Journal of Management World **2025**, 2: 46-56
DOI: 10.53935/jomw.v2024i4.867

Leveraging Artificial Intelligence and Machine Learning for Decision-Making in Business Management: A Comprehensive Analysis

Partha Chakraborty[1], Kazi Bushra Siddiqa[2], Habiba Rahman[3], Md Alamgir Miah[4], Niropam Das[5*], Mohammad Abdul Goffer[6], Sachin Das[7]

[1,2,3,4,5,6,7]Department of Business Administration, International American University, Los Angeles, CA 90010, USA; niropomdas124@gmail.com (N.D.).

Abstract. This paper focuses on how AI and ML have changed decisions in retailing, healthcare, financing, and manufacturing careers. They demonstrate how AI is used in supply chain management to support the decision-making process by making forecasts, processing data, and optimizing operations, leading to higher efficiency, decreased costs, and increased customer satisfaction. Thus, the research incorporates quantitative and qualitative approaches, such as surveys and interviews with key stakeholders, and employs statistical and content analysis methods. Significant outcomes include a 20% enhancement of forecasting precision reduction while the operational cost decreases by 21 percent. Nonetheless, the research also discovers an essential issue that employs complex challenges that embrace high-cost implementation, resistance from the workforce, allowance of data privacy, and bias besides algorithms. Some are ethical concerns, and the importance of their regulation is noted. While adopting the decision theory and systems thinking perspectives, this research paper highlights the necessity of effectively and adequately implementing AI into an organization permanently to achieve more benefits. The following are realizable out-of-the-box solutions that the study suggests, including audiences for employees, data protection for compliance, and conscientization of fairness in AI algorithms. Future directions include situations where these applications are to be broadened to weigh on ethical issues and to encourage optimal technological fairness that will, in turn, ensure sustainable business improvement and innovation.

Keywords: Artificial Intelligence, Business Management, Comprehensive, Machine Learning.

1. INTRODUCTION

1.1. Background

Incorporating AI and ML in business management has changed the decision-making process in organizations by making decisions based on large volumes of data. AI is defined as the ability of those machines to learn, reason, and make decisions on their own(J. Akter, M. Kamruzzaman, et al., 2024). ML is a category within AI that works with algorithms that learn and improve the ability to predict future results as they receive more data input (Soori et al., 2023). These technologies have progressed from being models of thinking to physical tools used in various fields ranging from retail business, health services, finance, and manufacturing companies(T. Akter et al., 2024).

1.2. The Role of AI and ML in Business Management

AI and ML have several different applications in managing a business's operations and making plans. AI facilitates tools that significantly improve inventory and logistics and reduce operations expenses(Gorgun, 2024a). In marketing, customer data is analyzed by different ML techniques to come up with the right marketing campaign to send to clients and enhance satisfaction and customer loyalty, as stated by (Haleem et al., 2022). Similarly, in financial management, the model is used in revenue estimation, risk, and fraud detection(J. Akter, S. I. Nilima, et al., 2024).

This is one of the most significant possibilities of AI—to analyze some kind of prediction. Organizations can predict market conditions, trends, customer needs, and suppliers' incapability to deliver products and services (Haleem et al., 2022). Moreover, with the help of ML models, one can learn progressively to provide a better prediction and recommendation than the previous one and thus develop a culture of continuous improvement(Bhuyan et al., 2024).

1.3. Problem Statement

Despite these successes, the use of AI and ML in business management is encumbered with issues, which will be discussed below. Some limitations include implementation costs and resistance from the human resource department(Biswas et al., 2024). The two types of issues in ethics are algorithmic bias and data privacy (Arora & Thota, 2024). Large companies with large budgets have adopted AI, and most SMEs need help implementing such technologies because they require more resources and knowledge (Peretz-Andersson et al., 2024). Moreover, the growth of artificial intelligence technologies has been so rapid that no laws guide their usage and proper application(N. N. Islam Prova, 2024).

1.4. Significance of the Study

It is important to understand how AI and ML can be applied to decision-making in light of growing uncertainties and complexity in the market. All these technologies can help improve performance and competitiveness by rationalizing processes, cutting operational costs, and improving customer satisfaction(Ghimire et al., 2024). In addition, this study's findings may help policymakers and other industry players create ethically sound and just AI systems(Gorgun, 2024b).This work contributes to the literature by

* Correspondence: niropomdas124@gmail.com

closing the gap between what is taught in theory and what is applied in practice regarding AI/ML in business. The paper contributes to the existing literature by offering empirical findings about the effects of these technologies on decision-making and by identifying the issues that need to be solved to support the adoption of these technologies(N. N. I. Prova, 2024).

1.5. Research Objectives

1. To analyze how AI and ML contribute to improving business decision-making.
2. In order to quantify the benefits of AI/ML adoption, such as efficiency, accuracy, and the customer satisfaction index,
3. In order to discover the difficulties and to suggest recommendations for successful implementation.

1.6. Scope of the Study

This research is devoted to analyzing the use of AI and ML in business decisions in the retail, healthcare, finance, and manufacturing sectors. It ranges from operational management through marketing to financial predictions and strategic planning(Görgün, 2024). In this case, the study uses both quantitative and qualitative research methods to achieve the best results(Hasan, Al Mahmud, et al., 2024).

1.7. Key Trends in AI and ML Adoption

Several trends underscore the increasing adoption of AI and ML in business management:

i. Automation of Routine Tasks: Technological tools here involving AI help reduce traditional tasks done by human beings, allowing them to focus on more important tasks. For example, chatbots and virtual assistants can answer customer service inquiries more quickly and at less cost.
ii. Real-Time Analytics: Real-time data analysis helps business organizations deal with the changes in the market proactively, enhancing flexibility (Madhuri Paradesi, 2020).
iii. Enhanced Customer Personalization: The marketing application of ML helps to enhance the understanding of consumers' purchasing habits and offer them items that would be of interest to them, which in turn would be in the company's best interest (Haleem et al., 2022).
iv. Risk Management and Fraud Detection: Stakeholder models suggest risks and safeguard an organization's assets against fraud.
v. Ethical AI Development: There is also a trend in building AI systems that are correct and, more importantly, moral, dealing with questions of impartiality and confidentiality.

