

Applications of Big Data Technology in Enterprise Informatization Management: Postprint

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Abstract

Against the backdrop of the knowledge economy and network economy, the survival environment of contemporary enterprises has undergone fundamental changes, with big data technology and informatization development becoming essential trends for the long-term development of enterprises. Vigorously driving the integration of informatization and industrialization to meet the demands of the times plays a decisive role in achieving corporate strategic objectives. In recent years, outdated management methods have severely constrained the enhancement of informatization management capabilities in China's modern enterprises. This paper leverages big data technology to effectively improve and refine informatization management methods, focusing on investigating the application of big data technology in enterprise informatization management, thereby facilitating improved management efficiency and competitiveness of modern enterprises.

Full Text

Preamble

Application of Big Data Technology in Enterprise Information Management

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Abstract: Against the backdrop of the knowledge and network economy, the operating environment of modern enterprises has undergone fundamental changes, making big data technology and informationization development essential trends for long-term enterprise growth. Vigorously promoting the integration of informationization and industrialization to meet the demands of the times plays a decisive role in achieving strategic corporate objectives. In recent years, outdated management methods have severely constrained the improvement of information management capabilities in China's modern

enterprises. This paper utilizes big data technology to effectively improve and refine information management methods, focusing on investigating the application of big data technology in enterprise information management to enhance management efficiency and competitiveness in modern enterprises.

Keywords: big data technology; informationization development; information management system architecture; information security

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Introduction

A new round of technological revolution and industrial transformation is currently emerging globally. Vigorously promoting the integration of informationization and industrialization is crucial to the effectiveness of China's development model transformation [1]. The management of this integration comprises four interrelated elements: data, technology, business processes, and organizational structure. Reflecting on the development of enterprise informationization in China over the years, despite substantial government and corporate investment that has achieved certain results, informationization construction has often failed to meet its intended strategic objectives. Modern enterprises now face significant challenges in leveraging big data aggregation to enhance the value of information management and efficiently utilize precious information resources—issues that this paper explores in depth.

1. Brief History of Modern Enterprise Information Management Models

Big data technology enables rapid extraction of valuable information from various data types. Numerous new technologies have emerged in the big data domain, providing powerful tools for data collection, storage, processing, and visualization. In practice, big data technology plays an irreplaceable role in enterprise information management and serves as a critical link for management optimization. As social division of labor becomes increasingly refined, modern enterprises face more complex demands in socioeconomic development. Individual enterprises can no longer compete effectively in intense market competition, and the scope of enterprise management has expanded to encompass both internal and external resources. Enterprise management systems have gradually evolved toward structured development, transforming management into a massive and complex systematic engineering challenge [2]. Different information

management models have emerged across historical periods, which can be categorized into four stages: traditional information management, object-oriented information management, process information management, and systematic information management. The first three models lack robust and efficient early warning and intervention mechanisms, creating numerous vulnerabilities in information management process control. Outdated management methods have severely constrained improvements in information security management capabilities for modern enterprises. This paper employs big data technology to improve and refine information security management methods, focusing on applications of big data technology in enterprise information management to enhance both efficiency and competitiveness.

Enterprise information management involves two critical dimensions: informationization operation management and big data technology-based information system construction and management. The former emphasizes comprehensive management of the entire informationization process, while the latter addresses management of the informationization application process and comprehensive management of applied informationization outcomes.

[Figure 1: see original paper] Main Contents of Big Data Technology in Enterprise Information Management

Based on this comprehensive analysis, big data technology support is integral throughout the entire information management architecture, primarily encompassing production information, management information circulation systems, and standardized information dissemination, thereby facilitating the dynamic and efficient operation of modern enterprise information management systems.

2. Informatization Content and COBIT Model

2.1 Informatization Content

COBIT (Control Objectives for Information and Related Technology) represents an evaluation standard for information systems developed by the Information Systems Audit and Control Association based on big data technology. The COBIT model addresses modern enterprise information security management by effectively handling existing problems through four domains: PO (Planning and Organization), AI (Acquisition and Implementation), DS (Delivery and Support), and Monitoring.

