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Feasibility Design and Analysis of Process-aware Accounting Information System for Business Management

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***Abstract* - Accounting Information Systems (AIS), as a fundamental element of Enterprise Information Systems (EIS), are experiencing dual pressures from the enterprise management surroundings and the advancement of accounting control. The current AIS focused on functional applications needs to be revised to meet contemporary enterprise management requirements. This study suggests implementing a Process-Aware Accounting Information System (PA-AIS) that utilizes data mining techniques to enhance managing business processes. The objective is to enhance the accounting effectiveness of organizations and provide valuable insights for building AIS. This paper compares the benefits and drawbacks of standard methods employed in building AIS. It also assesses the potential of process-aware AIS to enhance business Process Management (PM) by considering factors such as enterprise effectiveness, accounting expenses, accounting duration, etc. An analysis assesses the viability of improving the PA-AIS for managing business processes regarding enterprise effectiveness, accounting expenses, accounting duration, etc. The findings indicate that implementing a PA-AIS with enhanced business PM is economically viable and successful. This system saves time, minimizes accounting risks, and enhances management control inside the firm. The implementation of a PA-AIS, along with enhanced business PM, effectively decreases the accounting expenses of firm Y. The initial accounting cost is from 100k to 200k, but the accounting expense after implementing the new system ranges from 80k to 100k. Implementing the new system resulted in a minimum 10-20% improvement in Company Y's accounting efficiency, rationality, and user convenience. The PA-AIS enhances business process administration, facilitating growth and effective firm management.**

Keywords: **Process-Aware Accounting Information, Business Management, Feasibility Design, Enterprise Information System**

I. INTRODUCTION

Due to the fast advancement of economic globalization and informatization, firms are encountering significant problems and new potential for growth. The competitive landscape of contemporary businesses has seen significant transformations (Kraus et al., 2022). The customer demand is varied and customized, resulting in a shift from a seller's market to a buyer's market. Technology innovation is progressing rapidly, leading to shorter product life cycles and unpredictable market dynamics. Clients, competition, and change provide significant obstacles to the firm outside, while the organizational framework is the most considerable difficulty within (Volberda et al., 2021). The conventional management approach revolves around functional management. This style often leads to excessive hierarchical levels, bloated organizations, ambiguous duties, and other occurrences that hinder firms from promptly meeting the demands of the market and consumers, gradually losing their competitive edge in the fast-evolving market.

Partitioning internal functional divisions results in the fragmentation and disintegration of the business processes. These variables contribute to a decrease in the effectiveness of corporate management and a spike in operational costs (Imam & Ilori, 2022). To thrive in a fast-paced and fiercely competitive marketplace, enterprises must promptly abandon management methods unsuitable for the present business climate (Arora, 2024). Instead, they ought to develop a framework and management system that can easily adjust to external changing circumstances and respond flexibly (Settembre-Blundo et al., 2021).

A new kind of Process Management (PM) has arisen due to the changing social and economic context and the increasing capabilities of technological assistance systems (Mendling et al., 2020). Scholars have labeled this PM framework as "the third wave of processes administration" and are actively comprehensively promoting relevant research (Stojanovic et al., 2020). The latest iteration of process control places the process at the core (Obeidat & Yaqbeh, 2023). Improving the organizational framework, method development, and customer-oriented horizontal PM structure aims to enhance the company's operational efficiency, maximize resource utilization, enhance collaboration between personnel, minimize operating costs, enhance responsiveness to customer requirements, and achieve maximum profitability (Dieter, 2012). This company's PM platform has the qualities of being reusable, flexible, and agile. It can operate across different enterprises and technological platforms, ensuring the smoothness and efficiency of business procedures (Veile et al., 2022).

