

# **Opening the Black Box: A Framework for Ethical AI Integration in Accounting Decision-Making and Financial Reporting**

## **Abstract**

The integration of generative artificial intelligence (AI) into accounting information systems presents a fundamental challenge to the accounting profession's core principles of transparency, accountability, and professional judgment. While AI capabilities promise enhanced financial analysis and decision-making support, algorithmic opacity threatens the reliability and auditability of accounting information, potentially undermining stakeholder trust and regulatory compliance. This research addresses this critical tension by developing and validating a novel framework—the Throughput Model (TPM)—specifically designed for AI-augmented accounting decision-making processes.

Drawing on accounting theory and professional standards, we extend the TPM from a conceptual decision-making model to a practical framework for integrating AI into accounting processes while preserving professional judgment and maintaining audit trails. Unlike existing AI implementations that often compromise transparency for efficiency, our approach enables parallel processing of financial information and ethical considerations while ensuring decision traceability and compliance with accounting standards. The framework operationalizes four interconnected constructs—perception, information processing, professional judgment, and decision implementation—to create AI-assisted accounting systems that enhance analytical capabilities while preserving professional accountability.

We demonstrate the framework's application through financial risk assessment and cybersecurity threat evaluation—critical areas where accounting professionals must rapidly process complex

information while maintaining fiduciary responsibilities. Using generative AI to create virtual expert advisory systems, we show how the TPM framework can systematically integrate AI insights with professional accounting judgment while maintaining transparency required for audit and regulatory purposes.

Empirical validation through paired-samples t-tests ( $n=247$ ) reveals statistically significant relationships among TPM constructs, confirming the framework's reliability for accounting applications. Results demonstrate that parallel processing of ethical and technical considerations significantly enhances decision quality ( $p<0.001$ ) while maintaining the transparency and accountability required by accounting standards.

This research contributes to accounting theory by providing the first comprehensive framework for ethically integrating AI into accounting processes that addresses the transparency-capability trade-off inherent in modern financial reporting. For practice, the framework offers accounting professionals and firms a validated approach for AI adoption that meets professional standards and regulatory requirements while realizing the analytical benefits of advanced AI capabilities. The study establishes theoretical foundations for AI-augmented accounting practices that maintain professional oversight and fiduciary responsibility while enhancing the quality and efficiency of financial reporting and analysis.