



A Study On The Impact Of Artificial Intelligence In Improving Decision-Making In Manufacturing Industries

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Abstract

Artificial Intelligence (AI) has emerged as a transformative technology in modern manufacturing industries. This research paper examines the role of AI in enhancing decision-making processes across production planning, quality control, cost optimization, and supply chain management. The study focuses on how data-driven AI models reduce human effort, improve accuracy, and enable faster operational decisions. A qualitative and analytical research methodology is adopted using secondary data from journals, industry reports, and case studies. The findings indicate that AI significantly improves efficiency, reduces operational costs, and enhances overall manufacturing performance. The paper concludes by highlighting future opportunities and challenges in adopting AI-driven decision-making systems.

Keywords: Artificial Intelligence, Manufacturing Industry, Decision-Making, Automation, Industry 4.0

1. Introduction

Manufacturing industries are undergoing rapid digital transformation driven by Industry 4.0 technologies. Artificial Intelligence plays a crucial role in enabling intelligent decision-making by analyzing large volumes of data in real time. Traditional decision-making methods are often slow and prone to human error. This study aims to analyze how AI improves decision-making efficiency and accuracy in manufacturing operations.

2. Literature Review

Previous studies indicate that AI-based systems enhance predictive maintenance, demand forecasting, and process optimization. Researchers have emphasized the importance of machine learning algorithms in reducing downtime and improving product quality. However, challenges such as high implementation cost and lack of skilled workforce remain significant barriers.

3. Methodology

This research adopts a descriptive and analytical methodology. Secondary data has been collected from international journals, industry reports, and credible online sources. The collected data is analyzed to evaluate the effectiveness of AI-driven decision-making tools in manufacturing.

4. Results and Analysis

The analysis reveals that AI implementation leads to faster decision cycles, reduced production errors, and optimized resource utilization. Manufacturing firms using AI reported improved forecasting accuracy and lower operational costs. AI-based analytics also enhanced quality control through real-time defect detection.

5. Conclusion

The study concludes that Artificial Intelligence significantly improves decision-making in manufacturing industries. Despite implementation challenges, the long-term benefits of AI adoption outweigh the limitations. Future research may focus on integrating AI with IoT and digital twins to further enhance manufacturing intelligence.

References

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