are test data.

The cashier module lists menu items by category (*seblak*, coffee, tea, drinks, bottled drinks, and snacks) with prices and a search field. On the right is an Active Order panel showing the time, cashier shift, table selection (for example, Table 04, Dine In), subtotal, and a 0% business tax ([Figure 9](#)). Buffet *seblak* is sold through a "Racik Seblak" (build-your-own *seblak*) button with a base price of IDR 3,000 plus the fillings chosen by the customer; the prices of individual fillings are not visible in the evidence.

Payment can be made in cash, via QRIS, or by transfer. For cash, the cashier enters the amount received, with an exact-amount button and quick buttons for IDR 10,000 to IDR 100,000, and the system calculates the change. In the screenshot, a bill of IDR 5,000 paid with IDR 10,000 produces change of IDR 5,000 (Figure 10). For QRIS and transfers, the cashier confirms receipt of funds manually, and the screens for these two flows are not included in the evidence; what is visible is that both methods are recorded in the test transaction history. After confirmation, a receipt appears on screen containing a transaction number in the format WH-date-number, the time, the table, the items, the payment method, the amount paid, and the change (Figure 11). The button in the payment window reads "Confirm & Print Receipt", but printed output is not shown in the available evidence.

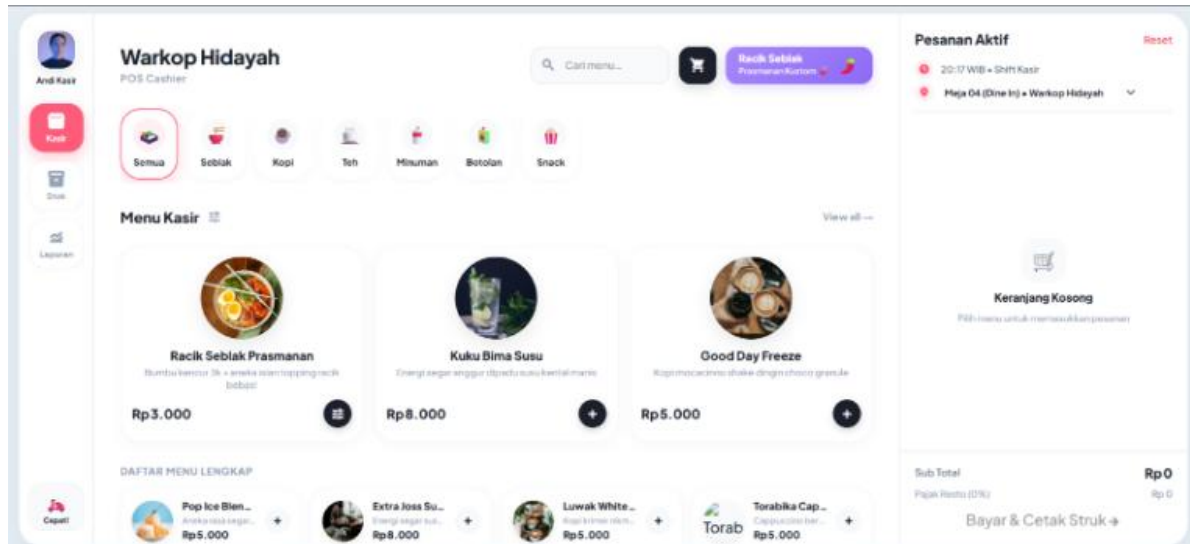


Figure 9. Screenshot of the Cashier Module
Source: Compiled by the authors (2026) – in Bahasa Indonesia

