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Section A-Research paper

THE INVENTORY ACCOUNTING OF DRUG FOR THE TREATMENT ANALYSIS AND ASSISTS IN MAKING INFORMED BUSINESS DECISIONS IN PHARMACEUTICAL INDUSTRY

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Abstract

The pharmaceutical industry plays a crucial role in the healthcare sector by producing and distributing drugs that contribute to the well-being and treatment of patients. As pharmaceutical companies deal with various types of drugs and medicines, proper accounting treatment of drug inventory becomes essential. Accurate accounting ensures that the financial statements reflect the true value of inventory and assists in making informed business decisions. The accounting treatment of drug inventory involves several aspects that need careful consideration. These include the valuation of inventory, recognition criteria, measurement methods, and potential write-downs or impairments. Each of these aspects has implications for financial reporting and affects the overall financial health of the pharmaceutical company. Valuation is a fundamental aspect of drug inventory accounting. The valuation of inventory is typically based on the lower of cost or net realizable value (NRV). Cost includes all expenditures incurred to bring the drugs to their current location and condition. This encompasses purchase costs, transportation costs, and direct production costs. On the other hand, NRV represents the estimated selling price of the drugs minus any further costs to be incurred.

Keyword: Pharmaceutical, inventory, ABC method

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1. Introduction

The pharmaceutical industry plays a crucial role in the healthcare sector by producing and distributing drugs that contribute to the well-being and treatment of patients. As pharmaceutical companies deal with various types of drugs and medicines, proper accounting treatment of drug inventory becomes essential. Accurate accounting ensures that the financial statements reflect the true value of inventory and assists in making informed business decisions. The accounting treatment of drug inventory involves several aspects that need careful consideration. These include the valuation of inventory, recognition criteria, measurement methods, and potential write-downs or impairments. Each of these aspects has implications for financial reporting and affects the overall financial health of the pharmaceutical company. Valuation is a fundamental aspect of drug inventory accounting (Ridwan et al., 2022). The valuation of inventory is typically based on the lower of cost or net realizable value (NRV). Cost includes all expenditures incurred to bring the drugs to their current location and condition (Ali et al., 2022). This encompasses purchase costs, transportation costs, and direct production costs. On the other hand, NRV represents the estimated selling price of the drugs minus any further costs to be incurred. This valuation approach ensures that inventory is not overstated and reflects its true economic value (Raniyah et al., 2022). Recognition criteria are another crucial element in drug inventory accounting. To be recognized as an asset on the balance sheet, drug inventory must meet specific criteria. Generally, recognition occurs when control over the drugs has been obtained, and it is probable that future economic benefits will flow to the pharmaceutical company. Control is typically established upon delivery or when legal ownership is transferred. Measurement of drug inventory is an essential aspect of accounting treatment.

Once drug inventory is recognized, it is measured at cost. Different cost flow assumptions can be used, such as First-In, First-Out (FIFO), Last-In, First-Out (LIFO), or weighted average cost. The method chosen should be consistent and reflect the most appropriate cost flow assumption for the company's operations. Furthermore, pharmaceutical companies need to assess potential write-downs or impairments of drug inventory. If the net realizable value of the inventory is lower than it carrying cost, a write-down is required to adjust the inventory to its estimated NRV. This adjustment ensures that inventory is not overstated and reflects its current market value accurately. Overall, the accounting treatment of drug inventory in the pharmaceutical industry is a critical aspect of financial reporting. It involves valuation, recognition, measurement, and potential write-downs or impairments (Simarmata et al., 2022). Proper accounting ensures that the financial statements provide relevant and reliable information about the value and status of drug inventory, enabling informed decision-making and maintaining the financial health of pharmaceutical companies.

