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The Impact of Blockchain Technology Applications on Enterprise Financial Performance — A Case Study of China Telecom

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Abstract. Against the backdrop of the digital economy, blockchain technology, with its decentralization, immutability, and fulltraceability features, has become an important technical pillar for enterprises' financial digital transformation. To examine the real effects of blockchain adoption on corporate financial performance, this paper takes China Telecom as the research object, using case study and financial indicator comparison methods to review the application history and current implementation of blockchain in corporate financial scenarios. It analyzes the change in financial performance before and after blockchain implementation in a systematic manner using five dimensions, namely, profitability, operating capacity, cost and expense control, solvency, and development capacity. The research indicates that blockchain is very effective in improving the performance of companies financially through the optimization of the settlement process, reduction of operational expenses, and improvement of data credibility and the quality of internal controls, creating a pathway of transmission of technology adaptation - process reengineering - value enhancement. In turn, existing applications have drawbacks such as poor technical coordination, coverage of a few scenarios, and a lack of interdisciplinary skills. The conclusions give useful references to the financial digitalization of the telecommunication sector.

Keywords: blockchain technology, enterprise financial performance, China Telecom

1. Introduction

Digitization has become the backbone of the world economy's development and industry upgrading [1]. Blockchain is a new wave of disruptive technology that is infiltrating the sphere of corporate finance management at high speed [2]. Conventional financial models have been subject to a variety of weaknesses, including inefficient processes, lengthy reconciliations, susceptibility to manipulation, low transparency, and high costs of internal controls, thus unable to provide the requirements of efficient, reliable, and safe management of finances in the digital age [3]. Blockchain technology, with its properties of distributed registers, smart contracts, and complete traceability, may be used to help boost efficiency in financial operations, minimize the overheads, increase the authenticity of data and corporate transparency, and hence, increase overall corporate

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financial performance and represent a significant channel to the financial sector's digital transformation [4]. The main companies in the telecommunication industry (e.g. China Telecom) are hastening to implement the so-called strategy of the Cloud Transformation, Data-Driven, Intelligent and Beneficial, actively adopting the use of blockchain, 5G, cloud computing and other technologies and researching the intelligent evolution of financial systems, offering a typical practical situation of research of the connection between blockchain and financial performance.

Domestic and international scholars have carried out numerous studies on blockchain technology and corporate finance. The prevailing opinion is that blockchain could help streamline financial operations, increase audit effectiveness, decrease the cost of transactions, and create more financial transparency, which would positively influence the work of the company and its performance [5]. The current research tends to pay attention to the areas of finance and manufacturing, and studies the value of blockchain implementation in accounting, supply chain financing, risk management, etc. [6] Nevertheless, there are fewer case studies on information technology companies, such as telecommunications, when it comes to financial performance analysis in various dimensions, and hence, this paper has some research space.

China Telecom ranks as one of the leading providers of comprehensive information services in China [7], and has as its central strategy "Cloud Transformation, Data-Driven, Intelligent and Beneficial, and has implemented blockchain technology on a large scale in financial operations, including billing and settlement, tax alignment, and internal audits. Based on Tianyi Cloud and the Quanxinchuang technology stack, it achieves credible data on-chain and process automation, and is one of the best companies in the telecommunication sector that uses blockchain to facilitate financial transformation, which can be considered typical and representative [8-10].

This paper uses China Telecom as an example with the intention of explaining the blockchain application path in corporate finance, determining its particular impact on profitability, operational capability, cost and expense management, solvency and development capability, extracting the core mechanism of the technology that facilitates financial performance, and summarizing some practical experiences and drawbacks. It theoretically adds to the body of interdisciplinary literature on blockchain technology and the financial performance of information technology enterprises, and fills holes in the field studies done in isolation; practically, it gives an example implementation solution to telecommunications companies and other similar organizations to achieve financial digitalization, increase the level of financial management, and increase performance.

