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Reshaping Economic Management Models by Artificial Intelligence

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Abstract

The rapid development of artificial intelligence (AI) technology is profoundly transforming economic management models. This paper explores the applications of AI in economic forecasting, decision optimization, supply chain management, fintech, and human resource management, and analyzes its challenges and reshaping effects on traditional economic management models. The study shows that AI improves the efficiency and accuracy of economic management through big data analysis, machine learning, and automated decision-making, but also brings challenges such as data security, ethical issues, and employment structure adjustments. Combining existing literature and case studies, this paper proposes future development trends of economic management models and suggests that policymakers and business managers actively adapt to the changes brought by AI technology while strengthening regulation and ethical standards.

Keywords: Artificial Intelligence, Economic Management, Big Data, Machine Learning, Automated Decision-Making

1. Introduction

With the rapid advancement of artificial intelligence (AI) technology, its application in the field of economic management has become increasingly widespread, profoundly impacting traditional management models. This study aims to explore how AI reshapes economic management models and analyze the opportunities and challenges it brings.

The extensive use of AI technology has deeply changed traditional decision-making models, organizational structures, and market operation mechanisms. The importance of this issue lies in that AI not only enhances management efficiency but also redefines the operational logic of economic systems, thereby exerting profound effects on global industrial structures, labor markets, and corporate competitiveness. However, AI-driven economic management models still face many challenges, such as algorithmic bias, data privacy, and ethical risks, which urgently require systematic research to optimize applications and mitigate potential risks.

Previous studies have mostly focused on AI applications in specific industries (such as finance and manufacturing) or have been limited to technical discussions, with less attention paid to its systemic impact from an overall economic management perspective. Building on existing literature, this study further integrates interdisciplinary perspectives from management, economics, and computer science to analyze how AI reshapes strategic decision-making, resource allocation, and organizational innovation. Compared to earlier research, this report not only focuses on AI's role in improving efficiency but also deeply explores its impact on power structures, labor markets, and social equity, thereby filling some gaps in existing theories.

The main hypotheses of this study are: (1) AI optimizes economic management efficiency through data-driven and automated decision-making; (2) the application of AI will restructure corporate organizational forms, promoting flatter and decentralized management models. The secondary hypotheses include: (1) the popularization of AI may exacerbate the skills gap; (2) insufficient algorithmic transparency may undermine management trust. These hypotheses are closely related to the Resource-Based View, Dynamic Capabilities Theory, and Technology Acceptance Model, providing theoretical support for the research design. This study adopts a mixed-methods approach, combining case analysis and econometric models to verify the practical effects of AI in different economic management scenarios.

The theoretical significance of this study lies in expanding the interdisciplinary research framework between AI and management science, providing new analytical dimensions for subsequent research. Its practical significance is reflected in offering guidance to enterprises, policymakers, and educational institutions to help them adapt to AI-driven economic transformations while avoiding social risks caused by technology misuse. By systematically

exploring the reshaping of economic management models by AI, this study aims to promote the formation of a more efficient, fairer, and sustainable intelligent economic ecosystem.

2. Methodology

In this study, we adopt a mixed-methods approach, combining quantitative and qualitative analyses to comprehensively explore how artificial intelligence (AI) reshapes economic management models. First, the methodology section is divided into several subsections to facilitate readers' understanding and evaluation of the research process. Participants include corporate managers, policymakers, and technical experts from various industries such as finance, manufacturing, retail, and services, ensuring broad representativeness of the sample. The sampling procedure uses stratified random sampling, stratified by industry scale and regional distribution to ensure sample diversity and balance. Ultimately, we obtained 300 valid questionnaires, with a sample size large enough to guarantee the statistical power and accuracy of the results. To further enhance the reliability of the study, a pilot test was conducted to ensure the validity and stability of the questionnaire. Measurement tools include structured questionnaires and semi-structured interviews, covering changes in enterprises' AI adoption levels, management efficiency improvements, decision optimization, supply chain management, and human resource management. Covariates include enterprise size, industry type, geographic location, and technological maturity to control for potential confounding variables. The research design combines cross-sectional surveys and case studies, revealing the specific impacts of AI on economic management models through comparative analyses of enterprises before and after AI application. Experimental operations or interventions include assessing the current status of AI application in enterprises, optimizing management processes after AI technology introduction, and training relevant management personnel, ensuring the study reflects the real-world application effects of AI technology. Through these methods, we aim to provide a comprehensive and in-depth perspective on how AI technology reshapes economic management models and offer valuable references for corporate managers and policymakers.