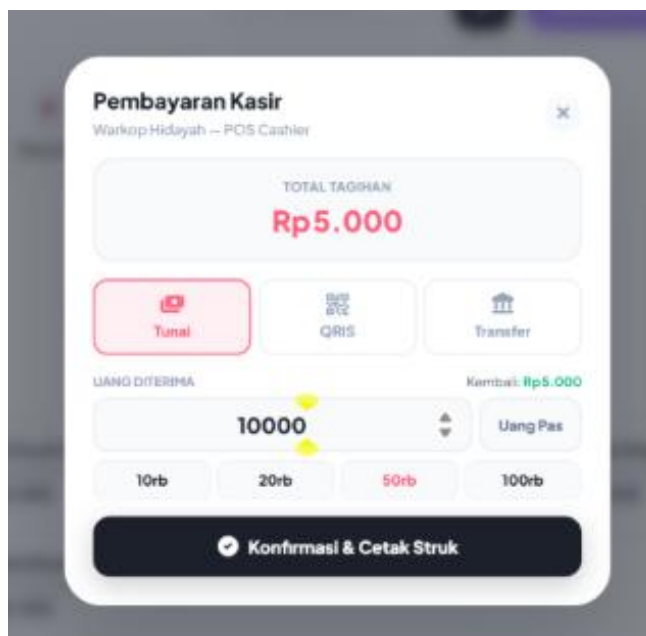


Figure 10. Screenshot of the Cash Payment Window
Source: Compiled by the authors (2026) – in Bahasa Indonesia

Single-Operator Cashier for Efficiency: Designing a Point of Sale and Inventory Management System for the Warkop Hidayah MSME in Tuban

Kartika Dwi Astuti, Najwa Zaskia Lyralityawaty, Rayya Aliya Hafidzah, Aisyah Lindi Nursaputri, Venessa Deva Masitha, Micka Andria

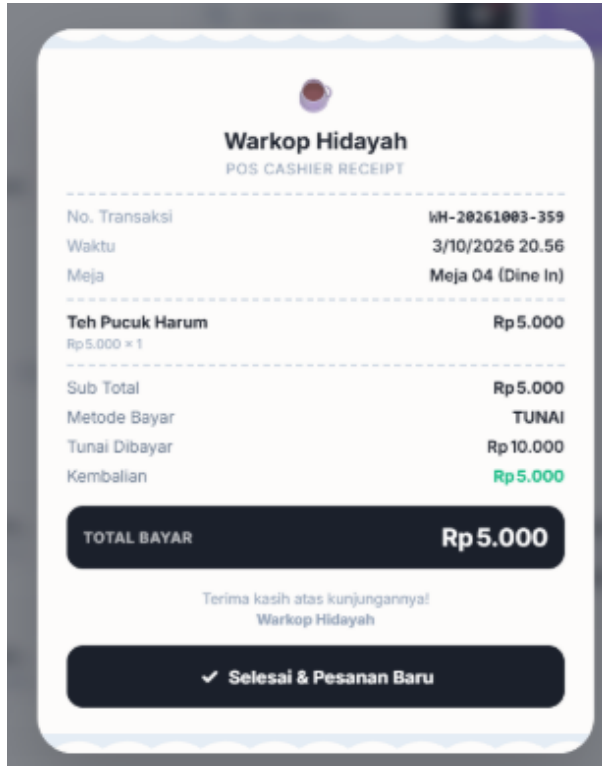


Figure 11. Screenshot of Payment Confirmation and Receipt

Source: Compiled by the authors (2026) – in Bahasa Indonesia

The Stock module lists products with category, price, remaining stock, and a status of "AMAN" (sufficient) or "MENIPIS" (running low), together with add, subtract, and set buttons for manual adjustment (Figure 12). This feature reflects Warkop Hidayah's inventory of drinks and *seblak* ingredients.

"We do not buy stock on credit; we pay cash when we shop. The stock is drinks and sausage fillings for buffet seblak." (Owner)

