Ann PUBLISHER Journal of Economic Sciences (Ekuisci)
e-ISSN 3047-0579
p-ISSN 3046-837X

Real Time Clinic's Financial Crisis Early Warning System Implementation Strategy for Profit Optimization at Klinik Permata Bunda Syariah Cirebon

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Abstract
Background. Financial uncertainty and cash flow dynamics in healthcare facilities require an early warning system that can detect potential *financial distress* quickly and accurately. PBSC Clinic, as a healthcare institution, faces financial risks stemming from fluctuations in revenue, operating expenses, and short-term and long-term liabilities. Therefore, the development of the *Real Time Clinic's Financial Crisis Early Warning System* (RT, CFC, EWS) is important as a managerial decision-making tool based on actual financial data.
Purpose. This study aims to analyze the financial condition of PBSC Clinic and to develop a CFC EWS RT based on profitability, liquidity, leverage, and distance-to-default indicators, presented in *a real-time dashboard*.
Method. This type of research is an evaluative-descriptive study with a case study approach. The data used are the financial statements of the PBSC Clinic for the current period, which are analyzed using financial ratios and risk zone mapping (green, yellow, red) as early warning signals.
Results. The results of the study show that the CFC EWS RT dashboard can represent the clinic's financial condition in an accurate and contextual manner. This system is effective at providing an early signal of declining profitability, liquidity pressures, and increased leverage risk, allowing management to take corrective action in a relatively short time.
Conclusion. RT CFC EWS plays a strategic role in supporting the financial stability and sustainability of the PBSC Clinic.
Implications. Practically, this research provides implementable guidance that can be directly used by the management of PBSC Clinics and similar health facilities. *The* CFC EWS RT Dashboard is capable of being a simple but effective daily monitoring tool.

Keywords: *Financial Crisis Early Warning System, Financial Distress, Clinic, Real-Time Dashboard.*

INTRODUCTION

Optimization is a fundamental concept in modern management that aims to achieve the best performance of a system by effectively and efficiently using resources. In the management literature, optimization is often associated with the process of *continuous improvement* and the reduction of inefficiencies in various aspects of organizational operations. Optimization is not only focused on the end result but also on the systematic process of achieving it through a data-driven approach, clear operational standards, and appropriate technology. Therefore, optimization is often considered a long-term strategy that must run in parallel with efforts to improve service quality within each organizational entity.

In the context of clinics as healthcare providers, the concept of optimization is highly relevant given the complex, labor-intensive, capital-intensive, and highly time-dependent nature of their operations. The clinic not only functions as a medical service unit but also as a business organization that must maintain financial sustainability. Therefore, optimization in the clinic cannot be seen as partial but must be understood as the integration of various subsystems, including human resources, patient service flows, information systems, and cost management. Optimization in clinic operations requires comprehensive improvements in how it works, coordination between units, and evaluation and management control mechanisms.

Permata Bunda Syariah Cirebon Clinic (PBSC Clinic) is a premier clinic offering 24-hour outpatient and treatment services, including specialist Obstetrics and Gynecology services. This clinic is a primary health care institution serving the community in Cirebon City, established in 2012. In addition to being a health service institution, PBSC Clinic must also be seen as a business entity that must be managed properly and optimally in order to maintain operational continuity. As a business entity, PBSC Clinic has not achieved optimal profit in accordance with management's expectations. Opportunities in healthcare, such as increasing patient visits, inpatient occupancy rates, loyalty, and reassurance levels, if managed properly, will certainly increase and optimize profits. However, internal challenges, such as operational costs, and external challenges, such as competition with similar clinics, if not managed properly, can reduce profits and even threaten the survival of PBSC clinics.

The management of the PBSC Clinic so far has not been fully in accordance with the principles of effective and efficient. Unstable occupancy rates or the number of patients, despite promotional and marketing efforts, low and insufficient patient visits to increase revenue, and a lack of patient loyalty to the services provided. Building a consistent revenue stream for patients is still low. Operational costs that are cut through efficiencies, such as the use of technology to reduce administrative time and labor costs, remain unchanged in financial conditions. Unavoidable expenses, such as rent, medical equipment, and medicines, remain high. Human resource management is suboptimal, resulting in reduced productivity, scheduling delays for patient visits, and inefficient management of doctors' and other medical personnel's service time.

Dealing with external and internal business shocks, the PBSC Clinic requires risk mapping (financial risk, patient health and safety risk, legal and regulatory risks, operational risks, reputational risks, environmental risks, and natural disasters) of the entire system working within the clinic entity. However, the reports currently produced are still periodic, so the data they present cannot be used because it is not relevant to the ongoing operational situation. For example, during the COVID-19 pandemic, from the beginning to the end of 2022, when it was declared that the pandemic was over, management was passive, leading to managerial policies that were reactive, not preventive. Likewise, when the government's BPJS policy is enforced, clinics respond passively and reactively, rather than proactively, to avoid risky financial shocks that threaten the clinic's sustainability.

