

Enhancing Managerial Decision-Making through AI: Opportunities, Challenges, and Operational Impact (*Systematic Literature Review*)

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Abstract. Artificial Intelligence (AI) has become an essential tool in the world of management for decision-making. This article examines the ways in which AI can be used to improve the quality and speed of decision-making, and how AI can improve the operational efficiency of companies. In addition, this article also examines the challenges and opportunities that companies face in adopting AI. In the rapidly evolving digital era, AI has become an essential component of modern business strategies. Today's managers are often faced with the challenge of analyzing very large and complex volumes of data. To make good and timely decisions, AI offers a potential solution with fast and precise data analysis capabilities. The use of AI in decision-making involves machine learning algorithms and models to efficiently process and analyze large amounts of data. This helps managers gain deeper and more accurate insights, enabling more effective decision-making.

Keywords: Systematic Literature Review, Artificial Intelligence (AI), Decision Making

Abstrak. Kecerdasan Buatan (AI) telah menjadi alat penting dalam dunia manajemen untuk pengambilan keputusan. Artikel ini mengkaji cara-cara di mana AI dapat digunakan untuk meningkatkan kualitas dan kecepatan pengambilan keputusan, dan bagaimana AI dapat meningkatkan efisiensi operasional perusahaan. Selain itu, artikel ini juga mengkaji tantangan dan peluang yang dihadapi perusahaan dalam mengadopsi AI. Di era digital yang berkembang pesat, AI telah menjadi komponen penting dari strategi bisnis modern. Manajer saat ini sering dihadapkan dengan tantangan menganalisis volume data yang sangat besar dan kompleks. Untuk membuat keputusan yang baik dan tepat waktu, AI menawarkan solusi potensial dengan kemampuan analisis data yang cepat dan tepat. Pemanfaatan AI dalam pengambilan keputusan melibatkan algoritma dan model pembelajaran mesin untuk memproses dan menganalisis data dalam jumlah besar secara efisien. Hal ini membantu manajer memperoleh wawasan yang lebih dalam dan lebih akurat, sehingga memungkinkan pengambilan keputusan yang lebih efektif.

Kata Kunci: Tinjauan Pustaka Sistematis, Kecerdasan Buatan (AI), Pengambilan Keputusan

1. BACKGROUND

Artificial Intelligence (AI) has fundamentally transformed the way organizations operate and make strategic decisions. By leveraging its advanced computational power and machine learning capabilities, AI can process vast and complex datasets in a fraction of the time it would take a human. This rapid analysis not only increases efficiency but also enhances the accuracy and depth of insights generated.

For managers, this means having access to real-time data-driven insights that are both precise and predictive. AI can uncover patterns, trends, and correlations that may not be immediately apparent through traditional analysis. As a result, managers are empowered to make more informed, objective, and timely decisions—reducing guesswork and increasing the likelihood of achieving positive outcomes. This transformation applies across various functions such as finance, marketing, operations, and human resources, where AI tools are increasingly integrated to support strategic planning, risk management, performance monitoring, and customer engagement. In short, AI acts as an intelligent assistant that helps managers move beyond intuition-based decisions toward more reliable and evidence-based strategies.

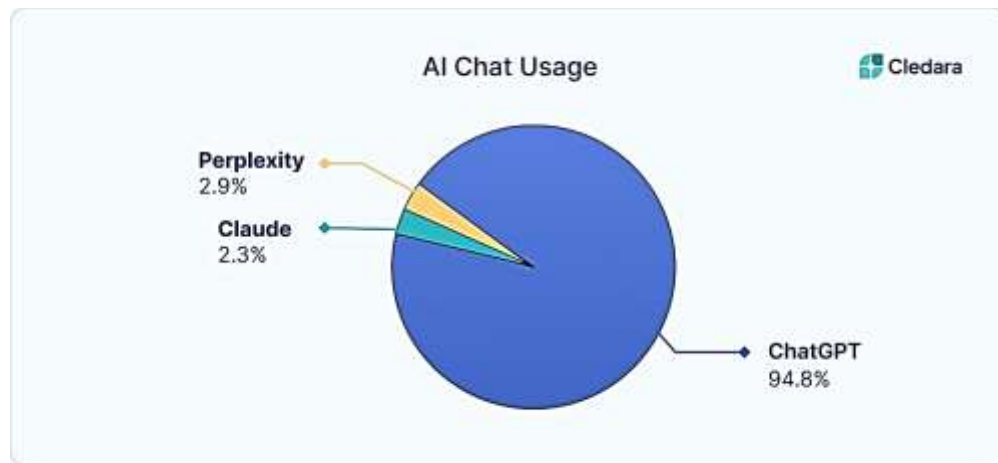


Figure 1 AI usage data (Chat GPT) compared to other AI software (2023 – 2024)