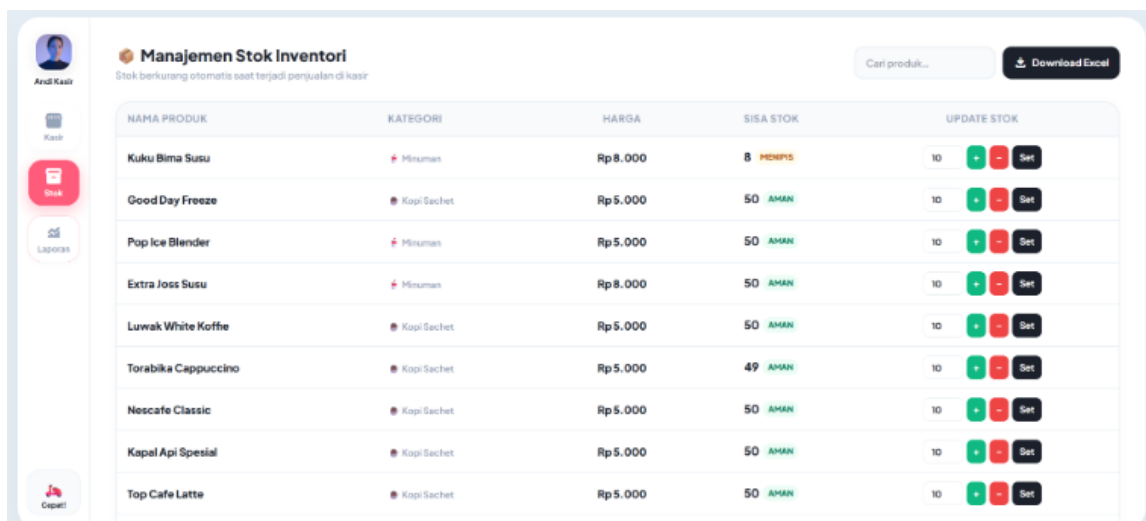


Figure 12. Screenshot of the Stock Module

Source: Compiled by the authors (2026) – in Bahasa Indonesia

Stock is reduced automatically when a sale occurs. In the test data, the stock of Kuku Bima Susu fell to 8 pcs after 42 units were recorded as sold, and its status changed to "MENIPIS", while the stock of Torabika Cappuccino fell to 49 pcs after one unit was sold. The dashboard flags low stock at a threshold of ≤ 10 pcs. This parameter will still be adjusted to the user's needs, so the safety-stock feature is not final.

The Report dashboard shows today's turnover, total sales, estimated net profit, a seven-day turnover trend, the five best-selling items with quantities and sales values, a list of low-stock items, and the latest transaction history (Figure 13). In the test data, Kuku Bima Susu ranks first (42 units, IDR 336,000) and also appears in the low-stock list with 8 pcs remaining. These figures come from dummy transactions and do not describe the business's actual sales. Excel export buttons are also available for transactions, stock, and a full report (Figure 14). Login and the adding and deleting of product types are still under development and are not visible in the evidence.

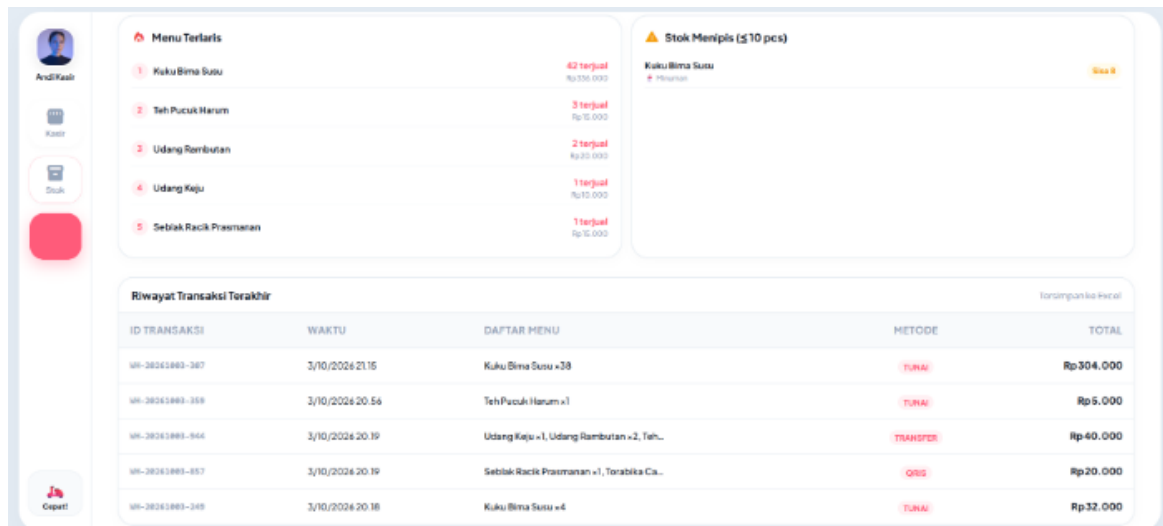


Figure 13. Screenshot of the Dashboard: Best-Selling Items, Low Stock, and Transaction History
Source: Compiled by the authors (2026) – in Bahasa Indonesia