The PBSC clinic is currently building an EWS system and is running as services are developed. With financial information integrated into a single, modern clinic digital information system, the Clinic's Early Warning System (CEWS) will be more informative. CEWS to be formed, PBSC Clinic, by using the latest information technology, Cloud Computing, namely Google Firebase, will make financial statements real-time and more adaptive. The management's response to problems that arise, such as declining revenue, late claim payments, and a surge in operational expenses due to emergencies like the pandemic, is not too late. Even the information used will form a collection of solutions for the work plan (*Framework*) management that is correlative, integrative, dynamic, and sustainable. Thus, Real Time Clinic's Financial Crisis Early Warning

System (RT CFC EWS) required PBSC Clinic to prepare for future business shocks in order to continue growing and remain resilient.

Research on Financial Distress and Financial Early Warning System (EWS) has developed widely, especially in the banking sector, public corporations, and capital markets. Classic and up-to-date literature (Altman, Beaver, Ohlson, Powell et al., 2024) identifies the ratios of profitability, liquidity, and leverage as the primary indicators for detecting financial stress early. Recent developments have even led to the use of machine learning, ensemble models, and big data analytics to improve the accuracy of financial crisis predictions. However, most of those studies have some common characteristics:

1. Based on periodic historical data, not real-time operational data.
2. Focus on large entities (banks, public companies, manufacturing industries).
3. Oriented towards academic predictions, not daily managerial implementation.
4. There is a lack of context for health services, especially medium-scale clinics.

In the healthcare sector, financial research is still dominated by studies of cost containment, operational efficiency, and revenue management, while real-time financial early warning systems are still not mainstream research. Clinic information systems generally serve as recording and reporting tools, not as preventive decision-support systems.

This article puts itself on a wedge between:

1. Financial Distress Theory
2. Financial Risk Management
3. Real-Time Management Information System
4. Operational context of a healthcare clinic

Thus, this article expands the state of the art from a mere financial prediction model to an operational, contextual, and applicative early warning system in a clinical setting

LITERATURE REVIEW

One of the key components of optimization is improving patient services. Patient service is a central point in clinical operations, so that any form of inefficiencies in service flow, waiting time, or administrative processes can have a direct impact on

the perception of service quality. Service optimization includes more effective patient flow management, increased staff capacity to deliver fast, precise services, and the use of technology to manage schedules and reduce queues. Clinics that create a good service experience tend to have higher levels of patient satisfaction, which, in turn, increases patient retention and loyalty.

In addition to patient services, optimizing operational costs is a strategic aspect in the clinic's sustainability. Clinics face various costs, ranging from the purchase of consumables and salaries of medical personnel to investment in medical devices and environmental and technological maintenance. Without effective cost management, the clinic's profitability can erode despite increased patient volume. Cost optimization is achieved through appropriate control and resource allocation strategies, such as more accurate inventory management, the implementation of an efficient medical device use system, and adjustments to staff work schedules to eliminate wasted working hours. Optimal cost management allows clinics to maintain profit margins without sacrificing service quality.

Profit optimization is a long-term goal that every clinic must achieve. Optimal profits are determined not only by increased revenue but also by the clinic's ability to manage costs effectively. In practice, increasing profits can be achieved through service diversification strategies, developing superior services such as specialist services, measurably increasing service prices, and integrating health services with digital technology. Clinics that can expand service segments will have a greater opportunity to increase revenue. However, profit optimization must still balance the business aspect with the social mission of health services.

Another important component in optimization efforts is the use of information systems and technology. Information technology has a strategic role in helping clinics map service patterns, record financial data in real time, and facilitate managerial decision-making. Technology-based clinic management systems improve efficiency across many administrative processes, including patient registration, payment processing, medical record management, and financial reporting. Automation helps reduce human error in record-keeping, speed up service processes, and improve the accuracy of

operational data. In the modern context, digital technology is the backbone of various optimization strategies.

The entire optimization process can only be successful if it is supported by competent human resources (HR). Training and capacity building of staff are key components in ensuring that all changes are implemented effectively. Human resources who understand the new duties, responsibilities, and operational procedures will be better able to make an optimal contribution to the clinic's performance. In addition, a collaborative, open culture of change is essential to creating an environment that supports sustainable optimization.