Source: <https://www.cledara.com>

In addition, the primary objectives of the study focusing on the use of artificial intelligence (AI) in management decision-making include several key areas. First, it aims to identify the benefits of AI in enhancing decision-making processes. This involves examining how AI can improve both the quality and speed of decisions at various managerial levels and evaluating its impact on overall operational efficiency within companies. Second, the research seeks to analyze the challenges associated with AI adoption. This includes identifying major barriers such as implementation costs, concerns over data security, and technological limitations. Additionally, the research explores potential solutions that organizations can adopt to overcome these challenges and ensure the successful integration of AI into their decision-making processes. With these research objectives, it is expected to provide in-depth insights

into the role of AI in management decision making and how companies can optimally utilize this technology to achieve competitive advantage in an increasingly complex market.

2. THEORETICAL REVIEW

Systematic Literature Review (SLR)

Systematic Literature Review (SLR) is a method used to collect, critically evaluate, integrate, and present findings from multiple research studies on a specific research question. SLR aims to provide comprehensive, evidence-based answers to the stated research question (Calderón & Ruiz, 2015).

Management Decision Making

Management decision making is a systematic process used to select the best alternative from several available options to achieve a particular goal. Terry (1972) states that "the selection of certain alternative behaviors (conduct) from two or more existing alternatives". This means that decision making is the process of choosing one action from several existing options based on rational and logical considerations. The concept of decision making according to Terry, the following is an elaboration of each point as follows:

a. Alternative Behavior Selection

Decision making involves choosing between several possible actions or behaviors. In this process, managers must identify the various options available before making a final decision. Each alternative has its own implications and consequences, so it is important to evaluate each alternative carefully. For example, in a business context, alternatives might be various marketing strategies, production methods, or management approaches. The evaluation process involves analyzing the benefits, costs, risks, and long-term impacts of each alternative. The goal is to choose the alternative that best meets the organization's goals and produces optimal results.

b. Two or More Alternatives

Decision making always involves at least two alternatives. If there is only one choice available, then no decision-making process is necessary. Therefore, it is important to ensure that there are multiple options or courses of action that can be taken. This process becomes

more complex as the number of alternatives increases, because managers must consider the many factors and variables that affect each choice. For example, in new product development, alternatives may include different product designs, different marketing strategies, or different distribution models. Considering these multiple alternatives allows managers to make more informed and timely decisions.

c. A Rational Process

Decision making should be done in a rational and logical manner. This means that decisions should be based on careful analysis and available evidence, not on intuition or feelings. The rational process involves collecting and analyzing data, evaluating options based on objective criteria, and selecting the alternative that provides the best value to the organization. For example, when considering an investment in a new technology, managers must analyze the costs, benefits, risks, and long-term impacts of various technology options. Rational decisions reduce the risk of error and increase the chances of success.

The Development of AI in the World

1. The development of Artificial Intelligence (AI) began in the 1950s , when Alan Turing introduced the concept of the Turing Test to measure whether a machine could think like a human. Then, in 1956, John McCarthy officially introduced the term Artificial Intelligence at the Dartmouth Conference, marking the beginning of formal research on AI. The development of AI continued in the 1960s with the birth of the General Problem Solver by Herbert Simon and the introduction of the perceptron by Marvin Minsky and Seymour Papert, which became the initial foundation in machine learning. However, in the 1970s, AI experienced a setback due to unrealistic expectations and technological limitations. Even so, in 1979, Paul Werbos succeeded in developing the backpropagation method, which is the basis of many modern machine learning algorithms.
2. In the 1980s, AI began to revive with the introduction of expert systems, which allowed machines to make decisions based on previously recorded data. John Holland also introduced genetic algorithms, which used the principles of evolution to optimize solutions to problems. AI advanced rapidly in the 1990s, with major achievements such

as IBM's Deep Blue's victory over world chess champion Garry Kasparov in 1997, and the development of Natural Language Processing (NLP) in 1999, which allowed for more natural interactions between humans and machines. In the early 2000s, AI became increasingly integrated with big data technology, as seen in the birth of Convolutional Neural Networks (CNN) by Yann LeCun in 2006, which became the basis for modern image recognition systems, and the launch of the virtual assistant Siri by Apple in 2011.