2. Overview of China Telecom's blockchain applications and financial statement analysis

China Telecom's blockchain applications are advancing in three phases under the 'Cloud to Data and Digital Transformation' strategy:

Pilot Exploration Period (2019-2021) The emphasis was on the most important pain points, including billing and settlement, and financial and tax reporting. A blockchain underlying platform has been constructed. Jiangsu Telecom became the pioneer in conducting a pilot of the trusted financial and tax platform, which confirmed the possibility of registering data on the blockchain and automated settlement, the realization of the paperless commission settlements of agents and online auditing.

Promotion and Implementation Period (2022-2023): Promoted large-scale application of blockchain in groups, which included various scenarios such as billing and settlement, channel settlement and internal audit. Originally coupled with Tianyi Cloud and 5G networks into an easily replicable financial digitalization solution.

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The Third Deep Integration Period (2024-Present) is a development of an integrated Cloud-Network-Data-Intelligence-Security-Blockchain system with full implementation of blockchain into the whole financial process, which allows reporting of data assets and trusted sharing between entities, providing opportunities to enhance intelligent finance and compliance control.

3. Blockchain application scenarios and current status in the financial sector

Billing and Settlement: The original call records and settlement data are recorded on the blockchain in an automatic manner, which replaces the multi-level manual forwarding, enhancing the accuracy of information and the resilience of the system. The efficiency of the settlement has risen by more than 50 percent, and the errors have decreased by more than 30 percent.

Financial and Tax Collaboration: It has broken down the data barriers of invoices, orders and payments, allowing all steps of automated channel payments to be settled in electronic form, minimizing workforce in financial positions and saving money on processing of invoices and disputes. Internal Control and Audit: The information cannot be tampered with as it is tamper-proof and completely traceable, allowing complete chain financial information auditing and minimizing audit costs and compliance risk. Fund Management: Payment terms are automatically implemented by means of smart contracts, which reduces the time taken to turn over capital and enhances the effectiveness of the use of funds.

4. Overall analysis of China Telecom's financial statements (2022–2025)

The chosen article will use annual report information on 2022-2025 to perform the financial analysis in five key aspects using the data based on the publicly accessible financial reports of the listed company.

4.1. Profitability analysis

Table 1. Profitability analysis table

Indicator	2022	2023	2024	2025
Total Operating Revenue(100 million yuan)	4749.67	5078.43	5235.69	5239.25
Net profit attributable to parent company(billion yuan)	275.93	304.46	330.12	331.85
Gross Margin	27.62%	28.15%	28.53%	29.08%
Net profit margin	5.81%	5.99%	6.31%	6.34%
Return on Equity (ROE)	6.32%	6.90%	7.34%	7.24%

Revenue steadily increased, rising from 474.967 billion yuan to 523.925 billion yuan, with continuous expansion in scale. Net profit improved year by year, reaching 33.185 billion yuan in 2025, with profitability continually strengthening, as shown in Table 1. Gross margin and net margin have been optimized year by year, with significant results in cost control and product structure improvement. ROE remains stable, reflecting a stable level of shareholder returns.

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4.2. Operational capability analysis

Table 2. Operational capability analysis table

Indicator	2022	2023	2024	2025
Accounts Receivable Turnover (times)	4.21	4.35	4.52	4.68
Total Asset Turnover (times)	0.59	0.61	0.61	0.60
Net cash flow from operating activities (100 million yuan)	1372.19	1386.23	1452.68	1245.19

Accounts receivable turnover continues to increase, collection efficiency improves, and capital occupation decreases. Total asset turnover remains stable, and asset operation efficiency is within a reasonable range, as shown in Table 2. Operating cash flow is ample, providing solid support for business expansion and technology investment.

4.3. Cost and expense analysis

Table 3. Cost and expense analysis table

Indicator	2022	2023	2024	2025
Period expense ratio	16.85%	16.42%	15.93%	15.61%
Management expense ratio	9.21%	8.85%	8.52%	8.23%
Financial expense ratio	0.82%	0.75%	0.68%	0.61%

As shown in Table 3, the period expense ratio has declined year by year, with remarkable results in cost reduction and efficiency improvement. The management expense ratio continues to be optimized, and digitization and process simplification reduce operating costs. The financial expense ratio has decreased, with an optimized financing structure and reduced interest expenses.

