



SMSEs' Inventory Recording Procedure in an Excel-Based Inventory Subsidiary Ledger Using the Weighted Average Method

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ABSTRACT

Purpose: This study describes and analyses the procedure for recording inventory in an Excel-based inventory subsidiary ledger at CV ABC, a trading company that sells medical devices, and explains how the weighted average method is applied to determine the cost of goods sold and ending inventory.

Method: The study implements a qualitative descriptive single-case study. Data were collected through participant observation during an internship and documentation of the client's stock report, the ending inventory of the previous period, the purchase report, and sales invoices for October 2024, supplemented by consultations with the field supervisor. The data were analysed through data reduction, data display, and conclusion drawing, and the observed practice was compared with subsidiary ledger, perpetual inventory, item coding, and cost-formula concepts.

Findings: The subsidiary ledger consists of four integrated sheets: item codes, stock report, purchases, and sales. The stock report sheet contains five linked tables (item data, beginning inventory, goods in, goods out, and ending inventory). Recording follows five steps: entering item codes, carrying forward beginning inventory from the previous period's ending inventory, entering purchases, entering sales, and checking the stock report. Formula links between sheets remove repetitive manual input, and the weighted average formula produces one unit cost per item per month that is applied consistently to goods sold and ending inventory. The design tracks quantities continuously but computes cost on a monthly weighted-average basis, which should be recognised when the ledger is described as perpetual.

Implication: The documented procedure can serve as a working guide for accounting staff, interns, and small trading businesses that keep inventory records in spreadsheets, and it highlights the importance of meaningful item codes, opening-balance reconciliation, and periodic formula checks for the accuracy of records. The study also supports SDG 8 (decent work and economic growth) through training-based skill development and reliable record-keeping.

Originality: The study documents a practice-based, step-by-step inventory recording procedure and links subsidiary ledger theory, item coding, the weighted-average cost formula, and spreadsheet-risk controls within a single spreadsheet design.

Keywords: inventory subsidiary ledger, perpetual inventory, weighted average method, SDG 8.

JEL Classification: A22, L81, M11, M41

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1. INTRODUCTION

Inventory is one of the most important components affecting the smooth running of a company's production and sales (Prihasti & Nugraha, 2021). Warren et al. (2017) explain that inventory consists of merchandise held for sale in the normal course of business, materials used in production, or goods held for particular purposes. For trading companies, inventory is usually a current asset of material value, so the accuracy with which it is recorded directly affects the cost of goods sold, profit, and the value of assets reported in the financial statements (Kieso et al., 2020).

In a competitive environment, effective inventory management can increase profit, whereas poor management erodes revenue (Pitriyani et al., 2021). Inventory management covers not only purchase requisitions and storage but also recording. Differences between inventory records and the physical stock in the warehouse can arise from data-entry errors, inaccurate recording, deliveries that do not match orders, and the behaviour of system users (Tumiwa et al., 2022). Such differences are not rare: an empirical study of a large retailer found that a majority of inventory records did not match the physical quantities on hand (DeHoratius & Raman, 2008). Poorly managed inventory can turn an asset into a burden, for example through storage and maintenance costs and losses from stock discrepancies.

Mulyadi (2016) distinguishes two inventory recording methods: the perpetual method, in which every movement of inventory is recorded directly on an inventory card, and the physical (periodic) method, which records only additions to inventory from purchases and determines the remaining stock by counting. The perpetual method allows the quantity and value of inventory to be updated every time a transaction occurs. In accounting service offices and small and medium enterprises, perpetual records are often maintained in Microsoft Excel because it is inexpensive, flexible, and easy to learn (Novita & Wulanditya, 2020; Putri & Fatma Ginoga, 2024). However, the effectiveness of a spreadsheet depends heavily on the design of its structure, the integrity of its formulas, and the care with which users enter data (Romney & Steinbart, 2018); research on spreadsheet use has repeatedly shown that errors in operational spreadsheets are common and often go undetected (Panko, 1998; Powell et al., 2008).

The first author encountered these conditions during the Merdeka Belajar Kampus Merdeka (MBKM) internship programme, when she was assigned to record the inventory of CV ABC, a trading company that sells medical devices, in an Excel-based inventory subsidiary ledger. CV ABC's products come in many variants that differ only slightly in type and size, so they are easily confused unless they are supported by systematic item coding. In addition, purchase prices differ from one purchase to another, which requires a consistent inventory valuation method.

The case also relates to the Sustainable Development Goals (SDGs) adopted by the United Nations (2015). Small businesses serve as a fundamental pillar of the regional economy. For this reason, those who manage micro, small, and medium-sized enterprises (MSMEs) are expected to possess financial literacy, a skill that is highly valuable for the management of small businesses. The spreadsheet-based inventory recording is one of the tasks they are commonly given. At the same time, reliable inventory records support the productivity and sound management of trading businesses, which is a concern of SDG 8 (decent work and economic growth). Documenting the procedure used in practice therefore serves both the development of students' skills and the improvement of record-keeping in the businesses that host them.

Accordingly, this study aims (1) to describe the structure of the Excel-based inventory subsidiary ledger used to record CV ABC's inventory and (2) to explain the procedure for recording inventory in that ledger, including the application of the weighted average method. The results are expected to serve as a practical guide for accounting staff, interns, and small trading businesses that keep perpetual inventory records in spreadsheets. The remainder of the article reviews the relevant literature, describes the research method, presents the structure of the ledger and the five recording stages, discusses the controls and limitations of the design, and concludes with implications.