2. Literature Review

a. First-In, First-Out (FIFO)

A commonly used cost flow assumption in the pharmaceutical industry for inventory management and accounting. FIFO assumes that the first units of inventory purchased or produced are the first ones to be sold or used, resulting in the most recent units remaining in inventory. Pharmaceutical products often have limited shelf lives due to expiration dates. FIFO is particularly useful in managing inventory in the pharmaceutical industry because it ensures that drugs with earlier expiration dates are sold or used first, minimizing the risk of expired inventory. The pharmaceutical industry is subject to strict regulatory requirements for product safety and quality. FIFO aids in compliance with

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regulations by ensuring that older batches of drugs are used before newer ones, minimizing the potential for product recalls and quality issues. FIFO generally results in a more accurate valuation of inventory, especially when the prices of drugs are increasing over time. By assigning the most recent purchase costs to inventory, FIFO reflects the current market value of the remaining inventory more closely, enhancing financial reporting accuracy. FIFO provides a more realistic representation of the cost of goods sold. Since the earliest purchased or produced units are considered as the first ones sold, the cost assigned to COGS matches the actual costs incurred when the drugs were purchased or produced (Fajrina et al., 2022). The use of FIFO allows for a more accurate assessment of profitability. As the cost of inventory is more closely aligned with current market prices, the reported gross profit margin reflects the true profitability of the sales made during the period.

FIFO can have tax advantages in situations where the cost of inventory is increasing. By assigning older, lower-cost units to COGS, it potentially reduces taxable income, resulting in lower tax liabilities. It is important to note that the use of Last-In, First-Out (LIFO), an alternative cost flow assumption, is generally not allowed under International Financial Reporting Standards (IFRS) and is limited under U.S. Generally Accepted Accounting Principles (GAAP). This limitation makes FIFO the preferred choice for inventory management and accounting in the pharmaceutical industry for companies following these accounting standards. While FIFO offers various advantages in the pharmaceutical industry, companies should consider factors such as expiration management, market conditions, and specific cost characteristics of their inventory when determining the most appropriate cost flow assumption for their operations.

b. Last In – First Out (LIFO)

An alternative cost flow assumption that is not commonly used in the pharmaceutical industry for inventory management and accounting. LIFO assumes that the most recently acquired or produced inventory units are the first ones to be sold or used. In an inflationary environment, this can result in a higher cost of goods sold (COGS) and a lower ending inventory valuation compared to other cost flow assumptions like FIFO. This approach aligns with the concept of cost recovery, where the most recent costs are matched against current revenues. LIFO can provide tax advantages in situations where the cost of inventory is increasing. By assigning the most recent, higher-cost units to COGS, LIFO can potentially reduce taxable income, leading to lower tax liabilities. This can be particularly beneficial in periods of rising prices when inventory costs are expected to increase over time. Inflation Impact: The pharmaceutical industry is subject to price fluctuations and inflationary pressures. While LIFO may be useful in certain industries where inflation is significant, the pharmaceutical industry generally experiences less significant inflationary effects on inventory costs. As a result, the potential benefits of LIFO may be limited in this context. The use of LIFO may conflict with certain regulatory requirements and accounting standards. For example, International Financial Reporting Standards (IFRS) generally does not permit the use of LIFO, while U.S. Generally Accepted Accounting Principles (GAAP) allows LIFO but with certain restrictions. This limitation can influence the adoption of LIFO in the pharmaceutical industry. LIFO may present challenges in managing inventory aging and expiration, as it assumes that the most recent inventory units are the first ones to be sold. This can increase the risk of holding outdated or expired inventory if not adequately monitored and managed. Given the considerations mentioned above, the pharmaceutical industry typically favors other cost flow assumptions, such as First-

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In, First-Out (FIFO) or weighted average cost, which are more aligned with the specific characteristics and challenges of the industry. However, it is important for pharmaceutical companies to assess their individual circumstances, including regulatory requirements and the potential tax implications, when determining the most appropriate cost flow assumption for their inventory accounting.

c.   Weighted Average Cost (WAC)

Weighted Average Cost (WAC) is a commonly used cost flow assumption in the pharmaceutical industry for inventory management and accounting. WAC calculates the average cost of all inventory units available for sale during a given period. WAC smooths out the fluctuations in inventory costs by considering the average cost of all units purchased or produced. This approach can be useful in the pharmaceutical industry, where the prices of drugs may vary due to market conditions or supplier contracts (Fajrina et al., 2022). WAC provides a reasonable approximation of the cost basis for inventory valuation. It reflects the average cost of inventory units and is less influenced by the timing of purchases or production. This can lead to a more accurate representation of the inventory's value on the balance sheet. WAC is relatively straightforward to calculate and apply in inventory accounting. It involves dividing the total cost of all units available for sale by the total number of units. This simplicity can make it an attractive option for pharmaceutical companies with complex inventory systems.