Financial Management: *Financial Distress* and *Financial Early Warning System (EWS)*

Financial management is crucial in an organization because it involves planning, budgeting, controlling, auditing, and managing the organization's overall financial resources. Contemporary financial theory positions financial management at the center of coordination in the strategic decision-making process, particularly through the integration of financial planning and risk management. Within the framework of modern financial theory, these functions are no longer seen as mere operational activities but as strategic instruments that determine an organization's sustainability and competitiveness. Financial management plays a role in optimizing capital *allocation* by evaluating capital costs, analyzing return and risk, and determining investment priorities aligned with the organization's long-term goals. The effectiveness of this capital allocation is highly dependent on management's ability to conduct strategic financial mapping, which is the process of matching project funding needs with cash flow capacity, capital structure, and organizational growth projections. With proper alignment between organizational strategy and fund allocation, financial managers can ensure that financial resources are used efficiently and effectively, minimizing waste and preventing the misallocation of capital that could reduce the company's value.

Funding and investment decisions consider not only profitability but also exposure to market volatility, macroeconomic uncertainty, and industrial sector dynamics. This integration allows organizations to build adaptive financial structures that are able

to support growth while maintaining long-term financial stability. Thus, modern financial management not only manages funds but also lays a strong foundation for financial governance, increasing the company's value, strengthening the organization's resilience, and ensuring that every financial decision directly contributes to achieving the organization's strategic vision.

Modern financial management not only manages the flow of organizational funds but also serves as a strategic framework that connects financial theory with real decision-making practices. From the perspective of Trade-off Theory, organizations must balance the benefits of debt, such as tax savings, with the risks of bankruptcy and liquidity pressures. This makes the planning and budgeting process a means to determine the optimal capital structure that not only reduces capital costs but also minimizes long-term financial risks. Ammann, M., & Verhofen, M. (2022) stated in *Pecking Order Theory* that financial managers tend to prioritize internal funding before seeking external funding so that the effectiveness of cash flow planning and cost control is a critical factor in minimizing dependence on volatile external markets.

In a broader strategic context, the Resource-Based View (RBV) approach by Chen, Y., & Young, M. (2020) positions financial management as a strategic organizational capability that is difficult to replicate. Strong financial controls, accurate reporting systems, and a deep understanding of the cost of capital are *intangible capabilities* that enable companies to allocate resources effectively and create a competitive advantage. Breia, C., & da Costa, J. (2021), in Cash Flow Theory, emphasize that a company's value is highly dependent on the organization's ability to generate free cash flow consistently. Therefore, financial audit and performance evaluation activities are not only aimed at identifying errors but also at mapping cash flow patterns to assess investment sustainability and detect potential liquidity pressures.

The integration of these theories is particularly relevant for performance measurement (*performance indicators*) and financial crisis prevention (*financial distress indicators*). Indicators such as *return on assets (ROA), economic value added (EVA), cash conversion cycle*, and *debt service coverage ratio* are used to evaluate the effectiveness of capital allocation and the organization's operational efficiency. Meanwhile, for the detection of financial crises, various models such as *the Altman Z score, Ohlson O score*,

and machine learning-based models have been used to identify early signs of financial failure, including a decline in operating cash flow, a decrease in profit margin, and a surge in leverage (Li, W., & Wang, Z., 2023). Thus, modern financial management functions as a bridge between theory and practice by integrating strategies, risk analysis, and performance measurement, thereby strengthening the organization's resilience to internal and external shocks. In financial management, there are several theories related to financial stress, namely the Financial Distress Theory and the Early Warning System, which detect when Distress occurs.

Financial Distress Theory describes the conditions under which an entity is under significant financial pressure, such that the company's ability to meet short- and long-term obligations begins to be disrupted.

The Financial Early Warning System (EWS) is a systematic mechanism designed to detect early signs of a financial crisis by monitoring relevant financial and non-financial variables. In the modern risk management framework, EWS serves not only as a passive alarm but also as a proactive tool that signals to management before a problem becomes a full-blown crisis, enabling risk mitigation and timely intervention.

The liquidity ratio focuses on a company's ability to meet its short-term obligations, such as paying business debts or obligations that are about to mature. Companies with strong liquidity generally have stable short-term finances, while low liquidity signals potential cash difficulties and bankruptcy risk.

This ratio indicates a company's level of debt and financial risk. The leverage ratio measures the extent to which a company's assets are financed by debt. This ratio is important because high debt levels increase interest expense and the risk of bankruptcy, especially if profits decline.

Financial risk management is a strategic framework that focuses on identifying, measuring, mitigating, and monitoring risks that can affect organizational stability and performance. In the perspective of modern risk management theory, risk is not only seen as a threat but also as an element that must be managed in order to optimize the value of the company (*Value Maximization*). Therefore, the risk identification process must include all relevant financial aspects, including liquidity risk, market risk, operational risk, revenue risk, as well as credit risk that can affect the company's ability to

meet its obligations and maintain profitability (Aebi, V., Sabato, G., & Schmid, M., 2020).

