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Research on the Application of Large Language Models in Management Accounting

Xurui Cheng, Yuedan Hu

Maejo University, Thailand 50000

Abstract: Large language models (LLMs) offer significant potential for transforming management accounting through their ability to process and analyze complex data patterns. This paper explores the current applications, future scenarios, opportunities, and challenges of LLMs in management accounting. By combining case studies and literature reviews, this study proposes an analysis framework and outlines future research directions to provide guidance for both theoretical research and corporate practice.

Keywords: Management Accounting; Large Language Model Applications; Artificial Intelligence; Predictive Analysis; Decision Support

1. Introduction

In the digital age, the integration of artificial intelligence (AI) and management accounting has become a focal point for enhancing corporate decision-making. Large language models (LLMs) stand out as a powerful tool in this integration due to their advanced capabilities in natural language processing (NLP) and data analysis^[1]. These models can process vast amounts of structured and unstructured data, providing valuable insights that traditional methods cannot. This paper aims to explore how LLMs can enhance management accounting practices, addressing both the opportunities and challenges that arise from this technological integration.

2. The Relationship Between Large Language Models and Management Accounting

2.1 Cost Management and Optimization

LLMs can analyze historical cost data, supply chain information, and market dynamics to predict future cost trends and provide optimization suggestions. For example, a manufacturing company integrated historical procurement data, international commodity price trends, and supplier contract texts to train a cost prediction model. Using a generative model like GPT-4, the company simulated cost changes under different price fluctuation scenarios and generated dynamic adjustment suggestions. This approach reduced the cost prediction error rate from 12% to 5% and saved 8% on annual raw material costs.

2.2 Risk Management and Compliance Auditing

LLMs can identify internal and external risk factors for companies, such as market fluctuations, policy changes, and supply chain risks, and provide early warnings and response strategies. In compliance auditing, LLMs can automatically check the compliance of financial data and identify abnormal transactions, reducing the burden of manual auditing. For instance, in the medical industry, LLMs and graph neural networks (GNNs) can build supplier network relationship graphs to identify key node risks. By scanning real-time supplier news and industry policy documents, LLMs can trigger emergency procurement plans, reducing risk response time from 5 days to 2 hours and increasing the matching efficiency of alternative suppliers by 50%.

2.3 Intelligent Financial Analysis and Report Generation

LLMs can automatically parse financial data, market reports, and management statements to generate financial analysis summaries, trend predictions, and management recommendations. For example, multinational companies can use LLMs to automatically translate and proof-read local financial reports from different countries, significantly reducing the time and effort required for manual translation and adjustment. A multilingual LLM can convert headquarters' financial report data into text and charts that comply with local accounting standards, improving decision-making efficiency.

2.4 Budget Preparation and Dynamic Adjustment

LLMs can provide more accurate budget forecasts and dynamic adjustments based on historical budget execution data, industry trends, and corporate strategic goals. For example, a chain retail company used the BERT model to analyze social media comments, weather forecast

reports, and local event information to extract demand drivers. By combining multimodal data (text + time-series data), the company generated regional and category-specific sales forecasts and linked them to the inventory management system for automatic restocking.

2.5 Strategic Decision Support

LLMs can simulate the impact of strategic decisions, such as carbon tax policies, and generate financial feasibility reports for emission reduction paths. This helps companies build "anticipatory strategic capabilities" and promotes long-term value growth. For example, an energy company used LLMs to simulate the impact of carbon tax policies on different business lines, shortening the strategic decision-making cycle.

3. Opportunities and Challenges

3.1 Opportunities

Enhanced Data Analysis and Decision Support. LLMs can rapidly process vast amounts of structured and unstructured data to provide more accurate cost predictions, budget optimizations, and performance evaluation suggestions, assisting management in making data-driven strategic decisions. **Automated Financial Processes and Improved Efficiency.** Through NLP technology, LLMs can automatically generate financial analysis reports, management recommendations, and audit summaries, reducing repetitive manual work and operational costs. **Dynamic Budgeting and Real-Time Adjustment.** LLMs can dynamically adjust budget plans based on real-time operating data, enhancing corporate agility in responding to market changes. **Intelligent Risk Management and Compliance Monitoring^[2].** LLMs can analyze internal and external risk factors, provide early warnings, and suggest response strategies. They can also automatically check the compliance of financial data, reducing audit vulnerabilities. **Personalized Performance Management and Strategic Optimization** By integrating diverse data, LLMs can offer customized performance improvement plans and optimize resource allocation based on corporate strategic goals.