Considering this study issue, Knechel et al. assert that financial shared services are focused on meeting client demands (Knechel et al., 2020). The company's internal divisions tailor appropriate solutions based on client needs to deliver these customized services. Lu et al. argue that shared services involve streamlining repetitive and routine tasks within a company by establishing internal structures and implementing standardized procedures (Lu et al., 2020). This transformation enables the company to become self-sufficient, enhance efficiency, generate value, reduce expenses, and achieve its goals. Categorize the service content of financial distribution into four groups: the first group includes activities like cash entrance, sales peace, and additional inflow administration; the second group involves flow management such as purchasing materials and receipt observation; the third group encompasses internal oversight, budget oversight, and another comprehensive command; and the fourth group focuses on providing knowledge-intensive distant assistance (Oureilidis et al., 2020). The primary staff members responsible for the company's operations devote greater attention to financial matters. Thacharodi et al., (2024) identified seven key attributes of financial sharing based on implementing financial sharing services within businesses: standardization, procedure, institutionalization, excellent quality, high effectiveness, inexpensiveness, and value generation. Highlighted that the sharing service center is a specific shared service provider or an external entity that operates independently from the company (Curtis, 2021). This is a novel approach to the operation and leadership strategy, where the customer's demands are the primary focus for development. It can provide pooled services to businesses across various functional divisions and sectors based on cost and service level (Yu et al., 2020). Conducted research indicating that establishing a sharing center provides firms and finance staff with an advantageous environment for learning and development, resulting in positive outcomes and promising possibilities for growth (Sadiq et al., 2023). Analyzed the stage features and current issues related to building bank computer systems, with a specific focus on complete business systems (Khan et al., 2022). They reviewed the functional structure and planned bank information technology development method, emphasizing accounting and finance as the central components. Chakraborty et al. conducted a study on credit management digitization (Chakraborty, 2020). They proposed that the growth of bank information technology can be categorized into three phases: the conventional business and technological application phase, the network of computers and business innovation phase, and the information application phase. According to state-owned institutions have reached a stage of development characterized by little or no growth, called the "flat" stage (Lo, 2020). Contend that the data-driven construction of big and medium-sized banks has undergone the first installation, widespread adoption, and regulatory phase of the Nolan paradigm (Bateman, 2022). It is in the advanced phase of integration or the intermediate phase of data administration, while smaller and most medium-sized firms are in the stage of controlling their computer networks (Oleksandr et al., 2024).

This study does a comparative analysis of domestic and international literature, examines relevant ideas and theories, assesses the existing state of the case, and develops a solution design based on the case. The paper analyzes and improves Y company's Accounting Information System (AIS). It collects case data via field study and identifies the issues with the system. The article proposes a scheme combining enhanced business PM and process-aware technological advances to optimize the AIS. An analysis evaluates the impact of implementing a Process-Aware Accounting Information System (PA-AIS) with enhanced process oversight on the business. This analysis considers the economic practicality, technical practicality, organizational possibility, and time scale. This analysis aims to provide a benchmark for the layout of the company's AIS.

II. Proposed Process-aware Accounting Information System

The traditional dispersed application software design has advanced program function componentization and reduced reliance on hardware infrastructures and managing database systems. However, from an enterprise management viewpoint, developing organizational software platforms to satisfy individual business requirements and enable flexible response and adaptability of management Information Systems (IS) is essential. This can be achieved by abstracting and encapsulating company models, shielding company requirements, and simplifying company procedure complexities in specialized fields. Abstracting and encompassing a company model fulfill business processing demands in some specialized regions and conceal the intricacy of company demands and operations. The business foundation program platform is designed to cater to a particular area of expertise. It abstracts company procedures and expertise within that domain to create a reusable model. This model supports domain programs and enables the quick configuration of ISs by configuring and invoking the framework.

AIS is part of the accounting programs. The software framework for accounting company operations is designed to simplify the knowledge and skills needed in accounting and create a model that can be used repeatedly for assisting applications related to accounting. Understanding the precise meaning of different accounting information and meta-processes is crucial for developing the software system that forms the backbone of an accounting firm. Following the implementation of the accounting company foundation system, the PA-AIS is categorized into several levels, as shown in Figure 1.