The Management Information System (SIM) provides a theoretical and operational framework that enables organizations to systematically use technology to process operational data into strategic information. In financial management, SIM is the digital backbone that connects transaction, budget, reporting, and financial analytics modules. liquidity policy, postpone capital expenditures, or undertake *Hedging* risk (Mustafa, F., Almaududi Ausat, A. M., & Kraugusteeliana, K. (2024)).

Based on the literature review and the position of this article, there are several main research gaps that have been successfully filled:

Gap 1: Real-Time vs Periodic Financial Monitoring

Most EWS research still relies on periodic financial data, so it is slow to respond to crises. This article fills the gap by developing dashboard-based real-time monitoring, which enables risk detection in the latent phase before an acute crisis arises

Gap 2: Clinical Sector as a Research Object

The EWS literature focuses almost entirely on the financial sector and large corporations. This study closes the gap with:

1. Examining health care clinics as business entities that are vulnerable to financial distress,
2. Shows that clinics require a different EWS approach than large companies.

Gap 3: The Gap between Academic Models and Managerial Practice

Much of the research stops at testing predictive models without explaining how the system is used by management. This article bridges that gap by:

1. Develop managerial response mechanisms, SOPs, and risk escalation flows,
2. Making EWS a decision support system, not just an analysis tool.

Gap 4: Lack of Integration of EWS with Governance and Human Resources

Previous research has rarely linked EWS to organizational culture, role sharing, and governance. This article closes the gap by placing HR, Organizational structure, and operational procedures as determinants of the success of an early warning system.

METHODS

This study uses Qualitative Approach With design Case Study (*Case Study*). This approach was chosen because the research aims to understand in depth the implementation process of RT CFC EWS in the specific context of a clinic that is building an early warning system for financial crises in real time. Case studies allow researchers to explore the phenomenon comprehensively through in-depth interviews, observations, document analysis, and reinforcement of findings through triangulation of sources and techniques.

Data analysis was carried out through Triangulation of sources and techniques to improve the validity and reliability of research findings. Data analysis was carried out using the Qualitative Thematic Analysis (Braun and Clarke, 2006), through several stages:

1. Identify the CFC EWS RT data. Interview transcripts, observation notes, and documents are collected in a single analysis database.
2. Categorization and *coding*. Researchers identify key words, important sentences, and information patterns, then group them in thematic categories.
3. Data reduction. Irrelevant or repetitive information is eliminated, and focus is directed to data that answers the formulation of the problem.
4. Mapping patterns and relationships between themes. The researcher compiled the relationship between supporting factors, obstacles, implementation mechanisms, and their impact on clinical profitability.
5. Synthesis of conclusions.

Instrument Validity and Reliability

1. Content Validity. The instruments were prepared based on EWS theory, financial management, and the study of Powell et al. (2024), and consulted with experts (supervisors/validators).
2. Reliability is maintained through: Data triangulation (interviews, observations and documents). *Member checking*. Consistency of questions between sources.

DISCUSSION

Awareness (*sense of crisis*) and Financial Crisis Risk Management Practices of PBS Clinic in Conditions Without a Structured Financial Early Warning System

PBS clinics do not yet have an early warning system for financial crises, so awareness of potential financial crises and financial risk management practices remains traditional. As a result, management is unable to mitigate or respond to crises, and to implement financial risk management and financial strategies that must be carried out systematically and integrated.

Kaplan and Mikes (2012) emphasized that the effectiveness of risk management depends on strategic, anticipatory risk awareness. However, the findings of the study show that the management awareness of PBSC Clinics is still limited to the short-term operational dimension, where financial crisis risk is narrowly perceived as a matter of momentary liquidity or difficulty in fulfilling obligations, thus ignoring the nature of financial crisis as a gradual process that can be identified early through changes in liquidity, leverage, and profitability indicators (Altman, 1968; Beaver, 1966). This inability to recognize *early warning signals* leads to reactive risk management, leaving organizations vulnerable because management's attention only arises after the impact of the crisis is felt.

Management's attitude towards visible external risks, such as government policies on regional wages that increase operational costs, indicates an *external attribution bias* that shuts down critical evaluation of internal weaknesses. Cost inefficiencies, weak cash controls, and limited financial planning are medium-term financial pressure factors in healthcare organizations (Fraser & Simkins, 2016; Gapenski & Pink, 2015). The tendency to *underestimate* the probability and impact of crises as long as clinics are still operating normally further weakens the sense of urgency in building a proactive risk management system.