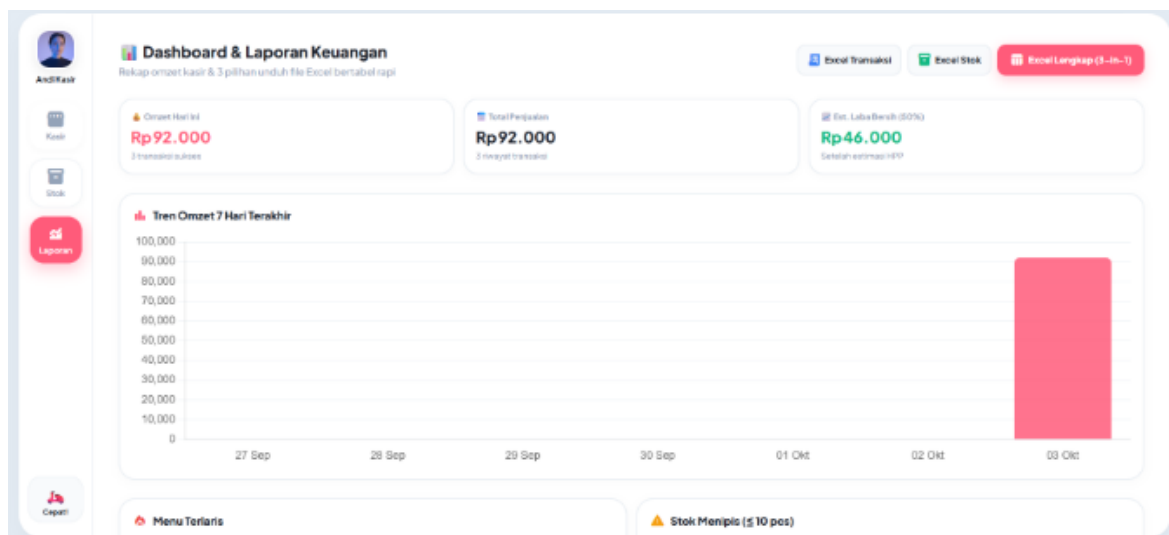


Figure 14. Screenshot of the Report Dashboard
Source: Compiled by the authors (2026) – in Bahasa Indonesia

The implementation status of each feature is summarised in Table 8.

Table 8. Implementation Status of the Prototype

Feature	Evidence	Status
Menu by category, search, cart, table selection	Cashier screenshot	Visible in evidence
Cash payment and change calculation	Payment window and receipt	Visible in evidence (one scenario)
On-screen receipt	Receipt screenshot	Visible in evidence
Printing receipts to a printer	"Confirm & Print Receipt" button visible; printed output not shown	Designed; not yet visible in evidence
Transaction recording (number, time, items, method, total)	Transaction history and Excel export	Visible in evidence (test data)
QRIS and transfer payments	Methods recorded in test transactions; manual confirmation by cashier; screen flow not shown	Designed; flow not yet visible in evidence
Insufficient or failed payment, out-of-stock, and product-not-found notices	Not shown	Designed; not yet visible in evidence
Automatic stock deduction and AMAN/MENIPIS status	Stock page and dashboard	Visible in evidence (test data)
Manual stock adjustment	+, -, and Set buttons on the Stock page	Available on screen; results not yet shown
Low-stock indicator and safety stock	≤10 pcs threshold on dashboard	Indicator visible; parameters and safety stock under development
Dashboard and best-selling items	Report screenshot	Visible in evidence (display, test data)
Excel export and simple income statement	Three-sheet export file	Visible in one export; conformity with SAK EMKM cannot yet be verified
Login and access rights; adding and deleting product types	Only the user name "Andi Kasir" is visible	Under development (scheduled for weeks 11–13)
Chart of accounts, statement of changes in equity, statement of financial position	Not in the export	Planned (weeks 9–10 and 13–14)
System trial	–	Not yet tested (scheduled for week 14)

