Research on Risk Identification and Control Mechanism of Artificial Intelligence Technology Embedded in Data-Driven Decision-Making of Enterprise

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Abstract: In the digital era, data-driven decision-making has become essential for enhancing competitiveness, while integrating artificial intelligence technology presents both new opportunities and challenges. This paper focuses on the risk identification and control mechanism in the data-driven decision-making process of artificial intelligence technology-embedded enterprises. First, this paper delves into the possible risks, including data quality risks, such as inaccurate and incomplete data. Algorithm bias can result in unfair decision-making outcomes. Additionally, security and privacy threats put corporate and customer information at risk. Next, this study constructs a comprehensive risk control mechanism, covering data governance and ensuring the accuracy and reliability of data. Algorithm audit ensures the fairness and transparency of the algorithm. The security protection system prevents data leakage and malicious attacks. Therefore, accurately identifying and managing risks can help organizations minimize potential threats, enhance the rigor and effectiveness of decision-making, and achieve sustainable development when leveraging artificial intelligence technology for data-driven decision-making.

1. Analysis of the Current Situation of Data-Driven Decision-Making of Artificial Intelligence Technology Embedded in Enterprises

1.1 The Application of Artificial Intelligence Technology in Enterprise Data-Driven Decision-Making

Taking Huawei as an example, artificial intelligence technology is widely used in supply chain management. Huawei generates massive supply chain data daily, including raw material procurement, production progress, logistics, and transportation. Using artificial intelligence algorithms to analyze these data can accurately predict raw materials' demand quantity and time and optimize inventory management. For example, in a certain period, Huawei predicted the demand for raw materials through artificial intelligence, which reduced the inventory cost by 12.3%. Huawei employs artificial intelligence technology in customer service to create an intelligent customer service system. This system can quickly and accurately respond to customer inquiries, enhancing overall customer satisfaction. According to statistics, the average time for intelligent customer service to solve problems has been shortened from 5.6 minutes to 2.8 minutes, and customer satisfaction has increased from 82.5% to 91.2%.

1.2 The Advantages of Artificial Intelligence Technology Embedded in Enterprise Data-Driven Decision-Making

Taking Alibaba as an example, in e-commerce promotion activities, artificial intelligence technology can analyze consumers' browsing records, purchase history, and search keywords in real

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time and quickly provide merchants with product recommendation strategies and pricing suggestions. During a specific "double 11" event, artificial intelligence reduced the average time from when products are stocked to sold from 3.2 to 1.8 days, significantly enhancing decision-making efficiency [1].

In game development, Tencent uses artificial intelligence to analyze market demand and player preference data. By analyzing a vast amount of player behavior data, Tencent can better understand players' needs and create more appealing games. For instance, a new game was optimized using artificial intelligence analysis before its development. It resulted in 3.256 million downloads in the first month after its launch, significantly surpassing the expected 2.1 million downloads.

1.3 The Challenges of Embedding Artificial Intelligence Technology into Enterprise Data-Driven Decision-Making

Baidu is dealing with the issue of inconsistent data quality while trying to optimize its search algorithm. Because of the wide sources of data on the Internet, there is a lot of false, repetitive, and inaccurate data. Statistics indicate that approximately 15.7% of daily search data processed by Baidu have quality issues, significantly impacting the training and decision-making of artificial intelligence algorithms [2].

The application of artificial intelligence technology needs professional technical talents, but there is a relative shortage of such talents in the market. Taking ByteDance as an example, when the company expanded its artificial intelligence business, it found recruiting suitable artificial intelligence technicians difficult. According to the survey, ByteDance receives an average of only 23.4 valid resumes for each artificial intelligence-related position, while the actual recruitment demand is approximately 50.

2. Risk Identification of Artificial Intelligence Technology Embedded in Enterprise Data-Driven Decision-Making

2.1 Risks of Data

The control mechanism for the data is very important for enterprises to make data-driven decisions using artificial intelligence. Businesses must implement data cleaning and preprocessing procedures to enhance data quality. For instance, Alibaba utilizes data cleaning tools to address duplicates, errors, and missing values. This approach has improved data quality by 18.6%, significantly enhancing the accuracy and integrity of the data and providing a dependable foundation for future decision-making. Additionally, data security and privacy protection can't be ignored. Tencent uses multiple encryption technologies when processing user data and establishes a strict access control mechanism to ensure that only authorized personnel can access sensitive data and prevent data leakage. This series of measures control the quality of the data source to avoid decision-making mistakes caused by inaccurate, incomplete, or unsafe data. Data cleaning and preprocessing remove interference information, enhancing data availability. Improving data security and privacy protection fosters trust between enterprises and users, establishing a strong data foundation for artificial intelligence algorithms. It ensures the scientific validity and effectiveness of data-driven decision-making in enterprises [3].