Overall, the low *sense of crisis* regarding financial risk at the PBSC Clinic signals a less adaptive, less responsive risk management pattern. Without increased sensitivity, a sense of urgency, readiness, and decisiveness in decision-making, early warning signals are at risk of being ignored and developing into more serious financial pressures. This condition underscores the importance of strengthening the sense of crisis as

the primary foundation for building an early warning system and for more effective, sustainable financial risk management.

Obstacles to the Implementation of the PBS Clinic's Financial Early Warning System

The obstacles to the implementation of the financial early warning system at the PBS Clinic show that the failure of the implementation is not solely caused by technical limitations, but is rooted in structural problems and organizational capabilities in line with the view of Arena, Arnaboldi, and Azzone (2010) that organizational obstacles, resource limitations, and low integration of information systems are the main determinants of risk management system failure.

The organizational structure of PBS Clinic, which is still oriented to daily operations, with financial functions that are administrative and without a formal risk management unit or mandate, results in the identification, monitoring, and evaluation of financial risks being conducted unsystematically. The absence of reporting flows and risk escalation mechanisms, centralized decision-making, and weak cross-functional coordination reinforces organizational barriers and underscores low organizational embedding, which, according to Kaplan and Mikes (2012), is the main cause of the ineffective functioning of risk management systems. This condition is exacerbated by weak financial governance and unclear division of tasks, where financial planning, record-keeping, and control are carried out by the same individuals, thereby decreasing the effectiveness of internal control and increasing the risk of decision-making bias that is contrary to COSO's (2017) principles regarding clarity of roles and accountability.

Designing the PBSC Clinic's Financial Early Warning System

The design of the PBSC Clinic's financial early warning system should be understood as a strategic response to the organization's specific characteristics. In line with the view of Altman and Hotchkiss (2006) that an effective early warning system is not universal but must be adapted to the characteristics of the entity, operational context and stage of risk faced. In this study, it was found that although the system is not

yet available, management already has adequate conceptual readiness and contextual understanding to design the relevant system.

Real-Time Clinic's Financial Crisis Early Warning System *(RT-CF EWS)* Implementation Strategy

Based on calculations of ratios and profitability trends, including EBIT/TA, NI/TA, RE/TA, and EBITDA/TL, the CFC EWS RT Dashboard in November 2025 provides a comprehensive visual overview of the financial performance of the PBSC Clinic. Presenting indicators as color zones (green–yellow–red) allows management to quickly identify the position of profitability risk and its real-time tendency to change.

In general, profitability indicators show that the clinic's ability to generate operating profit on total assets and liabilities is still in a condition that needs to be watched out for but has not yet entered the acute crisis phase. Some ratios show fluctuations that indicate pressure on operational efficiency and the cost structure, so the early warning signal on the CFC EWS RT Dashboard serves as an *alert* for management to conduct an in-depth evaluation of revenue sources and operating expenses.

The findings of this study align with those of Powell et al. (2024), which emphasized that accounting-based profitability ratios such as EBIT/TA, NI/TA, and retained earnings are sensitive early warning indicators of financial pressures in both crisis and non-crisis periods. Powell et al. point out that changes in profitability ratios often precede financial distress, becoming apparent before *financial distress* conditions become apparent. This is consistent with the results of the RT CFC EWS PPC Clinic, where fluctuations in the profitability ratio have not indicated an acute crisis phase but have given signals of caution towards operational efficiency and cost structure. The difference lies in the implementation approach: Powell et al.'s research is empirical-quantitative, based on historical data across companies, while the study develops a trend-based, real-time dashboard system that allows clinic management to respond to signals of declining profitability more quickly and contextually. Thus, the results of this study expand on the findings of Powell et al. by placing profitability ratios not only as an academic prediction tool but also as an early-warning operational instrument that supports direct managerial decision-making.

Liquidity Ratio Performance as an Indicator of Short-Term Liability Fulfillment

Based on the results of the calculation of liquidity ratios and trends which include Current Assets to Total Liabilities (CA/TL) and Current Assets to Current Liabilities (CA/CL), the CFC EWS RT Dashboard in November 2025 is able to visually display the condition of the PBSC Clinic's ability to meet short-term liabilities and total liabilities through color zone indicators. This presentation makes it easier for management to recognize potential liquidity pressures early, without waiting for periodic financial reports.

The monitoring results show that the liquidity ratio of PBSC Clinic is volatilecondition, reflecting the dynamics of operational cash flow that could lead to *financial distress* if not managed optimally. The change in the zone on the CA/TL and CA/CL indicators serves as an early warning signal that, although operational activities are still ongoing, there is a risk of cash limitations in meeting short-term liabilities, especially in the event of a delay in revenue receipts or a sudden increase in operating expenses.

