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INTELIGENCIA ARTIFICIAL EN LA TOMA DE DECISIONES EMPRESARIALES: UN ENFOQUE EN LOS SIMULADORES

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Resumen. La Inteligencia Artificial (IA) está revolucionando la toma de decisiones empresariales al permitir el análisis de conjuntos de datos masivos, la elaboración de pronósticos precisos y la optimización de estrategias. Este estudio examina cómo los simuladores basados en IA funcionan como herramientas cruciales para el modelado de escenarios, la evaluación de riesgos y la mitigación de la incertidumbre en la toma de decisiones estratégicas, operativas y financieras. El análisis explora beneficios como mayor velocidad, objetividad y adaptabilidad, junto con desafíos éticos, técnicos y organizativos. Estudios de casos reales demuestran que la sinergia entre el juicio humano y la IA fortalece la gestión empresarial. Una implementación responsable y gradual es esencial para garantizar el éxito.

Palabras clave: Inteligencia Artificial, Toma de Decisiones, Simuladores, Estrategia Empresarial, Análisis de Datos, Gestión Empresarial, Automatización.

ARTIFICIAL INTELLIGENCE IN BUSINESS DECISION-MAKING: A FOCUS ON SIMULATORS

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Abstract. Artificial Intelligence (AI) is revolutionizing business decision-making by enabling the analysis of massive datasets, accurate forecasting, and optimized strategies. This study examines how AI-powered simulators function as critical tools for scenario modeling, risk evaluation, and uncertainty mitigation in strategic, operational, and financial decision-making. The analysis explores benefits such as enhanced speed, objectivity, and adaptability, alongside ethical, technical, and organizational challenges. Real-world case studies demonstrate that synergy between human judgment and AI strengthens business management. Responsible and phased implementation is essential for ensuring success.

Keyword. Artificial Intelligence, Decision-Making, Simulators, Business Strategy, Data Analysis, Business Management, Automation

TOPIC

In today's dynamic business landscape, Artificial Intelligence (AI) is redefining how organizations make decisions. The increasing complexity of markets and the abundance of data have accelerated the adoption of AI systems in business administration. A pivotal component in this transformation is the use of simulators, which allow companies to model scenarios and predict outcomes before making critical decisions. While AI already plays a vital role in many organizations, its application in high-level strategic decisions remains emergent—only around 7% of firms currently use AI for major strategic choices. Nevertheless, the trend is unmistakable: business leaders increasingly recognize that effective AI usage will be a key driver of future competitiveness. This paper explores the core concepts of AI in decision-making, the application of simulators in business management, associated benefits and challenges, and real-world case examples, all supported by recent academic sources.

1. INTRODUCTION

Artificial Intelligence in business decision-making refers to the use of algorithms and computational models to support or automate decision processes. This encompasses machine learning techniques, deep learning, rule-based systems, and other approaches that analyze vast datasets, identify patterns, and recommend optimal actions. A key concept is AI-driven decision support systems, which integrate internal and external data to present managers with valuable analyses and forecasts. These systems range from predictive models for demand forecasting to optimization algorithms for resource allocation.

AI could manage both structured (routine, well-defined) and unstructured (novel, strategic) decisions. Traditionally, strategic decisions have relied on executive intuition and experience. However, advances in AI challenge this paradigm by demonstrating that certain models can emulate or even match aspects of human reasoning in strategic contexts. For instance, large language models have generated and evaluated business strategies at a level comparable to human entrepreneurs and investors in controlled settings, indicating that AI can contribute meaningfully to strategic formulation by offering speed and diverse perspectives.

Another crucial concept is computational simulation applied to decision-making. Simulation involves creating a digital model of a business system (a market, a company, a production line, etc.) and experimenting with different conditions or strategies to observe potential outcomes. AI-powered simulators combine intelligent algorithms with simulation models, enabling not only behavioral projections based on historical

data but also adaptive learning from each iteration. Integrated AI in simulations allows real-time parameter adjustment and optimal solution finding in complex scenarios that are difficult to analyze manually.

In summary, key foundational concepts include AI as a data-driven enabler, intelligent decision support systems, and simulated environments to test and refine strategic options before real-world implementation. These pillars form the theoretical basis for understanding how smart technologies are applied in modern business administration.