2. LITERATURE REVIEW

2.1 Inventory Subsidiary Ledger

When financial data classified in the general ledger require further detail, a company can establish a subsidiary ledger consisting of subsidiary accounts that break down the data in a particular general ledger account (Mulyadi, 2016). The inventory subsidiary ledger, also known as the inventory card, contains information on the movements and balances of each type of inventory, in terms of both quantity and cost. At the end of the period, the total of all inventory cards should equal the balance of the inventory account in the general ledger, so the subsidiary ledger also functions as a control device. In accounting information systems, the general ledger account is the control account and the subsidiary ledger provides the detail needed for day-to-day management, such as knowing which items need to be reordered (Romney & Steinbart, 2018).

The value of a subsidiary ledger therefore lies in two properties: completeness (every movement of every item is captured) and reconcilability (the detail adds up to the control total). When the subsidiary ledger is kept in a spreadsheet rather than in an accounting package, both properties depend on how the workbook is designed. Studies of Excel-based accounting tools for small businesses show that well-structured workbooks can provide reliable subsidiary records at very low cost (Novita & Wulanditya, 2020; Ardiansyah et al., 2025), while database-based tools offer stronger controls at the price of greater complexity (Itan & Meiviana, 2024).

2.2 Perpetual Recording Method

Under the perpetual method, every transaction that affects inventory, such as purchases and sales, is recorded directly and in detail, so that the quantity and value of inventory are always up to date (Mulyadi, 2016). This method suits trading companies that need continuous stock information for purchasing and sales decisions. Paraswati et al. (2021) show that the choice of recording and valuation methods affects the fairness of the inventory value presented in the financial statements. In a perpetual system, cost of goods sold is recognised at the time of each sale, whereas in a periodic system it is determined at the end of the period as the difference between goods available for sale and ending inventory (Warren et al., 2017; Kieso et al., 2020).

In practice, small entities often adopt hybrid arrangements in which quantities are updated with every transaction while costs are computed once a period. Such arrangements provide continuous stock quantities for operational decisions while keeping the cost calculation simple. They are acceptable provided that the cost formula is applied consistently and disclosed, but they should not be confused with a fully perpetual system in which costs are also updated after every purchase (Kieso et al., 2020).

2.3 Weighted Average Method

The weighted average method determines the cost per unit of inventory by dividing the total cost of goods available by the total number of units available (Rasyidan & Zaenuddin, 2020). The average cost is used to determine the cost of goods sold until the next purchase occurs (Warren et al., 2017). The method assumes that the goods sold are charged at average cost, which dampens the effect of fluctuations in purchase prices (Paraswati et al., 2021).

Two variants are commonly distinguished. Under the periodic weighted average, a single average cost is calculated for the whole period from beginning inventory and all purchases of the period and is applied to all units issued and to ending inventory. Under the moving average used in perpetual systems, a new average is calculated after every purchase and applied to the issues that follow it (Kieso et al., 2020; Warren et al., 2017). Both are permitted cost formulas for interchangeable items, and both reduce the effect of price volatility compared with FIFO; they produce different results only when purchases and issues are interleaved within a period at different prices.

2.4 Item Coding

An item code is a unique identifier that distinguishes one product from another and facilitates searching, tracking, and grouping data. Mulyadi (2016) describes several coding methods, including sequential numeric codes with a letter prefix, in which the initial letters abbreviate a group so that the group can be identified easily. In a spreadsheet-based system, the item code also serves as the lookup key that

links data across sheets. Poorly designed or inconsistently applied codes are a known source of errors in master data, which then propagate to every transaction that refers to them (Romney & Steinbart, 2018).

2.5 Spreadsheet Risk and Controls

Spreadsheets are widely used for accounting tasks, but research has shown that a large proportion of operational spreadsheets contain errors, many of which arise from incorrect references, formulas that are not copied to new rows, and data-entry mistakes (Panko, 1998; Powell et al., 2008). Because spreadsheet developers tend to be overconfident about the accuracy of their work, systematic checks such as reconciling totals, testing formulas, and reviewing the workbook after structural changes are recommended controls. These findings are directly relevant to an inventory subsidiary ledger in which several sheets are linked by formulas and in which a single broken link can affect the cost of every item.

3. RESEARCH METHOD

3.1 Research Design

This study uses a qualitative descriptive approach with a single case study design (Yin, 2018). The approach was chosen because the study seeks to describe in detail the inventory recording procedure as it is carried out in a real context, rather than to test relationships between variables (Sugiyono, 2019). The unit of analysis is the inventory recording procedure for one client in one monthly period.

3.2 Research Object and Data Collection

The object of the study is the inventory recording of CV ABC, a trading company that sells medical devices, which was carried out by the first author during the MBKM internship. The company's name is anonymised to protect the client's data. Data were collected through participant observation while the author was directly involved in the recording work and through documentation of four types of source documents: the client's stock report, the ending inventory as of 30 September 2024, the inventory purchase report, and the sales invoices for October 2024. The working document, an Excel template of the inventory subsidiary ledger, was also analysed to understand its structure and the links between its formulas. Informal interviews were held with the field supervisor at the internship host to clarify the purpose of each sheet and the checking procedure.

"We record CV ABC's inventory every month. What the client sends us is the stock report, the purchase report, and the sales invoices; from those we update the workbook and check that the ending stock makes sense before we pass it on." (Field supervisor)

3.3 Data Analysis

The data were analysed descriptively and qualitatively through data reduction, data display, and conclusion drawing. Data reduction involved selecting information relevant to the structure of the subsidiary ledger and the recording flow. Data were displayed in a flow diagram, tables, and screenshots of the working papers. Conclusions were drawn by comparing the observed practice with the concepts of subsidiary ledgers, perpetual recording, item coding, the weighted average method, and spreadsheet controls. To illustrate the calculation, two items visible in the working papers were recomputed manually and compared with the figures produced by the workbook.

4. RESULTS AND DISCUSSION

This section first describes the structure of the inventory subsidiary ledger and then explains CV ABC's inventory recording procedure step by step. An overview of the recording flow and the source documents used at each stage is presented in Figure 1, and the relationship between source documents, sheets, and outputs is summarised in Table 1.