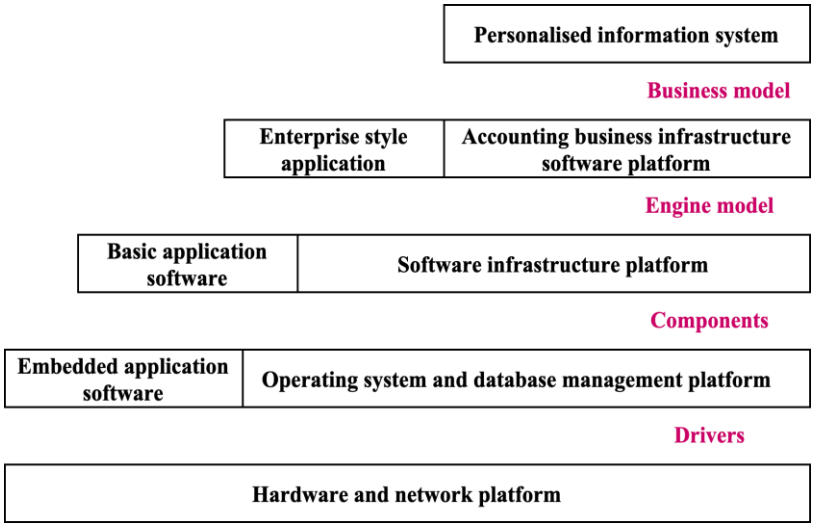

Fig. 1 The Architecture of the Proposed PA-AIS

The hierarchical arrangement of the process-aware accounting information structure division removes inter-layer dependency. The study on constructing the PA-AIS concentrates on three levels: the software architecture platform, the accounting business infrastructure application platform, and the individual data system. In the software infrastructure device, workflow technological advances are utilized to create the central engine that manages and integrates consumers, business connections, programs, and other associated assets. It describes accounting company operations through the creation of procedure models. The process-aware accounting system is employed in the accounting business infrastructure software to quickly construct and configure the accounting business model using specific methods. The company model abstracts professional domain information and procedure algorithms to enable agile configuration and deployment of the platform, thereby enhancing module recycling and reducing deployment prices. The personalized IS platform offers a customized user interface and associated definition and publication capabilities, enabling users to swiftly adapt the system to their requirements. The following description outlines the structure and primary roles of every level within the overarching architecture:

The infrastructure layer encompasses the hardware and software components that support the system's functioning. This includes the operating systems, database servers, application servers, and other relevant elements.

The application software layer encompasses the necessary application assets, standardized middleware, and typical elements that the PA-AIS's company operation layer utilizes. The PA-AIS primarily oversees and activates the resources required for process execution. Among these resources, the application has significant importance. A system can invoke the system to transmit emails.

The business execution level relates to the central mechanism of business operations, including the operation core engines and the procedure model implementation core engines. It establishes, maintains, runs process copies, and serves as the universal support base.

The accounting business infrastructure software layer is the critical component of the PA-AIS. Metadata refers to knowledge that describes the properties and features of data. It provides details on the structure of the information and serves as a general overview. Accounting metadata refers to the conceptual representation of accounting information. The procedure metamodel encompasses the accounting submitting metamodel, accounting oversight metamodel, and calculating collaboration metamodel. It is a general overview and representation of the reporting, control management, and teamwork process procedure. The procedure metamodel is crucial in constructing a business process framework and forms the core of procedure development. Standard corporate procedures and standard company elements refer to the predefined models and elements the technology offers customers to use as a reference. Users alter and customize these frameworks and components based on their needs. Standardized corporate procedures and elements are often established using industry-specific models or approved principles.

Procedure definition technologies offer user-friendly graphical aids that assist users in defining, publishing, and transforming typical company procedures into procedures that can be executed. Process optimization instruments assist users in achieving processes that improve and monitor to

facilitate the ongoing enhancement of corporate procedures and the practical application of process-aware accounting software.

The application representation layer encompasses the consumer interface and process execution instruments for monitoring, serving as the interface for user-system communication. The user experience offers a unified platform for customers to engage with the software. Customers use this interface to provide directions and duties and stay updated on the progress of company procedure execution using monitoring instruments.

2.1. Process Perception Decision Method

To fully replicate managers' decision-making procedure, incorporating perceived assessment should complement the overall system growth by the concept of perceived worth. The system's supplemental material is the decision connection, expressed in the procedure paradigm. The first three linkages are focus, curiosity, and desire.

Managers often have many channels to get data, such as business documents, salespersons, and networks. These channels usually include repetitive content intended to make a lasting impression. Managers must evaluate the management procedure with specific elements that will capture notice. The research assigns the established information as α Eq. (1).

$$\alpha = \frac{\sum_{x=0}^{M-1} a_x}{M} = \frac{a_1}{M} + \frac{a_2}{M} + \cdots + \frac{a_M}{M} \quad (1)$$

A denotes the level of comprehension, M is the quantity of received data, and a_x indicates the understanding of perceived data.

Interest: Once supervisors comprehensively understand a particular leadership task, they can skillfully adjust it by modifying the conventional leadership plan and system setup according to the related requirements. They can evaluate the possibilities or concepts related to the setup scenario and the advantages and disadvantages of implementing such practices. Managers must thoroughly understand the unique circumstances of a specific setup to optimize administration. The term used to describe supervisors' comprehension of a particular task in this article is configuration knowledge β. Eq. (2).

$$\beta = \frac{\sum_{x=0}^{M-1} b_x}{M} = \frac{b_1}{M} + \frac{b_2}{M} + \cdots + \frac{b_M}{M} \quad (2)$$

B indicates the level of comprehension, M indicates the quantity of perceived data, and b_x indicates the comprehension of received information.