3. The 2010s marked the era of *deep learning*, with the development of AlexNet by Alex Krizhevsky, Ilya Sutskever, and Geoffrey Hinton in 2012, which revolutionized deep learning in image recognition. In 2016, AI shocked the world again when AlphaGo, developed by DeepMind, defeated the world champion of Go, demonstrating its extremely complex problem-solving abilities.
4. In the 2020s, AI advanced further with the birth of GPT-3 by OpenAI in 2020, which is capable of generating text with near-human intelligence. In 2023, AI began to be used in automated medical diagnostics with high accuracy in Russia. Most recently, in 2024, OpenAI introduced "o1", which took AI to the next level in strategic thinking and autonomous web navigation, marking continued innovation in the field of artificial intelligence.

3. RESEARCH METHOD

This study uses Systematic Literature Review (SLR) as the main approach in examining the use of Artificial Intelligence (AI) in management decision making. SLR is a systematic, transparent, and structured research method to identify, evaluate, and synthesize previous research results related to the topic being studied. This methodology was chosen because it allows researchers to collect relevant scientific evidence, analyze trends in AI use, and identify challenges and opportunities that arise in its implementation. Thus, this study can provide broader and evidence-based insights regarding the impact of AI on decision making in the world of management. The SLR method in this study was carried out through several main stages:

a. Identifying Research Questions

The first stage in SLR is to determine the main research questions (Research Questions - RQ) that you want to answer.

Research questions or research questions are made based on the needs of this research topic. The formulation of research questions on the Use of AI in Management Decision Making focuses on 5 elements known as PICOC, namely

1. Population (P), the target group for the investigation (e.g. people, software, etc.)
2. Intervention (I), determines the aspects of the investigation or problem that are of interest to the researcher.
3. Comparison (C), the aspect of the investigation that will be compared with the intervention
4. Outcomes (O), the effects of the intervention.
5. Context (C), the background or environment of the investigation.

Table 1 PICOC Structure

PICOC Elements	Description
P (Population)	Organizations and managers that use Artificial Intelligence (AI) in management decision-making processes.
I (Intervention)	Implementation and use of AI technologies (including DSS, CRM, RPA, predictive analytics) in the decision-making process.
C (Comparison)	Managerial decision making without using AI or using traditional/non-AI methods.
O (Outcome)	Increased efficiency, speed and accuracy in managerial decision making as well as reduced bias and increased operational efficiency.
C (Context)	The context of business management in the digital era, with a focus on various industrial sectors adopting AI.

Source: processed by the author

Some of the research questions that are the focus of this study include:

- RQ1 : How can AI improve the quality and speed of managerial decision making?
- RQ2 : What are the main benefits of AI in supporting managers in decision making?
- RQ3 : What are the main challenges in implementing AI for decision making in management?

b. Literature Search and Data Sources

The next step is to conduct a search for relevant literature through various academic databases and trusted sources. Search process or the process of finding data needed in this study. Data obtained from the Google Scholar site address <https://scholar.google.co.id/> with the help of the Publish or Perish (PoP) application or software to make it easier to find the journals needed. Then search for journals by entering the keywords "Artificial Intelligence in Decision-Making", "AI in Business Management" and "AI for Risk Management". These input criteria and limitations are to determine whether the data is suitable or not to be used in this study. The following are the suitable criteria in this study:

1. The data used is in the 2023-2024 period
2. Data obtained from the source <https://scholar.google.co.id/>
3. The data used only concerns the level of voluntary disclosure of company value.
4. The data used are only quantitative and qualitative research.

c. Selection and Evaluation of Literature Quality

After the search process, the obtained literature was selected based on the title, abstract, and full content. Articles that met the inclusion criteria were then further evaluated to assess, Relevance to the research objectives and Methodology used in the study.

