

Analysis of the Application of the Abc-Ved Priority Scale in Managing Accounts Payable to Support Smooth Hospital Operations

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Abstract. *Accounts Payable (AP) management in the hospital industry is highly complex as it directly relates to the continuity of critical medical supplies. This study aims to develop and evaluate a vendor debt payment queue decision-making model using the integration of ABC and VED analysis through the MATA-AP (Accounts Payable Queue Tabulation Management) system at JEC Candi Eye Hospital, Semarang. The research method used is a qualitative case study with an implementation simulation approach using an operational database for the June 2026 period in a cash stress testing scenario. The simulation results show that the MATA-AP system successfully shifts the conventional debt management paradigm from purely nominal financial accounting (ABC Scale) to one based on clinical protection and patient safety. Through the implementation of a hierarchical weighting system algorithm, the system is able to automatically filter and elevate Vital (V) clinical category vendors to the top of the executive summary of the daily finance manager email, regardless of the small nominal rupiah value billed. In addition, the automation of internal control functions has proven reliable in detecting duplicate invoice number input errors to prevent cash leakage due to double payments. From a workflow perspective, this system successfully reduces the manual recapitulation process from hours to minutes after data is inputted through the Input Panel. The managerial implications of this research underscore the crucial role of MATA-AP as a strategic tool for top management in developing objective, transparent, and accurate cash allocation planning to eliminate the risk of credit blockages from major medical vendors.*

Keywords: *ABC-VED Analysis; Accounts Payable; Decision Making; Hospital; Patient Safety.*

1. Introduction

Financial management in the private healthcare industry demands a high level of independence and flexibility to maintain operational stability. As organizations operating without national insurance coverage (non-JKN), private hospitals rely entirely on optimizing internal revenue, such as general patient payments and the smooth processing of private and corporate insurance claims (Fuad & Soewondo, 2025). In this independent ecosystem, maintaining liquidity, or the availability of ready cash, is a crucial indicator for service continuity (Maślach et al., 2019). Management is required to carefully control cash outflow, a key element of which is the management of accounts payable (AP) to provider partners or vendors (Burnie & Ridder, 2023). Failure to manage this payment cycle can directly disrupt the stability of the hospital's daily supply chain (Yanti et al., 2025).

The challenge of maintaining a balanced cash flow is a daily operational reality faced by JEC Candi Eye Hospital, Semarang. As a specialist eye healthcare facility committed to maintaining quality service standards and utilizing cutting-edge medical technology, the hospital is highly dependent on high-value medical logistics supplies (Cheryka et al., 2026). When daily revenue fluctuations occur, the financial management unit is often faced with a large pile of invoices from various vendors arriving simultaneously (Fajriah & Ikhsan, 2023). The problem is, the current system for determining the payment queue for invoices is still conventional and tends to be subjective. Decisions about payment are often made solely based on the proximity of the due date or the aggressiveness of the vendor's collection efforts, without objectively measurable priority indicators based on the clinical importance or investment value of the invoices.

The urgency of this payment queue arrangement is clearly evident from the characteristics of the internal data of Accounts Payable management at JEC Candi Eye Hospital Semarang throughout 2025. The hospital's monthly financial obligations are spread across dozens of active vendors with very contrasting levels of urgency. Based on the initial data collection (baseline) of 531 invoice transactions during 2025, it was found that the existing cash out management system that was not standardized triggered a financial deviation of 35.22% due to non-compliance with the priority scale. A crucial problem arose when budget flexibility was disrupted, where the percentage of high-risk bills (Vital category vendors blocked or hampered) reached 29.89%, while the allocation of cash out funds was absorbed by 5.27% to pay off non-priority bills that were subjective or simply for convenience (Desirable).

This allocation imbalance confirms that late payments to partners providing vital commodities—such as Medical Consumables (BMHP) specifically for cataract and retinal surgery, anesthetic drugs, and even the cost of regular maintenance of sophisticated medical equipment—even though sometimes nominally small, carry a significant risk of instantly halting surgical procedures in the operating room and jeopardizing patient safety (Kumar & Chakravarty, 2015). On the other hand, there are bills worth significant investment but fall into the non-medical support category whose payment is actually flexible and can be postponed (Amalia et al., 2026). If payment queue management is left without a clear mapping method, errors in payment decisions risk triggering a loss of vendor trust and threatening the smooth operation of the hospital's primary medical services.