Using WAC, the cost assigned to COGS is based on the average cost of inventory units. This provides a more balanced reflection of the costs incurred over a given period and is suitable for matching against the revenue generated from sales. WAC allows for a reasonable assessment of profitability. The average cost basis aligns with the revenue generated from the sale of inventory units, providing a more accurate representation of gross profit margin and net income. WAC does not offer the same tax advantages as LIFO, but it also avoids the potential tax complexities associated with LIFO inventory accounting. It provides a straightforward and generally accepted method for calculating inventory costs for tax purposes. Once a company adopts WAC as its cost flow assumption, it should consistently apply this method to maintain comparability across financial periods. Consistency in cost flow assumptions enhances the reliability and comparability of financial statements. While WAC offers advantages in the pharmaceutical industry, companies should consider factors such as price volatility, specific inventory characteristics, and their financial reporting requirements when selecting the most appropriate cost flow assumption for their operations. It is crucial to ensure that the chosen method accurately reflects the cost basis of the inventory and is consistent with accounting standards and regulations.

3.   Method

The research method of this study is by comparing studies about drug inventory accounting treatment analysis in Pharmaceutical Industry (Darmawan et al., 2022). The research data that conducted by Manhas Anil K, Malik Aubid, Haroon Rashid, Sheikh Mushtaq A, Syed AT, was collected by checking the stock registers and the bills of the supplies of main drug store. The data included only those drugs which were provided to the patients by the hospital and does not include the drugs for sales counter, surgical items, disposables, and dressing items. The researcher visited the main drug store daily on working days and the items were recorded on predesigned and pretested proforma developed for the same purpose.

The proforma enlisted the inventory of drugs stored for the study period as well as additional characteristics like cost per unit, units stored as well as the total cost for each

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drug. The proforma also categorized drugs in accordance with VED analysis. The total cost of the drugs stored was entered on the proforma in descending order with highest cost item at the top and lowest cost item at the bottom. The cumulative cost was calculated and entered on the same proforma. Cumulative cost of the drugs was compared with actual no. of drugs and the results drawn on a graph showing percentage of A, B and C category drugs.

A-category being the highest cost items. B-category the intermediate cost items and C-category the lowest cost items.

To study the inventory of drugs based on their criticality (VED analysis), a team of five medical experts including a physician, a surgeon, a cardiothoracic surgeon, a gastroenterologist, and a cardiologist was constituted. The inventory of drugs stored for the study period was presented to each member of the team for categorization of drugs because of VED analysis. The final list of drugs arranged based on VED analysis by medical experts were analyzed for concurrence of opinion regarding classification. Up to 60% concurrence was taken as cutoff limit. Drugs having concurrenceof opinion less than 60% were not considered for the category. On the other hand the research data that conducted by Ahmad Mustofa, Kurnia Ekasari, Anik Kusmintarti, the type of data in this study was primary data in the form of observations and interviews with pharmacists in Tirta pharmacy. Data analysis was carried out in this study in order to analyze obstacles and problems regarding financial reports, the functions of the data obtained, and procedures related to the design of accounting information systems with the aim of implementing a good financial statement accounting information system and can improve efficiency and stabilization of operational activities, especially in the drug supply division at Tirta Pharmacy.

4. Results and discussion
4.1 Result

Cost accounting has become an essential part of healthcare management. The increasing costs have forced the healthcare managers to know the costs of different alternatives, approaches to providing care. These costs can only be known if the organization has the knowledge and capability to measure. With the advent of advanced medical technology and drugs, the expenditure on health-care delivery is increasing disproportionately as compared to the resources available. Armed forces medical services (AFMS) provide state of art medical care through a network of over 100 hospitals with a central procurement system. In one of their studies, they found that the drugs consume approximately 60% of the total consumable budget. This necessitates effective and efficient management of medical stores. Efficient priority setting, decision making in purchases and distribution of specific drugs, close supervision of drugs belonging to important categories, and prevention of pilferage depends on drug and inventory management. In a study from a large state funded hospital, control measures for expensive drugs have resulted in 20% savings.