The findings on liquidity in this study are consistent with those of Powell et al. (2024), which affirm that accounting-based liquidity ratios play an important role as early indicators of financial stress, especially in detecting potential *financial distress* before a real payment default occurs. Powell et al. point out that fluctuations in liquidity ratios are often a signal of a transition from stable to risky, even though companies still appear to be operating normally. This is in line with the results of the RT CFC EWS PPC Clinic, where the CA/TL and CA/CL ratios show fluctuating dynamics and do not indicate an acute crisis, but have provided early warnings of potential short-term cash constraints. The difference is that Powell et al.'s research relies on periodic quantitative analysis of historical data across entities, while this study implements a real-time liquidity dashboard that translates ratio changes into visual signals that can be acted on immediately by management. Thus, the results of this study reinforce Powell et al.'s findings by emphasizing that liquidity indicators are not only theoretically relevant but also highly effective when integrated into real-time, operational early warning systems.

Leverage Level and Distance to Default as Indicators of Structural Risk and Probability of Bankruptcy

Based on the results of the calculation of the leverage ratio (Total Liabilities to Total Assets / TL/TA) and Distance to Default (DD), the CFC EWS RT Dashboard in November 2025 provides an overview of the level of dependence of PBSC Clinics on liability-based financing and the safe distance of clinics from potential defaults. Presenting indicators as color zones allows quick, intuitive identification of capital structure risks.

The monitoring results show that the TL/TA ratio reflects the leverage pressures that need to be controlled, especially in maintaining a balance between asset growth and increased liabilities. Meanwhile, the *Distance to Default* indicator serves as a comprehensive signal that combines aspects of profitability, volatility, and liability structure to provide an early picture of clinics' vulnerability to bankruptcy or *financial distress*.

The findings on leverage and distance to default in this study are also consistent with Powell et al. (2024), who emphasized that liability and solvency indicators are strong early warning signals of increasing financial distress risk, especially when combined with profitability and liquidity trends. Powell et al. point out that an increase in the ratio of liabilities to assets often precedes a phase of more serious financial stress, even though operating conditions still appear stable. This is consistent with the results of the RT CFC EWS PPSC Clinic, where the TL/TA ratio and *the Distance to Default* indicator have not indicated an acute risk of default but have signaled caution against the potential for increased solvency risk if financial pressures continue. The difference lies in the implementation approach: Powell et al.'s research is predictive, based on historical data and cross-company empirical testing, while this study applies real-time monitoring of leverage and default risk through a visual dashboard that allows clinic management to make financing structure and liability control adjustments more quickly and contextually. Thus, this study expands on the findings of Powell et al. by treating leverage and distance to default as early-warning operational indicators that directly support managerial decision-making.

Real Time Clinical Financial Crisis Early Warning System (RT CFC EWS) Implementation Strategy for Profit Optimization

The implementation *of the Real Time Clinical Financial Crisis Early Warning System* **(**RT CFC EWS) at PBSC Clinics requires a gradual and integrated approach that considers the readiness of human resources, the alignment of work procedures, and the capabilities of the information system.

HR Strengthening Strategy.

This training must be conducted before the CFC EWS RT is used so that staff have an equal ability to read dashboards and respond to early warning signals.

Role and Function Determination in the EWS Cycle

Implementing EWS requires a clear division of functions. Key positions to be strengthened: *Data Entry Officers* (cashiers, pharmacists, medical admins) as custodians of the accuracy of daily inputs. *Clinical Financial Analyst* as a data quality controller and a daily interpretation maker. The Administrative Supervisor is the final validator of the anomaly. Clinic Manager as a decision maker based on EWS signals. This division of roles ensures that responses to red or yellow signals are done quickly and precisely.

Strengthening Real-Time Data-Based Work Culture

EWS will be effective if staff are accustomed to working with accurate data and time discipline. Then the strategy needed: Standardization *of the cutoff time for* daily data input. Strengthening the culture of accuracy and transparency. Reward units that consistently maintain data quality. Weekly briefings related to EWS performance. This will increase the accountability of the entire unit.

Strategy to Strengthen Procedures and SOPs

Harmonization of SOPs for Data Recording and Validation

The interview findings show that SOPs already exist but do not fully meet real-time needs. Therefore, it is needed to revise SOPs for income recording, pharmaceuticals, and actions. New SOP on *real-time data submission*. SOP about *exception handling* when data deviations are found. This ensures that EWS integration is not hampered by procedural inconsistencies.