3.2 Challenges

Cybersecurity and Data Privacy Issues. Financial data is highly sensitive, and the training and application of LLMs must comply with data protection regulations (such as GDPR). The training and application of LLMs may face risks of data leakage, misuse, or non-compliance with cross-border data transfer regulations. **Lack of Model Interpretability and Trust.** The "black box" nature of LLMs can make decision-making logic opaque, leading to skepticism from management and auditing bodies, especially in high-risk scenarios (such as merger and acquisition decisions), limiting their practical application. **Shortage of Professional Talent.** Traditional financial teams need to adapt to role changes, acquire new knowledge, and develop higher capabilities. Management needs to reconstruct assessment and incentive mechanisms. **Management accounting personnel,** long confined to financial domain knowledge, lack keen insights into business scenarios and technological developments. **Integration Difficulties with Traditional Systems.** Existing ERP and financial software often have closed data formats, which may not directly interface with LLMs, leading to data silos and process fragmentation. System upgrades or interface development is required, increasing technical complexity and implementation costs. **High Computational Power and Implementation Costs.** Training and deploying LLMs require high-performance computing resources. Small and medium-sized enterprises may face high technical barriers and operational costs^[3].

4. Response Strategies

4.1 Data Security and Privacy Protection

Privacy-enhancing technologies (such as federated learning and homomorphic encryption) can be adopted to achieve "data availability without visibility." A localized private deployment solution can be built to keep sensitive data flowing only within the corporate intranet. A data access security authorization mechanism can be established to restrict the access permissions of LLMs.

4.2 Enhancing Model Interpretability

Interpretability tools (such as SHAP and LIME) can be combined to generate visual decision path reports. A hybrid model architecture (such as "rule engine + LLM") can be used, with key decisions made by the rule engine. Additionally, a human-AI collaborative review process can be designed, allowing management to question and correct AI suggestions.

4.3 System Integration and Process Optimization

Develop standardized API interfaces to connect LLMs with existing systems (such as ERP, CRM). Utilize low-code platforms to build lightweight middleware, reducing development costs. Promote corporate data construction by unifying data formats and cleaning standards.

4.4 Reducing Computational Power and Cost Barriers

Model compression techniques (such as knowledge distillation and quantization) can be adopted to lighten LLMs for edge device compatibility. Collaborate with industry experts to develop domain-specific LLMs and build vertical SaaS services with pay-as-you-go models

to reduce self-construction costs^[4]. Explore micro-tuning solutions for open-source models (such as LLaMA, Falcon) to lower licensing fees. Construct industry knowledge bases (such as accounting standards, supply chain terminology) to enhance model professionalism. Implement few-shot learning to reduce data labeling costs.

4.5 Application Analysis of Large Language Model Technology

LLMs enhance the dynamism of management accounting through real-time data fusion and adaptive model iteration, enabling companies to build resilient and agile operating systems. This capability is crucial for companies to navigate the uncertainties of the business environment and make timely strategic adjustments. LLMs improve precision by providing fine-grained, multi-dimensional analysis, solving traditional issues like "cost black box" and enabling real-time insights into corporate value creation. This precision allows companies to make more informed decisions and optimize resource allocation effectively.

LLMs automate risk monitoring and compliance checks, transforming management accounting from post-event recording to forward-looking decision-making. This automation not only reduces manual effort but also enhances the accuracy and timeliness of risk management and compliance activities. LLMs integrate with other technologies and business systems, promoting a collaborative ecosystem that enhances efficiency and strategic empowerment. This integration allows for seamless data flow and collaboration across different departments and systems, improving overall business performance. LLMs enable real-time financial management by integrating stream computing and edge intelligence, reducing lag and improving response mechanisms. Real-time capabilities are essential for companies to respond quickly to market changes and seize opportunities as they arise. LLMs support sustainable development by optimizing resource allocation and improving decision-making efficiency, redefining management accounting as a core enabler of corporate sustainability. This support helps companies achieve long-term value creation while addressing environmental and social challenges.

5. Conclusion

The integration of LLMs and management accounting represents a paradigm shift from traditional tools to an intelligent decision-making hub. This study highlights the potential of LLMs in areas such as cost quantification, risk prediction, and sustainable development. However, challenges such as data security and model interpretability must be addressed. Future research should focus on developing lightweight industry-specific models and human-AI collaborative mechanisms. The successful application of LLMs in management accounting depends on balancing technological tools with human values and embedding them within the corporate value chain. As businesses continue to evolve in the digital age, the role of management accounting will become increasingly strategic, with LLMs playing a pivotal role in driving this transformation.

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