2.2 COBIT-Based Informatization Management Concepts and Strategies

The COBIT model serves as a representative and professional application tool in current big data technology. This tool is convenient and efficient to understand and use, facilitating communication and interaction among enterprise management, IT departments, and audit functions. The primary operational processes are as follows:

- (1) The COBIT model fundamentally enables enterprise management to understand how to control impacts on business functions at various stages during daily operations. As a big data technology tool with distinct advantages, COBIT provides managers with valuable case resources. Leveraging technical tools and implementation strategies from the information age helps managers clearly comprehend the essence of information management, enabling correct decision-making based on best practices.
- (2) COBIT models reduce the complexity of managing vast information systems to some extent, offering accessible information management and problem-solving solutions applicable to various industry business projects and audits. Combined with enterprise development status, COBIT provides targeted guidance. Promoting the integration of informationization and industrialization according to contemporary developmental needs plays a decisive role in achieving corporate strategic objectives.
- (3) Information system audit reports generated by the COBIT model for enterprise development facilitate strategic deployment and implementation planning for managers.
- (4) By utilizing the COBIT model and integrating substantive needs of modern enterprises, enterprises can continuously optimize their information management capabilities. Through comprehensive responsibility analysis using the COBIT model, role-based information management, and explicit analysis and definition of process measures can fundamentally protect legitimate user interests.

The information management process is essentially a closed-loop operation. The first step involves clarifying information management objectives based on enterprise realities, followed by comprehensive analysis of the current informationization status, which informs the informationization design approach, culminating in analysis and design of the overall enterprise information management roadmap. The COBIT model can effectively achieve positive interaction between corporate strategy and information strategy according to modern enterprise development needs. By scientifically applying COBIT's informationization governance framework and concepts to manage data information and related technologies, enterprises can establish informationization governance mechanisms conducive to long-term development [3].

3. System Architecture and Implementation Strategies

3.1 System Architecture

Enterprise information management is essentially a closed-loop practical operation process that requires robust support from big data technology. Throughout this application process, the first step is to clarify information management objectives based on enterprise realities, followed by comprehensive analysis of the current informationization status, which informs the design approach for

informationization solutions, culminating in analysis and design of the overall enterprise information management roadmap. The system architecture for modern enterprise information management combines the COBIT model with enterprise security objectives, primarily referencing Deming's PDCA (Plan-Do-Check-Act) cycle framework, which encompasses four aspects: Plan, Design, Check, and Act.

3.1.1 Plan Phase The management operation mode of enterprise information management systems emphasizes management organizational decision-making, establishment of corporate objectives, assessment criteria, risk control solutions, and analysis and identification of enterprise risk sources. The planning phase of modern enterprise information management systems primarily includes enterprise information classification, information resource acquisition, information sharing and processing, and information transmission protocols.

3.1.2 Design Phase The design of modern enterprise information management systems primarily involves documentation and revision of management files, operational control, infrastructure management, stage-by-stage information management, incident early warning, and emergency management. Following successful information decision-making and planning, enterprises should establish information management organizational structures according to informationization development needs and complete design and functional implementation of each module within the information management system to ensure orderly operation supported by professional technology.

3.1.3 Check Phase During enterprise information management processes, the informationization system should be monitored and warned according to standardized requirements, enabling timely problem resolution. This phase focuses on reviewing enterprise data acquisition and preservation while conducting strict evaluations of standardization across the entire system and its various components.

3.1.4 Act Phase Based on data obtained from the check phase, this stage effectively implements external management reviews and evaluates enterprise standardization performance, facilitating improvement of modern enterprise information systems. Through scientific technical analysis and operation, this phase supports healthy and sustainable enterprise development.