Table 2 Search Filtering

No	Search Filtering	Number of Articles
1	Not Valid (not a journal paper)	125
2	Title and abstract do not match	85
3	Title and abstract match but filling in is not discussed	4
4	Selected articles	11

Source: processed by the author

d. Data Extraction and Synthesis

At this stage, data from the selected studies were extracted using a data extraction form that included the following information: study title, author names and year of publication,

study objectives, methods used in the study, key findings related to the use of AI in decision making, type of AI technology used.

e. Analysis and Interpretation of Findings

The data that has been collected and synthesized is then analyzed using a thematic analysis approach to identify, Key trends in the application of AI in decision making, Benefits obtained from the use of AI in various management sectors and Challenges and obstacles faced in the implementation of AI.

f. Previous Research

Table 1 Previous Research

No	Reference	Findings Categories	Findings	Types of AI Applications Used
1	Brown, J. (2023). The role of AI in enhancing managerial decision-making.	Management Decision Making	AI improves the quality and speed of management decision making.	Decision Support Systems (DSS)
2	Davis, R. (2023). Risk management through AI: A comprehensive study.	Risk Management	AI helps in risk identification and management by analyzing historical data patterns.	Risk Management Software
3	Garcia, M. (2024). AI-driven customer personalization in business.	Customer Personalization	AI enables better personalization for customers based on behavioral analysis.	Customer Relationship Management (CRM)
4	Johnson, L. (2024). Automating financial anomaly detection with AI.	Financial Anomaly Detection	AI automates financial anomaly detection, increasing the reliability of anomaly detection.	Financial Anomaly Detection Software
5	Kim, S. (2023). Predictive analytics for customer behavior using AI.	Predictive Analysis of Customer Behavior	AI is used to analyze customer behavior and make accurate predictions.	Predictive Analytics Software
6	Lee, H. (2024). Historical data analysis for risk prediction with AI.	Risk Prediction	AI analyzes historical data to predict potential risks and assist in risk management.	Historical Data Analysis Software
7	Nguyen, T. (2023). Data privacy and	Data Security and Privacy	AI requires strict data management to protect	Data Privacy and Security Tools

No	Reference	Findings Categories	Findings	Types of AI Applications Used
	security in AI applications.		privacy and information security.	
8	Roberts, P. (2024). The economic impact of AI implementation in enterprises.	Economic Impact	AI implementation has a significant economic impact on companies, especially in operational efficiency.	Enterprise AI Platforms
9	Smith, A. (2023). Administrative automation through AI: A case study.	Administrative Automation	AI automates administrative tasks, reducing manual workload.	Robotic Process Automation (RPA)
10	Taylor, K. (2024). Limitations of AI in complex decision-making.	Limitations of AI	AI has limitations in making complex decisions and understanding certain contexts.	General AI Applications
11	Wang, Y. (2024). Real-time data analysis using AI algorithms.	Real-time Data Analysis	AI enables real-time data analysis, providing fast and accurate insights.	Real-time Data Analysis Tools

Source: processed by the author

4. RESULT AND DISCUSSION

Decision making in management is a systematic process of selecting the best alternative from various available options to achieve organizational goals. As stated by George R. Terry (1972), decision making involves selecting the most rational and logical course of action based on various considerations. In this context, AI technology has a significant role in improving the quality, speed, and accuracy of managerial decision making.

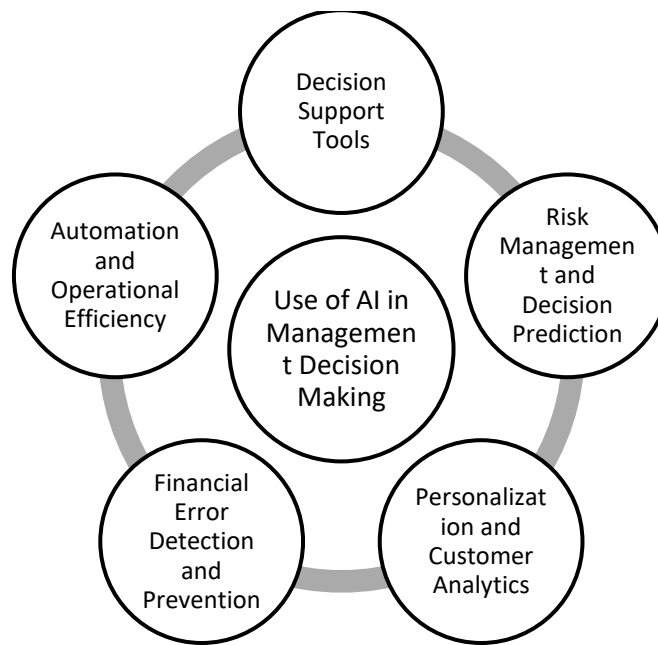


Figure 2 AI factors in decision making
Source: processed by the author

Based on the research results in the journals that have been summarized, there are several factors that influence the use of AI and decision making in management:

a. AI as a Decision-Making Support Tool

Brown (2023) highlights how AI-based *Decision Support Systems* (DSS) help managers make faster and more accurate decisions. AI enables real-time processing of large amounts of data, allowing managers to gain deeper insights before selecting the best alternative. DSS is a computer-based system used to analyze data and support the decision-making process by providing data-driven recommendations. AI in DSS improves the effectiveness of decision-making in several ways, namely Large-Scale Data Processing, Prediction and Simulation, Recommendation of Decision Alternatives and Reduction of Bias in Decision Making.