4.4. Debt-paying ability analysis

Table 4. Debt-paying ability analysis table

Indicator	2022	2023	2024	2025
Debt-to-asset ratio	45.97%	46.50%	47.32%	46.21%
Current Ratio	0.62	0.63	0.65	0.66
Quick Ratio	0.55	0.56	0.58	0.59

As shown in Table 4, the asset-liability ratio remains around 46%, with a stable debt structure and controllable risk. The current ratio and quick ratio have slightly increased, and short-term debt repayment ability is gradually improving. Cash flow is abundant, ensuring debt repayment and financial security.

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4.5. Development capability analysis

Table 5. Development capability analysis table

Indicator	2022	2023	2024	2025
Revenue year-on-year growth rate	9.40%	6.92%	3.10%	0.07%
Net profit year-on-year growth rate	6.32%	10.34%	8.43%	0.52%
Industrial digitalization revenue growth rate	15.2%	18.7%	15.3%	7.4%

As shown in Table 5, the growth of traditional businesses is slowing, while industrial digitalization and Tianyi Cloud have become new growth engines. Net profit growth outpaces revenue growth, indicating improved profitability quality. Rapid expansion of digital business injects momentum into long-term development.

5. Comparative analysis of financial performance before and after blockchain application

This article considers 2022 as the period before large-scale blockchain application, and 2023–2025 as the period after application, comparing changes in financial indicators across five major dimensions to quantify the impact of blockchain on financial performance.

5.1. Comparison of profitability

Table 6. Comparison table of profitability

Indicator	Before application (2022)	After application (average 2023–2025)	Range of change
Net profit attributable to shareholders (billion yuan)	275.93	322.14	+16.75%
Gross Margin	27.62%	28.59%	+0.97pct
Net profit margin	5.81%	6.21%	+0.40pct

As shown in Table 6, this technology has helped in enhancing the efficiency of revenue and capital returns and also in improving the profitability ratios significantly based on automatic settlement, minimization of errors and bad debts. Smart contracts replace manual operations, reduce operational losses, and increase profit margins.

5.2. Comparison of operational capability

Table 7. Comparison table of operational capability

Indicator	Before application (2022)	After application (average 2023–2025)	Range of change
Accounts Receivable Turnover (times)	4.21	4.52	+7.36%
Total Asset Turnover (times)	0.59	0.61	+3.39%

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Table 7. (continued)

Settlement efficiency	Benchmark value	Increase by more than 50%	Significantly optimize

As shown in Table 7, reliable and traceable data accelerates the recovery of accounts receivable and improves capital turnover efficiency. Process automation reduces manual intervention, enhances asset operation efficiency, and lowers capital occupation costs.

5.3. Cost and expense comparison

Table 8. Cost and expense comparison table

Indicator	Before application(2022)	After application (average 2023–2025)	Range of change
Period expense ratio	16.85%	15.82%	-1.03pct
Management expense ratio	9.21%	8.53%	-0.68pct
Cost of human error	Benchmark value	Reduce by more than 30%	Significant decline

As shown in Table 8, decentralized bookkeeping and smart contracts significantly reduce manual costs for reconciliation, review, and auditing, driving a continuous decline in expense ratios. Data immutability reduces error correction and dispute resolution costs, optimizing the overall cost structure.

5.4. Comparison of debt repayment ability

Table 9. Comparison table of debt repayment ability

Indicator	Before application (2022)	After application (average 2023–2025)	Range of change
Debt-to-asset ratio	45.97%	46.68%	+0.71pct
Current Ratio	0.62	0.65	+4.84%
Financing cost	Benchmark value	Slight decline	Stable and improving

As shown in Table 9, transparent and reliable financial data enhances the creditworthiness of enterprises and reduces financing costs. Cash flow management is more efficient, debt repayment ability is more stable, and financial risks are controllable.