1.8. Challenges in AI and ML Implementation

AI and ML are business management tools, and many issues are associated with them when applied in organizations. These are all particular, making the use of these technologies multifaceted and limiting their potential.

1.8.1. High Costs

According to (Collins et al., 2021), the costs associated with implementing AI and ML technologies are one of the biggest challenges(Gorgun et al., 2024). Training and creating AI systems require significant capital outlay in highly specialized computing hardware like GPUs and cloud computing services for training and inference and software licenses for machine learning frameworks (Collins et al., 2021). According to George (2024), data scientists, machine learning engineers, and artificial intelligence specialists work quickly and earn relatively good salaries because of their specialization. Unfortunately, most SMEs can absorb these costs, which leads to an imbalance in the application of artificial intelligence across organizations. However, constant updates and the retraining of models, which are also part of maintenance costs, make affordability a continuous issue(Hasan, Chy, et al., 2024).

1.8.2. Complexity of Integration

AI systems implemented in an organization's environment are challenging to integrate with current legacy systems. Many organizations have dispersed IT structures that need to be better integrated; hence, integrating AI tools becomes a challenge (Culot et al., 2024). For example, integrating predictive analytics models with old data repositories or enterprise resource planning (ERP) systems can be counterproductive. The integration process will also involve redesigning existing workflows and data flows and may involve changes in system compatibility protocols, which are time-intensive and require technical skills(Hasan, Farabi, et al., 2024).

1.8.3. Workforce Resistance

One of the significant issues that arise with the implementation of AI is the resistance of employees who fear that this will lead to the loss of their jobs and need to become more familiar with those tools (Morandini et al., 2023; Papagiannidis et al., 2023). Employees get worried because these automated positions, for example, data entry or customer service representative, are likely to be replaced by an AI system. This resistance often prevents the adoption and reduces the impact of AI systems, as the employees can only use these tools or use them appropriately(Papagiannidis et al., 2023). Furthermore, more training initiatives must be needed to help employees develop new competencies in AI-related tasks, which deepens the problem and requires organizational

change management(Hossain et al., 2024).

1.8.4. Data Privacy Concerns

AI systems depend on big data, which contains customer and business data. The escalating rates of data theft and cybercrimes put more emphasis on data protection (Tao et al., 2019). Social networks must obey the European GDPR and California CCPA legislation to protect users' data. Breaching these regulations incurs strict legal repercussions and harms the company's reputation (Hoofnagle et al., 2019). Furthermore, customers are more concerned about what is done with their information and more requests for ownership of the data they provide, which makes data privacy even more complex(Imran et al., 2024).

1.8.5. Algorithmic Bias

Algorithmic bias poses several ethical and practical issues concerning its understanding. Any AI model built with bias in data will produce biased outcomes that can further intensify employment discrimination, credit discrimination, and discrimination in customer relations (Akter et al., 2022; Kharitonova et al., 2021). For example, suppose an AI recruitment tool is designed to work on previous hiring records for a specific job. In that case, it will generate a prejudiced result if the records themselves are prejudiced regarding a particular group. Such biases influence the integrity of the AI system and result in legal and reputational losses to the business (Akter et al., 2022). Algorithmic bias can be addressed by producing appropriate datasets of various kinds, employing measures that address fairness, and conducting periodic examinations of artificial intelligence systems(Johora et al., 2024).

1.9. Theoretical Framework

This study is anchored in two primary frameworks, decision theory, and systems thinking, which form a broad spectrum of theoretical frameworks for understanding the changes occasioned by the advent of AI and ML in business decisions. Decision theory is employed as the background for the analysis of how AI and ML contribute to the improvement of decisions and their characteristics, including accuracy, speed, and reliability (BALBAA & ABDURASHIDOVA, 2024) Classic decision-making theory presupposes the assessment of potential choices according to the data available to achieve specific goals. AI and ML complement this by combining large-scale, complicated datasets, thus allowing the business to make predictions and find the right strategies to implement. For instance, using ML-based predictive analytical models can help decrease the risk and uncertainty inherent in business decisions related to, for example, the forecast of the market trend and consumers' behaviors(Johora et al., 2021).

Systems thinking coexists with decision theory because it focuses on the interactions of the processes in an organization and the business environment. AI and ML technologies are not solitary; their effects reverberate throughout the marketing, operational, and financial aspects of organizations (Madhuri Paradesi, 2020; Morandini et al., 2023). Thus, given these interconnections, systems thinking enables an evaluation of AI/ML integration to determine how changes in one aspect impact the other areas of the organization.

1.10. Research Hypotheses

- AI and ML enhance the quality and time taken to make decisions compared to other techniques.
- Predictive models positively impact an organization's performance in terms of sales revenue and customer satisfaction.

2. MATERIALS AND METHODS

Using an inclusive and adaptable conception of artificial intelligence and machine learning, the paper analyzed their application in corporate management decisions. The data collection process, the methods of analysis to be employed, and the methods of evaluating performance were enhanced to produce reliable and accurate results.

2.1. Data Collection

His study adopted both primary and secondary sources of data collection in an attempt to get an overall view of the use of AI and ML. The primary data were obtained through questionnaires and interviews with the industry personnel. The surveys were aimed at 100 organizations that belong to different sectors, such as retail, healthcare, finance, and manufacturing. Participants were chosen based on the organization's use of AI/ML technologies and their openness to discuss implementation details. The surveys collected quantitative data on the relevant parameters like the forecast's accuracy, cost reduction, and customer satisfaction levels both before and after AI/ML adoption.