To address this dilemma in prioritization, a selective approach is needed that simultaneously integrates the economic value of bills and their operational urgency. One relevant method to adapt is the combination of ABC and VED analysis. ABC analysis maps bills based on the accumulated nominal volume of funds absorbed (Saragih & Suseno, 2026), while VED (Vital, Essential, Desirable) analysis is used to measure the fatal impact of late payment of a commodity on the course of clinical services in a hospital (Kulkarni et al., 2025). Combining these two methods in the form of a combined ABC-VED matrix will produce a much more objective and comprehensive classification of priority groups (Ayalew et al., 2025; Gupta et al., 2007). Through this approach, management is no longer trapped by subjective assessments, but rather has a scientific reference in determining which bills must be paid immediately and which bills can be rescheduled without compromising patient safety.

However, the implementation of the ABC-VED combination priority scale will not run optimally in the field if the entire billing data filtering process is still done manually, considering the dynamic daily transaction volume of hospitals. Therefore, the support of a structured accounting information system in the form of a Decision Support System is needed to help speed up the tabulation process of billing queue data (Khataie et al., 2011). By integrating ABC-VED logic into cash disbursement administration management, the finance unit can present payment recommendations quickly, accurately, and objectively. Based on all the explanations of the phenomena, practical urgency, and theoretical basis above, the researcher is interested in conducting in-depth research which is outlined in a thesis proposal with the title Analysis of the Application of the ABC-VED Priority Scale in Accounts Payable Management to Support Smooth Hospital Operations.

2. Research Methods

This research was designed using a descriptive qualitative approach through a daily case study method (Sugiyono, 2023). This case study method was considered most appropriate because it aimed to deeply dissect a contemporary, real-world phenomenon in the workplace, namely the dynamics of Accounts Payable (AP) management and the challenges of daily liquidity

fluctuations at JEC Candi Eye Hospital, Semarang. Through this approach, the researcher did not intend to test statistical hypotheses in the laboratory, but rather wanted to systematically explore how a selective management model could solve the real-world problem of determining the length of vendor payment queues.

3. Results and Discussion

3.1. Overview of Research Object

This case study research takes the JEC Candi Eye Hospital in Semarang as its object. Socio-geographically and economically, this specialist hospital operates within the dynamic private healthcare industry in Semarang City. Unlike government-owned healthcare facilities or general hospitals that rely heavily on national insurance schemes such as the National Health Insurance (JKN)/BPJS, JEC Candi Eye Hospital in Semarang is characterized by its financially independent operations through non-JKN market segments, such as general patients (self-financing), private insurance coverage, and corporate partnerships.

This non-JKN business model demands flexibility, speed of service, and the application of cutting-edge ophthalmology technology as a competitive advantage. To achieve these advantages, hospitals are highly dependent on a stable supply chain for specific, high-value medical supplies, such as premium intraocular lens components, viscoelastic fluids for operating rooms, microsurgical blades (keratomes), and specialized ophthalmic anesthetics.

From a financial organizational structure perspective, the daily cash flow management unit plays a crucial role in supporting the continuity of these services. Cash outflow control at this hospital is centered on the Accounts Payable (AP) department. The AP department is fully responsible for managing administration, verifying invoice compliance, and tabulating the order of short-term liabilities paid to dozens of active vendor partners. This unique characteristic makes JEC Candi Eye Hospital Semarang a highly representative object for testing the application of the ABC-VED priority scale tactical decision mode. ...through the MATA-AP supporting instrument.

3.2. Initial Evaluation of Accounts Payable Governance

Prior to conducting the simulation and implementing the MATA-AP decision-making instrument, the researchers first collected historical data (baseline data) to evaluate the effectiveness of the ongoing cash outflow management. This initial evaluation object included the entire history of the hospital's short-term liability transactions throughout 2025, which recorded 531 invoice transactions from various active partner vendors of JEC Candi Semarang Eye Hospital. In hospital corporate financial management, the balance of working capital turnover between accounts receivable collection management and the accuracy of debt

repayment scheduling to operational partners is a fundamental aspect determining the stability of daily cash flow (Chu, Zollinger, Kelly, & Saywell Jr, 1991; Yanti, Anisha, & Fazira, 2025).