Establishment of Daily, Weekly, and Monthly Control Cycles

RT CFC EWS requires multilevel control:

1. Daily Controls. Cashier reconciliation, pharmaceutical–action per unit. Identify color signals (green, yellow, red). Quick response to anomalies (e.g., revenue mismatch).
2. Weekly Controls. Review of EWS trains. Analysis of the root *cause*. Weekly operational strategy adjustments.
3. Monthly Control: In-depth analysis of cash flow and profitability. Official reporting to the clinic leader. Evaluation of the effectiveness of EWS.

Interunit Communication Mechanism When the EWS Signal Appears

Clear communication protocols are required: Yellow signal: administrative supervisors must confirm across units within 12 hours. Red signal: the clinic manager must issue corrective action within <24 hours. All deviations are recorded in the *EWS incident record logbook*. This ensures that the system not only detects but also encourages immediate corrective action.

Strategy to Strengthen Technical Aspects and Information Systems

The results of the interviews show that the integration has been underway to some extent. For EWS, the integration must be complete so that Revenue data automatically flows into the EWS dashboard. Pharmaceutical and immediate action data update revenue projections. BPJS claims are connected to the receivables module and aging schedule. This integration is the main foundation of RT CFC EWS.

Comprehensive Development of the CFC EWS RT Dashboard. The dashboard should include the following features: real-time daily revenue monitoring; a 24-hour cash flow tracker; critical financial ratios (liquidity, solvency, profitability); an auto-alert system with color-coded red, yellow, and green; automatic anomaly detection (outlier detection); and weekly and monthly trend reports.

Strengthening Digital Infrastructure needs improvement to support real-time operations: Increased bandwidth and server stability; implementation of daily automated backups.; Tightening firewalls and data encryption for security; Assignment of

a dedicated IT team for the maintenance of EWS. This is important for the RT CFC EWS to work without operational interruptions.

Real-time Data Management: Technical standards are required: Elimination of duplicate inputs; Auto-reconciliation; Mandatory data entry in a standard format; Warning signs if any data is entered late. This standardization improves the accuracy of EWS data.

Phased Implementation Strategy (Roadmap)

1. Stage 1: Preparation (1–2 months). Audit of information systems and SOPs; Financial and operational staff training; Determination of clinical EWS indicators; Initial system integration setup.
2. Stage 2: System Development (2–3 months). Development of RT CFC EWS dashboard; Automatic alert module creation; Daily data integration trials.
3. Phase 3: Pilot Project (1–2 months). Implementation in cashier and pharmaceutical units, especially dahulU; Evaluation of data accuracy and response to warning signals; Technical improvements according to the pilot's findings.
4. Stage 4: Full Implementation (1 month). The system runs for the whole unit; SOP tightened; The EWS team was formally formed.
5. Stage 5: *Monitoring* and *Continuous Improvement:* Monthly evaluation of effectiveness; EWS; Adjustment of the indicator if required; Strengthening clinical risk governance.

Governance Strengthening Strategy (*Governance*)

To ensure the sustainability of the implementation of the CFC EWS RT: Established a Clinical Financial Risk Control Committee, comprising the clinic manager, head of finance, head of IT, and financial analyst; has duties: monitoring EWS signals, risk analysis, and recommendations for managerial decisions. This committee ensures that EWS not only detects crises but also becomes a strategic tool for decision-making. Overall, the implementation of RT CFC EWS in PBSC Clinics must be carried out through three main areas of strengthening: competent human resources and data

discipline; Harmonious and responsive procedures to risk signals; and an integrated and reliable digital infrastructure**.**

The implementation strategy of the Real-Time Clinic's Financial Crisis Early Warning System (RT-CF EWS) at the PBSC Clinic emphasizes that the main advantage of the real-time-based system lies in its ability to improve the accuracy and speed of financial distress detection, thus enabling more responsive and anticipatory managerial decision-making, as emphasized by Powell et al. (2024). The study's findings show that liquidity and operational cost indicators serve as relatively accurate initial signals for detecting financial pressures in the latent phase, supporting Altman and Hotchkiss's (2006) view that financial crises are progressive and can be identified before they reach the acute stage. This success shows that RT-CF EWS has fulfilled the fundamental principles of the early warning system, namely timeliness and predictive relevance, because it is able to bridge operational financial data with management's needs for strategic information that is prospective, not just retrospective. The high level of trust in management in the system's signals is a key factor in the effectiveness of implementation, as the consistency of data updates, the reliability of information sources, and the relevance of indicators to clinical operational characteristics build the legitimacy of the system as a strategic tool, in line with Arena et al. (2010) and Kaplan and Mikes (2012) who affirm that without user trust, early warning systems will lose their substantive functions. Furthermore, the presentation of concise, visual, and easy-to-interpret information accelerates the managerial sense-making process and strengthens the speed of response to risk signals, so that the RT-CF EWS not only serves as a detection tool, but also as a facilitator of efficient and structured decision-making (Granlund, 2011). The strategic impact of the implementation of the system is reflected in the stability and growth of operating profits, where real-time information allows for early identification of cost efficiency opportunities and revenue optimization, confirming that early warning systems have strategic value that goes beyond defensive functions and contributes directly to improved financial performance (Fraser & Simkins, 2016). In addition, real-time liquidity monitoring has been shown to strengthen operational cash flow stability, as management can anticipate potential cash shortages before disrupting service activities, reinforcing the role of RT-CF EWS as a proactive, sustainability-oriented