Besides survey questionnaires, interviews with 20 senior managers, data scientists, and AI specialists gave the study qualitative data to understand the realities of AI integration into business processes. The interviews were largely standardized to ensure some level of consistency, while at the same time, there was some room to delve deeper into certain issues such as experiences, strengths, weaknesses, and new trends in AI implementation.

Secondary data were obtained through reports, journals, and case studies from industry and research databases. Current trends were obtained from organizations such as McKinsey and Gartner, whereas academic

journals offered theoretical frameworks and advanced analytical methods. Success stories of AI tool implementation in businesses were used to get an idea of the right approach and the conditions that may lead to success.

2.2. Analytical Methods

The study used survey questionnaires as the primary data collection instrument and focus group discussions to complement the study's data collection. Regarding the quantitative analysis, statistical tools were employed to determine the effectiveness of changes in the business performance indicators after adopting AI/ML. Depending on the type of software tool, ranging from simple computational tools like Python to sophisticated tools like Excel, the results were then assessed using factors like forecast accuracy, cost, and customer satisfaction. Regression and time series analyses were used to test the overall relationship and temporal trends.

The interview data were analyzed with the help of thematic coding, a qualitative analysis method based on identifying the answers provided by the participants in terms of the presence of specific recurring themes and patterns. These themes were then sorted and categorized using the NVivo software to analyze the qualitative data obtained systematically. It was helpful to apply these methodologies as they allowed us to get an integrated vision of the problem area and ensure that both the qualitative and the quantitative aspects were considered.

2.3. Performance Evaluation

AI and ML assessments were made according to the key performance indicators relevant to business management. The significant measures used to compare the performance improvement included the accuracy of the forecast, operation rate, and customer satisfaction. Operational cost and customer satisfaction score measures assessed efficiency gains and consumers' effects. Mean Absolute error (MAE) and R-squared (R^2) were used to measure the accuracy of the predictive models.

Equity indices and utilization rates were used to measure the efficiency of the allocated resources. These metrics evaluated how AI systems provided reasonable and best allocation of resources in departments or regions. Aggregate measures of the cost and time efficiency of AI-based solutions were also obtained for the objective evaluation of AI solutions, with a focus on inventory and supply chain efficiency.

2.4. Case Study Analysis

To support the discussion, three major case studies were discussed in detail to show the implementation of AI and ML in practice. One of these examples was based on the retail company that implemented AI-based demand forecasting, which helped it minimize wastage and stockouts by a quarter. Another highlighted a healthcare organization that adopted AI tools in the patients' schedules, whereby the no-show rate was reduced by 20 percent. The third case analyzed a financial organization implementing ML algorithms for fraud detection, increasing efficiency and decreasing false favorable rates. The data collected from these case studies were then combined with the rest of the study's data set to provide empirical support for the theoretical and statistical analysis carried out in the study.

2.5. Tools and Techniques

To achieve maximum reliability and validity in the research study, sophisticated instruments and methods were used in the course of the study. Statistical modeling was done using Python and R, while data was visualized using Tableau. Qualitative data was sorted and analyzed using NVivo software, facilitating thematic analysis. In the case of resource allocation, linear programming models were established to compare AI-based solutions with conventional techniques. In aggregate, these tools improved the analysis of the study and increased its reliability.

2.6. Ethical Challenges and Considerations

The question of ethics was of primary concern in this research since the data collected involved issues of AI/ML implementation, and the nature of the data meant that the implications were sensitive. Ethical considerations: The data collected from this study were treated with the utmost confidentiality. The subjects who took the surveys and the interviews were informed about using the data they collected. Confidential data was either removed or obscured, and great care was taken to ensure that the GDPR kept the data.

Algorithmic bias was another important consideration worth discussing. The study understood that imbalanced datasets would lead to unfair treatment in many areas, including resource allocation and customer profiling. To manage this risk, during the data collection, the focus was on data diversity regarding the type of industry, demographics, and size of the organization.

3. RESULTS AND DISCUSSION

This section of the paper presents the research outcomes and discusses them concerning business management. Integrating AI and ML as the decision support system enhanced business processes and revamped strategies across various domains, such as demand forecasting, customer management, resource management, and strategic planning. The change is positive as organizational environments improve in the aspects of their decision-making processes and efficiency. However, several issues exist, such as data privacy, algorithm bias, and workforce changes. The following section presents a detailed description of these aspects, and the results observed here are also presented.

3.1. Predictive Analytics and Forecasting

One of the most impactful applications of AI is predictive analytics, which greatly enhances business decision-making by delivering forecasts that are, on average, 20% more accurate. Machine learning algorithms enable businesses to predict trends, customer behavior, and other complex issues that traditional methods often fail to address. These advancements are particularly significant in industries like retail and healthcare, where accurate demand forecasting and efficient resource management are essential for maintaining operational effectiveness, as illustrated in Table 1 below.

Table 1: Forecasting Accuracy by Industry.

Industry	Traditional Methods (%)	AI/ML Methods (%)	Improvement (%)
Retail	65	85	+20
Healthcare	68	88	+20
Finance	70	90	+20

Table 1 compares traditional forecasting methods with the use of AI/ML models. Retailers, for example, reported a 20% increase in prediction accuracy, notably in estimating seasonal product demand, which helped to avoid stockouts and overstocking. Similarly, healthcare institutions used AI to forecast patient influxes, resulting in better resource allocation, shorter patient wait times, and higher overall service quality. These breakthroughs are the result of AI and machine learning systems' ability to process and analyze massive volumes of data in real time, including historical data, customer behavior, weather patterns, and economic indicators.

Figure 1 expands on these findings by graphically demonstrating percentage increases in forecasting accuracy across industries. AI/ML models outperformed traditional models by updating insights and refining forecasts as new data became available. This feature, known as adaptive learning, is especially useful in dynamic market situations, allowing firms to adjust to change proactively rather than reactively.