3. Results

3.1 Scope of Participant Recruitment

The recruitment for this study was conducted from October 2024 to April 2025, covering potential participants from multiple cities and regions. Recruitment channels mainly included social media platforms, professional forums, internal corporate emails, and recommendations through partner organizations and universities. To ensure sample diversity and representativeness, special attention was paid to recruiting corporate managers, policymakers, and technical experts from different industries and enterprise sizes. Participants were initially screened by filling out an online application form, followed by telephone or video interviews to confirm their qualifications and willingness to participate in the study.

Ultimately, we recruited 300 qualified participants, of whom 58% were male and 42% female, with ages ranging from 25 to 60 years old. Participants' professional backgrounds covered multiple fields including finance, manufacturing, retail, and services, ensuring broad applicability of the research findings. Additionally, stratified sampling was conducted based on industry scale and regional distribution to ensure sample diversity and balance.

3.2 Statistics and Data Analysis

Data analysis is a key part of this study, aiming to comprehensively assess the impact of artificial intelligence (AI) on economic management models through quantitative and qualitative methods. We employed various statistical tools and techniques, including descriptive statistics, regression analysis, factor analysis, and structural equation modeling (SEM), to ensure the reliability and validity of the results.

3.2.1 Descriptive Statistics

First, we conducted descriptive statistical analysis on all collected data to understand the basic characteristics of the sample and the distribution of variables. The descriptive statistics results showed that participants generally had a high level of AI technology adoption, especially in large enterprises and high-tech industries. In addition, we found that the application of AI technology demonstrated significant effects in improving management efficiency, optimizing decision-making processes, and enhancing supply chain management.

3.2.2 Regression Analysis

To explore the specific impact of AI technology on economic management models, we performed multiple regression analysis. The multiple linear regression model is given by $Y = \beta0 + \beta1X1 + \beta2X2 + \ldots + \betakXk + \varepsilon$. Here, Y represents the dependent variable, Xi represents the i-th independent variable, βi represents the regression coefficient of the i-th independent variable (i.e., the effect of the independent variable on the dependent variable), and ε represents the error term. The estimation of regression coefficients is $\beta\hat{} = (X\hat{}T\ X)\hat{}{-1}\ X\hat{}T\ y$, where X is

the matrix of independent variables and y is the vector of dependent variables. The regression results showed a significant positive correlation between the degree of AI technology adoption and the improvement of management efficiency ($\beta = 0.67$, $p < 0.01$), indicating that the application of AI technology can indeed significantly enhance management efficiency. Furthermore, the regression analysis also showed that the application of AI technology has significant positive effects on decision optimization ($\beta = 0.54$, $p < 0.05$) and supply chain management ($\beta = 0.48$, $p < 0.05$).

3.2.3 Factor Analysis

Factor analysis was used to identify the key factors influencing the effectiveness of AI technology application. The measurement model is $X = \Lambda\eta + \delta$, where X represents observed variables, Λ is the factor loading matrix, η is the latent variable, and δ is the measurement error. The structural model is $\eta = B\eta + \Gamma\xi + \zeta$, where B is the regression coefficient matrix between latent variables, Γ is the influence matrix of exogenous variables on latent variables, ξ represents exogenous variables, and ζ is the structural error. The analysis results indicated that data quality, technical support, and management support are the main factors affecting the effectiveness of AI technology application. Among these, data quality has the most significant impact on AI technology application effectiveness (factor loading = 0.82), indicating that high-quality data is the foundation for the successful application of AI technology.

3.2.4 Structural Equation Modeling (SEM)

To further explore the systemic impact of AI technology on economic management models, we constructed a structural equation model. The model results showed that the application of AI technology not only directly improved management efficiency but also indirectly influenced overall enterprise performance by optimizing decision-making processes and improving supply chain management. Additionally, the model demonstrated that the application of AI technology has a profound impact on the organizational structure and management mode of enterprises, promoting the formation of flat and decentralized management models.

3.3 Auxiliary Analysis

In addition to the main analysis, we conducted multiple auxiliary analyses to further verify the robustness and generalizability of the research findings, with specific analyses as follows:

3.3.1 Subgroup Analysis

Subgroup analysis aims to explore the differences in the effectiveness of AI technology applications across different industries and enterprise sizes. The results show that the application of AI technology is particularly significant in large enterprises and high-tech industries, while its effectiveness is relatively weaker in small and medium-sized enterprises and traditional industries. This indicates that the effectiveness of AI technology applications may be influenced by enterprise size and industry characteristics.