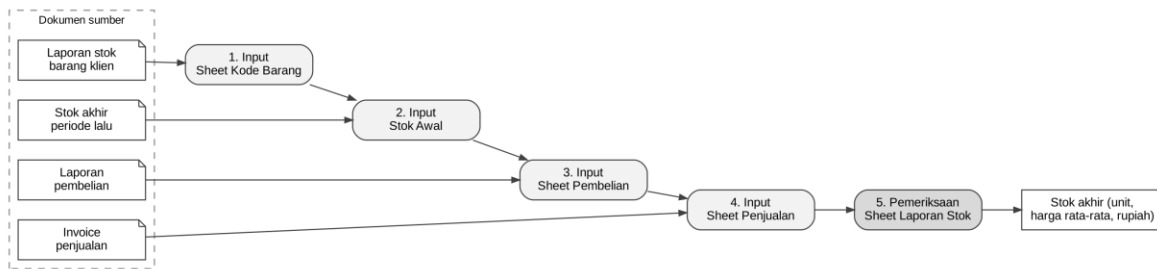


Figure 1. Inventory Recording Flow in CV ABC's Inventory Subsidiary Ledger

Source: Compiled by the authors (2024)

Table 1. Source Documents, Sheets, and Outputs in the Recording Procedure

Stage	Source document	Sheet updated	Output/effect
1	Client's stock report (catalogue codes and item names)	Item code (master data)	Unique code, name, unit, and type for each item
2	Ending inventory of the previous month (30 September 2024)	Stock report – beginning inventory	Units, unit cost, and amount at the start of October 2024
3	Inventory purchase report	Purchases	Units and amounts flowing into "goods in"
4	Sales invoices (October 2024)	Sales	Units flowing into "goods out", costed at the weighted average
5	– (review)	Stock report – ending inventory	Verified units, average cost, and amount of ending inventory

Source: Compiled by the authors (2024)

4.1. Results

The inventory subsidiary ledger consists of four main linked sheets: item codes, stock report, purchases, and sales. The item code sheet serves as master data containing the item code, item name, unit, and item type (Figure 2). It is the reference for all other sheets, so the user only needs to enter the item code and the other identity columns are filled in automatically.

The item code column gives each product a specific identifier; the item name column contains a full description to avoid misidentification; the unit column shows the unit of measurement (for example, piece, kilogram, dozen, or metre) so that recording and stock calculations are uniform; and the item type column classifies products into categories. Because all of CV ABC's products are medical devices, the item type is filled in with the abbreviation "am".

The stock report sheet is the core of the subsidiary ledger and is divided into five tables integrated by Excel formulas. First, the item data table contains the code, item name, unit, and item type, which are referenced automatically from the item code sheet. Second, the beginning inventory table records the units, unit cost, and amount of inventory at the start of the period, carried forward from the ending inventory of the previous period. Third, the goods-in table records additions to inventory and is linked to the purchases sheet. Fourth, the goods-out table records reductions in inventory and is linked to the sales sheet in the units column. Fifth, the ending inventory table calculates the inventory remaining at the end of the period. The calculation logic of these tables is summarised in Table 2.

The unit cost in the goods-out table is obtained by adding the beginning inventory to the goods-in amount and dividing the result by the sum of beginning units and goods-in units. In other words, the unit cost is the weighted average cost of all goods available for sale, consistent with the concept described by Rasyidan and Zaenuddin (2020) and Warren et al. (2017). Ending units are calculated as beginning units plus units received minus units issued, while the unit cost of ending inventory follows the average cost in the goods-out table.

DAFTAR PRODUK			
Kode	Nama	Satuan	Jenis
A1101-0-1050	Produk A	pc	am
A1101-0-1060	Produk B	pc	am
A1101-0-1075	Produk C	pc	am
A1101-0-1090	Produk D	pc	am
A1101-0-1100	Produk E	pc	am
A1101-0-1110	Produk F	pc	am
A1101-0-1125	Produk G	pc	am
A1101-0-1135	Produk H	pc	am
A1101-2-1075	Produk I	pc	am
A1101-2-1090	Produk J	pc	am
A1101-2-1100	Produk K	pc	am
A1101-1-1075	Produk L	pc	am
A1101-1-1090	Produk M	pc	am
A1101-1-1100	Produk N	pc	am
A1101-1-1110	Produk O	pc	am
A1101-1-1125	Produk P	pc	am
A1101-1-1135	Produk Q	pc	am
A1100-9-2201	Produk R	pc	am
A1100-9-2202	Produk S	pc	am
Kode Barang Lap Stock Pembelian Penjualan +			

Figure 2. Structure of the Item Code Sheet

Source: Inventory subsidiary ledger working papers (2024)

Table 2. Calculation Logic of the Stock Report Sheet

Table	Column	Calculation
Item data	Code, name, unit, type	Looked up from the item code sheet using the item code
Beginning inventory	Units, unit cost, amount	Carried forward from the previous month's ending inventory
Goods in	Units, unit cost, amount	Summed from the purchases sheet for each item code
Goods out	Units	Summed from the sales sheet for each item code
Goods out	Unit cost	(Beginning amount + goods-in amount) ÷ (beginning units + goods-in units)
Goods out	Amount	Units out × unit cost
Ending inventory	Units	Beginning units + goods-in units – goods-out units
Ending inventory	Unit cost, amount	Unit cost equals the goods-out unit cost; amount = ending units × unit cost

Source: Compiled by the authors from the working papers (2024)

The purchases sheet records all inventory procurement, with columns for the date, supplier name, item code, item name, unit, quantity, unit price, amount, 11% value-added tax (VAT), and total price. The sales sheet records sales to customers, with columns for the date, item code, item name, quantity, unit, unit price, and total price. The unit price in the sales sheet is linked to the unit cost in the goods-out table, so the value of goods sold always follows the latest average cost.