financial control instrument for PBSC Clinics (Altman & Hotchkiss, 2006). Overall, these findings confirm that the effectiveness of the RT-CF EWS implementation strategy is not only determined by technological sophistication, but especially by the suitability of indicator design, level of management trust, clarity of decision-making flow, and integration of the system into daily managerial practices, so that the system truly functions as a data-based decision support system that is able to support the optimization of profits and clinical financial stability sustainable. With the above strategies, PBSC Clinic will be able to detect potential financial crises early, accelerate managerial responses, and improve long-term financial sustainability.

Research Limitations

The study used only four main ratios (EBIT/TA, NI/TA, RE/TA, and EBITDA/TL). The EWS literature (Powell, Klopotan, Altman, and CAMEL model) emphasizes the need for additional indicators such as liquidity ratios, leverage, cash flow, operational efficiency, and management activities. The limitation of these variables can cause the results of the study not to be able to comprehensively capture all dimensions of financial risk.

The main novelty of this research is conceptual, contextual, and implementive, which can be formulated as follows:

1. Conceptual Novelty
    a. This study introduces the Real-Time Clinic's Financial Crisis Early Warning System (RT-CFC EWS) as a new framework that:
    b. Not only detecting *financial distress*,
    c. But it also becomes a daily managerial navigation tool based on risk signals (green–yellow–red zones).
    d. Different from the conventional EWS model which is static and retrospective in nature, this system integrates the financial ratio + visual dashboard + managerial response mechanism in a single continuous control cycle.
2. Contextual novelty
    a. This research is one of the pioneer studies that:

b. Implementing a financial crisis early warning system specifically in health service clinics,
c. Taking into account the characteristics of the clinic: dependence on daily cash flows, fixed cost pressures, and regulatory external risks.
d. Previous literature has rarely adapted distress models to specific clinical sectors, so this study fills a significant context gap.

3. Novelty Implementative
    a. Other important novelties are:
    b. Integration of cloud computing (Google Firebase) to generate real-time financial reports,
    c. The use of visual dashboards as *managerial* sense-making tools,
    d. The formulation of a phased implementation strategy (roadmap) is rarely found in EWS research, which generally stops at the model or statistical testing stage.

Thus, this study shifts EWS from an analytical instrument to an operational financial governance instrument.

CONCLUSION

A real-time financial early warning system has proven relevant and necessary for PBSC Clinics. This study concludes that the operational and financial characteristics of PBSC Clinics make a real-time-based financial early warning system a strategic need. Reliance on daily cash flows, relatively fixed cost structures, and healthcare revenue dynamics leaves clinics vulnerable to latent financial pressures. Therefore, RT-CF EWS plays an important role in detecting potential financial distress before it develops into an acute crisis that threatens the sustainability of clinic operations.

The obstacles to EWS implementation are multidimensional and interact. The results of the study show that the failure or delay in implementing the financial early warning system is not solely due to technological limitations, but also to a combination of organizational obstacles, weaknesses in financial governance, limited human resource competence, and low integration of information systems. The interaction

between these constraints strengthens reactive financial management patterns and reduces the effectiveness of early financial risk detection.

The design of contextual early warning systems increases managerial relevance and utilization. This study concludes that financial early warning systems designed based on clinical operational characteristics, with indicators of liquidity, operational costs, and service profitability, are more relevant and better accepted by managers than generic indicators. The selection of operationally meaningful indicators strengthens the system's role as a decision-making tool, rather than merely a financial reporting instrument.

The implementation of RT-CF EWS has a positive impact on financial stability and profit optimization. Empirical findings show that implementing RT-CF EWS enables faster, more targeted, and data-driven financial decision-making. This system contributes to cash flow stability, cost efficiency, and strengthening operating profits, thus confirming that the financial early warning system is not only defensive but also has strategic value in supporting the sustainability and profit growth of PBSC Clinic. For this reason, the implementation strategy is prepared to integrate the real-time detection system and dashboard, and the resulting signals must trigger management of all lines in the PBS Clinic to implement managerial policies according to their respective subdivisions.

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