Source: Compiled by the authors (2026)

Table 9. Components of the Income Statement in the Prototype

Component	Condition in the prototype	Remarks
Revenue	Accumulated cashier transactions (test data)	Covers coffee-stall items and <i>seblak</i>
Cost of goods sold	50% of revenue (team assumption for test data)	Sachet cost of IDR 1,500 for a drink sold at IDR 5,000; not actual cost of goods sold
Expenses	Electricity and water; rent and operations (IDR 0), entered manually in Excel	The owner mentioned purchases, electricity, and Wi-Fi; no rent
Depreciation	Not yet in the export	The owner mentioned freezers and vehicles used for purchasing
Profit	The estimated profit line equals gross profit	–
Statement of changes in equity and statement of financial position	Not yet in the export	Part of further development (scheduled for weeks 9–14)

Source: Compiled by the authors (2026)

The inventory export contains 30 products in the categories of drinks, sachet coffee, tea, bottled drinks, and snacks, together with their remaining stock. Build-your-own *seblak*, its fillings, and in-house items such as *pentol* and *sempol* are not yet included in the inventory list. Purchases and acquisition costs are not yet recorded, so at this stage the prototype provides only the quantity of finished goods in stock and not the value of inventory at cost. The components of the income statement produced by the prototype are summarised in [Table 9](#).

4.2 Discussion

4.2.1. System Design in Relation to the Research Focus

The research focus is to design a POS cashier and inventory management system that records daily transactions, controls the movement of goods, and presents sales summaries. At the modelling level, this focus has been elaborated through the Logical Model, the Level 0 DFD, the decision tables and trees, and BPMN. At the implementation level, the prototype, which is still being developed, already shows the basic functions: numbered transaction records, cash payment with change calculation, automatic stock deduction with a low-stock indicator, and a dashboard with Excel export. Such records are consistent with the view that POS systems make the recording of sales and cash receipts more structured ([Chusnia et al., 2025](#)). The study is at the design and early prototype stage, and several designed functions are still being refined.

4.2.2. Requirements and Initial Conditions

The initial conditions reported in the Results show a simple system that depends entirely on one person. In such a small business, segregation of duties is hard to achieve, but the consequences are clear: no one else checks the work, and there are no source documents to match.

From an accounting perspective, three points stand out. First, because sales, purchases, and stock are not recorded, cost of goods sold, profit, and the value of inventory can only be estimated. Second, non-cash receipts paid into a personal account make it difficult to separate business finances from personal finances, even though physical cash is separated between business units. Third, unpaid snacks cannot be matched against stock records because snack stock is not recorded. The owner did not see these as problems, so the system requirements were formulated by the team from the gap between current practice and the information needed to prepare financial statements, rather than from the owner's requests. [Table 3](#) maps these findings to requirements and design features. The last two problems in that table cannot be solved by software alone: separating accounts is the owner's decision, and snacks taken by customers themselves do not pass through the cashier.

4.2.3. Conformity of the Models with the Prototype and Its Development Status

The results must be read at three distinct levels. The first is the modelling results, namely the Logical Model, the DFD, the decision tables and trees, and BPMN, which state what the system should do. The second is the designed functions, that is, the processes and rules contained in the models that have not necessarily been implemented on the website. The third is the prototype implementation, that is, what is visible in the evidence. These levels must not be conflated.

The four DFD processes have concrete counterparts in the prototype: the cashier module for products and orders, the payment window, and the on-screen receipt. The stock deduction designed in the payment process appears as reductions in stock that match the test transactions. Of the payment decision table, only rule R1 is visible, in one scenario. Other rules, such as insufficient payment, failed non-cash payment, and the out-of-stock and product-not-found notices, are not yet visible in the evidence, so their status is "designed". The printer and the Generate Receipt process remain part of the design because the printer belongs to the MSME; in the prototype, the receipt appears on screen and a print button is available, but printed output has not yet been shown. Decision Table 2 also does not include the printing action that appears in Decision Tree 2 and the BPMN, a small inconsistency that can be aligned.