3.2 Implementation Strategies

3.2.1 Establishing Standardized Modern Enterprise Information Management Systems Enterprise informationization construction must adhere to standardization. As modern enterprise systems gradually optimize within socioeconomic development, standardized management systems have become the

foundation of modern scientific safety management. During operations management, enterprises must incorporate scientifically advanced information management technologies to construct suitable information management systems that emphasize procedural and standardized management across all links.

3.2.2 Information System Security as a Critical Success Factor Information security management is a key link in information system construction and smooth operation. First, professional security software should be used for comprehensive testing of all components to ensure stable system operation. Second, based on hierarchical structure analysis of the information management system and in-depth analysis of information resources, security aspects should encompass physical security (infrastructure and network systems), application software security, data information resource security, and system operational security. According to information system and security management requirements, enterprises should explicitly design security objectives and systems, emergency strategies and implementation plans, and information resource maintenance measures. Reasonable and feasible information security management methods should be adopted to address deficiencies in information system security technology.

3.2.3 Providing Specialized Security Training for Staff Security training is an irreplaceable critical task in modern enterprise information security management. From an employee perspective, security training strengthens safety awareness and enhances the ability to identify hazardous factors in daily work while eliminating unsafe conditions based on actual circumstances. Additionally, modern enterprises must provide relevant skills training for employees, particularly in computer applications and other communication facility usage.

During enterprise development and management, regular safety skills training should be provided according to each employee's position requirements to further strengthen knowledge, skills, and practical abilities, thereby enhancing employee safety competencies.

4. Network Security Protection Mechanisms

4.1 Establishing Computer Network Information Security Protection Mechanisms

With the deep popularization and application of big data technology in the information age, its importance in daily work has become particularly evident. Effective integration of big data technology and computer networks facilitates standardized enterprise information management and provides robust technical support for enterprise data security. Simultaneously, enterprise information security management requires sound laws and regulations to continuously adjust and optimize network information security protection mechanisms. Legal authority should constrain malicious behaviors such as hacker attacks during

enterprise development. By constructing and improving computer network information security protection mechanisms, enterprises can strengthen the effectiveness and rationality of information security management.

4.2 Integration of Security Technologies with Big Data

4.2.1 Integration of Virus Detection Technology with Big Data Virus detection technology is specialized for identifying and eliminating computer system viruses. Relevant departments should scientifically employ virus detection technology to enhance enterprise information security, further strengthening enterprise information security management through cloud technology, data mining, and other big data methods. Such detection systems can immediately monitor hacker attack behaviors upon virus detection and implement information security precautions. Simultaneously, integrating big data technology with network control technology and information authentication technology enables enterprises to more effectively control hacker intrusions and protect internal information during daily operations.

4.2.2 Integration of Symmetric Encryption, Digital Signature Technology with Big Data Symmetric encryption technology emphasizes symmetric encryption processing of data information according to specifications. Operators must accurately input pre-configured keys following relevant operational procedures to access encrypted information. This encryption technology's primary advantages are strong security, stability, and feasibility, making it difficult to crack.

The integration of digital signature technology with big data primarily combines symmetric encryption technology with cloud technology, data processing, and data mining to ensure key technology's non-replicability. Following standardized operational procedures for authentication, this provides safer and more reliable technical support for enterprise information security management.

4.2.3 Strengthening Integration of Computer Network Security Management with Big Data As network technology continues developing in the information age, enterprise data information demonstrates increasing value, meaning enterprises must strengthen information security protection technology while integrating computer network security management with big data technology to further enhance the timeliness and value of enterprise information security management. Concurrently, relevant national departments should attach great importance to this aspect by establishing specialized network security supervision departments according to specific conditions. Professional personnel should regularly inspect and analyze network operation codes within systems, systematically reviewing various risk behaviors in enterprise information systems through high-performance big data technology to fundamentally strengthen enterprise information management security and scientific validity.

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Note: Figure translations are in progress. See original paper for figures.

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