This in-depth evaluation is crucial for objectively capturing the impact of the existing payment queue determination system, which remains conventional and subjective, where repayment priority is largely influenced by the proximity of the due date (term of payment) or the aggressiveness of the debt collector's collection efforts. The summary results of the existing condition evaluation metrics for 2025 are presented in Table 4.1 below:

Table Initial Evaluation of Accounts Payable Payment Governance (Existing Conditions 2025)

No.	Initial Evaluation Parameters	Percentage Value	Existing Managerial Implications
1.	Secure Payment Percentage (According to Medical Priority)	64.78%	Most of the daily payments have already succeeded in securing the supply of the hospital's main clinical needs.
2.	Total Financial Deviation (Priority Non-Compliance)	35.22%	There is flexibility in the allocation of cash outflow funds due to the absence of a standard scale of payment priorities.
3.	High Risk Billing Percentage (Vital Vendors Delayed)	29.89%	There is a real risk of disruption to surgical procedures in the operating room due to payment constraints on vital commodities.
4.	Non-Priority Payment Percentage (Subjective)	5.27%	Liquidity allocation of cash outflow funds that were previously absorbed in administrative support bills or general convenience (Desirable).

Source: Processed Primary Data, 2026

Based on the presentation in Table 4.1, the analysis results indicate that the current conventional system has created a managerial gap in the form of a Total Financial Deviation of 35.22%. This deviation figure reflects the level of non-compliance in cash allocations for the hospital's clinical needs, where the order of disbursement of funds is not based on the urgency of service fatalities.

The most alarming impact of the high deviation rate is the emergence of a High-Risk Billing Percentage of 29.89%. This figure represents the fact on the ground that almost a third of the

total vendor transactions included in the Vital category, such as providers of monofocal and premium implant lens components, surgical viscoelastic fluid, and micro nylon surgical suture, have experienced payment delays (overdue) or even temporary supply interruptions (blocked). In the specialist healthcare industry, logistical obstacles in this Vital group directly threaten patient safety because it can stop the course of cataract or retinal surgery instantly on the day of the operation.

On the other hand, due to the lack of a standardized priority scale mapping, the finance unit simultaneously recorded a Non-Priority Payment Percentage of 5.27%. This indicates a tactical liquidity leak, where limited cash outflows are being absorbed to pay bills for general administrative or convenience support needs (Desirables), whose utilization is actually still very flexible and can be postponed.

This phenomenon of operational cash liquidity vulnerability is fundamentally rooted in the financial governance characteristics of the modern private hospital industry, which is required to consistently maintain working capital efficiency under very tight cash outflow cycles. From a strategic financial management perspective, inaccurate classification of operational cost urgency and weak internal control functions for accounts payable will directly depress financial performance stability, increase daily operational risks, and disrupt the company's long-term profitability (Dewi et al., 2025; Fuad & Soewondo, 2025).

Through this portrait of the existing conditions in 2025, it can be concluded that improving Accounts Payable governance through standardizing the ABC-VED integration matrix embedded in the MATA-AP digital system has become an absolute urgency, no longer just an innovation option, in order to mitigate medical operational risks while optimizing the efficiency of hospital cash liquidity allocation.

3.3. MATA-AP Management Control Working Mechanism

As a qualitative case study, the implementation of MATA-AP is analyzed in its capacity as a management control system. This system is designed to discipline the accounts payable payment process so that it no longer relies on subjective daily staff decisions, but rather adheres to standard business rules. The development of MATA-AP as a standalone decision support system application is a tactical solution amidst the challenges of rigid integration, high customization costs, and complex modifications to the core financial management system in SIMRS commonly found in Indonesia (Mustofa & Prasandi, 2025; Putri, Purba, Layana, & Lubis, 2025).

To test the consistency and effectiveness of this instrument before its full implementation in the future, researchers conducted prospective stress testing simulations using a new transaction database scenario (dummy data from 2026). This replicated environment test

aimed to determine the extent to which the established management parameters could control cash flow under the pressure of complex transaction variations.

Operational Policy Basis Priority Scale

The arrangement of the payment queue order in the MATA-AP system is designed objectively by referring to two pillars of the hospital's internal control policy to determine the priority scale for payment, namely:

1) Financial Rules (Compliance with Authority Limits)

The nominal limits in the system are rigidly set to reflect the internal governance regulations of JEC Candi Semarang Eye Hospital regarding approval authority limits (Table 3.3). The system automatically categorizes transactions into Category A (> Rp50,000,000), Category B (Rp10,000,000 to Rp50,000,000), or Category C (<Rp10,000,000). This determination ensures that large-value invoices requiring immediate approval from the Main Director receive strict oversight from the outset.