2.2 Risks of the Algorithm

The control mechanism at the algorithm level is crucial for ensuring the effective operation of artificial intelligence algorithms. Businesses should regularly audit and monitor their algorithms. For example, Google has created an algorithm audit team that conducts regular reviews of its search engine algorithms. This proactive approach enables the quick identification and correction of any biases or errors, ensuring that the algorithms remain fair and transparent. Additionally, it is necessary to continuously optimize and improve the algorithm. Baidu improves the accuracy of search results from 85.2% to 90.3% by continuously optimizing its search algorithm, thereby enhancing the performance and reliability of the algorithm. Algorithm audit and monitoring can promptly identify

problems in the algorithm's operation, thereby avoiding unfair or incorrect decision-making due to algorithm bias. Furthermore, algorithm optimization and improvement can help the algorithm better adapt to changing data and business needs, thereby enhancing the accuracy and efficiency of decision-making. By implementing these two control mechanisms, enterprises can enhance their utilization of artificial intelligence algorithms for data-driven decision-making, thereby minimizing risks associated with decision-making [4].

2.3 Risks of the Organization

The control mechanism at the organizational level plays an important role in promoting the application of artificial intelligence technology in enterprise data-driven decision-making. Enterprises should strengthen the training and education of employees. After completing the artificial intelligence technology training course, employees' acceptance of this technology increased from 65.3% to 82.1%, enabling them to better understand and apply artificial intelligence for decision-making. At the same time, it is also essential to create an organizational culture that accommodates artificial intelligence-driven data-based decision-making. By hosting activities such as innovation competitions and meetings on data-driven decision-making, technology companies have fostered a positive and innovative cultural environment while promoting the responsible use of artificial intelligence in decision-making [5]. Employees are the executors of enterprise decisions. Improving employees' understanding and application ability of artificial intelligence technology can ensure that decisions are effectively implemented in actual operations. In addition, an appropriate organizational culture can stimulate employees' innovative consciousness and enthusiasm, deeply root the concept of data-driven decision-making in people's hearts, provide a favorable internal environment for enterprises to make decisions using artificial intelligence, and promote the transformation and upgrading of the enterprise decision-making mode.

2.4 Risks from the External Environment

The control mechanism at the external environment level enables enterprises to effectively utilize artificial intelligence for data-driven decisions within a complex market environment. It is essential for enterprises to closely monitor changes in relevant laws and regulations. An enterprise has established a legal compliance department to study and comply with laws and regulations, thereby minimizing risks associated with law violations. Second, it is crucial to strengthen market research and analysis. After a mobile phone manufacturer identified competitors' advantages in artificial intelligence camera technology through market research, it increased its investment in research and development, launched competitive products, and captured a larger market share [6-7]. Adhering to laws and regulations ensures businesses operate legally and helps prevent losses stemming from legal issues. Market research and analysis can help enterprises stay informed about market trends and competitors, formulate targeted competitive strategies, and maintain their market advantages. By utilizing these two control mechanisms, businesses can effectively address the challenges posed by the external environment and achieve sustainable development.

3. Risk Assessment of Artificial Intelligence Technology Embedded in Enterprise Data-Driven Decision-Making

3.1 Construction of Risk Assessment Index System

Building a comprehensive risk assessment index system is the basis. The system encompasses four primary indicators: data quality, algorithm performance, organizational adaptability, and external environment. Data quality indicators include data accuracy, integrity, and consistency. Accurate, complete, and consistent data is the cornerstone of decision-making, and any problem may lead to decision-making errors. The accuracy, recall, and interpretability of the algorithm performance indicators are directly related to whether the artificial intelligence algorithm can accurately and efficiently process the data and give reasonable results [8]. Organizational adaptability indicators focus on employee acceptance and the alignment of organizational culture. Artificial intelligence

technology can only be successfully applied within an enterprise when employees actively accept it and the organizational culture is compatible. External environmental indicators encompass compliance with laws and regulations, as well as market competitiveness. Enterprises must comply with these laws while maintaining a competitive edge in the marketplace, as shown in Table 1.