Desire: Supervisors fully evaluate and assess if their management activity fits the demands of the present and foreseeable future leadership scenario only when they completely understand the exact content of data. The degree of need serves as the basis for subsequent management tasks, and its capacity to anticipate the ultimate level of leadership is referred to as demand level γ. Eq. (3).

$$\gamma = \frac{\sum_{x=0}^{M-1} c_x}{M} = \frac{c_1}{M} + \frac{c_2}{M} + \cdots + \frac{c_M}{M} \quad (3)$$

The symbol γ Denotes the level of demand, M indicates the quantity of perceived data, and $c_x$indicates the comprehension of received data.

2.2. Parameter Optimization Process

The improvement of the natural processes mainly involves multiparameter and multiobjective evaluation. The most efficient algorithm is chosen. The optimization approach considers process duration, expense, and resource use. The optimal approximating iterative method is employed to progressively alter the process characteristics until the criteria are satisfied after identifying the objective of the optimization operation, decision factors, and restrictions.

To resolve the procedure modeling min f(i), wherein i is an n-dimensional vector. Eq. (4).

$$I = \{i_1, i_2, \cdots, i_m\}^T \quad (4)$$

The parameters $i_1, i_2, \cdots, i_m$denote the decision parameters of the process that need to be addressed. The functions f(i), $h_x(i)$, and $g_y(i)$ correspond to the objective operation, restriction function, and condition, accordingly Eq. (5-6).

$$h_x(i) = 0; for\ x = 0,1, \cdots, N-1 \quad (5)$$
$$g_y(i) > 0; for\ y = 0,1, \cdots, P-1 \quad (6)$$

The collection of all viable solutions is documented as D, which forms the feasible zone. The approach to analyzing the system involves an iterative optimization approach.

- Find a valid starting point I in the domain D; set z equal zero.
- Given a starting feasible point, determine a feasible descending path, denoted as p_z at point i_z inside the feasible zone. This direction should result in a gradual drop in the functional value while going along.

Begin at i_z and extend a ray in the path of p_z Eq. (7).

$$i_z + p_z;\ \alpha > 0 \quad (7)$$

To locate point i_{z+1} on this ray, just add the step size a_z to the current point i_z. This will ensure that the function value at i_{z+1}, denoted as $f(i_{z+1})$, is less than the function value at i_z, denoted as $f(i_z)$.

III. RESULTS

Examining IS feasibility typically considers economic, organizational, and technological factors. This work explores the feasibility of constructing a PA-AIS, focusing on financial, managerial, and technical aspects.

Economic feasibility is the fundamental and prevalent method for assessing the viability of an AIS in terms of its benefit-to-cost ratio. As previously stated, a significant obstacle to the advancement of ISs is the expensive nature of installation, primarily due to the system's inadequate maintainability and adaptability. The PA-AIS employs the

concept of large-scale programming to minimize expenses by enhancing the reusability of modules and, concurrently, the capacity to rapidly construct a database that adjusts to the enterprise's operations through rational and adaptable allocation of assets.