“The client's products differ only in coating or size, so if we type names, mistakes happen easily. That is why every sheet works from the code, and the names appear by themselves.” (Field supervisor)

4.1.1. Stage 1: Entering the Item Code Sheet

The first stage is to enter item data into the item code sheet on the basis of the stock report received from CV ABC. The report contains the catalogue codes and item names used by the client. Coding was carried out with ease of identification in mind, much like the design of a chart of accounts for financial accounts. The result is shown in [Figure 3](#).

Kode	Nama	Satuan	Jenis
A1101-0-1050	VarioLoc Stem, TPS Coating, STD 5mm	pc	am
A1101-0-1060	VarioLoc Stem, TPS Coating, STD 6mm	pc	am
A1101-0-1075	VarioLoc Stem, TPS Coating, STD 7.5mm	pc	am
A1101-0-1090	VarioLoc Stem, TPS Coating, STD 9mm	pc	am
A1101-0-1100	VarioLoc Stem, TPS Coating, STD 10mm	pc	am
A1101-0-1110	VarioLoc Stem, TPS Coating, STD 11mm	pc	am

Figure 3. Item Codes Entered for CV ABC

Source: CV ABC inventory subsidiary ledger working papers (2024)

For example, code A1101-0-1050 for "VarioLoc Stem, TPS Coating, STD 5mm" can be broken down as follows: the letter A followed by four digits (1101) identifies the product group (VarioLoc Stem); the next single digit (0) identifies the type within the group (TPS Coating); and the last four digits (1050) indicate the size of the product (5 mm). This pattern is a sequential numeric code with a letter prefix, as described by Mulyadi (2016). A meaningful code structure is important for CV ABC because many products differ only in coating type or size, so the risk of confusion can be reduced. The same structure is visible in the other codes in the working papers: A1101-2-1075 denotes the cemented type of the same stem in 7.5 mm, and A1101-1-1090 the press-fit type in 9 mm.

"When a new product appears in the client's stock report, we add it to the code sheet first, following the same pattern, before any purchase or sale of it is entered." (Field supervisor)

A practical control at this stage is to ensure that each code appears only once in the master data. Duplicate codes would cause lookups to return the first match only, so that the second item would silently receive the wrong name or cost. Conversely, an item entered in a transaction sheet without first being registered in the code sheet would produce a lookup error, which is useful because it signals the omission immediately.

4.1.2. Stage 2: Entering Beginning Inventory

CV ABC's inventory is recorded monthly. Because the items recorded are largely the same from one period to the next, the beginning inventory of a month is taken from the ending inventory of the previous month. In this case, the ending inventory as of 30 September 2024 was transferred to become the beginning inventory for October 2024, covering units, unit cost, and amount (Figure 4).

Stock Akhir					Stock Awal (30 September 2024)						
Kode	Nama	Unit	Harga / Unit	Rupiah	Kode	Nama	Jenis	Satuan	Unit	Harga / Unit	Rupiah
A1101-0-1050	VarioLoc Stem, TPS Coating, STD 5mm	5	5.209.564	26.047.820	A1101-0-1050	VarioLoc Stem, TPS Coating, STD 5mm	am	pc	5	5.209.564	26.047.820
A1101-0-1060	VarioLoc Stem, TPS Coating, STD 6mm	2	5.385.914	10.771.828	A1101-0-1060	VarioLoc Stem, TPS Coating, STD 6mm	am	pc	2	5.385.914	10.771.828
A1101-0-1075	VarioLoc Stem, TPS Coating, STD 7.5mm	9	4.961.447	44.653.019	A1101-0-1075	VarioLoc Stem, TPS Coating, STD 7.5mm	am	pc	9	4.961.447	44.653.019
A1101-0-1090	VarioLoc Stem, TPS Coating, STD 9mm	6	5.656.272	33.937.630	A1101-0-1090	VarioLoc Stem, TPS Coating, STD 9mm	am	pc	6	5.656.272	33.937.630
A1101-0-1100	VarioLoc Stem, TPS Coating, STD 10mm	6	5.189.393	31.136.360	A1101-0-1100	VarioLoc Stem, TPS Coating, STD 10mm	am	pc	6	5.189.393	31.136.360
A1101-0-1110	VarioLoc Stem, TPS Coating, STD 11mm	7	5.071.320	35.499.240	A1101-0-1110	VarioLoc Stem, TPS Coating, STD 11mm	am	pc	7	5.071.320	35.499.240
A1101-0-1125	VarioLoc Stem, TPS Coating, STD 12.5mm	4	5.520.593	22.082.370	A1101-0-1125	VarioLoc Stem, TPS Coating, STD 12.5mm	am	pc	4	5.520.593	22.082.370
A1101-0-1135	VarioLoc Stem, TPS Coating, STD 13.5mm	4	5.135.677	20.542.700	A1101-0-1135	VarioLoc Stem, TPS Coating, STD 13.5mm	am	pc	4	5.135.677	20.542.700
A1101-2-1075	VarioLoc Stem Cemented, STD 7.5mm	2	3.939.144	7.878.288	A1101-2-1075	VarioLoc Stem Cemented, STD 7.5mm	am	pc	2	3.939.144	7.878.288
A1101-2-1090	VarioLoc Stem Cemented, STD 9mm	7	3.853.124	26.971.870	A1101-2-1090	VarioLoc Stem Cemented, STD 9mm	am	pc	7	3.853.124	26.971.870
A1101-2-1100	VarioLoc Stem Cemented, STD 10mm	4	3.943.317	15.773.268	A1101-2-1100	VarioLoc Stem Cemented, STD 10mm	am	pc	4	3.943.317	15.773.268
A1101-1-1075	VarioLoc Stem, Pressfit, STD 7.5mm	6	2.903.112	17.418.672	A1101-1-1075	VarioLoc Stem, Pressfit, STD 7.5mm	am	pc	6	2.903.112	17.418.672
A1101-1-1090	VarioLoc Stem, Pressfit, STD 9mm	35	2.917.354	102.107.370	A1101-1-1090	VarioLoc Stem, Pressfit, STD 9mm	am	pc	35	2.917.354	102.107.370
A1101-1-1100	VarioLoc Stem, Pressfit, STD 10mm	50	2.892.475	144.623.750	A1101-1-1100	VarioLoc Stem, Pressfit, STD 10mm	am	pc	50	2.892.475	144.623.750
A1101-1-1110	VarioLoc Stem, Pressfit, STD 11mm	45	2.906.808	130.806.360	A1101-1-1110	VarioLoc Stem, Pressfit, STD 11mm	am	pc	45	2.906.808	130.806.360
A1101-1-1125	VarioLoc Stem, Pressfit, STD 12.5mm	34	2.876.926	97.815.480	A1101-1-1125	VarioLoc Stem, Pressfit, STD 12.5mm	am	pc	34	2.876.926	97.815.480
A1101-1-1135	VarioLoc Stem, Pressfit, STD 13.5mm	43	2.876.588	123.693.290	A1101-1-1135	VarioLoc Stem, Pressfit, STD 13.5mm	am	pc	43	2.876.588	123.693.290
A1100-9-2201	Femoral Head, CoCr 22mm, 3mm	15	1.204.190	18.062.850	A1100-9-2201	Femoral Head, CoCr 22mm, 3mm	am	pc	15	1.204.190	18.062.850
A1100-9-2201	Femoral Head, CoCr 22mm, 3mm	15	1.204.190	18.062.850	A1100-9-2201	Femoral Head, CoCr 22mm, 3mm	am	pc	15	1.204.190	18.062.850
A1100-9-2901	Femoral Head, CoCr 29mm, 3.5mm	16	1.634.145	26.146.320	A1100-9-2901	Femoral Head, CoCr 29mm, 3.5mm	am	pc	16	1.634.145	26.146.320