2) Medical Operational Rules (Supply Risk Mitigation)

To ensure patient safety, Vital, Essential, and Desirable (VED) categories are locked directly at the vendor/supplier entity characteristic level, rather than randomly assessed per invoice. The underlying management logic is to mitigate the risk of blocked orders. If a key (Vital) pharmaceutical vendor is blocked due to negligence in paying a small invoice, the impact can be crippling to hospital operations. Therefore, all accounts payable to Vital vendors are automatically prioritized.

Information Flow and Internal Control

From a management information system perspective, MATA-AP controls the debt data cycle through mechanisms that ensure the cleanliness and security of financial information:

a. Cash Leak Prevention (Error Handling)

Before information is distributed, the system automatically scans daily invoice numbers. If an AP staff member accidentally enters the same invoice number (human error), the system issues a red visual alert and halts the process. This feature serves as an internal control to mitigate the risk of losses due to double payments to vendors (Kamelia & Nugroho, 2025).

b. Activity Data Segregation

To maintain work efficiency, settled invoices (Paid) are automatically separated into a separate database. This ensures the main management dashboard remains clean and focuses only on remaining outstanding liabilities. This database cleansing mechanism substantially adopts Lean Hospital principles, where eliminating clutter eliminates wasted staff time and improves the accuracy of monitoring hospital supply chain activities (Daryanti et al., 2023; Suriani & Sari, 2020).

c. Automated Executive Reporting Distribution

As a monitoring function, the system periodically filters data to extract the five most critical (overdue) invoices and five projected invoices due within the next seven days. This executive summary is automatically emailed directly to the inboxes of Finance Managers and relevant management. Automating this report delivery serves as an operational cost efficiency strategy by successfully reducing cumbersome manual coordination bureaucracy, accelerating liquidity decision-making, and maintaining stable business relationships with the supplier network (Munaa et al., 2021).

3.4. System Implementation Simulation Results

To demonstrate the reliability of the MATA-AP system's control function in reducing financial deviations and protecting hospital operations, researchers conducted a prospective implementation simulation. This management information system testing utilized an isolated research environment to avoid disrupting the hospital's daily operational database of finance. This experimental approach through simulation is commonly used in qualitative case study research to test the reliability of a new decision-making model before its full implementation in the field (Yin, 2018).

3.5. Grouping and Characteristics of Bills Based on Nominal Value (ABC Analysis)

Based on the first problem formulation regarding the characteristics of bills based on the nominal value of cumulative investments, the implementation of the MATA-AP system successfully stratified transaction data automatically using financial thresholds agreed upon by management. The characteristics of hospital bills are divided into three main clusters.

1) Class A (High Financial Risk Exposure)

This group is dominated by large-value invoices exceeding Rp 50,000,000 per invoice, as demonstrated by debt commitments to suppliers S-100 and S-14. Managerially, Class A represents the hospital's largest cash outflow. This group requires close oversight from the Finance Manager as late payments directly impact the hospital's macro liquidity and financial reputation among strategic partners.

2) Class B (Moderate Financial Risk Exposure)

The billing characteristics are in the nominal range of Rp 10,000,000 to Rp 50,000,000, as identified in suppliers S-04 and S-06. This group reflects daily operational transactions with medium volumes that require regular scheduling to prevent accumulation and burden on working capital.

3) Class C (Low Financial Risk Exposure)

Micro-value bills are those under Rp 10,000,000. In terms of volume, this group is often found in large quantities but has the smallest cumulative value, so it is often overlooked in conventional monitoring systems that are purely based on rupiah nominal values.

3.6. Classification of Urgency Level of Bills Against Medical Operations (VED Analysis)

To address the second research question, this study successfully shifted the debt governance paradigm from one based purely on financial accounting to one based on the continuity of hospital clinical services through a VED (Vital, Essential, Desirable) analysis. These operational urgency characteristics were automatically mapped through matching against a master supplier database.

1) Vital Category (V) - Patient Safety Core

This group of vendors primarily supplies pharmaceutical drugs, medical gases, and consumable components directly related to ophthalmic surgery (such as cataract and retinal surgery). A key characteristic of this group is its zero tolerance for delays. Discontinuing supply (credit blocking) from vendors in this category has a significant impact on patient safety and surgical success.