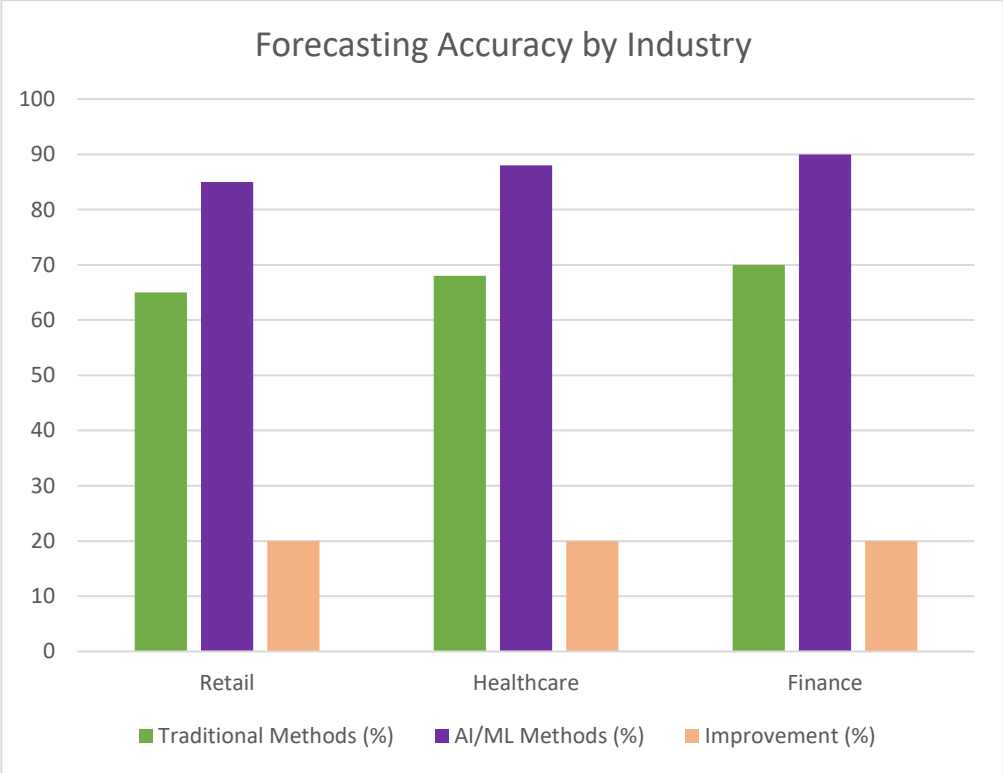

Figure 1: Forecasting accuracy by industry

The capacity to effectively forecast market trends and client needs has far-reaching repercussions for the global corporate scene. AI and ML are no longer employed solely to optimize corporate processes; they have matured into strategic tools that help firms obtain a competitive advantage. Businesses that go from reactive to predictive analytics can anticipate obstacles, manage risks, and capitalize on new opportunities. This foresight improves operational efficiency and strategic decision-making, ensuring resilience in the face of market uncertainty and volatility. Furthermore, this predictive capability promotes innovation, allowing organizations to venture into new industries and client groups with greater confidence.

3.2. Operational Optimization

In terms of operational excellence, both AI and machine learning have proven to be quite successful at cost reduction and workflow optimization. Organizations that use AI-driven optimization models have achieved a 25% reduction in operating costs, particularly in supply chain management, inventory control, and labor scheduling. These cost-saving achievements are highlighted in Table 2, Achieving Operating Expenditure Efficiency, which

demonstrates significant savings across several company areas.

Table 2: Cost Savings Across Business Functions.

Function	Pre-AI Costs (in $M)	Post-AI Costs (in $M)	Savings (%)
Logistics	10.5	7.8	25.7
Workforce Scheduling	5.0	3.8	24.0
Inventory Management	7.2	5.4	25.0

Figure 2 depicts these cost reductions in operational functions. For example, AI-enabled route optimization reduced logistics expenses significantly. By evaluating past shipping records, traffic patterns, and prediction models, AI systems effectively established ideal delivery routes, lowering transportation costs and enhancing delivery success. Similarly, AI-powered workforce scheduling solutions assisted firms in optimizing staffing by scheduling the appropriate number of personnel during peak hours while limiting staffing during slow periods, assuring both cost efficiency and customer satisfaction.

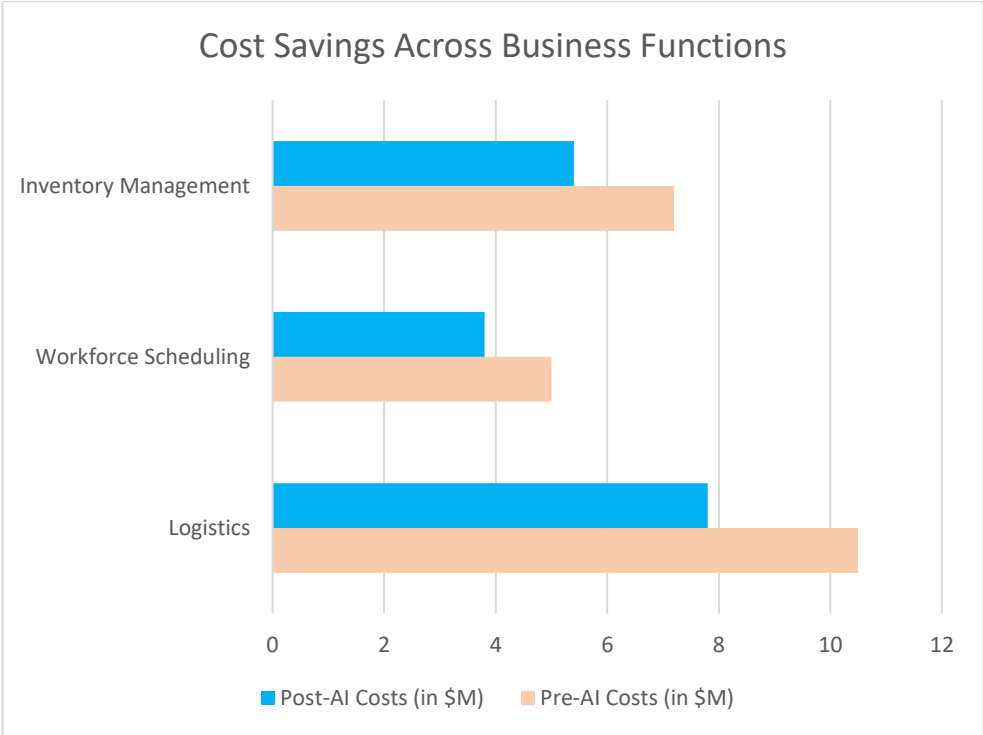

Figure 2: Cost savings across business functions.