Figure 4. Transfer of September Ending Inventory to October 2024 Beginning Inventory

Source: CV ABC inventory subsidiary ledger working papers (2024)

The main control point at this stage is to ensure that the units and amount of beginning inventory are exactly the same as the ending inventory of the previous period. Any difference at this stage carries through all the average-cost and ending-inventory calculations for the current period, so the opening balances must be reconciled before current-period transactions are entered. A simple way to perform this check is to compare the column totals of units and amounts in the new beginning inventory table with the totals of the previous month's ending inventory; both should agree to the last rupiah.

"Before entering the purchases, we always check that the total of the opening stock is the same as last month's closing stock. If it is not the same, everything after that will be wrong."
(Field supervisor)

4.1.3. Stage 3: Entering the Purchases Sheet

The source document for this stage is the client's inventory purchase report, which contains the date, supplier name, item code, item name, quantity, and unit price. The data were entered in the purchases sheet as shown in Figure 5. Because the code and name columns are linked to the item code sheet, the item name is filled in automatically after the code is entered. The 11% VAT column is calculated automatically from the unit price and quantity, and the total price is the amount after VAT.

Tanggal faktur	Supplier	Kode Brg	Nama Barang	Qty	Satuan	Harga satuan	Total	PPN 11%	Harga Total
14-Oct-24	PT X	A1100-9-2201	Femoral Head, CoCr 22mm, 3mm	10	pc	1.265.053	12.650.532	1.391.559	14.042.091
14-Oct-24	PT X	A1100-9-2202	Femoral Head, CoCr 22mm, 0mm	8	pc	1.265.053	10.120.426	1.113.247	11.233.673
14-Oct-24	PT X	A1100-9-3202	Femoral Head, CoCr 32mm, 0mm	3	pc	1.644.569	4.933.707	542.708	5.476.415
14-Oct-24	PT X	A1101-0-1060	VarioLoc Stem, TPS Coating, STD 6mm	3	pc	5.798.161	17.394.482	1.913.393	19.307.875
14-Oct-24	PT X	A1101-2-1075	VarioLoc Stem Cemented, STD 7.5mm	4	pc	4.427.686	17.710.745	1.948.182	19.658.927
14-Oct-24	PT X	A1101-4-6001	Proximal Body, TPS Coating, VarioLoc Modular, STD 60	5	pc	5.903.582	29.517.908	3.246.970	32.764.878
14-Oct-24	PT X	A1101-4-9901	Connecting Screw	10	pc	274.095	2.740.949	301.504	3.042.453
14-Oct-24	PT X	A1101-5-1512	Distal Stem, Straight, VarioLoc Modular 150mm, size 12n	2	pc	3.373.475	6.746.950	742.165	7.489.115
14-Oct-24	PT X	A1101-5-1513	Distal Stem, Straight, VarioLoc Modular 150mm, size 13n	5	pc	3.373.475	16.867.376	1.855.411	18.722.787
14-Oct-24	PT X	A1104-0-0041	Bipolar Head, size 41mm	5	pc	2.319.264	11.596.321	1.275.595	12.871.916
14-Oct-24	PT X	A1104-0-0043	Bipolar Head, size 43mm	2	pc	2.319.264	4.638.528	510.238	5.148.766
14-Oct-24	PT X	A1104-6-3941	Bipolar Insert, UHMWPE, size 39-41mm, 22mm	10	pc	1.581.317	15.813.165	1.739.448	17.552.613
14-Oct-24	PT X	A1104-6-4244	Bipolar Insert, UHMWPE, size 42-44mm, 22mm	15	pc	1.581.317	23.719.748	2.609.172	26.328.920

Figure 5. Entering Data in the Purchases Sheet

Source: CV ABC inventory subsidiary ledger working papers (2024)

The units and amounts purchased then flow automatically to the goods-in table in the stock report sheet. This integration eliminates the need for double entry, which Romney and Steinbart (2018) identify as one of the main sources of error in accounting data processing. The amounts transferred to the goods-in table are the amounts before VAT, which is appropriate when input VAT is creditable, because creditable VAT is not part of the cost of inventory (Kieso et al., 2020). Keeping the VAT in a separate column also makes it possible to reconcile the purchases sheet with the client's tax records.