2) Essential Category (E) - Operational Support

Vendors supplying medical support logistics, diagnostic equipment spare parts, or hospital sanitation services. Payment delays in this group are tolerable in the short term (a matter of days), but will disrupt the efficiency of service flows if allowed to persist.

3) Desirable Category (D) - Administrative Amenities

Vendors operating in the non-medical sector, providing amenities, decoration, or office administrative needs. This group is entirely focused on supporting convenience, allowing for the highest level of flexibility and deferred payments to save on medical cash.

3.7. Integration Form of Priority Scale in ABC-VED Combination Matrix

To address the third problem, the integration of priority scales in the MATA-AP model is realized by combining two-dimensional attribute matrices into a single priority code (e.g., AV, BV, and CD). This integration is concretely implemented through Google Apps Script programming logic in the Executive Summary Email feature.

This form of integration works by applying a hierarchical weighting system, where the maturity time and VED category parameters are placed as the primary filter, while the ABC nominal value is positioned as the second filter parameter within the same group.

This integration radically changes the data visualization in the email executive summary. For example, the MATA-AP algorithm successfully elevated vendor invoices S-06 and S-04, which were only medium-sized (Class B), to the Top 5 in the report due to their Vital (V) attributes. Conversely, the large invoices belonging to S-100 were automatically removed from the top priority due to their Desirable (D) category. This integration results in a standardized, transparent, and measurable payment queue for management.

3.8. The Role of Implementing the ABC-VED Priority Scale in AP Management and Smooth Operations

Answering the final problem formulation, the implementation of the ABC-VED priority scale through the MATA-AP system has a very crucial strategic role for JEC Candi Semarang Eye Hospital in two main aspects:

1) Accountable and Efficient Accounts Payable Management

Operationally, this model reduces the workload of AP staff from manual to automated recapitulation. Internal control functions such as automatic detection of duplicate invoice numbers (INV-16 on S-25) play an active role in preventing cash leakage due to double payments. From a managerial perspective, the VED-based Top 5 presentation in email provides Finance Managers with flexibility to plan daily working capital allocation (cash planning) accurately and objectively.

2) Maintaining Smooth Hospital Operations (Anti-Credit Block System)

The most important role of this system is its ability to act as a protective shield for the hospital's medical operations. By elevating V-coded invoices to the primary focus of daily financial managers, the hospital can ensure timely fulfillment of financial obligations to critical medical vendors. This preventative measure completely eliminates the risk of credit freezes

from pharmaceutical/medical equipment vendors, ensuring drug availability and smooth scheduling of patient eye surgeries without logistical supply disruptions.

4. Conclusion

Based on the results of the implementation simulation, internal control evaluation, and in-depth discussion that have been described in the previous chapter regarding the implementation of the MATA-AP (Accounts Payable Queue Tabulation Management) system at JEC Candi Eye Hospital, Semarang, several main conclusions can be drawn as follows:

- 1) ABC Analysis Based Grouping successfully maps the characteristics of financial risk exposure of hospital debt automatically into three nominal threshold levels, where bills above IDR 50,000,000 (Class A) are identified as the largest cash flow absorbers that require strict macro liquidity monitoring.
- 2) The VED Analysis-Based Classification has been proven to be able to shift the debt management paradigm from purely financial accounting to clinical protection-based, by assigning vendors supplying major pharmaceutical drugs and ophthalmic surgical consumable components into the Vital (V) category where late payments cannot be tolerated.
- 3) The integration of the ABC-VED Combination Priority Scale in MATA-AP is realized through a hierarchical weighting system-based information system architecture. This system intelligently places the clinical service criticality (VED) parameter as the primary daily filter and positions the nominal amount (ABC) as the secondary filter parameter, so that the visualization of debt commitments in executive reports becomes more objective, transparent, and standardized.
- 4) The implementation of this Combined Priority has proven crucial as a reliable operational risk mitigation system. The system completely eliminates the threat of credit blocking from major medical vendors, ensuring smooth patient eye surgery procedures. Furthermore, the automation of internal control functions (checking Manual Duplication) has proven effective in blocking report delivery when duplicate invoice numbers are detected, preventing cash leakage due to double payments.

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