Trends in Industrial Engineering Regarding the Use of Artificial Intelligence for Continuous Improvement

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Abstract

Artificial Intelligence is increasingly used for continuous improvement in Industrial Engineering, but its main applications remain unclear. This study identified current AI trends and their potential contribution to Industrial Engineering education. A systematic literature review evaluated 138 records from EBSCO and Emerald through Scanning, Skimming, and Mapping, selecting 23 studies for the final matrix. The predominant trends were Process Improvement (100.00%), Machine Learning (86.96%), Decision Making (86.96%), Quality Improvement (82.61%), and Variability (78.26%). The findings show that AI supports process improvement, quality, and data-driven decisions, highlighting the need to progressively integrate AI competencies into the Industrial Engineering curriculum.

Introduction

Artificial Intelligence (AI) is increasingly applied in Industrial Engineering for continuous improvement, yet available information remains scattered and does not clearly show which tools are most used, where they are applied, or the measurable benefits and limitations reported. This creates a gap for students and early-career industrial engineers who need a clearer, evidence-based understanding of AI in practice. As adoption grows, organizing current knowledge is essential to support learning, application, and future improvement efforts in Industrial Engineering.

Objectives

- Identify AI trends in Industrial Engineering, focusing on continuous improvement and process optimization.
- Examine evidence from the last five years to capture recent applications and developments.
- Map the most common AI tools and their reported benefits.
- Evaluate AI impacts across areas
- Explore how these trends can support Industrial Engineering education and curriculum improvement.

Methodology

A Systematic Literature Review was conducted to analyze AI use in Industrial Engineering.

