

Innovation of Information Management System in the Context of Big Data

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Keywords: Big data; Information management system; Enterprise; Innovate

Abstract: In this article, the innovation direction of Information Management System (IMS) is comprehensively discussed by combining in-depth theoretical analysis and case study. In terms of technological innovation, this article focuses on the application of cloud computing, artificial intelligence and machine learning in IMS. The application of these technologies enables the IMS to process and analyze large-scale data more efficiently and provide valuable data insight for enterprises. On the level of management innovation, this article discusses the improvement of data governance mechanism and the strengthening of information security and privacy protection. By establishing a sound data management process, enterprises can ensure the accuracy, security and compliance of data, thus protecting key data assets and optimizing operational efficiency. In terms of service innovation, this article focuses on the provision of personalized service and the continuous optimization of customer experience. By collecting and analyzing user data, IMS provides customized services and improved user interface to enhance user satisfaction and loyalty. Through the case analysis of IMS innovation in advanced enterprises, this article finds that innovation has significantly improved the data processing ability, operational efficiency and customer satisfaction of enterprises.

1. Introduction

Amidst the swift progress of science and technology, the big data era has dawned, elevating data to the status of a novel asset and riches [1]. In this epoch, IMS gains paramount significance as it holds the key to bolstering an enterprise's competitive edge [1]. The big data age has witnessed a colossal surge in data volume and a diversification in data types, evolving from mere structured data to unstructured formats, encompassing texts, audios, and videos, thereby continuously amplifying data complexity and scale [2]. This transformation has ushered in unprecedented avenues and impediments for businesses. Big data analytics empower enterprises to discern market patterns, pinpoint customer preferences, refine product designs, and streamline service procedures [3].

IMS stands as the pillar of corporate digitization, encompassing data collection, storage, processing, and dissemination, while also offering invaluable decision support [4]. A robust IMS can elevate operational efficiency, trim expenses, and amplify market competitiveness [5]. In the big data era, IMS's significance is further underscored as it serves as a pivotal instrument for unlocking data value and facilitating data-driven decisions [6].

The accelerated growth of big data technologies poses fresh demands on IMS. Conventional IMS systems fall short in handling vast and varied datasets, necessitating technological advancements and renovations [7]. Innovation constitutes the primary impetus propelling IMS development. By integrating cutting-edge technologies and fresh perspectives, IMS can adeptly tackle big data challenges and generate substantial value for enterprises [8]. This investigation aims to delve into big data's impact on IMS and outline responsive strategies for businesses. Additionally, it will delve into the practical applications and value manifestations of IMS innovation.

2. Relationship between big data and IMS

In the age of big data, IMS must continually evolve to handle enormous datasets and extract insightful information for decision-making, making it crucial to comprehend the interplay between

big data and IMS [9]. Big data refers to datasets too vast for traditional software to manage efficiently within a reasonable timeframe, characterized by their size, generation speed, diversity, and sparse value [10]. As cloud computing, the Internet of Things, and mobile technology advance, big data solutions are also progressing, encompassing data collection, storage, processing, analysis, and visualization, bolstering enterprises' data-handling capacities.

IMS is a holistic framework that integrates people, technology, data, and other components, aiming to optimize information management and utilization. It serves as a system for gathering, storing, processing, and disseminating information, enabling organizations to streamline data integration and efficient use, thereby informing business decisions and daily operations. Table 1 enumerates the IMS's key functionalities.

Table 1 Functions and functions of IMS

Functional category	Specific content
Data integration and storage	Integrate data from different sources and provide a secure storage environment.
Data processing and analysis	Clean, transform and analyze the data to extract valuable information.
Information retrieval and sharing	Support users to quickly retrieve needed information and realize information sharing within the organization.
Decision support	Provide decision-making basis through data analysis to help managers make more informed decisions.

The rise of big data technology has had a profound impact on IMS, mainly in the following two aspects:

(1) The improvement of data processing capacity

Big data technology provides IMS with more powerful data processing capabilities. Traditional IMS often face performance bottlenecks when dealing with large-scale data, and the introduction of big data technologies such as Hadoop, Spark and other distributed processing frameworks enables IMS to process and analyze massive data efficiently.

(2) Improvement of DSS

Big data has also promoted the improvement of DSS. Through advanced analytical techniques such as data mining and machine learning, IMS can provide more accurate and timely decision support for enterprises. For example, using big data to analyze customer behavior, market trends, etc., helps enterprises to formulate more accurate market strategies and product innovation directions.

3. Innovation direction of IMS

3.1. Technical innovation

Technological innovation is the key to promote the sustainable development of IMS, which involves the introduction and application of new technologies and methods to improve the performance and function of the system.