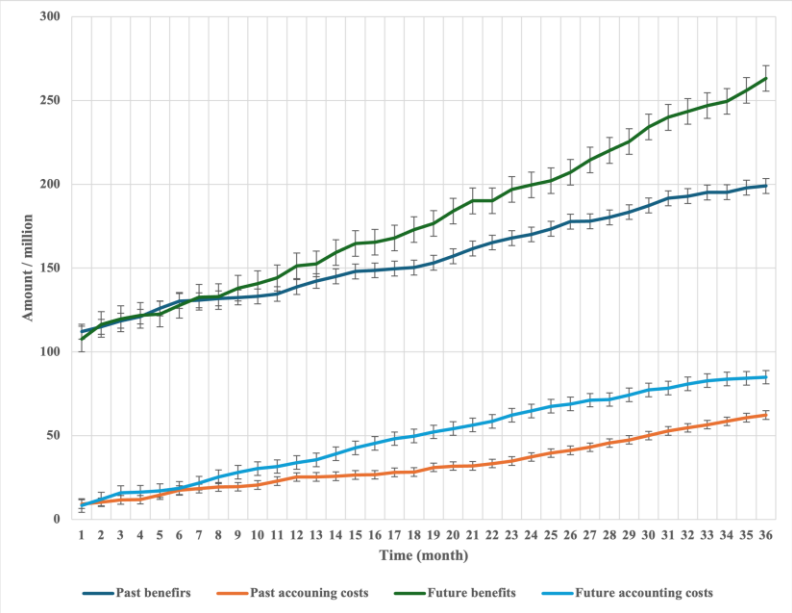

Fig. 2 Analysis of Benefits and Accounting Costs

Fig. 2 demonstrates that implementing an AIS that is process-aware and incorporates enhanced business PM can significantly improve the productivity of enterprise Y. Both methods yield identical effectiveness in the 17th month. The effectiveness of the enterprise improves every month after that with the implementation of the new data system. The technique decreases the accounting expenses by 100k to 200k compared to the prior conventional approach and by 80k to 100k compared to the current system.

3.1. Organizational Feasibility Evaluation

Two factors determine organizational feasibility: firstly, whether the management structure of the enterprise is suitable for implementing the fresh system, and secondly, whether there are sufficient personnel who can adjust to the changes in understanding and conduct that the new system will bring. A PA-AIS is designed to construct an IS based on a business process viewpoint. This approach aligns with the customers' application habits and behavioral reasoning, making it more readily accepted. As business PM concepts gain more acceptance and acknowledgment, enterprises are progressively transitioning towards a customer-centric approach in their organizational design. This shift involves adopting flat structures and matrix groups, which facilitate the installation of AIS that are aware of and aligned with various business processes.

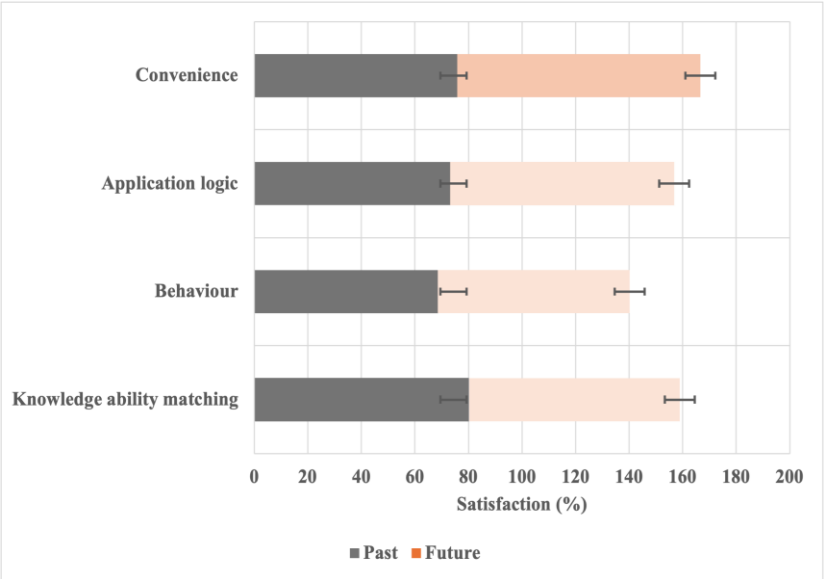

Fig. 3 Organizational Feasibility Analysis

Fig. 3 demonstrates that after implementing the updated system, all behaviors except expertise matching increased from 60 to 75. The satisfaction with logical application patterns rose by 12%, and the satisfaction with convenience rose by 17%. These results indicate that the new approach is feasible for the organization. It is essential to note that the current employees require additional knowledge storage, suggesting that the enterprise should prioritize professional development.

3.2. Technical Feasibility Evaluation

Technical feasibility is assessed by considering many factors, including the IS infrastructure, modeling approach, and modeling tools. From the viewpoint of analyzing IS facilities, a PA-AIS is built on the prevailing popular software design. It focuses on business-oriented uses and shields the underlying technical information. This system facilitates rapid business changes, encourages quick model development and conversion, and can be scaled up as needed. The process-aware accounting model combines the benefits of workflow modeling and modeling and fulfills the roles of modeling processes, organization modeling, and data modeling. It is highly feasible.

Process-aware has developed comprehensive tools that greatly enhance system creation and implementation. Implementing artificial intelligence methods, particularly the extensive utilization of optimization of processes and mining methods, establishes the groundwork for constructing an intelligent IS with self-adaptive and self-learning capabilities. This development is a critical distinguishing factor between process-aware AIS and non-process-aware accounting systems.