Applications of Simulators in Business Administration

Simulators have become essential tools in business administration, increasingly enhanced by AI for improved effectiveness. A business simulator is software that recreates business dynamics in a controlled environment where users make decisions and observe outcomes without real-world risk. While traditionally used in education and executive training, simulators now support strategic and operational planning within firms.

In educational and managerial training contexts, business simulation games (BSGs) have proven effective pedagogical strategies. These allow students and future managers to run simulated organizations in realistic and interactive environments, facing market challenges, competing, and learning from the results of their decisions. Participants can set prices, invest in marketing, manage inventory or human resources, and observe the financial impact of their choices. Recent studies highlight that BSGs enhance participants' decision-making skills, analytical thinking, and responsiveness. The integration of AI adds another dimension: through cognitive computing, AI evaluates student decisions, provides adaptive feedback, and generates dynamic scenarios. A qualitative study using the AI-enhanced Business Global simulator by Company Game revealed both strengths and challenges, suggesting that AI enriches learning experiences by delivering more objective evaluations and continuous improvement opportunities.

In strategic business planning, AI-assisted simulation is used to model markets and competitor behavior. Before launching a product or entering a new market, companies can simulate different scenarios: What if we adjust prices? How will competitors react to an increase in market share? AI enhances the realism and utility of these simulations by rapidly analyzing vast historical datasets and calibrating predictive models. Recent studies suggest that AI enables virtual strategy experiments by testing multiple actions in simulated markets and estimating competitor or consumer responses. This capacity to "rehearse" strategies reduces uncertainty and risk, mitigating adverse outcomes before real-

world implementation.

Operationally, AI-integrated simulators optimize production, logistics, and resource management. Digital twins—virtual replicas of physical systems—are an emerging concept. These twins, fed by real-time data and AI algorithms, simulate operational adjustments to enhance efficiency. Managers can forecast bottlenecks, test production line configurations, or inventory strategies, and make informed decisions. A 2023 study on sustainable production lines confirmed the value of AI-enabled simulation: the combination of simulation models and AI significantly improved energy and material resource management from both economic and environmental perspectives.

In finance and risk management, AI-powered simulators aid investment decisions and financial planning. Classical techniques like Monte Carlo simulations are enhanced by AI through the inclusion of machine learning for probability distributions and financial variable correlations. Financial institutions have developed simulators that evaluate millions of asset portfolio combinations and recommend optimal strategies based on risk profiles. Similarly, in risk management, simulating economic crises with models trained on past downturns prepares firms with robust contingency plans.

In sum, simulators in business administration are applied in leadership skill development, strategic experimentation, operational optimization, and financial planning. The integration of AI broadens their reach and accuracy, providing decision-makers with a virtual lab to explore complex decisions safely before real-world implementation.

2. CONTEXT

Adopting AI in decision-making processes provides numerous benefits that enhance business management. One of the most cited advantages is the ability to process large volumes of information quickly and accurately. AI systems can analyze data in seconds that would take months to process manually, extracting hidden insights from massive databases. This speed results in better-informed decisions: AI identifies patterns and trends that human analysts might miss. For instance, machine learning models can uncover correlations between market variables and sales performance, informing more effective marketing decisions.

In strategic planning, AI systems like language models generate multiple strategic alternatives and suggest the most promising, expediting theoretical analysis in business strategy. This enables companies to consider a broader spectrum of options before choosing a course of action.

Another significant benefit is improved decision effectiveness and accuracy. AI

reduces human error and cognitive bias. Routine or numerical decisions (e.g., inventory restocking, fraud detection) can be automated for consistency and reduced mistakes. Even in complex decisions, AI acts as an objective "second opinion." Recent studies indicate that AI tools lead to less biased and more comprehensive decisions, as algorithms impartially evaluate data without being influenced by prejudice or fatigue.

AI also incorporates real-time information into decisions. For example, dynamic pricing algorithms adjust service or product rates based on demand and competition, optimizing revenue. E-commerce firms like Amazon use intelligent algorithms to compare internal and external data and autonomously update prices within predefined limits, maximizing competitiveness and profit.

AI-enhanced simulators offer a safe environment for learning and experimentation. Organizations can test strategies or operational changes without incurring real costs or jeopardizing business stability. Executives might simulate entering a new market using an AI-supported global market model that integrates economic and cultural data. Simulation results reveal potential obstacles or advantages, informing more confident final decisions.