Inventory control is the tool of management which is used to maintain an economic minimum investment in materials and products for the purpose of obtaining a maximum financial return. ABC analysis is the analysis of stores on cost criteria. VED analysis analyses inventory based on criticality in relation to the functioning of the hospital. The study revealed that 156 items in total were stored during the study period. These items included the drugs provided by the hospital to the patients and does not include the drugs for sales counter, surgical items, disposables, and dressing materials. The value of annual consumption of the inventory was worked 0ut to be Rs.9303507/-. This amount does not include the inventory carrying cost, inventory storage cost and inventory

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acquisition/replacement costs. Out of these drugs, 24 items (15.38%) consumed 70% (Rupees 6512454) of annual drug expenditure comprising group 'A' items.35 items (22.43%) consumed 20% (Rs.1860701) of annual drug expenditure forming group 'B' items. Rest 97 items (62.17%) consumed only 10% (Rs.930350) of total budget, classified as group 'C' items- Table 1.

Table 1. Drug Analysis

Drug Analysis	Category			Total
	A	B	C	
Total Annual Consumption (%)	70	20	10	100
Value of annual consumption (%)	6512454.9	1860701.4	93050.7	9303507
No. of Items	24	35	97	156
%age of Items	15.38	22.43	62.17	100

Sources : Data Analysis (2023).

For ABC analysis it is the annual value of consumption which is taken into consideration and has nothing to do with the unit cost of the item. The curve clearly depicts the percentage no. of items (A=15.38%, B=22.43, C=62.70%) and their percentage annual consumption value (A=70%, B=20%, and C=10%). VED classification of the inventory depicted in Table-2 revealed that out of 156 items stored 30 items (19.23%) were considered 'Vital' by theconstituted medical panel; 61 items (39.10%) were 'Essential' and the rest 65 items (41.66%) were considered 'Desirable'. Out of 30 vital items, 10 items had 100% concurrence of opinion of the medical panel, 7 items had 80% concurrence while 13 items had 60% concurrence of opinion on drug classification. 61 items which were considered essential, 25 items had 100% concurrence of opinion of medical panel for being included as 'Essential items. Only 33 items of the remaining 65 items considered desirable had 100% concurrence of opinion of the medical panel.

Table 2. Concurrence of medical panel on drug classification

Category of Drugs	No.of drugs	% of drugs	Concurrence of medical panel on drug classification		
			100%	80%	20%
Vital	30	19.23	10	7	13
Essential	61	39.10	25	20	16
Desirable	65	41.66	33	20	12
Total	156	100	68	47	41

Sources : Data Analysis (2023).

The ABC-VED matrix classification of the inventory depicted in Table-3 reveals that 49 items (31.41%) out of 156 items constituted Category-I items.10 items of Category-I items were both high cost and vital, 11 items were high cost and essential, 8 items were high cost and desirable. Category- II items (39.10%) was constituted by intermediate cost and essential items numbering 17, intermediate cost and desirable items numbering 11 while 33 items were low cost and essential.

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Table 3. Category of Drugs and Matrix Classification

Category of Drugs	V	E	D	Matrix Classification
A	(AV) 10	(AE) 11	(AD) 8	Category I (31.41%)
B	(BV) 9	(BE) 17	(BD) 11	Category II (39.10%)
C	(CV) 11	(CE) 33	(CD) 46	Category III (29.48%)

The cash disbursement information system that occurs at Tirta pharmacy is almost the same as the accounting information system that occurs in business units in general, but there are

things that cause it to be inefficient in terms of implementing the procedure. Not only that, but records and controls are still low, so that cash disbursement activities do not run well.

From the above discussion, the researcher proposes a cash disbursement system and procedure using the Business Process Management Notation model. The following is illustrated in figure

1.Cash disbursement systems and procedures:

The cash receipt accounting information system at Tirta pharmacy has run with its problem in transaction recap checking which has conducted by pharmacists and pharmacy owners. This is often a problem of control over inventory disbursement. There was a difference in inventories due to lack of control and recording by using semi-manual method. The author provides a solution for cash receipt procedures so that the process runs better and can be controlled. Cash receipts are divided into two ways, such as:

1. Cash Receipts Using a Doctor's Prescription

The differences between pharmacy and conventional store is a doctor's prescription existence, most of the sales made by a pharmacy are made by using a prescription because there are terms and conditions for the drugs.