3.3. Time Dimension Evaluation

When examined from a temporal perspective, it is evident that the present efficiency of internal control operations could be better. This is mainly attributed to the need for more integration of control activities in the software system, which leads to the disorganized dispersion of business execution and management oversight across computer software and manual procedures. This results in significant waiting time and general inefficiencies in control. There needs to be more exchange of information and collaboration between various procedures and tasks within those processes. The scheduling of activity implementation and assessing preconditions for implementation must be carried out manually. The available resources and techniques need to be improved for ongoing monitoring of procedures, making it hard to promptly address issues that arise during the execution of these activities. Using an enhanced business PM system in accounting, known as a PA-AIS, results in notable improvements in accounting duration, reduction in waiting time, and enhancement of accounting effectiveness.

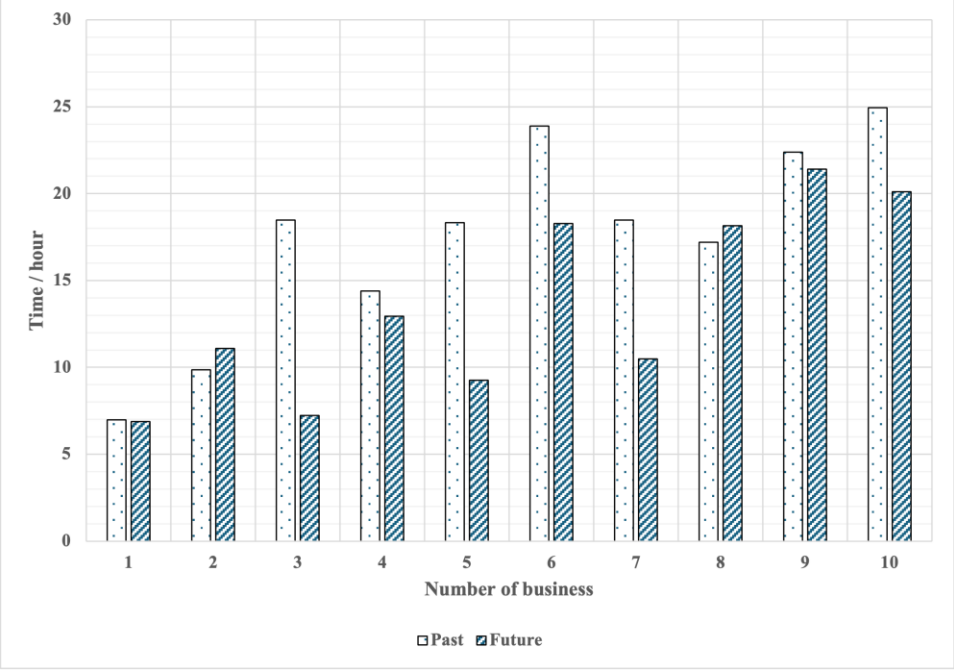

Fig. 4 Accounting Time Analysis

Fig. 4 demonstrates that implementing the PA-AIS and enhanced business PM resulted in a minimum improvement of 1.2 to 4 hours in the processing rate of each business group. Specifically, the time required for accounting tasks decreased from 4 to 7 hours for Business 1 and 24.95 to 20.1 hours for Business 10.

IV. CONCLUSION

After analyzing the existing state of business PM, this article proposes a business PM system based on an ontological framework. Integrating ontology technologies with case-based reasoning technologies creates a knowledge base

for business processes. This knowledge base prevents the redundant design of company procedures, enables the sharing and reusing of procedures, and enhances interoperability across systems. It improved the company process administration of a PA-AIS by optimizing the internal business logic for processing to meet external variables and internal effectiveness requirements. The process-aware accounting model is a synthesis and advancement of the workflow model, including the benefits of paradigm transmission and growth. It preserves the distinctive features and advantages of modeling in accounting competence while incorporating the concepts and techniques of process-oriented administration. The feasibility analysis indicates that the PA-AIS, designed to enhance the management of business processes, is economically and operationally feasible. It saves calculating time, aligns with enterprise staff members' working habits and operational logic, and decreases accounting risks. The system improves business PM. Implementing the IS will significantly enhance the internal control quality of the firm, elevating it to level 4 or 5. In summary, implementing a PA-AIS, along with improved management of company processes, will facilitate the growth of firms.

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