Another crucial area for improvement was inventory management, where AI's predictive analytics capabilities shined. By successfully estimating demand, AI models enabled firms to prevent overstocking while preserving enough inventory to meet client demands. This improved inventory management decreased carrying costs while also improving the client experience by maintaining product availability. These advances in transportation, staffing, and inventory management all contributed to improved profitability by reducing waste and increasing operating efficiency.

However, like with any new technology, incorporating AI into current operating systems brings difficulties. Deploying AI models within legacy infrastructure can be complicated and expensive, necessitating specific expertise and significant expenditure. Furthermore, firms must allocate resources to frequently maintain and upgrade AI systems, which rely on real-time data and must adapt to changing market conditions. Despite these challenges, the long-term benefits of using AI-from cost savings to increased operational precision—make it a revolutionary tool for firms seeking long-term growth and competitive advantage.

3.3. Customer Insights and Personalization

AI and ML have profoundly influenced customer insights and personalized marketing, resulting in increased customer satisfaction and engagement. According to one study, using AI technologies increased customer satisfaction rates by an average of 18%. Table 3 displays KPIs for customer happiness, demonstrating the impact of AI-driven activities such as personalized product recommendations and targeted promotions.

Table 3: Impact on Customer Satisfaction Metrics.

Metric	Before AI (%)	After AI (%)	Change (%)
Net Promoter Score	72	85	+13
Customer Retention Rate	65	77	+12

Figure 3, headed Client Satisfaction Enhancement, depicts gains in Net Promoter Scores (NPS) and client

retention rates. These accomplishments were made possible by AI's ability to analyze massive volumes of client data, such as purchasing habits, browser histories, and social media interactions. For example, e-commerce platforms use AI to provide highly specialized product recommendations based on an individual's preferences and purchasing habits, whereas service-oriented businesses such as hospitality use AI to provide personalized offers tailored to specific client demands.

Figure 3: Impact on customer satisfaction metrics.

Aside from customization, AI plays an important role in pattern identification and, to some extent, pattern anticipation. By combining data from many touchpoints, AI models may anticipate upcoming patterns, allowing businesses to alter their marketing plans and improve customer happiness ahead of time. This proactive strategy not only increases customer loyalty but also improves brand impression, which is an important aspect in increasing customer lifetime value (CLV). The capacity to provide individualized experiences and anticipate customer demands has far-reaching ramifications for businesses, encouraging deeper connections and boosting long-term engagement. Furthermore, these AI-powered tactics assist firms in distinguishing themselves in competitive markets, reinforcing their brand identity while assuring long-term client retention and profitability.

3.4. Strategic Decision-Making and Scenario Modeling

The use of AI to facilitate strategic decision-making, notably through scenario modeling, has had a significant impact in areas such as finance and retail. Companies in various industries have used AI to create multiple strategic scenarios, allowing them to foresee the outcomes of specific decisions and increase the efficiency of high-level planning. According to research, integrating AI into decision-making processes lowered strategic planning time by 30%, as demonstrated in Table 4.

Table 4: Decision-making efficiency by industry.

Industry	Traditional Timelines (days)	AI-Assisted Timelines (days)	Reduction (%)
Retail	10	7	30
Healthcare	12	8	33
Finance	15	10	33

Figure 4, labeled Shortened Decision-Making Cycles, shows how AI technologies have reduced decision-making time by offering quick access to data and actionable forecasts. Top executives can use AI to quickly analyze the feasibility of specific strategies and their potential ramifications. This feature is especially useful during periods of volatility or when making complex decisions involving several variables.