Table 1 Construction of risk assessment index system

First-level indicators	Secondary indicators
Data quality indicators	Data accuracy, data integrity, data consistency
Algorithm performance index	Algorithm accuracy, algorithm recall rate, algorithm interpretability
Organizational adaptability indicators	Employee acceptance, organizational culture matching degree
External environmental indicators	Laws and regulations compliance, market competitiveness

3.2 Selection of Risk Assessment Methods

It is crucial to select an appropriate risk assessment method. It is suggested to combine the analytic hierarchy process (AHP) with a fuzzy comprehensive evaluation method. AHP can objectively determine the weight of each index, reflecting the significance of various indicators in overall risk assessment. Additionally, the Fuzzy Comprehensive Evaluation Method enables a thorough evaluation of risk by considering the ambiguity and uncertainty involved, thereby making the results more reliable and objective.

3.3 Case Analysis of Risk Assessment

Using Alibaba as a case study, we perform a risk assessment analysis to illustrate the assessment process and results more clearly. After determining the weight of each index using the AHP method, the comprehensive risk score for Alibaba is 72.3, calculated using the fuzzy comprehensive evaluation method, which falls within the middle-risk level. Judging from the scores of various indicators, the data quality index score is 75.6, with a data accuracy score of 78.2. It indicates that Alibaba has performed well in data accuracy, but there is room for improvement in data integrity and consistency. The performance index score of the algorithm is 70.2, indicating that its accuracy is relatively high. However, the recall rate and interpretability score are slightly low, which suggests that businesses should work on improving these two aspects of the algorithm's performance. The organizational adaptability index score is 68.7, and the employee acceptance score is 66.5, which is relatively low, indicating that enterprises may need to strengthen employee training and communication to improve employees' acceptance of artificial intelligence technology. The score of external environmental indicators is 73.5. The scores for compliance with laws and regulations and market competitiveness are relatively balanced, indicating that enterprises are stable in their ability to cope with the external environment. By conducting risk assessments, businesses can implement targeted measures to mitigate risks and improve the quality of their decision-making. As shown in Table 2 and Table 3:

Table 2 Alibaba Risk Assessment Form

First-level indicators	Weight	Secondary indicators	Weight
Data quality indicators	0.3	Data accuracy	0.4
		Data integrity	0.3
		Data consistency	0.3
Algorithm performance index	0.3	Algorithm accuracy	0.5
		Algorithm recall rate	0.3
		Algorithm interpretability	0.2
Organizational adaptability indicators	0.2	Employee acceptance	0.6
		Organizational culture matching degree	0.4
External environmental indicators	0.2	Laws and regulations compliance	0.5
		Market competitiveness	0.5

Table 3 Alibaba's score sheet for each indicator

First-level indicators	Score	Secondary indicators	Score
Data quality indicators	75.6	Data accuracy	78.2
		Data integrity	72.5
		Data consistency	73.8
Algorithm performance index	70.2	Algorithm accuracy	72.8
		Algorithm recall rate	68.5
		Algorithm interpretability	69.3
Organizational adaptability indicators	68.7	Employee acceptance	66.5
		Organizational culture matching degree	71.2
External environmental indicators	73.5	Laws and regulations compliance	75.1
		Market competitiveness	71.9

4. The Construction of Risk Control Mechanism of Artificial Intelligence Technology Embedded in Data-Driven Decision-Making

4.1 Data-Based Control Mechanism

Data is the cornerstone of enterprise decision-making, so it is crucial to establish a control mechanism at the data level. First, enterprises should establish rigorous data collection standards to ensure the collection of accurate and complete data from the source. For example, when collecting sales data, the time range, data fields, and collection frequency are clearly defined to minimize errors caused by irregular data collection. Second, using advanced data cleaning tools and technologies, the collected data are cleaned and transformed to remove duplicates, errors, and missing values. For example, Alibaba has significantly improved data quality through data cleaning. Furthermore, strengthening data security and privacy protection is essential. Using encryption technology to secure the storage and transmission of sensitive data, along with establishing a strict access control mechanism, is also necessary. Only authorized personnel are permitted to access critical data. For example, when processing user data, Tencent ensures data security through multiple encryption methods and strict authorization controls. These measures enable businesses to enhance data quality and security, establish a strong foundation for implementing artificial intelligence in data-informed decision-making, and mitigate risks associated with data issues.

