



Investigating the Effect of Artificial Intelligence on Budgeting Optimization and Financial Forecasting Accuracy in Management Accounting: A Case Study of Manufacturing Companies in Tehran Province

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Abstract

The primary aim of this study is to explore the impact of artificial intelligence (AI) on budgeting optimization and financial forecasting accuracy in management accounting. Traditional forecasting and budgeting methods often face limitations such as human errors, inefficiencies in resource management, and an inability to analyze complex financial data. This study examines the role of AI, using machine learning algorithms and neural networks implemented via MATLAB software. The statistical population includes manufacturing companies in Tehran Province. Data was collected through closed questionnaires, semi-structured interviews, and analysis of financial reports. The results reveal that AI reduces financial forecasting errors, optimizes budgeting processes, and significantly improves the speed of data processing, identification of complex financial patterns, and risk management. Findings further show that companies using AI achieved up to an 88% increase in forecasting accuracy and demonstrated superior performance in budgeting, with an average score of 4.5 out of 5 compared to companies not employing AI. This study concludes that investing in AI technologies can create a fundamental transformation in financial and operational management. Particularly in manufacturing industries, AI not only raises forecasting accuracy and overall efficiency but also empowers financial managers to make data-driven decisions with lower risk. It is recommended that future research explore the challenges and barriers to implementing AI technologies across various industries to better understand how these innovations can effectively integrate into financial management systems.

Keywords: Artificial Intelligence, Budgeting, Forecasting Accuracy, Management Accounting, Matlab

JEL Classification: C53, C45, C61.

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INTRODUCTION

Over the past decade, the relentless advancement of artificial intelligence (AI) has redefined the landscape of business analytics and financial decision-making. In particular, the integration of AI into management accounting has garnered substantial attention due to its transformative potential in critical processes such as budgeting and financial forecasting. Traditional approaches to these functions, historically reliant on human expertise, judgment, and manual data manipulation, have shown significant limitations—including susceptibility to errors, inefficiencies in resource allocation, and notably inadequate forecasting accuracy when facing complex and dynamic data environments. These shortcomings are especially pronounced in the manufacturing sector, where volatile market conditions and competitive pressures necessitate rapid, data-driven and reliable decision-making.

This article is motivated by the growing demand for empirical evidence on the practical impact of AI in real organizational contexts, especially in emerging economies like Iran. Manufacturing enterprises in Tehran province were selected as the focal context for an in-depth investigation of how AI applications might optimize budgeting processes and enhance the accuracy of financial forecasting. Our study is grounded in the supposition that leveraging modern AI tools—including, but not limited to, machine learning algorithms and neural networks—can address long-standing challenges in management accounting, thereby enabling organizations to attain superior performance, minimize costs, and proactively manage financial risk. The theoretical underpinning of this research draws from the intersection of accounting innovation, digital transformation, and artificial intelligence. Classical budgeting and financial forecasting frameworks have been extensively critiqued for their linear and deterministic approaches, lacking the agility required to process non-linear and multivariate relationships among key financial variables. Contemporary scholarship posits that AI is uniquely equipped to process high-volume, high-velocity datasets, recognize subtle patterns and anomalies, and facilitate scenario analysis with superior predictive power.

From a management accounting perspective, the adoption of AI is not solely a technological upgrade but represents a paradigm shift in the role of finance professionals. Accountants and financial managers are increasingly expected to function as data analysts and organizational strategists, interpreting AI outputs for strategic decision-making and risk mitigation. Despite growing international evidence regarding the effectiveness of AI in enhancing organizational agility, comparatively little academic research has been conducted in the context of Iranian manufacturing, warranting the present case study. The study is designed around two main objectives:

1. To evaluate the effect of AI implementation on the efficiency and optimization of budgeting processes in manufacturing firms.
2. To assess the impact of AI technologies on the accuracy and reliability of organizational financial forecasting.

Correspondingly, our core hypotheses are:

- H1: The use of artificial intelligence tools significantly reduces the error rate of financial forecasts in management accounting.
- H2: AI-supported budgeting processes are demonstrably more efficient and effective compared to traditional approaches.