"The purchase report already shows the price per unit; we only enter it once in the purchases sheet. The VAT is in its own column, so the stock value uses the price before tax." (Field supervisor)

4.1.4. Stage 4: Entering the Sales Sheet

The source document for this stage is CV ABC's sales invoice (Figure 6). The information taken from the invoice is the date, item name, and quantity sold. Because the invoice shows item names rather than codes, the user must first look up the corresponding code in the item code sheet and then enter it in the sales sheet, after which the item name is filled in automatically (Figure 7).

The unit price in the sales sheet is taken from the goods-out unit cost in the stock report sheet, which is the result of the weighted average calculation. The value of goods sold is therefore charged at average cost, so the effect of fluctuating purchase prices is dampened (Paraswati et al., 2021). This stage also shows that the item code serves as a bridge between external documents, which are based on item names, and the internal system, which is based on codes. Because the matching of names to codes is done manually, it is the step most exposed to human error: two items whose names differ only in size can easily be confused, which is why the meaningful code structure described in Stage 1 matters.

"The invoice only writes the product name, for example the stem, the coating, and the size. We have to find the right code first; if we pick the neighbouring size, the stock of two items will be wrong at once." (Field supervisor)

INVOICE				
No : AMI/171/X/2024				
Kepada Yth.		Tanggal : 09-Oct-24		
		Mata Uang : Rp		
		No PO : --		
		Tgl. Jatuh tempo : 09-Nov-24		
No.	Nama Barang	Satuan	Qty	Harga Satuan
	Paket implant Bipolar Cementless, yang terdiri dari : • 1 pc VarioLoc Stem, Pressfit, STD 9mm • 1 pc Femoral Head, CoCr 28mm, + 0mm • 1 pc Bipolar Insert, UHMWPE, size 45-47mm, 28mm • 1 pc Bipolar Head, size 47mm	UNT	1	Rp 26.231.460
Sub Total				Rp 26.231.460
PPN 11%				Rp 2.885.460
Grand Total				Rp 29.116.920

Figure 6. CV ABC Sales Invoice

Source: CV ABC documents (2024), identities anonymized

Tanggal	Kode Barang	Nama Barang	QTY	Nama Satuan	Harga / Unit	Total Harga
09-Oct-24	A1101-1-1000	VarioLoc Stem, Pressfit, STD 9mm	1	pc	2.917.354	2.917.354
09-Oct-24	A1100-9-2802	Femoral Head, CoCr 28mm, 0mm	1	pc	1.664.794	1.664.794
09-Oct-24	A1104-5-4547	Bipolar Insert, UHMWPE, size 45-47mm, 28mm	1	pc	1.585.844	1.585.844
09-Oct-24	A1104-0-0047	Bipolar Head, size 47mm	1	pc	2.287.510	2.287.510

Figure 7. Entering Data in the Sales Sheet

Source: CV ABC inventory subsidiary ledger working papers (2024)

4.1.5. Stage 5: Checking the Stock Report Sheet

After beginning inventory, purchases, and sales have been entered, the final stage is to review the stock report sheet (Figure 8). The review ensures that all goods-in and goods-out data have been carried over completely and that no formula returns an error. The focus is on the ending inventory table, namely the correctness of the units, unit cost, and amount at the end of the period.

Kode	Nama	Stok Awal (30 September 2024)			Masuk			Keluar			Stock Akhir		
		Unit	Harga / Unit	Rupiah	Unit	Harga / Unit	Rupiah	Unit	Harga / Unit	Rupiah	Unit	Harga / Unit	Rupiah
A1101-0-1050	VarioLoc Stem, TPS Coating, STD 5mm	5	5.209.564	26.047.820	-	5.864.482	-	-	5.209.564	-	5	5.209.564	26.047.820
A1101-0-1060	VarioLoc Stem, TPS Coating, STD 6mm	2	5.385.914	10.771.828	3	5.798.161	17.394.482	-	5.633.262	-	5	5.633.262	28.166.309
A1101-0-1075	VarioLoc Stem, TPS Coating, STD 7.5mm	9	4.961.447	44.653.019	-	-	-	-	4.961.447	-	9	4.961.447	44.653.019
A1101-0-1090	VarioLoc Stem, TPS Coating, STD 9mm	6	5.656.272	33.937.630	-	-	-	1	5.656.272	5.656.272	5	5.656.272	28.281.359
A1101-0-1100	VarioLoc Stem, TPS Coating, STD 10mm	6	5.189.393	31.136.360	-	-	-	-	5.189.393	-	6	5.189.393	31.136.360
A1101-0-1110	VarioLoc Stem, TPS Coating, STD 11mm	7	5.071.320	35.499.241	-	-	-	-	5.071.320	-	7	5.071.320	35.499.241
A1101-0-1125	VarioLoc Stem, TPS Coating, STD 12.5mm	4	5.520.593	22.082.371	-	-	-	-	5.520.593	-	4	5.520.593	22.082.371
A1101-0-1135	VarioLoc Stem, TPS Coating, STD 13.5mm	4	5.135.677	20.542.706	-	-	-	-	5.135.677	-	4	5.135.677	20.542.706
A1101-2-1075	VarioLoc Stem Cemented, STD 7.5mm	2	3.939.144	7.878.289	4	4.427.686	17.710.745	1	4.264.839	4.264.839	5	4.264.839	21.324.195
A1101-2-1090	VarioLoc Stem Cemented, STD 9mm	7	3.853.124	26.971.870	-	-	-	-	3.853.124	-	7	3.853.124	26.971.870
A1101-2-1100	VarioLoc Stem Cemented, STD 10mm	4	3.943.317	15.773.268	-	-	-	1	3.943.317	3.943.317	3	3.943.317	11.829.951
A1101-1-1075	VarioLoc Stem, Pressfit, STD 7.5mm	6	2.903.112	17.418.673	-	-	-	-	2.903.112	-	6	2.903.112	17.418.673
A1101-1-1090	VarioLoc Stem, Pressfit, STD 9mm	35	2.917.354	102.107.376	-	-	-	2	2.917.354	5.834.707	33	2.917.354	96.272.669
A1101-1-1100	VarioLoc Stem, Pressfit, STD 10mm	50	2.892.475	144.623.758	-	-	-	-	2.892.475	-	50	2.892.475	144.623.758
A1101-1-1110	VarioLoc Stem, Pressfit, STD 11mm	45	2.906.808	130.806.367	-	-	-	2	2.906.808	5.813.616	43	2.906.808	124.992.751