In Large-Scale Data Processing, AI enables the analysis of large amounts of data from multiple sources (e.g. financial reports, market trends, customer behavior) in real

time. This helps managers understand situations better than relying solely on intuition or experience.

Furthermore, in making Predictions and Simulations, AI can create predictive models based on historical data, allowing managers to see the possible outcomes of various decisions. AI-based simulations can be used to test various scenarios before making strategic decisions.

The next stage is Decision Alternative Recommendation, where AI not only presents data but also provides recommendations based on machine learning algorithms. For example, DSS can suggest the best marketing strategy based on sales data and market trends.

The final stage is Bias Reduction in Decision Making, where Human decisions are often influenced by cognitive bias. AI in DSS helps reduce bias by objectively analyzing data and providing fact-based insights.

Thus, AI in Decision Support Systems (DSS) provides significant benefits to managers by enabling large-scale data processing, trend prediction, decision recommendations, and bias reduction. Real-world examples across industries show how AI supports faster, more accurate, and data-driven decision making, ultimately improving business effectiveness.

b. AI for Risk Management and Decision Prediction

Risk management is the process of identifying, analyzing, and responding to potential threats or uncertainties that may impact business objectives. In managerial decision making, risk must be taken into account so that decisions taken can minimize losses and maximize opportunities. Davis (2023) and Lee (2024) journals emphasize that Artificial Intelligence (AI) can help in identifying risk patterns and predicting potential threats by using historical data analysis. AI allows systems to learn from past patterns and provide insights into possible future risks, thereby helping managers make more strategic decisions.

The two main AI technologies used in risk management are:

1. Risk Management Software used to identify and assess risks based on historical patterns and real-time data.

2. Historical Data Analysis Software is used to analyze past trends to predict possible future risks.

So, AI plays a vital role in risk management and strategic decision-making by identifying risk patterns, predicting future threats, and automatically recommending solutions to mitigate risks. With the implementation of Risk Management Software and Historical Data Analysis Software, companies can improve their business resilience, reduce financial losses, and make more informed decisions.

c. AI for Personalization and Customer Analytics

Decisions in marketing and customer service are also made easier by AI. In the modern business world, decisions related to marketing and customer service are increasingly supported by artificial intelligence (AI). AI is able to analyze customer behavior, identify preference patterns, and provide more effective marketing strategy recommendations.

Garcia (2024) and Kim (2023) journals highlight how AI enables deeper customer analysis, assisting managers in market segmentation, optimizing customer experience, and creating data-driven marketing strategies.

AI technologies used in customer personalization include:

1. Customer Relationship Management (CRM) is used to understand customer behavior and develop more personalized marketing strategies.
2. Predictive Analytics Software is used to analyze customer data and predict their future preferences and needs.

d. AI in Financial Error Detection and Prevention

In the business world, financial errors and fraud can have a major impact on a company's stability. Johnson's journal (2024) highlights how AI-based Financial Anomaly Detection Software can help detect irregularities in financial transactions automatically. This technology enables early identification of financial anomalies, so that financial managers can make more accurate decisions in financial reporting, regulatory compliance, and fraud prevention. AI in financial error detection and prevention is used in several key aspects, namely Real-time detection of suspicious transactions, Pattern analysis and

prediction of potential errors or fraud, Financial audit optimization and Increasing accuracy in financial reporting. The AI technology used is:

1. Machine Learning (ML) for pattern and anomaly analysis that is able to identify normal financial patterns based on historical data, detect financial anomalies, such as unusual transactions or spikes in suspicious activity and improve predictive models by learning from new data automatically.
2. Natural Language Processing (NLP) for financial document analysis that is able to examine financial documents to detect errors or non-compliance with accounting standards, automate financial statement audits, such as reading contracts and finding discrepancies and analyzing business communications (emails, reports, memos) to identify indications of fraud.

e. AI for Automation and Operational Efficiency

In operational decision-making, AI also plays a role in automating administrative tasks (Smith, 2023) and increasing the efficiency of business processes (Roberts, 2024). With Robotic Process Automation (RPA), managers can make decisions to allocate human resources to more complex and strategic tasks.