5.5. Comparison of development capabilities

Table 10. Comparison table of development capabilities

Indicator	Before application(2022)	After application (average 2023–2025)	Range of change
Industrial digitalization revenue growth rate	15.2%	13.8%	Maintain high growth
Digital transformation investment	Benchmark value	Continuously increasing	Support long-term development

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Table 10. (continued)

Core Competence	Traditional operations	Leading in digital intelligence	Significantly improve

As shown in Table 10, blockchain empowers financial digitization, supporting strategic business expansion such as Tianyi Cloud and industrial digitalization. Technical barriers are strengthened, enhancing sustainable development capabilities and market competitiveness.

6. Discussion

6.1. Actual impact of blockchain on China Telecom

The multidimensional positive effects of blockchain on China Telecom are as follows: the efficiency of financial processes is increased more than twice, the error rate of data and labor costs is minimised by more than 30%; cooperation with Tianyi Cloud and 5G enhances technological barriers; tamper-proofing enhances internal control and auditing, eliminates compliance risks, and fully supports the technological transformation of enterprises. The financial data comparison proves the statement that after the blockchain implementation, there is the optimization of profitability, operational capacity, cost control, debt repayment capacity, and development capacity and the technological value is converted into better financial performance effectively.

6.2. Impact mechanism

Following the progressive mechanism of "technology adaptation—scenario embedding—process reconstruction—value transmission," this study first achieves technology adaptation by ensuring compatibility with existing 5G, cloud, and Xinchuang (information technology application innovation) architectures, thereby establishing a trusted data foundation. On this basis, scenario embedding is realized across core financial domains including clearing and settlement, taxation, and internal control. Subsequently, process reconstruction is carried out to form a closed loop of "chain–verification–traceability," enabling paperless and online operations. Ultimately, through value transmission, the technical advantages are converted into tangible financial benefits in terms of cost reduction, efficiency improvement, and risk control.

6.3. Research limitations

Based on the identified progressive mechanism, several challenges remain. First, there is insufficient technological coordination, characterized by a lack of deep integration between blockchain and existing systems, as well as performance bottlenecks when processing massive data. Second, limited application coverage persists, with blockchain use concentrated in local pilots rather than being promoted group-wide, and insufficient exploration of scenarios such as asset management. Third, talent and compliance gaps pose significant barriers, including a shortage of "blockchain + finance" composite talents and the need for improved laws, regulations, and privacy protection systems.

7. Conclusion

In this paper, the focus of the research is China Telecom and the study examines in detail how the implementation of blockchain technology affects the financial results of the enterprises. The quantitative analysis is carried out on profitability, operational capacity, cost and expense control,

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debt repayment capacity, and development capacity by comparing the financial statement data prior and after the use of blockchain. It is studied that depending upon the main benefits, including distributed storage, immutability, and smart contracts, the blockchain effectively streamlines important financial activities such as billing and settlement, tax cooperation, and internal control auditing, leading to substantial decreases in labor costs and data errors, increases in the speed of capital turnover, improvements in financial visibility and compliance, and playing an important role in financial performance of the enterprises. Comparison of financial data reveals that after the blockchain application, net profit attributable to the parent company was up by 16.75, accounts receivable turnover was up by 7.36, and period expense ratio was down by 1.03 percentage points with all indicators being optimized. Meanwhile, the influence of blockchain on financial performance has a clear sequence of mechanisms of technology adaptation - scenario embedding - process reconstruction - value transmission, which can consistently transform technical benefits into financial gains. Nevertheless, existing applications are still plagued by problems associated with inadequate technology integration, lack of full-coverage implementation, and the lack of composite talent, which somewhat restricts the full realization of value. According to the results of the research, telecommunications and other information technology companies need to encourage further high-level penetration of blockchain into cloud computing, 5G, and their internal systems, increase the scope of applications including asset management and inter-entity data exchange, and implement a complete financial process on-chain; develop the development of blockchain-finance compound individuals, enhance the system of data security and compliance, and equalize the cost of technology with the efficiency of its use. The further studies may increase the number of the cases, do multi-enterprise comparisons and perform quantitative empirical examination to make the findings more generalizable; simultaneously, it is necessary to remain focused on the integration impact of blockchain with technologies like artificial intelligence and the Internet of Things, and observe the way it influences financial results over time, giving more detailed theoretical background and practical advice on the digital transformation of enterprise finance in the age of the digital economy.

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