Cloud computing provides flexible and extensible computing resources for IMS. Through cloud computing, the IMS can realize centralized storage and on-demand access of data, which greatly improves the availability and maintainability of data. In addition, cloud computing also provides powerful computing power, making large-scale data processing and analysis possible. Enterprises can use cloud computing platforms, such as AWS and Azure, to build an efficient and stable IMS.

The integration of artificial intelligence and machine learning brings the possibility of intelligence to IMS. By introducing these technologies, the IMS can realize automatic classification, clustering and prediction of data, thus providing a higher level of data insight. For example, using machine learning algorithm to forecast and analyze sales data can help enterprises to formulate more accurate market strategies. Furthermore, artificial intelligence can also be used to optimize the user experience of the system, such as intelligent recommendation and intelligent customer service.

3.2. Management innovation

Management innovation mainly involves the optimization and improvement of the operation mode of IMS to adapt to the changing market demand and technical environment.

With the surge of data and the diversification of data types, it is particularly important to improve the data governance mechanism. Enterprises need to establish a complete set of data management processes and norms to ensure the accuracy, consistency and security of data. This includes data collection, cleaning, integration, storage, access and use. Through the perfect data governance mechanism, enterprises can better protect data assets, improve data quality, and then improve the efficiency of IMS.

In the era of big data, information security and privacy protection are also important aspects that cannot be ignored in IMS. Enterprises need to strengthen the security protection measures of the system, such as adopting advanced encryption algorithms and establishing strict access control mechanisms to ensure that data is not illegally obtained or tampered with. Furthermore, enterprises also need to comply with relevant privacy protection laws and regulations, such as GDPR, to ensure the legitimate use and protection of user data.

3.3. Service innovation

Service innovation mainly focuses on how to improve the user experience and service quality of IMS to meet the growing and changing needs of users.

With the increasing diversification of consumer demand, providing personalized service has become an important innovation direction of IMS. By collecting and analyzing users' behavior data and preference information, the IMS can provide users with more accurate and personalized content recommendations and product suggestions. This can not only improve users' satisfaction and loyalty, but also help enterprises to better understand market demand and consumer behavior. Furthermore, optimizing customer experience is the key to the sustainable development of IMS. Enterprises need to constantly pay attention to users' feedback and needs, improve the functions and performance of the system in time, and improve the usability and stability of the system. Enterprises can also introduce advanced technical means, such as virtual reality and augmented reality, to provide users with a richer and more immersive experience. By continuously optimizing the customer experience, the IMS can attract more users and maintain its competitive advantage.

4. Practical case analysis of innovative IMS

4.1. Innovative cases of IMS in advanced enterprises

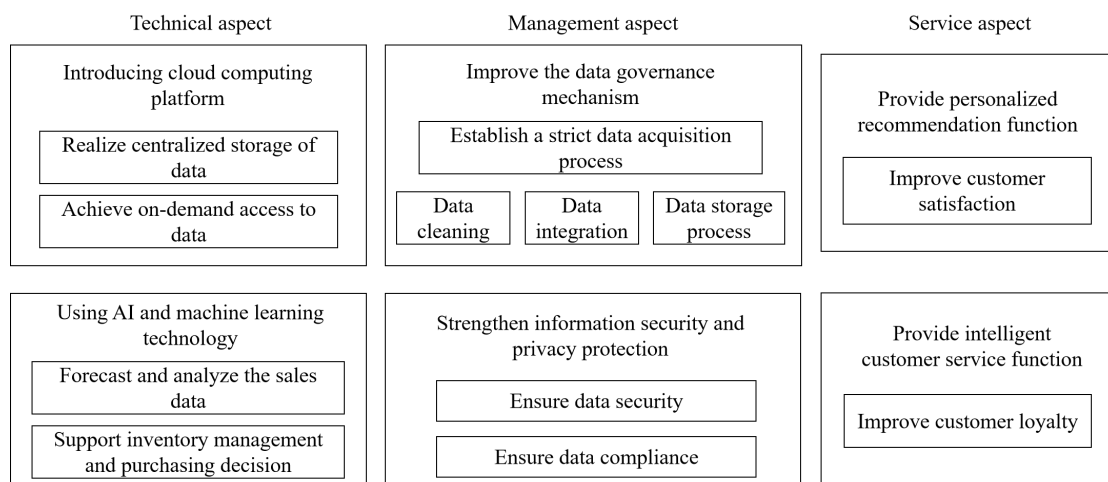


Figure 1 Flow chart of enterprise technological innovation, management and service upgrade

In order to deeply understand the practice of IMS innovation, this article selects an advanced enterprise as a case to analyze. The enterprise is a large retailer, facing challenges such as massive data processing and fierce market competition. In order to enhance competitiveness, enterprises

decided to innovate and upgrade their IMS. The process of enterprise technological innovation, management and service upgrade is shown in Figure 1.