2. Cash Receipts without a Doctor's Prescription

Not only by using a doctor's prescription, drug selling was carried out in the pharmacy without a prescription with limited over-the-counter drug terms and conditions.

4.2 Discussion.

The rising cost of the health care has become a matter of great concern all over the world. Today's healthcare is more complex, more sophisticated and it is hoped to be more effective. Increase in costs of hospital care, modern technology, inflation, increasing demands and expectations of public are necessitating the development of financial policies and mechanisms. The main healthcare concern nowadays is development of resources on

rationale basis. Approximately 35% of the annual hospital budget is spent on buying materials including drugs. This necessitates effective and efficient management of medical stores. Efficient priority setting, decision making in purchase and distribution of specific drugs, close supervision on drugs belonging to important categories, and prevention of pilferage depend on the drug and inventory management. ABC analysis of the drugs stored at Drug and Pharmacy deptt. of SKIMS revealed that 156 items were stored in total during the period of study. The annual value of consumption for the

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inventory worked out to Rs.9303507. Of these drugs 15.38% items (n=24) consumed 70% of annual drug expenditure comprising group "A" items. 22.43% items (n=35) consumed 20% of annual drug expenditure, forming group "B" items. Rest 62.17% inventory consumed only 10% of the annual budget and were classified as group "C" items. Research by Lt.Col.R Gupta et al in 2007, studied ABC and VED analysis in medical stores of a 190 bedded hospital. The results of the study showed that 14.4% (n=47) items consumed 70% of annual drug consumption comprising group "A", 22.46% (n=73) items 20% of annual drug consumption forming group "B" items and rest 205 (63.7%) drugs merely consumed 10% of the annual drug expenditure, grouped as "C" items. The findings of the study are in complete agreement with the findings of the present study. Another study in line with the findings of present study by Ridhi Prakash Doshi et al observed that about 70% of the annual drug expenditure was on 35 drugs, 20% on 56 drugs, and 10% on 308 drugs.

The drugs belonging to group "A" category should be controlled strictly by top management of the institution. The group "B" items require a moderate control by the middle level managers while the "C" items can be left for the lower management as it requires lesser control measures for order and purchase. Also in line with the findings of the present study, research by Ashraf Khan et al at a tertiary care institute revealed that cumulative cost of Rs.87 lac was spent on 198 items stored during the period of study. Most of drug budget was spent on "A" items which was 75% and rest 25% on "B" and "C" item which was found as 18% and 7% respectively. Further in comparison with the results of present study, research by D Mario et al observed that 822 drugs were stored during the period of study. Out of 822 drugs, 10.83% were classified as "A" category and consumed around 69.82% of the annual budget. "B" category items constituted 20% and consumed 20.13% of annual

consumption budget. Group "C" items constituted 69.10% of the total inventory and consumed 10.05% of the annual budget. VED classification of the inventory revealed that out of 156 items stored, 30 items (19.23%) were considered "Vital" by the constituted medical panel; 61 items (39.10%) were "Essential" and the rest 65 items (41.66%) were considered "Desirable". Out of 30 vital items, 10 items had 100% concurrence of opinion of the medical panel, 7 items had 80% concurrence while 13 items had 60% concurrence of opinion of the constituted medical panel on drug classification. 61 items which were considered essential, 25 items had100% concurrence of opinion of the medical panel for being included as essential items.

Only 33 items of the remaining 65 items considered desirable had 100% concurrence of opinion of the medical panel. Lt.col.Gupta et al in their research observed that 24 (7.3%) items constituted vital, 160 (49.3%) itemswere considered essential and the rest 141 (43.4%) were considered desirable. In line with the findings of the present study, Ridhi Prakash Doshi et al also observed that 13% (n=54) drugs were vital for the patient's life, 51% (n=203) drugs were essential and 36% (n=142) were considered desirable. The ABC-VED matrix revealed that 10 items of Category-I drugs were both high cost and vital, 11 items were high cost and essential and 8 items were high cost and desirable. Category-II items were constituted by intermediate cost and essential items (n=17), intermediate cost and desirable items (n=11), and 33 items were low cost and essential. The Category-III items were both low cost and desirable. In line with thefindings of the present study, Lt.Col.Gupta et al observed that 68 items were classified as Class-I items, 159 items constituted Class-II, while 98 items were constituted as Class-III. In a comparable study by Sikder SK et al ABC-VED matrix shows that out of 292 items, 63 (21%) items were Class-I, 164 items (56%) Class-II and

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65 items (22%) were Class-III. In agreement with the findings of the present study, research by Ridhi Prakash et al showed that Category-X consists of expensive and vital drugs accounting for 20.6% of drugs. Category-Y consists of less expensive and essential drugs accounting for 50.9% and Category-Z consists of cheap and non-essential drugs accounting for 28.6%.