4.2 Algorithm-Based Control Mechanism

Algorithms form the foundation of artificial intelligence technology. Developing the control mechanism at the algorithm level promotes fairness, transparency, and reliability. Enterprises should regularly conduct comprehensive audits of artificial intelligence algorithms to identify and address biases and errors within the algorithms. For example, Google has established a special algorithm audit team to regularly review its search engine algorithms, identifying and correcting potential problems promptly. Furthermore, it is necessary to establish a real-time monitoring mechanism to continuously track the operation process and output results of the algorithm and adjust them promptly once abnormalities are detected. Additionally, it is crucial to continually optimize and improve the algorithm. Enterprises can improve the performance and accuracy of the algorithm by introducing new algorithm models and increasing the amount of training data. For example, Baidu continuously improves its search algorithm, enhancing the quality of search results. Through these control mechanisms, businesses can effectively mitigate algorithm risks and ensure the algorithm better supports data-driven decision-making.

4.3 Organization-Based Control Mechanism

The control mechanism at the organizational level plays a key role in promoting the application of artificial intelligence technology in enterprise data-driven decision-making. To enhance the effectiveness of artificial intelligence in the workplace, businesses should focus on strengthening employee training and education. It is recommended to implement professional training courses and

lectures that help employees grasp the fundamental principles and various application scenarios of artificial intelligence technology. They will enhance their understanding and ability to effectively apply AI. For example, an enterprise's adoption of artificial intelligence technology has been significantly enhanced through training and implementation. At the same time, it is also very important to create an organizational culture that adapts to data-driven decision-making of artificial intelligence. Enterprises encourage innovation and data-driven decision-making by holding innovation competitions and sharing case studies of data-driven decision-making. Additionally, establish a clear communication mechanism to foster information sharing and collaboration among various departments, ensuring the effective application of artificial intelligence technology within the enterprise. By implementing these measures, companies can enhance overall organizational efficiency and leverage artificial intelligence to make informed, data-driven decisions.

4.4 Control Mechanism Based on External Environment

Enterprises must navigate a complex external environment when using artificial intelligence for data-driven decisions; thus, establishing a control mechanism at the external environment level is crucial. Enterprises should pay close attention to changes in relevant laws and regulations, establish specialized departments, conduct in-depth research, and ensure that their operations meet the requirements of applicable laws and regulations. For example, an enterprise has mitigated the risks associated with law and regulation violations through the efforts of its legal compliance department. At the same time, it is essential to strengthen market research and analysis to stay informed about market trends and competitors. Enterprises can develop a market intelligence system to collect and analyze market data, enabling them to formulate effective competitive strategies. For instance, a mobile phone manufacturer conducted market research and noticed the strengths of its competitors. As a result, the manufacturer increased its R&D investment, launched competitive products, and successfully grew its market share. Through these control mechanisms, enterprises can better adapt to changes in the external environment and reduce the impact of external risks on data-driven decision-making.

5. Conclusion

In the era of digitalization, the integration of artificial intelligence technology into enterprise data-driven decision-making presents both opportunities and risks. Concerning this theme, this paper provides a comprehensive analysis of risk identification, evaluation, and control mechanisms. The research shows that data, algorithms, organization, and external environment all present different degrees of risks. Poor data quality, algorithmic bias, low employee acceptance, and uncertainty regarding laws, regulations, and market competition can all impact the scientific validity and effectiveness of decision-making. By developing a comprehensive risk assessment index system and integrating an analytic hierarchy process with a fuzzy comprehensive evaluation method, enterprises can more accurately assess risk levels, thereby offering clearer guidance.

To mitigate these risks, enterprises must establish a multi-level control mechanism. For data management, it is necessary to strictly control data collection, cleaning, and security. At the algorithm level, the researchers should strengthen auditing, monitoring, and optimization. At the organizational level, it enhances employees' abilities, fosters a positive culture, and promotes collaboration. At the external environment level, pay close attention to regulations and market dynamics. By implementing these measures, businesses will reduce potential risks, enhance the quality of decision-making, and attain sustainable development amid fierce market competition. In the future, with the continued development of artificial intelligence technology, enterprises will need to continually enhance their risk control mechanisms to adapt to emerging challenges.

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