Limitations of AI in Complex Decision Making

Although AI has many advantages in assisting the decision-making process in management, this technology still has significant limitations. Taylor's journal (2024) highlights that AI cannot always replace the role of humans in complex decision-making, especially those involving intuition, creativity, and understanding social and ethical contexts.

Following are some of the major limitations of AI in managerial decision making:

1. Inability to Understand Context and Nuance

AI can only process data based on learned patterns, but often cannot understand the context of a situation in depth. Business decisions often involve emotional, cultural, and political factors that AI cannot fully analyze. For example, in international business negotiations, AI might recommend strategies based on financial data but fail to understand the cultural aspects that influence the other party's decisions.

2. Lack of Creativity and Intuition

AI works based on existing patterns, making it difficult to generate innovative ideas or think outside the box. AI lacks human intuition, which is often a critical factor in strategic decision-making. This can be seen in creative industries such as advertising and marketing, AI can analyze customer trends, but cannot create unique campaigns that arouse audience emotions like humans.

3. Dependence on Existing Data

AI is highly dependent on the availability and quality of data. If the data used to train AI is inaccurate, incomplete, or biased, then the resulting decisions will also be less accurate. AI cannot make good decisions if it is faced with a new situation that has never existed in its historical data. If a company is facing an unprecedented global crisis (e.g. the COVID-19 pandemic), AI may not be able to provide accurate recommendations because it lacks relevant historical data.

4. Potential Bias in Algorithms

AI can exhibit bias in decision-making if its training data contains unconscious bias. AI decisions can be unfair or discriminatory if the system is not designed with proper bias management. For example, AI in employee recruitment can reject candidates based on gender or race if historical data shows a preference for a particular group.

5. Limitations in Complex and High-Risk Decision Making

Decisions in strategic management often involve high uncertainty and major impacts on the organization, requiring multidimensional considerations that AI cannot process perfectly.

6. Lack of Ethical and Moral Aspects

AI has no moral consciousness and cannot make decisions based on complex ethical values. In many cases, the mathematically optimal decision is not necessarily the most ethical decision. For example, in healthcare, AI may suggest cutting costs by reducing care for certain patients, but this decision may conflict with medical ethical standards.

Challenges in Adopting AI Technology

The adoption of AI in management faces several challenges that can hinder widespread implementation. One of the main challenges is the high cost of implementation, as highlighted by Roberts (2024). Companies must invest large sums to build adequate technological infrastructure, including high-performance hardware, AI-based software, and integration with existing systems. In addition, employee training is a crucial factor, as the use of AI requires new skills that not all workers have. This can slow down the adoption process, especially for companies that do not yet have the technological readiness and human resources skilled in managing AI.

In addition to costs, data security and privacy aspects are also major concerns in the implementation of AI, as stated by Nguyen (2023). AI relies on large amounts of data, including customer data and sensitive business information. If not managed properly, the risk of data leakage and privacy violations can increase, especially when AI is used for automated decision-making. In addition, Taylor (2024) highlighted that AI still has limitations in understanding context and handling complex decisions, especially in situations that require human intuition or long-term strategic thinking. Therefore, AI still requires human supervision and intervention, especially in critical decision-making processes that cannot be fully automated.

5. CONCLUSION AND SUGGESTION

Conclusion

The use of Artificial Intelligence (AI) in management decision-making has shown significant benefits in improving the efficiency, speed, and accuracy of the decision-making process. AI enables real-time processing of large amounts of data, helping managers manage risk, detect financial anomalies, and optimize the company's marketing and operational strategies. However, the adoption of AI in management also faces various challenges, including high implementation costs, data security and privacy, and the technology's limitations in understanding context and complex decision-making. Therefore, the best approach in adopting AI is to combine AI technology with human intuition and expertise to ensure more accurate and strategic decisions.

Suggestion

Further research can delve deeper into several important aspects to enrich the understanding of the use of AI in management. First, further studies are needed to explore bias reduction strategies in AI algorithms, so that the system can provide fairer and more objective decisions. Second, research can focus on developing AI that is more adaptive to context and complex decision-making, especially in scenarios that require long-term strategic thinking. Third, the security and regulation aspects of AI are also important topics, given the increasing need for data protection and compliance with privacy policies in various industrial sectors. With more in-depth research in this area, it is hoped that AI can continue to develop as a more effective and ethical tool in supporting managerial decision-making.

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