Figure 8. Stock Report Sheet after All Data Have Been Entered

Source: CV ABC inventory subsidiary ledger working papers (2024)

Table 3 recomputes two items visible in Figure 8 to illustrate how the weighted average is calculated and to verify the workbook's results. For item A1101-0-1060 (VarioLoc Stem, TPS Coating, 6 mm), two units were on hand at the beginning of October at IDR 5,385,914 each, and three units were purchased at IDR 5,798,161 each. The average cost is $(\text{IDR } 10,771,828 + \text{IDR } 17,394,482) \div 5 = \text{IDR } 5,633,262$, and because no units were sold, the five units in ending inventory are carried at this cost. For item A1101-2-1075 (VarioLoc Stem, Cemented, 7.5 mm), two units at IDR 3,939,144 and four units purchased at IDR 4,427,686 give an average of $\text{IDR } 25,589,034 \div 6 = \text{IDR } 4,264,839$; one unit was sold at this cost, leaving five units with a value of $\text{IDR } 21,324,195$. The manual recomputation agrees with the workbook, apart from differences of one rupiah caused by rounding.

Table 3. Recomputation of the Weighted Average Cost for Two Items (October 2024)

Component	A1101-0-1060 (TPS Coating, 6 mm)	A1101-2-1075 (Cemented, 7.5 mm)
Beginning inventory	2 units × IDR 5,385,914 = IDR 10,771,828	2 units × IDR 3,939,144 = IDR 7,878,289
Goods in	3 units × IDR 5,798,161 = IDR 17,394,482	4 units × IDR 4,427,686 = IDR 17,710,745
Goods available	5 units; IDR 28,166,310	6 units; IDR 25,589,034
Weighted average unit cost	IDR 5,633,262	IDR 4,264,839
Goods out	0 units; IDR 0	1 unit; IDR 4,264,839
Ending inventory	5 units; IDR 28,166,309*	5 units; IDR 21,324,195

Source: Recomputed by the authors from the working papers (2024). *Difference of IDR 1 due to rounding.

The findings show that the Excel-based subsidiary ledger applies the principle of perpetual recording for quantities: every purchase and sale updates the units of inventory, so the balance of each item can be known at any time (Mulyadi, 2016). Costing, however, is performed once per month: the average cost is computed from beginning inventory and all purchases of the month and is then applied to all issues of that month, regardless of whether a particular sale took place before or after a particular purchase. Strictly speaking, the design therefore combines perpetual quantity records with a periodic weighted average cost formula (Kieso et al., 2020). For CV ABC, whose purchase prices for a given item change moderately and whose records are closed monthly, this simplification is reasonable and is applied consistently; it should nevertheless be described accurately in working papers and notes so that users do not assume that costs are updated after each purchase.

The reliability of the design depends on two further conditions. First, item codes must be correct, because all cross-sheet references rely on them. Second, formulas must remain intact, because inserting new rows or copying sheets risks breaking them. This is consistent with Tumiwa et al. (2022), who found that user behaviour also determines the success of inventory accounting systems, and with research showing that spreadsheet errors frequently arise from formulas that are not extended to new data (Panko, 1998; Powell et al., 2008). The stock report review should therefore be a routine procedure at the end of every period rather than an optional extra step. The key risks and the corresponding controls at each stage are summarised in Table 4.

Table 4. Risks and Controls in the Recording Procedure

Stage	Main risk	Control applied or recommended
1. Item codes	Duplicate or inconsistent codes; new items not registered	Unique code per item; meaningful code structure; register new items before entering transactions
2. Beginning inventory	Opening balance differs from previous closing balance	Reconcile unit and amount totals with the previous month's ending inventory
3. Purchases	Wrong code or price; VAT included in cost	Code-based lookup; VAT in a separate column; agree totals with the purchase report
4. Sales	Wrong code chosen for an item name on the invoice	Check item size/type against the code; agree units with invoices
5. Stock report	Broken or unextended formulas; negative stock	Review for error values and negative balances; reconcile totals with the general ledger; periodic stock count

Source: Compiled by the authors (2024)

4.2 Discussion

The procedure documented in this study shows that a relatively simple workbook can provide the core functions of an inventory subsidiary ledger: item-level detail, continuous quantity balances, a consistent cost formula, and a link to cost of goods sold. This supports earlier findings that spreadsheet-based accounting tools are a practical option for small trading businesses that cannot yet justify an accounting package (Novita & Wulanditya, 2020; Putri & Fatma Ginoga, 2024; Ardiansyah et al., 2025). The design also reflects the internal control principle that data should be captured once and reused, which reduces transcription errors (Romney & Steinbart, 2018; Suryaningrum, 2024).