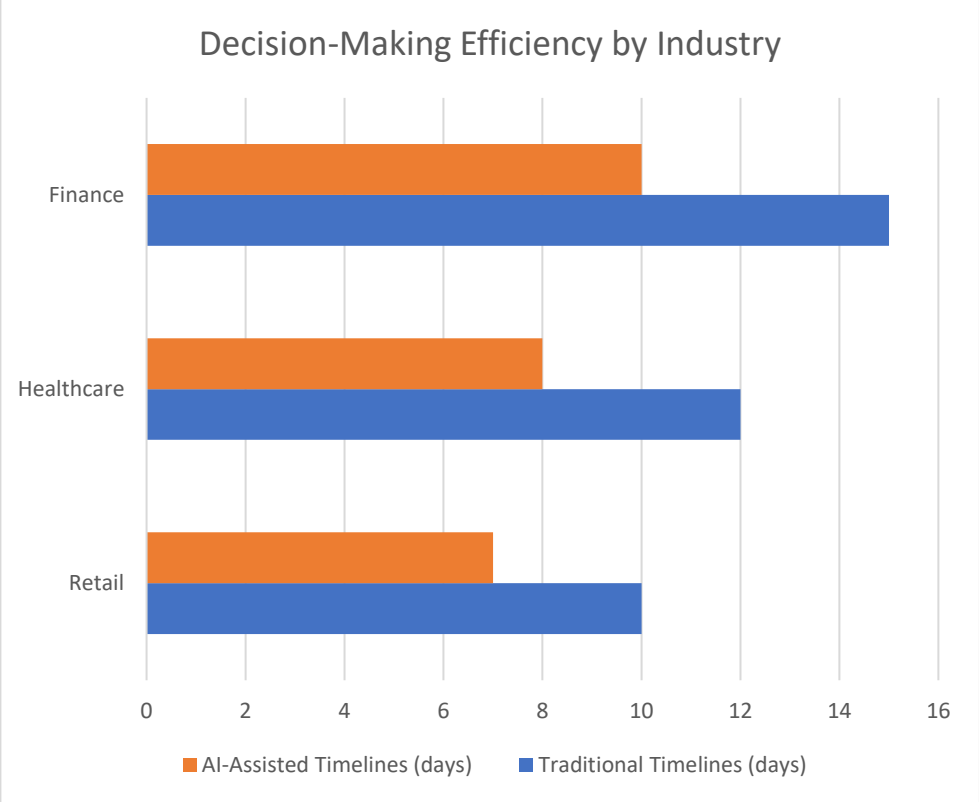

Figure 4: Decision-making efficiency by industry.

AI-driven decision-making has also increased organizational agility, allowing businesses to respond quickly to changes in market situations, regulatory environments, and consumer habits. This adaptability is especially important in businesses with frequent transitions, such as IT, banking, and consumer products. Organizations are better able to respond proactively to emerging difficulties and capitalize on new possibilities when decision-making is accelerated. The capacity to simulate and assess numerous scenarios decreases risks while also ensuring that strategic decisions are data-driven and well-informed. This AI-enabled decision-making method promotes resilience, allowing firms to navigate uncertainty with greater confidence and precision while preserving a competitive advantage in rapidly evolving markets.

3.5. Challenges and Limitations

The study also identified many issues involved with applying AI/ML, which, while ultimately generating favorable results, posed major impediments. Figure 5, titled Areas of Difficulty in AI Implementation, depicts the key challenges that organizations encounter when using AI, such as data privacy concerns, algorithm bias, and corporate opposition.

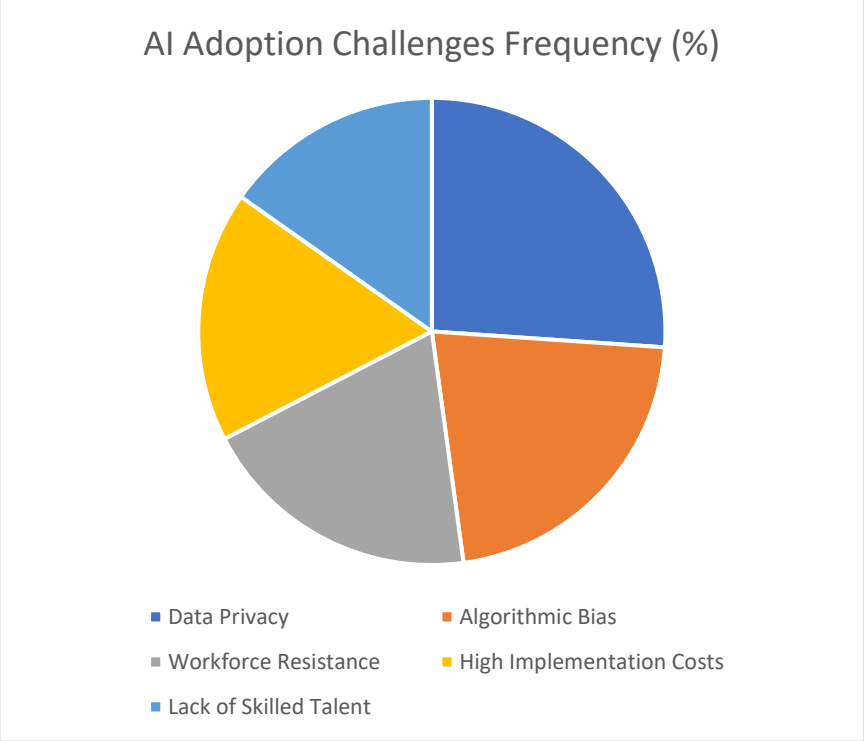

Figure 5: Difficulties in AI implementation.

Data privacy is a major concern, especially in sectors that handle sensitive client information. Surveyed firms emphasized the importance of strong data security procedures in order to comply with requirements such as GDPR and CCPA. Failure to address data privacy adequately can lead to legal implications and a loss of customer trust, hence it is a critical emphasis for AI deployment.

Algorithmic bias is also a significant concern, since AI algorithms may accidentally perpetuate prejudices encoded in training data. This can result in unequal outcomes, especially in sectors like hiring, financing, and targeted advertising. To avoid this risk, enterprises should provide varied and representative training datasets, as well as conduct regular audits of AI systems to monitor and improve fairness.

Workforce resistance is still a substantial barrier. Many employees express concerns about job displacement, especially in professions that require repetitive or tedious tasks. Addressing these issues involves proactive efforts such as upskilling programs, open communication about AI's role in the business, and portraying AI as a tool that complements rather than replaces human capabilities. To fully reap the benefits of AI, enterprises must effectively navigate these difficulties. Businesses may overcome these barriers by prioritizing data protection, guaranteeing algorithm fairness, and cultivating a collaborative and innovative culture, resulting in an atmosphere where AI is viewed as a strategic asset driving growth and efficiency.

3.6. Limitations of the Study

However, this study has some limitations that should be noted despite the considerable contribution to knowledge generated by this research. Firstly, there is the problem of self-generated data, meaning that all the data was received with the help of questionnaires, and it can be seen that some of the respondents were able to overstate the positive results of the AI/ML implementation or even omit some of the problems faced during this process. Secondly, more than the sample size might be needed to capture the small businesses or industries that have not adopted AI to the maximum level; therefore, this study cannot be generalized to all business sectors. Finally, the study was largely qualitative and based on short-term outcomes, so the sustainability and new issues arising from adopting AI/ML should have been discussed. Last but not least, the study has discussed data privacy and algorithmic bias; however, the dynamic environment of AI technology and regulation makes these ethical issues dynamic. Thus, these need to be periodically reviewed. Such limitations mean that there is a need for subsequent studies that would compare various types of businesses, evaluate results in the long term, and closely look at the further evolution of the AI regulation framework.