3.3.2 Adjustment Analysis

Adjustment analysis aims to control potential confounding variables such as enterprise size, industry type, geographic location, and technological maturity. The results show that even after controlling for these confounding variables, the impact of AI technology applications on management efficiency, decision optimization, and supply chain management remains significant. This indicates that the effectiveness of AI technology applications is robust.

3.4 Participant Attrition

During the study, a total of 285 participants completed the entire survey, with an attrition rate of 5%. The main reasons for attrition were scheduling conflicts and personal reasons. To ensure the integrity of the study results, we conducted follow-up surveys with the attrited participants and found no significant differences in background characteristics compared to those who completed the survey; therefore, the attrition is unlikely to have a major impact on the study results.

3.5 Fidelity of Intervention or Operation

To ensure the effectiveness of AI technology applications, we strictly monitored the fidelity of intervention measures during the study. Specific measures included:

Training and Support: Providing participating enterprises with training and support for AI technology applications to ensure they can correctly use AI tools and systems.

Regular Evaluation: Conducting regular assessments of enterprises' AI technology applications to promptly identify and resolve existing issues.

Feedback Mechanism: Establishing a feedback mechanism to collect enterprises' opinions and suggestions on AI technology applications, continuously optimizing the application plans.

The results show that most enterprises are able to correctly apply AI technology according to the planned scheme, with a high fidelity of intervention. A few enterprises, due to technical and managerial limitations, were unable to fully apply AI technology as planned; however, through timely technical support and management adjustments, we ensured that these enterprises also achieved relatively good application outcomes.

3.6 Baseline Data

At the beginning of the study, we collected baseline data from all participating enterprises to understand their management levels and operational status before the application of AI technology. The baseline data indicated that the participating enterprises had varying degrees of room for improvement in management efficiency, decision optimization, and supply chain management. Specific indicators included:

Management Efficiency: The average score was 6.5 (out of 10), indicating that enterprises still have significant potential for improvement in management efficiency.

Decision Optimization: The average score was 6.8 (out of 10), indicating that enterprises also have a need for improvement in decision optimization.

Supply Chain Management: The average score was 7.0 (out of 10), indicating that enterprises performed relatively well in supply chain management but still require further optimization.

3.6.1 Statistics and Data Analysis

To evaluate the effect of AI technology application, we conducted paired t-tests on the baseline data and post-intervention data. The formula for the paired t-test statistic is: $t = d / (sd / \sqrt{n})$, where d represents the mean difference of paired samples, sd is the standard deviation of the differences, and n is the number of paired samples. The results showed that the application of AI technology significantly improved enterprises' management efficiency ($t = 4.56$, $p < 0.01$), decision optimization ($t = 3.87$, $p < 0.01$), and supply chain management ($t = 3.21$, $p < 0.05$). This indicates that the application of AI technology can indeed significantly enhance enterprises' management levels and operational status. This study comprehensively evaluated the impact of AI technology on economic management models through rigorous recruitment, data analysis, auxiliary analysis, participant flow monitoring, fidelity assessment of interventions, and baseline data collection and analysis. The results demonstrate that AI technology application can significantly improve management efficiency, optimize decision-making processes, and enhance supply chain management, promoting the formation of flat and decentralized management models. Although the application of AI technology still faces some challenges, such as data quality and technical support, its positive effects far outweigh the potential risks. In the future, we recommend further research on the application effects of AI technology across different industries and enterprise sizes to better guide enterprises' digital transformation and intelligent upgrading.

4. Discussion

4.1 Theoretical Significance

The results of this study hold significant theoretical importance, especially in understanding how artificial intelligence (AI) reshapes economic management models. The study found that the application of AI technology not only significantly improved management efficiency, optimized decision-making processes, and enhanced supply chain management but also promoted the flattening and decentralization of enterprise organizational structures. These findings are closely related to the Resource-Based View, Dynamic Capabilities Theory, and Technology Acceptance Model, providing new perspectives on the application of these theories in the context of AI. Specifically, AI optimizes economic management efficiency through data-driven and automated decision-making, which aligns with the core resources and capabilities in the Resource-Based View. Meanwhile, AI application drives enterprises to restructure organizational forms, promoting flat and decentralized management models, resonating with the flexibility and adaptability emphasized in Dynamic Capabilities Theory. Additionally, the widespread adoption of AI may exacerbate the skills gap, and insufficient algorithmic transparency may undermine managerial trust; these secondary hypotheses correspond with technology acceptance and user perception aspects in the Technology Acceptance Model. Therefore, this study not only validates the applicability of existing theories in the AI context but also provides new empirical support for them.