At the same time, the case illustrates the limits of spreadsheet controls. The workbook cannot prevent a user from choosing the wrong code for an invoice line, nor can it detect that a physical item is missing from the warehouse. These risks require controls outside the workbook, such as review by a second person and periodic stock counts, which are the only way to detect the kind of record inaccuracy documented by [DeHoratius and Raman \(2008\)](#). Compared with database-based solutions such as the Microsoft Access system described by [Itan and Meiviana \(2024\)](#), the spreadsheet offers flexibility but relies more heavily on user discipline. For CV ABC, whose items are high-value medical devices, the cost of a single misclassified unit is substantial, which strengthens the case for the review stage and for periodic reconciliation with physical counts.

“For us the most important thing is that the closing stock can be trusted, because the client uses it for their financial statements. That is why the last step, checking the stock report, is never skipped.” (Field supervisor)

The case also illustrates the contribution of internships to the Sustainable Development Goals. Through the five recording stages, the intern applied item coding, the weighted average cost formula, and spreadsheet controls to real transaction data under the guidance of a field supervisor, which is the kind of practical, employment-relevant skill described in SDG target 4.4 (United Nations, 2015). In turn, a documented and reviewable inventory procedure helps the client keep reliable records of high-value goods, which supports sound management and productivity in line with SDG 8. Both contributions depend on the procedure being used and reviewed consistently, and this study does not measure them directly.

4.2.1. Linking the Subsidiary Ledger to the General Ledger and the Financial Statements

The subsidiary ledger is not an end in itself; its purpose is to support the inventory and cost of goods sold balances reported in CV ABC's financial statements. Three links are therefore important. The first is the link between the purchases sheet and the general ledger. Each purchase recorded in the purchases sheet corresponds to a journal entry that debits inventory for the amount before VAT, debits input VAT for the 11% tax, and credits cash or accounts payable for the total price. Because the purchases sheet already separates these three amounts, its column totals for the month can be agreed directly with the debit to inventory, the debit to input VAT, and the credit to payables or cash in the general ledger ([Romney & Steinbart, 2018](#)).

The second link concerns cost of goods sold. The total of the goods-out amount column in the stock report sheet is the cost of goods sold for the month at weighted average cost. In the general ledger, this amount is recorded by debiting cost of goods sold and crediting inventory. Under a periodic weighted average formula, the entry is naturally made once at the end of the month, after all purchases have been entered, which is consistent with the monthly closing practice observed in this case ([Warren et al., 2017](#)). Recording the entry before all purchases have been entered would produce an average cost that later changes, so the order of the five stages in [Figure 1](#) is also the order in which the general ledger entries should be finalised.

The third link is the reconciliation between the subsidiary ledger and the inventory control account. At the end of the month, the total of the ending inventory amount column should equal the balance of the inventory account in the general ledger. Any difference indicates that a transaction has been recorded in one place but not the other, that a formula in the workbook has not been extended, or that a purchase has been posted with or without VAT inconsistently. This reconciliation is the formal expression of the control function of a subsidiary ledger described by [Mulyadi \(2016\)](#), and it is the step that turns the workbook from a working list into an accounting record.

“At the end of the month the total of the stock report has to agree with the inventory balance in the client's ledger. If there is a difference, we trace it item by item before anything is reported.” (Field supervisor)

Finally, the values in the subsidiary ledger are measured at cost. For presentation in the financial statements, inventory should be stated at the lower of cost and net realisable value ([Kieso et al., 2020](#)). For medical devices whose models may be superseded, the subsidiary ledger can support

this assessment by showing items that have had no movement for several months. Adding a simple "last movement date" column to the stock report would allow slow-moving items to be identified and reviewed for possible write-downs, extending the usefulness of the workbook beyond record-keeping to valuation.

5. CONCLUSION

CV ABC's Excel-based inventory subsidiary ledger consists of four linked sheets: the item code sheet as master data, the stock report sheet with five integrated tables, the purchases sheet, and the sales sheet. Recording proceeds in five stages: entering item codes, entering beginning inventory from the previous period's ending inventory, entering purchases, entering sales, and checking the stock report. The weighted average method is applied through a formula that divides the total value of goods available by the total units available, so the unit cost of goods sold and of ending inventory is consistent and less affected by fluctuations in purchase prices. Quantities are updated with every transaction, while costs are calculated on a monthly weighted-average basis.

Integration across sheets reduces repeated input and the risk of errors, but care in item coding, reconciliation of opening balances, and review of formulas remain the keys to accurate inventory records.

5.1 Implications

In practical terms, the procedure can be used as a work guide and training material for new accounting staff, interns, and small trading businesses that keep perpetual inventory records in spreadsheets. It is also recommended to add a sheet recording the history of purchase prices to support price-trend analysis and purchase planning, to describe the cost formula accurately (monthly weighted average) in the working papers, and to schedule periodic reviews of the links between sheets. For universities and host institutions, the procedure also shows how internships can contribute to supporting better record-keeping in trading businesses in line with SDG 8 (decent work and economic growth).

5.2 Limitations and Future Research

The study is limited to one company and one recording period (October 2024) and to the technical aspects of recording; it does not analyse financial aspects in depth or compare the results with a physical stock count. Future research could test the accuracy of the design through reconciliation with a stock count, compare it with other valuation methods such as FIFO or the moving average, or develop it into a database-based accounting application.

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Abbreviations

MBKM: Merdeka Belajar Kampus Merdeka (Independent Learning, Independent Campus programme)
QTY: quantity
VAT: value-added tax (PPN)

Authors' Contributions

HS, RM, and HY collected the data during the internship, prepared the working papers, and wrote the draft manuscript. INS supervised the internship, guided the conceptual framework, and reviewed and edited the manuscript. All authors have read and approved the final manuscript and order of authors.

Conflict of Interest

All authors declare that there are no financial or non-financial conflicts of interest that influenced this research.

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The research data, consisting of working papers and client documents, are not publicly available in order to protect client confidentiality, but they are available from the corresponding author upon reasonable request and with the consent of the parties concerned.

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