4. CONCLUSION

Based on the findings, the following action should be taken to get the most out of AI and ML in businesses. First, organizations should develop intense training sessions to enhance the skills of their employees and build a bridge toward effective AI decision-making. Chatbots help businesses by providing a better forecast, efficient operations, and better services to their customers. The results indicate that AI applications in business promise to drive improvements throughout organizations in operational cost, customer satisfaction, and time to make decisions. However, the study shows other crucial issues, including high implementation costs, data privacy issues, algorithm bias, and organizational employee resistance to AI/ML implementation to be effective.

4.1. Recommendations

Below are several primary recommendations for businesses that wish to benefit from using Artificial Intelligence and Machine Learning: First, organizations should develop complex training initiatives that will help improve the readiness level of the workforce in transitioning to AI decision models. Supervisors and other employees need to be educated on how to share working space with AI applications to integrate AI into the working process properly. Second, regarding data security, it is imperative to keep data private. There should be proper data management that meets the GDPR, CCPA, or other similar laws to protect consumer data from excessive use and misuse, as well as the implementation of ethical AI to reduce the problem of bias in artificial intelligence.

Moreover, companies should invest in creating and sustaining explanations and accountability for AI decision-making. This will help gain stakeholders' trust and create fairness in the way AI makes decisions. Embedded predisposing bias checking for AI systems is required, including employment resolution and resource provision. Last of all, organizational learning involves sustained assessment of AI models about the prevailing market trends and consumer habits, which need to be addressed to guarantee the sustainability of these systems.

4.2. Future Implications

This research suggests many more significant applications of AI/ML beyond the straightforward adoption of such solutions. Longer-term AI technologies are anticipated to be even more fully embedded within business plans, and there is the prospect of re-architecting industry and business models. This evolution will continue and only become even more complex; hence, we will see the next AI advancements in predictive maintenance, self-sustaining systems, and highly individualized customer experiences. As AI becomes more mainstream and affordable, some industries may be empowered to use these tools to challenge larger organizations.

However, the emergence of such technologies itself presents ethical dilemmas that need to be solved by further research and policies. In the future, AI in business will need general ethical principles that protect AI from malicious use and guarantee compliance with general values. In addition, there is an increasing concern about how AI changes employment relations. Thus, there will be pressure to develop policies that will address the changing relations in a manner that will allow for the benefits of technology to be shared among the population.

In conclusion, both AI and ML have great potential for businesses, yet their implementation is a complex process that should involve the consideration of ethical, operational, and societal aspects. It is, therefore, crucial that with the increasing automation of business decisions, transparency, fairness, and constant innovation are realized. Future work should concentrate on the emerging issues of AI use, such as bias, privacy, and other social impacts of AI use.

REFERENCES

Akter, J., Kamruzzaman, M., Hasan, R., Khatoon, R., Farabi, S. F., & Ullah, M. W. (2024). Artificial Intelligence in American Agriculture: A Comprehensive Review of Spatial Analysis and Precision Farming for Sustainability. 2024 IEEE International Conference on Computing, Applications and Systems (COMPAS),

Akter, J., Nilima, S. I., Hasan, R., Tiwari, A., Ullah, M. W., & Kamruzzaman, M. (2024). Artificial intelligence on the agro-industry in the United States of America. *AIMS Agriculture and Food*, *9*(4), 959-979.

Akter, S., Dwivedi, Y. K., Sajib, S., Biswas, K., Bandara, R. J., & Michael, K. (2022). Algorithmic bias in machine learning-based marketing models. *Journal of Business Research*, *144*, 201-216. https://doi.org/https://doi.org/10.1016/j.jbusres.2022.01.083

Akter, T., Samman, A. S. A., Lily, A. H., Rahman, M. S., Prova, N. N. I., & Joy, M. I. K. (2024, 24-28 June 2024). Deep Learning Approaches for Multi Class Leather Texture Defect Classifcation. 2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT),

Arora, S., & Thota, S. (2024). Ethical Considerations and Privacy in AI-Driven Big Data Analytics. *no. May*.

BALBAA, M. E., & ABDURASHIDOVA, M. S. (2024). The impact of artificial intelligence in decision making: a comprehensive review. *EPRA International Journal of Economics, Business and Management Studies (EBMS)*, *11*(2), 27-38.

Bhuyan, M. K., Kamruzzaman, M., Nilima, S. I., Khatoon, R., & Mohammad, N. (2024). Convolutional Neural Networks Based Detection System for Cyber-Attacks in Industrial Control Systems. *Journal of Computer Science and Technology Studies*, *6*(3), 86-96.

Biswas, B., Mohammad, N., Prabha, M., Jewel, R. M., Rahman, R., & Ghimire, A. (2024). Advances in Smart Health Care: Applications, Paradigms, Challenges, and Real-World Case Studies. 2024 IEEE International Conference on Computing, Applications and Systems (COMPAS),

Collins, C., Dennehy, D., Conboy, K., & Mikalef, P. (2021). Artificial intelligence in information systems research: A systematic literature review and research agenda. *International Journal of Information Management*, *60*, 102383. https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2021.102383

Culot, G., Podrecca, M., & Nassimbeni, G. (2024). Artificial intelligence in supply chain management: A systematic literature review of empirical studies and research directions. *Computers in Industry*, *162*, 104132. https://doi.org/https://doi.org/10.1016/j.compind.2024.104132

Ghimire, A., Imran, M. A. U., Biswas, B., Tiwari, A., & Saha, S. (2024). Behavioral Intention to Adopt Artificial Intelligence in Educational Institutions: A Hybrid Modeling Approach. *Journal of Computer Science and Technology Studies*, *6*(3), 56-64.