Additionally, AI enables faster decision-making. In volatile settings, real-time analysis is critical. Smart systems monitor key indicators and alert managers at the right moment. For example, AI-driven financial systems instantly recommend investment strategy changes in response to market shifts, avoiding losses or seizing favorable conditions. In supply chain management, AI reconfigures distribution routes in response to disruptions (e.g., natural disasters, regulations) by simulating logistics scenarios and selecting the optimal option.

AI also democratizes access to advanced analytics. With user-friendly interfaces and smart business intelligence tools, complex analyses become accessible beyond data experts. This empowers mid-level managers to make data-driven decisions without full analyst reliance, accelerating decision-making across organizational levels.

Finally, AI enhances organizational resilience. By detecting complex patterns, it anticipates future issues and suggests preventive actions. For instance, AI systems identifying early signs of customer dissatisfaction on social media may recommend service improvements before reputational damage occurs. In manufacturing, predictive maintenance algorithms determine optimal machine downtime before costly failures, blending component lifespan simulation with sensor data analysis.

In summary, AI in business decision-making improves information accuracy and speed, reduces biases, facilitates risk-free strategy

testing, dynamically adapts to environmental changes, and expands access to analytical tools. When properly leveraged, these benefits contribute to sustainable competitive advantage.

3. DEVELOPMENT

Despite its advantages, integrating AI into business decision-making presents substantial challenges that must be addressed for effective and ethical implementation. A key issue is data bias and quality. AI learns from historical data, and if these datasets contain biases (e.g., past human prejudices or unbalanced representations), the system may perpetuate or amplify them. A known case involved hiring algorithms that unintentionally discriminated due to biased training data. Business decisions risk favoring certain strategies or markets based on spurious data correlations. Continuous human oversight and curated data are essential to ensure fair and rational AI recommendations.

Another critical challenge is the lack of transparency and explainability in many AI models, especially deep learning. Decision-makers may hesitate to follow AI advice if its reasoning is opaque. In sensitive areas such as finance or personnel decisions, understandable explanations are vital for trust. The so-called "black box" problem complicates accountability: if an automated decision yields adverse results, who is responsible—the machine or the manager? User trust in intelligent systems hinges on transparency; recent research emphasizes that clear explanations and model interpretability are key to AI acceptance. Explainable AI (XAI) approaches aim to mitigate this, though balancing model accuracy and comprehensibility remains a research priority.

Organizational resistance to change is also common. AI integration is not just a technological shift but a cultural one. Managers and staff must trust automated recommendations, which may provoke concerns about control or job security. Some executives, accustomed to intuitive decision-making, may resist algorithmic suggestions that contradict their instincts. Overcoming this requires training and value demonstration: when users see AI improving their effectiveness, adoption increases. Companies should foster a human-machine collaboration mindset, where AI augments rather than replaces human capabilities. Studies indicate that augmented decision-making, in which humans retain final control, is the preferred model.

Technical and resource challenges exist as well. Enterprise-wide AI deployment requires robust infrastructure—from powerful computing capabilities to integrated data platforms. Small and mid-sized firms may lack these resources. Moreover, skilled personnel in data science, AI engineering, and digital

change management are necessary. Talent shortages can stall adoption or lead to flawed implementations. Research underscores the importance of proper infrastructure and skilled teams for successful AI initiatives. Without these, even the best tools may fail to deliver results or cause decision confusion.

Ethical and legal issues cannot be ignored. Using AI in decision-making raises questions about data privacy (especially personal client or employee data), responsibility for automated outcomes, and regulatory compliance. For instance, if an AI simulator suggests a profitable but ethically questionable strategy (e.g., mass layoffs), executives must weigh social impact. Emerging regulations—such as the EU's AI Act—may mandate transparency, risk assessments, and algorithmic audits. Firms must align AI usage with ethical principles and legal frameworks, potentially through data ethics committees or independent algorithm reviews.

Another concern is dependency and reliability. Overreliance on AI without maintaining internal analytical capabilities can leave firms vulnerable. System failures, cyberattacks, or environmental shifts not reflected in historical data may disrupt AI decision-making. Hence, human oversight ("human-in-the-loop") remains vital, especially for critical decisions, until systems prove superior reliability in specific contexts.

Conceptually, determining when and where to delegate decisions to AI is complex. Not all decisions should be automated. Identifying which decisions can be fully handled by AI (e.g., minor inventory adjustments) and which require human scrutiny (e.g., corporate strategy) is itself a strategic task. Effective human-AI interaction will be a core leadership skill, combining human creativity and intuition with machine logic and speed.