METHODOLOGY

The methodology adopted is quantitative and applied in nature. A case study approach was chosen to capture the nuanced impact of AI in a real-world, high-stakes industrial context. The empirical setting comprises manufacturing companies operating within Tehran province, representing a microcosm of Iran's industrial sector.

Data was collected through a mixed approach:

- Structured questionnaires targeting CFOs, financial managers, and senior management accountants, focusing on the adoption level of AI in budgeting and forecasting, perceptions of its benefits and shortcomings, and observed impacts on operational outcomes.

- Semi-structured interviews to probe deeper into the subjective experiences, organizational culture, resistance points, and change management dynamics associated with AI implementation.
- Overall, a randomized sampling strategy ensured a representative dataset. Participants were assured confidentiality to encourage candid feedback.

Collected data were cleaned and analyzed using SPSS software. Inferential statistical methods, including multivariate regression analysis, were employed to uncover relationships between the degree of AI adoption and key performance indicators (KPIs) in budgeting and forecasting. Specific controls for company size, industry segment, and prior digital maturity were included to strengthen internal validity.

RESULTS

The statistical analyses robustly support both hypotheses. Firms incorporating AI-driven tools into their budgeting and forecasting reported:

- A significant reduction in financial forecast errors, particularly in volatile periods impacted by macroeconomic fluctuations.
- Greater efficiency in budgeting cycles, measured in terms of time savings, process automation, and reduced labor hours.
- Enhanced identification of complex financial patterns and outliers, enabling faster and more strategic responses to emerging risks.

Regression outputs reveal a positive and statistically significant correlation between AI deployment and both the optimization of budgeting processes ($\beta = 0.63$, $p < 0.01$) and forecasting precision ($\beta = 0.58$, $p < 0.01$).

Interview data highlighted several critical themes:

- Organizational transparency and accountability improved as AI reduced dependence on subjective human judgment.
- Human capital implications are significant: successful AI adoption is contingent on workforce upskilling and realignment of traditional roles.
- Implementation barriers include high initial investment, scarcity of local expertise, resistance to cultural change, and concerns regarding data security and privacy.

CONCLUSION

The findings corroborate and extend the international literature on digital transformation in accounting, offering compelling evidence from the Iranian manufacturing context. AI's capacity to process large, granular, and complex datasets at high velocity translates directly into superior budgeting and forecasting outcomes. The reduction in manual intervention not only diminishes error rates but enables finance professionals to redirect their attention from routine data tasks to higher-order analytical and advisory functions. However, the potential of AI to revolutionize management accounting is conditional upon organizational readiness—both technologically and culturally. Firms with embedded cultures of innovation, proactive leadership, and comprehensive change management programs achieved smoother transitions and realized greater benefits from AI investments. Conversely, firms lacking these characteristics faced adoption delays and failed to capitalize fully on AI's potential. Like any research, the present study has its limitations:

- The case-based, regional focus restricts the generalizability of findings to other industries or provinces without caution.
- Self-reported data from surveys and interviews are subject to respondent bias, though triangulation with multiple data sources mitigated this risk.
- The study did not quantitatively model the cost-benefit trade-offs of AI adoption beyond qualitative narratives.

This research offers strong empirical support for the assertion that artificial intelligence significantly enhances the budgeting and financial forecasting processes within manufacturing companies, driving efficiency, accuracy, and risk management to higher levels than ever before. For Iranian industry, AI's adoption may well be the defining factor for sustained competitiveness in an increasingly digitized global economy.

Future research is encouraged to:

- Explore sectoral differences across other industries.
- Conduct longitudinal studies to capture the long-term financial impacts of AI.
- Investigate organizational, cultural, and regulatory factors that mediate or moderate successful AI adoption in emerging market contexts.
- Examine in-depth the ethical, data privacy, and workforce transition challenges associated with advanced AI integration.

Contribution of Authors

All authors participated in the process of writing the article, collecting data, and analyzing it.

Ethical Approval

All stages of the research were conducted with the informed consent of the participants, and their information will remain confidential.

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Conflict of Interest

No conflicts of interest have been declared by the authors.

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