In terms of technology, the enterprise introduced the cloud computing platform, which realized the centralized storage and on-demand access of data. Furthermore, artificial intelligence and machine learning technology are used to forecast and analyze the sales data, which provides strong support for inventory management and purchasing decision. In terms of management, the enterprise has improved the data governance mechanism and established strict data collection, cleaning, integration and storage processes. Furthermore, information security and privacy protection measures have been strengthened to ensure data security and compliance. In terms of service, the enterprise provides personalized recommendation and intelligent customer service functions, which greatly improves customer satisfaction and loyalty.

4.2. Evaluation and analysis of innovation achievements

Through the evaluation and analysis of the innovation practice of the enterprise's IMS, this article finds that the innovation effect is remarkable (see Table 2).

Table 2 The specific performance of the impact of innovative technology on business

Innovation type	Innovative content	Specific impact	Numerical representation
Technical innovation	Introduction of cloud computing platform	The data processing capacity has been improved several times	The data processing capacity is improved by 3-5 times.
Technical innovation	Application of artificial intelligence and machine learning	The accuracy of sales forecast is improved	The accuracy of sales forecast has improved by 26%
Management innovation	Perfect data governance mechanism	Data quality is effectively guaranteed	The data error rate is reduced by 11%
Management innovation	Enhanced information security measures	The security of data is guaranteed	Data security incidents decreased by 82%
Service innovation	Provision of personalized recommendation	Customer satisfaction improvement	Customer satisfaction has increased by 15%
Service innovation	Introduction of intelligent customer service	Customer loyalty has improved significantly	Customer loyalty has increased by 21%

In terms of technological innovation, the introduction of cloud computing platform has improved the data processing ability several times, and the application of artificial intelligence and machine learning has greatly improved the accuracy of sales forecast. In terms of management innovation, perfect data governance mechanism and strengthened information security measures effectively guarantee the quality and security of data. In terms of service innovation, personalized recommendation and intelligent customer service have significantly improved customer satisfaction and loyalty.

The success of the innovation practice of IMS in this enterprise mainly benefits from the following factors: first, clear innovation objectives and strategic planning; Second, a strong technical team and R&D investment; Third, perfect management system and process specification; The fourth is the keen insight and quick response ability to market demand and user demand. These successful factors have jointly promoted the successful practice of IMS innovation in this enterprise.

5. Suggestions for enterprises and policy makers

5.1. Optimization of IMS by utilizing big data in enterprises

Strengthen data governance: Establish a sound data governance mechanism to ensure the accuracy and security of data.

Invest in technological innovation: actively introduce advanced technologies such as cloud computing and artificial intelligence to enhance the capabilities of IMS.

Training data talents: Strengthen the training and introduction of talents such as data science and big data analysis, and provide talent support for the optimization of IMS.

5.2. Policy-level support suggestions for IMS innovation

Formulate preferential policies: provide tax incentives, financial support and other policy support for IMS innovation.

Strengthen supervision and guidance: On the premise of ensuring data security and privacy protection, encourage enterprises to innovate IMS.

Promote cooperation in Industry-University-Research: Strengthen cooperation among government, enterprises, universities and research institutions to jointly promote IMS innovation and technology research and development.

6. Conclusions

In this investigation, a profound examination of IMS within the context of big data reveals several key discoveries:

Firstly, big data exerts a considerable influence on IMS. The incorporation of big data advancements has not just upgraded IMS's data handling capabilities, but also induced a qualitative transformation in its DSS. This enables enterprises to promptly assess market patterns and refine their product designs and service workflows.

Secondly, technological advancements serve as the primary impetus. The combined utilization of innovations like cloud computing, artificial intelligence, and machine learning delivers robust technical backup to IMS, facilitating smarter and more efficient data processing and analysis.

Management innovation improves operational efficiency: By improving data governance mechanism and strengthening information security and privacy protection, enterprises can manage their data assets more effectively and ensure the accuracy, security and compliance of data.

Service innovation enhances user satisfaction: providing personalized service and continuously optimizing customer experience have become the key for IMS to attract and retain users.

In order to realize the sustainable development of IMS innovation, the following paths are worthy of attention:

Continuous technological innovation: constantly introduce new technologies and methods to improve the performance and function of the system.

User-driven innovation: pay close attention to user needs and provide personalized and differentiated services.

Cross-border cooperation and ecological co-construction: cooperate with other industries and fields to jointly create an open and shared IMS ecology.

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