The Logical Model describes system functions at a more general level, while the DFD and BPMN focus on the cashier transaction flow. Features not yet included in the diagrams, such as login and access rights, which are still to be developed, are therefore not used to assess the conformity of the models. This shows that planned, modelled, and implemented functions must be distinguished when assessing the development status of the system.

Compared with the initial conditions, the process design brings one main change: every payment leaves a trail consisting of a number, time, items, method, and total, and the receipt can serve as a source document, something that did not exist before. Stock deduction tied to payment turns stock from the owner's memory into data. The sequence of ordering, paying, and receiving a receipt is also consistent with Warkop Hidayah's pay-first practice. Two things are not changed by the design. Validation of non-cash payments is still done manually by the cashier, so the accuracy of the records depends on that confirmation. QRIS funds also still go into the owner's personal account, so the separation of business and personal funds must be resolved outside the system.

4.2.4. Development of Financial Statements and Access Control

Financial statements should be developed only after the underlying transaction and inventory data are adequate. SAK EMKM is the reference for preparing MSME financial information, but the conformity of the prototype with the standard cannot yet be claimed because account classification, measurement bases, calculations, and presentation have not been verified. In the prototype, the income statement still uses an assumed cost of goods sold, certain expenses are entered manually in Excel, and there is no statement of changes in equity or statement of financial position. Reporting development should therefore address not only the presentation of reports but also the quality of the source data on which they are based ([Handayani & Suryaningrum, 2021](#); [Ayem et al., 2024](#)).

Access control is also important because the Logical Model distinguishes the roles of cashier and admin. In the prototype, login and the separation of access rights are still under development, so the roles cannot yet be distinguished through verifiable authentication. Similarly, the development of product master data and safety stock must take the user's operating conditions into account. The low-stock indicator, currently set at ≤ 10 pcs, needs to be adjusted to each product so that inventory information reflects purchasing decisions rather than a mere technical limit.

This development is also related to the sustainability of system use. Information on sales per menu item, stock availability, and summary business results can help the owner evaluate the business and plan inventory. However, these benefits cannot yet be measured at Warkop Hidayah because the website has not been tested with actual business data. The existing features therefore indicate the direction of support for business management, not evidence that sustainability or financial performance has improved.

The same caution applies to the contribution of the system to the Sustainable Development Goals. The design gives a woman owner who runs every part of the business alone a tool that could reduce the effort of reconstructing sales from memory and give her clearer information for her decisions, which is consistent with SDG targets 5.5 and 5.b on women's economic participation and the use of enabling technology (United Nations, 2015). Separating QRIS receipts from the owner's personal account and eventually preparing SAK EMKM-based statements would also support formalisation and access to financial services under SDG targets 8.3 and 8.10. These contributions are potential and depend on the system being adopted and used consistently.

4.2.5 Limitations and System Development Plan

The study has several limitations. There was only one key informant, the owner of Warkop Hidayah. A group interview was conducted once online and followed up through WhatsApp, while observation was used to gain direct knowledge of the business. Because purchase receipts are not kept, there are no transaction documents for comparison, so information on daily income, *seblak* volume, and ingredient prices obtained from the interview is treated as the owner's statements rather than as verified accounting data.

There are also limitations at the implementation stage. The prototype still uses test data, the website has not undergone documented testing, and there is no user feedback with which to assess ease of use or functional accuracy. The scope of the system is limited to coffee-stall and *seblak* sales; recording of *seblak* ingredients, in-house production, purchases, and the other business units is not yet included.

Because the website is still under development, these limitations are treated as areas for improvement. The project plan already includes login and access rights, adding and deleting product types, safety-stock settings, a chart of accounts, a statement of changes in equity and a statement of financial position, and system testing. Based on the requirements identified, development should also

address the recording of purchases and acquisition costs, expense management suited to the business (including Wi-Fi), possible depreciation of assets, the recording of build-your-own *seblak* and its fillings, and testing of the QRIS, transfer, insufficient or failed payment, and receipt-printing flows.