In conclusion, AI challenges in business decision-making include data bias, transparency, cultural resistance, infrastructure and talent needs, ethical and legal considerations, technological dependency, and appropriate autonomy levels. Addressing these is essential for responsible AI integration that preserves trust and decision quality.

4. CONCLUSIONS

Theory and prior analysis manifest in practical examples where AI and simulators directly impact business decisions:

Strategy generation in startups: A recent study explored AI tools in startup strategy. Researchers used advanced language models to generate business strategies based on problem descriptions, comparing results with human experts. The AI-generated strategies were rated on par with those by entrepreneurs and investors. The AI also evaluated and scored business plans using investor-like

criteria, showing its potential in early-stage strategic decision-making by offering viable ideas and objective assessments.

Financial automation in banking (Ant Financial): In finance, Ant Financial (an Alibaba affiliate) exemplifies AI-delegated decisions. Their system approves loans to small businesses and consumers in seconds using machine learning to assess credit risk. Processing multiple variables (income, payment history, alternative data), the system automates credit decisions without human input in most cases. This speeds microcredit delivery and reduces bias, evaluating applicants objectively by data rather than human intuition.

Content curation and personalization (Netflix): In entertainment, Netflix uses AI to decide what content to recommend or produce. Reinforcement learning algorithms tailor content recommendations, optimizing engagement and retention. Each user interaction feeds a preference simulator that decides the next show or movie. On a strategic level, Netflix uses AI simulations to forecast demand for content types, guiding multimillion-dollar production investments.

Corporate training with business simulators: Multinationals uses AI simulators for leadership training. A major auto manufacturer developed a global market simulator to train executives in emerging market entry. The AI-powered simulator adjusts macroeconomic and competitive conditions based on user decisions, offering performance reports with insights and improvement suggestions.

Supply chain optimization with digital twins: A global logistics firm implemented a digital twin of its distribution network, linking real-time warehouse, vehicle, and order data to an intelligent simulator. During demand spikes, the company simulated responses—inventory relocation, route changes, temporary transport—evaluating service and cost impacts. The AI recommended the optimal option, enabling agile and evidence-based decision-making.

Sustainable and efficient production: Cardoso et al. (2023) studied AI-supported simulation in sustainable production lines. Simulation models with intelligent optimization let managers test equipment configurations and workflows to cut energy and waste. Results confirmed that such systems improve environmental and economic outcomes. For example, adjusting maintenance schedules saved energy during peak hours without hurting productivity.

These examples confirm that AI in decision-making is real across sectors. Whether startups or global firms, organizations using these technologies achieve tangible performance gains. Each case also highlights the need for high-quality data, clear criteria, and human oversight. Best practices include starting with small-scale pilots and combining expert

knowledge with automated suggestions.

Conclusion Artificial Intelligence, enhanced by simulators, is transforming business decision-making in profound and multidimensional ways. This paper reviewed key concepts, applications, benefits, challenges, and real-world examples, demonstrating AI's potential as a powerful ally for executives. Core concepts included AI's capacity to analyze large datasets and generate decision alternatives, while simulators provided controlled environments to test business strategies and policies.

Applications span executive education, strategic planning, operational optimization through digital twins, and financial forecasting. Benefits include faster, more informed, and potentially less biased decisions; real-time data integration; complex scenario evaluation; and broader access to advanced analysis. Cutting-edge firms report market responsiveness and resource efficiency thanks to AI support in decision-making.

However, challenges are equally significant. Data bias, transparency, cultural resistance, infrastructure needs, and ethical concerns must be addressed to achieve responsible AI adoption. Human oversight remains crucial to validate AI recommendations and ensure accountability.

Case studies reaffirm the applicability of the AI-simulation tandem—from startups to banks and supply chains, showing measurable decision improvements. Success lies in gradual integration, matching AI to high-value domains and adapting processes and training accordingly.

Ultimately, AI, empowered by simulation, is poised to become an indispensable component of modern business administration. When implemented diligently, it democratizes advanced analytics, improves accuracy and speed, and fosters strategic innovation. Companies that balance algorithmic precision with human insight—and proactively confront technical and ethical issues—will be best positioned to thrive in this decision-making revolution. Future research should explore the evolving human-technology dynamic to develop sustainable and effective frameworks for AI integration across organizational decision levels.

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