Tirta pharmacy is a private trading company engaged in the drugs selling in Jember district. At the time of this report, the inventory of items sold has reached more than 500 items. This includes lozenges, coated tablets, syrup / suspense / emulsion, dry syrup, effervescent tablets, buccal, and sublingual tablets. The warehouse part is the part that has the right to handle the supplies needed by all users in the company. The warehouse department must be be able to control the availability of inventory because if there is a shortage of items supplies that are often used, it will disrupt the course of the company's business activities. Therefore, to avoid this, the warehouse administration officer must be able to calculate the minimum standard of stock where this standard is used as a reference for deciding when to make a purchase request. In the inventory system that is owned by the warehouse department, if the status of the items is orange, the warehouse administration officer must immediately make a list of requests for purchase of items.

The explanation above is a description of the inventory procedures that have been implemented by the company to date. The purpose of this procedure is so that purchasing activities can run smoothly and efficiently so that it does not take too much time so as not to interfere with the company's business activities, prevent fictitious purchases, and avoid wasting costs. In the procedures that have been made, the company has clearly divided the duties of each division involved in inventory management activities so that there is no overlapping of positions. The existence of this purchasing procedure is one part of the internal control system owned by Tirta pharmacy.

The scope of the inventory procedure includes procuring, receiving, storing, and distributing items. First, procuring these items is intended so that the need for items does not lead to a shortage of items supplies and hamper the productivity later and makes scheduling of supporting materials ordering. Second, activities in receiving items include making work orders by pharmacists, checking items with pharmacists, entering incoming items as stock. And third, the activities of storing items include the placement of items which are classified based on the type of items and specifications, and finally, the activities of items distributing, which include verification of transaction evidence to items display.

Based on the proposed accounting information system application, there are several recording features that are able to overcome weaknesses in the accounting information system at Tirta Pharmacy. As for the advantages of the proposed accounting information system, such as being able to provide an effective and efficient process in processing financial activities and making it easier for users because the data can be processed automatically by the proposed database. A well-integrated accounting information system will provide higher quality report output with a reporting concept that can be modified according to user needs. Faster reporting time will make it easier for the leadership to make decisions for the progress of the company.

In accordance with the advantages of the proposed accounting information system, this paper recommends Tirta pharmacy to switch from an accounting recording system that uses notes and transaction books to ERP or automated information technology that will make it easier to input existing financial

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transaction activity data. at the company. This writing leads to the application of an accounting information system by implementing the features of the proposed program so that manual recording processes are not required. According to Friedrich (2011) Implementation is an action that leads to the goals proposed by a person or group in connection with certain obstacles in order to find a way out to achieve the expected goals.

5. Conclusions

The study has analyzed the inventory of drugs as per their cost and criticality. It is expected to guide the management to delegate the responsibility to different officers and apply the "Principle of Management by Exception". Moreover it will facilitate the management in controlling the cost and ensure the availability of vital and essential items in the hospital which will be in the interest of patients and the administration. It is also suggested that the sales counter inventory be also analyzed which involves more costly drugs and have much more financial implications.

Based on the analysis conducted by the author to the Tirta Pharmacy, it can be concluded that:

1. The cash disbursement accounting information system had control problems on documents archiving and control to the inventory. So the authors suggested a system solution and cash disbursement procedures that become the basis of operational activities at the Tirta Pharmacy.

2. The accounting information system for cash receipts had problem in monitoring the items delivery, so there were differences and miscommunication between pharmacists and pharmacy owners. So the authors suggested a cash receipt system and procedure which is divided into two parts, such as the cash receipts system and procedures with a doctor's prescription and cash receipts without a doctor's prescription.

3. Overall the implementation of ERP (Enterprise Resource Planning) or automatic computing systems could overcome the problems of financial records to make the company's operational activities become more effective and efficient.

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