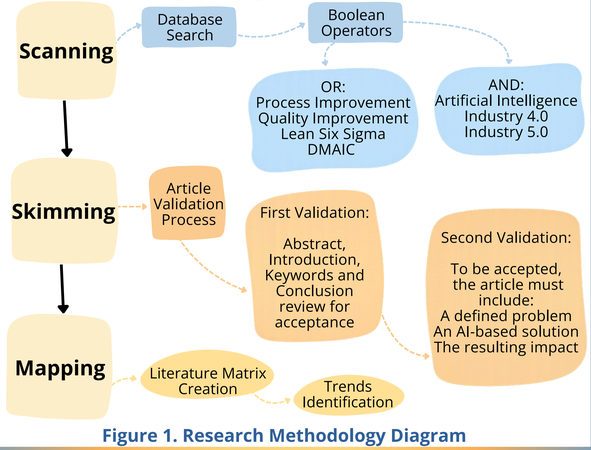

Figure 1. Research Methodology Diagram

Data

Scanning Phase

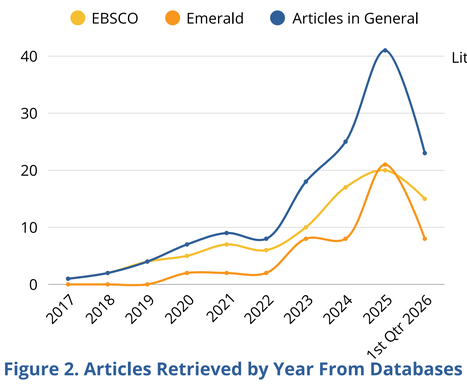

Figure 2. Articles Retrieved by Year From Databases

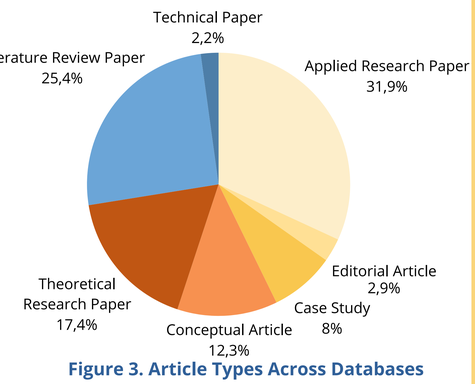

Figure 3. Article Types Across Databases

Skimming Phase

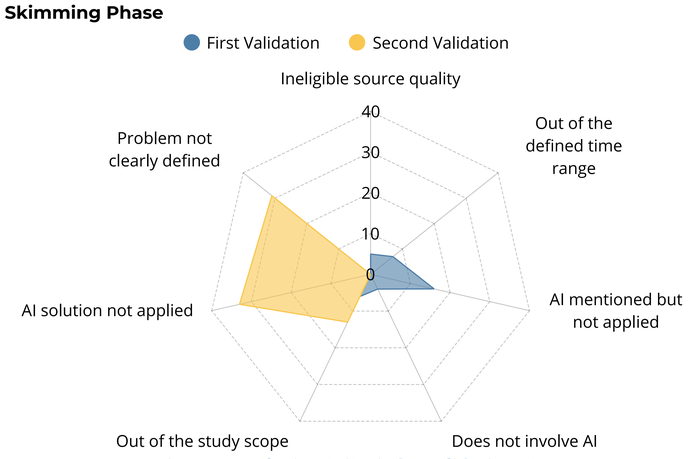

Figure 4. Exclusion Criteria by Validation Stage

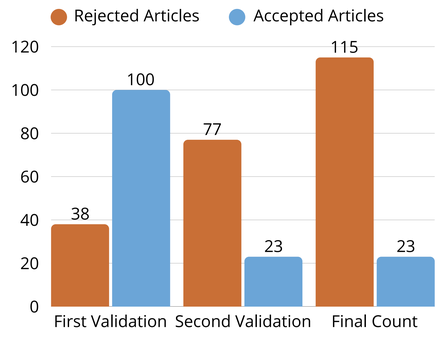

Figure 5. Article Screening Outcomes by Stage

Mapping Phase

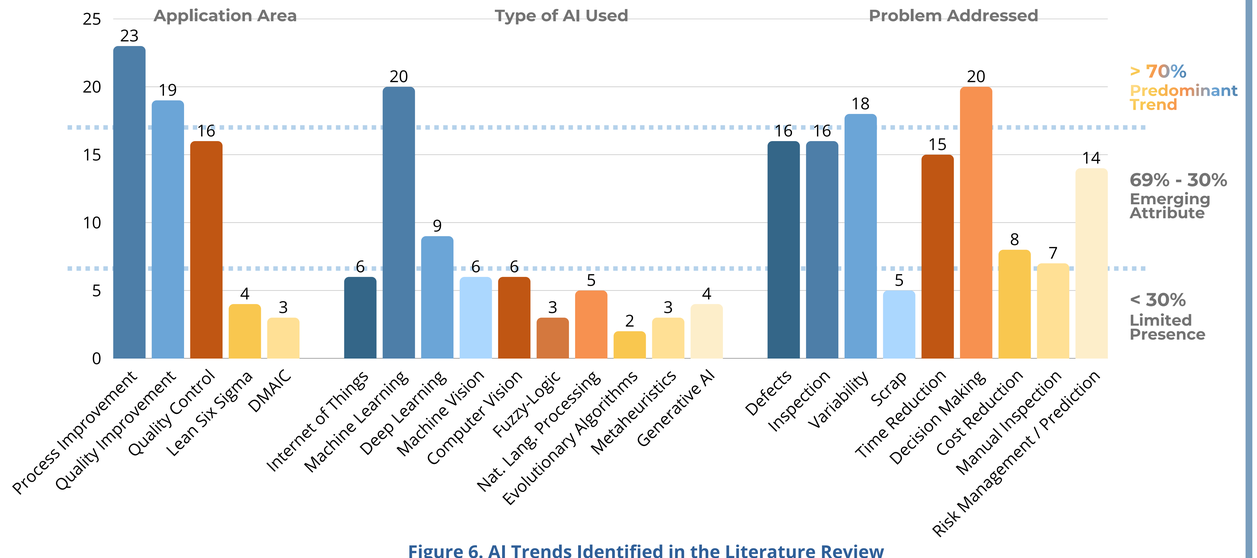

Figure 6. AI Trends Identified in the Literature Review

Analysis and Results

Literature Screening

The search retrieved 138 articles, showing increase from 2023 through early 2026. After the relevance screening, 100 articles progressed to a full-text evaluation phase for analysis. From this set, 23 studies (16.67%) were selected because they addressed an industrial problem, proposed an AI-based solution, and demonstrated a measurable operational or performance impact. The final matrix included 2 studies from 2021, 3 from 2023, 3 from 2024, 8 from 2025, and 7 from early 2026. , most studies were concentrated in 2025 and 2026, confirming the rapid and sustained growth of artificial intelligence research within the field of Industrial Engineering related technological domains.

Trend Analysis

Process Improvement (100.00%) and Quality Improvement (82.61%) were the leading application areas, with Machine Learning (86.96%) being the most common AI technology and Deep Learning (39.13%) emerging, while the main problems addressed included Decision Making (86.96%) and Variability (78.26%), alongside growing attention to Quality Control, Defects, Inspection, Time Reduction, and Risk Management and Prediction, showing that overall AI was mainly used to improve processes, enhance quality, and support more effective data-driven decision-making. AI adoption strongly aligns with operational efficiency goals across industrial contexts.

Conclusion

The review confirms that AI is becoming a strategic support for continuous improvement in Industrial Engineering. Current evidence is concentrated on Machine Learning applications for process and quality improvement, decision support, and variability reduction, while Lean Six Sigma/DMAIC integration and other AI technologies remain less documented. AI should complement traditional engineering methods, statistical foundations, and human judgment. A progressive curricular integration is recommended, beginning with IE 5990, IE 4212, IE 3222, IE 3510, and IE 3620. This approach would prepare students to select, validate, and responsibly apply AI to achieve measurable and sustainable operational improvements.

Future Work

Future research should examine how companies in Puerto Rico are using AI in continuous improvement processes, since no local studies were identified in the literature search. This would help better understand practices, challenges, and opportunities in the local context.

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