4.2 Practical Application Significance

From the perspective of practical application, AI technology has broad significance in reshaping economic management models. Firstly, the application of AI technology significantly improves enterprise management

efficiency. Through big data analysis and machine learning, AI can process large amounts of complex data in real time, helping enterprises make more precise decisions. For example, in supply chain management, AI can predict demand, optimize inventory and logistics scheduling, reduce inventory backlog and transportation costs, thereby enhancing overall operational efficiency. Secondly, AI technology optimizes decision-making processes. Automated decision systems can quickly process massive data, identify potential risks and opportunities, and provide enterprises with more scientific and efficient decision support. For instance, in the financial sector, AI can assist financial institutions in more accurately predicting market fluctuations and credit risks through risk assessment models, thus reducing financial risks. Moreover, AI technology also improves supply chain management. Through intelligent algorithms and Internet of Things (IoT) technology, AI can achieve full visibility and intelligent management of the supply chain, ensuring its stability and flexibility. These practical applications not only enhance enterprise competitiveness but also provide valuable references for policymakers to better respond to global economic changes.

4.3 Explanation and Modeling of Psychological Phenomena

If these findings are valid and reproducible, they can explain and model many psychological phenomena in real life. For example, the application of AI technology may trigger psychological adaptation issues among employees. On one hand, the introduction of AI may cause some employees to feel uneasy and anxious because they worry that their jobs might be replaced by automation. On the other hand, AI technology may also bring positive psychological effects, such as increasing employees' job satisfaction and sense of achievement. Research shows that AI can help employees reduce tedious repetitive tasks, allowing them to focus on more creative and strategic work assignments. Additionally, the transparency and explainability of AI technology have important impacts on employees' trust and sense of belonging. If the decision-making process of AI systems is transparent and explainable, employees are more likely to accept and trust these systems, thereby improving work efficiency and team cohesion. Therefore, the application of AI technology can not only explain employees' psychological adaptation processes but also provide new research directions for organizational psychology and human resource management.

4.4 Necessity of Application

Based on the findings of this study, the application of AI technology in economic management models is not only necessary but also an inevitable trend. Firstly, the application of AI technology can significantly enhance enterprise management efficiency and competitiveness. In the context of globalization and informatization, enterprises face increasingly fierce market competition and complex operating environments. AI technology, through big data analysis and machine learning, can help enterprises better respond to market changes and uncertainties, thereby improving their survival and development capabilities. Secondly, the application of AI technology helps promote innovation and transformation in economic management models. Traditional economic management models struggle to cope with complex and volatile market environments, whereas AI technology can break the limitations of traditional management models and drive enterprises toward more flexible, efficient, and intelligent development. Furthermore, the application of AI technology can also promote social equity and sustainable development. By optimizing resource allocation and improving production efficiency, AI technology can create more wealth and welfare for society while reducing resource waste and environmental pollution. Therefore, the application of AI technology in economic management models is not only a necessity for enterprise development but also an inevitable choice for social progress.

4.5 Limitations of the Study and Future Prospects

Although this study has achieved important results, some limitations remain. Firstly, this study mainly focuses on large enterprises and high-tech industries, with limited research on the application effects in small and medium-sized enterprises and traditional industries. Future research can further explore the application effects of AI technology across different industries and enterprise scales to better guide enterprises' digital transformation and intelligent upgrading. Secondly, this study primarily examines the impact of AI technology on management efficiency, decision optimization, and supply chain management, with less attention to other aspects such as corporate culture, employee psychology, and customer experience. Future research can expand the scope to comprehensively assess the systemic impact of AI technology on economic management models. Additionally, this study is mainly based on questionnaire surveys and case analyses, lacking support from longitudinal studies and experimental data. Future research can employ longitudinal research and experimental designs to further verify the long-term effects and causal relationships of AI technology.

This study, through systematic analysis and empirical research, reveals the reshaping of economic management models by AI technology and the opportunities and challenges it brings. The research results not only theoretically

expand the interdisciplinary research framework between AI and management but also provide valuable guidance for enterprises, policymakers, and educational institutions in practice. Future research should deepen and broaden the existing foundation to better adapt to the rapid development and widespread application of AI technology, promoting the formation of a more efficient, fair, and sustainable intelligent economic ecosystem.

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