Gorgun, E. (2024a). Numerical analysis of inflow turbulence intensity impact on the stress and fatigue life of vertical axis hydrokinetic turbine. *Physics of Fluids*, *36*(1).

Gorgun, E. (2024b). Ultrasonic testing and surface conditioning techniques for enhanced thermoplastic adhesive bonds. *Journal of Mechanical Science and Technology*, *38*(3), 1227-1236.

Görgün, E. (2024). Investigation of The Effect of SMAW Parameters On Properties of AH36 Joints And The Chemical Composition of Seawater. *International Journal of Innovative Engineering Applications*, *8*(1), 28-36.

Gorgun, E., Ali, A., & Islam, M. S. (2024). Biocomposites of Poly (Lactic Acid) and Microcrystalline Cellulose: Influence of the Coupling Agent on Thermomechanical and Absorption Characteristics. *ACS omega*, *9*(10), 11523-11533.

Haleem, A., Javaid, M., Asim Qadri, M., Pratap Singh, R., & Suman, R. (2022). Artificial intelligence (AI) applications for marketing: A

literature-based study. *International Journal of Intelligent Networks*, *3*, 119-132. https://doi.org/https://doi.org/10.1016/j.ijin.2022.08.005

Hasan, R., Al Mahmud, M. A., Farabi, S. F., Akter, J., & Johora, F. T. (2024). Unsheltered: Navigating California's homelessness crisis. *Sociology Study*, *14*, 143-156.

Hasan, R., Chy, M. A. R., Johora, F. T., Ullah, M. W., & Saju, M. A. B. (2024). Driving Growth: The Integral Role of Small Businesses in the US Economic Landscape. *American Journal of Industrial and Business Management*, *14*(6), 852-868.

Hasan, R., Farabi, S. F., Kamruzzaman, M., Bhuyan, M. K., Nilima, S. I., & Shahana, A. (2024). AI-Driven Strategies for Reducing Deforestation. *The American Journal of Engineering and Technology*, *6*(06), 6-20.

Hoofnagle, C. J., van der Sloot, B., & Borgesius, F. Z. (2019). The European Union general data protection regulation: what it is and what it means*. *Information & Communications Technology Law*, *28*(1), 65-98. https://doi.org/10.1080/13600834.2019.1573501

Hossain, M. A., Tiwari, A., Saha, S., Ghimire, A., Imran, M. A. U., & Khatoon, R. (2024). Applying the Technology Acceptance Model (TAM) in Information Technology System to Evaluate the Adoption of Decision Support System. *Journal of Computer and Communications*, *12*(8), 242-256.

Imran, M. A. U., Aziz, M. B., Tiwari, A., Saha, S., & Ghimire, A. (2024). Exploring the Latest Trends in AI Technologies: A Study on Current State, Application and Individual Impacts. *Journal of Computer and Communications*, *12*(8), 21-36.

Johora, F. T., Hasan, R., Farabi, S. F., Akter, J., & Al Mahmud, M. A. (2024). AI-Powered Fraud Detection in Banking: Safeguarding Financial Transactions. *The American Journal of Management and Economics Innovations*, *6*(06), 8-22.

Johora, F. T., Manik, M. M. T. G., Tasnim, A. F., Nilima, S. I., & Hasan, R. (2021). Advanced-Data Analytics for Understanding Biochemical Pathway Models. *American Journal of Computing and Engineering*, *4*(2), 21-34.

Kharitonova, Y. S., Savina, V., & Pagnini, F. (2021). Artificial Intelligence's Algorithmic Bias: Ethical and Legal Issues. *Perm U. Herald Jurid. Sci.*, *53*, 488.

Madhuri Paradesi, S. (2020). Emerging trends in artificial intelligence. Advances in Computational and Bio-Engineering: Proceeding of the International Conference on Computational and Bio Engineering, 2019, Volume 2,

Morandini, S., Fraboni, F., De Angelis, M., Puzzo, G., Giusino, D., & Pietrantoni, L. (2023). The impact of artificial intelligence on workers' skills: Upskilling and reskilling in organisations. *Informing Science*, *26*, 39-68.

Papagiannidis, E., Mikalef, P., Conboy, K., & Van de Wetering, R. (2023). Uncovering the dark side of AI-based decision-making: A case study in a B2B context. *Industrial Marketing Management*, *115*, 253-265. https://doi.org/https://doi.org/10.1016/j.indmarman.2023.10.003

Peretz-Andersson, E., Tabares, S., Mikalef, P., & Parida, V. (2024). Artificial intelligence implementation in manufacturing SMEs: A resource orchestration approach. *International Journal of Information Management*, *77*, 102781. https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2024.102781

Prova, N. N. I. (2024, 28-30 Aug. 2024). Garbage Intelligence: Utilizing Vision Transformer for Smart Waste Sorting. 2024 Second International Conference on Intelligent Cyber Physical Systems and Internet of Things (ICoICI),

Prova, N. N. I. (2024, 3-5 Oct. 2024). Improved Solar Panel Efficiency through Dust Detection Using the InceptionV3 Transfer Learning Model. 2024 8th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC),

Soori, M., Arezoo, B., & Dastres, R. (2023). Artificial intelligence, machine learning and deep learning in advanced robotics, a review. *Cognitive Robotics*, *3*, 54-70. https://doi.org/https://doi.org/10.1016/j.cogr.2023.04.001

Tao, H., Bhuiyan, M. Z. A., Rahman, M. A., Wang, G., Wang, T., Ahmed, M. M., & Li, J. (2019). Economic perspective analysis of protecting big data security and privacy. *Future Generation Computer Systems*, *98*, 660-671. https://doi.org/https://doi.org/10.1016/j.future.2019.03.042