With this development, the website can move from a transaction-recording prototype to a system that better supports the provision of accounting information. Its benefit for business sustainability can be assessed only after it has been used with real data, tested in daily operations, and evaluated by the owner. Development and testing are therefore essential before the system is adopted as Warkop Hidayah's main recording tool.

5. CONCLUSION

The POS system is intended to turn records that were previously manual or non-existent into an integrated digital process that produces summaries and, once fully developed, financial statements (income statement, statement of changes in equity, and statement of financial position). From the perspective of financial performance, it allows revenue to be viewed for a given period and sales transactions to be monitored transparently. From the perspective of inventory, the owner can see which items sell quickly and which sell slowly and can adjust stock levels so that capital is not tied up in slow-moving goods. Financial statements, as the ultimate output of the POS system, help the owner monitor sales more accurately, make decisions, and evaluate profit or loss (Putri et al., 2025). In the context of the Sustainable Development Goals, the design shows how a low-cost digital tool can support a woman-owned micro-enterprise (SDG 5) and lay the foundation for its formalisation and growth (SDG 8).

5.1 Implications

The interviews and analysis show that Warkop Hidayah's strength lies in its wide range of products, from sachet drinks and bottled drinks to buffet *seblak*. This variety, however, requires an orderly stock management system to track the movement of inventory. The business also keeps no accounting records and does not retain documentation of inventory purchases, so the profit it earns is known only as a rough estimate rather than through accurate calculation.

To address these problems, a POS cashier system with an added inventory feature was designed. The inventory feature helps make sales recording more systematic and reduces calculation errors through automated recording and reporting (Sudrajat & Aryanny, 2023). The POS system was not built in isolation: it was preceded by business modelling using a Logical Model, a DFD, decision tables, decision trees, and BPMN to describe the processes and requirements of Warkop Hidayah.

5.2 Limitations

The system designed and developed in this study is still centred on sales recording and inventory management; it does not yet cover payables and receivables that may arise with vendors or the full recording of operating expenses at Warkop Hidayah. The study was also conducted in a single MSME, so its results cannot yet be generalised to or applied in full in similar businesses. Furthermore, the accuracy of the financial statements depends on how consistently the owner enters data, including inventory purchase receipts. Future research could add payables and receivables management and operating-expense features and test the system in several MSMEs over a longer period.

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Abbreviations

AI: Artificial Intelligence
 BPMN: Business Process Model and Notation
 COA: Chart of Accounts
 CSS: Cascading Style Sheets
 DFD: Data Flow Diagram

DSRM: Design Science Research Methodology
HTML: HyperText Markup Language
JS: JavaScript
MSME: Micro, Small, and Medium Enterprise (UMKM)
pcs: pieces
PERT: Program Evaluation and Review Technique
POS: Point of Sale
QRIS: Quick Response Code Indonesian Standard
SAK EMKM: Financial Accounting Standards for Micro, Small, and Medium Entities
SDLC: System Development Life Cycle
SWOT: Strengths, Weaknesses, Opportunities, Threats
Warkop: *warung kopi* (coffee stall)

Authors' Contributions

KDA made the strategic decisions in conducting the research, coordinated the research activities, liaised with the partner MSME, provided the data and information obtained from the MSME, and designed the development of the POS system according to the needs of the MSME. NZL wrote the literature review and research method, reviewed the literature relevant to the topic, and finalised the draft article. RAH wrote the conclusion, completed the information on data and materials availability, and checked the layout and consistency of the article. ALN wrote the introduction, abstract, and keywords and refined the initial structure of the article. VDM analysed and interpreted the research results from the interviews and business models and wrote the results and discussion.

Conflict of Interest

The authors declare that there are no financial or non-financial conflicts of interest in the research or the writing of this article.

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Availability of Data and Materials

This article is based on interviews, the authors' analysis, and a literature review. Interview data and analysis materials are available from the authors upon request by email. Published sources, such as journal articles, proceedings, and official documents, are publicly accessible as listed in the references.

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