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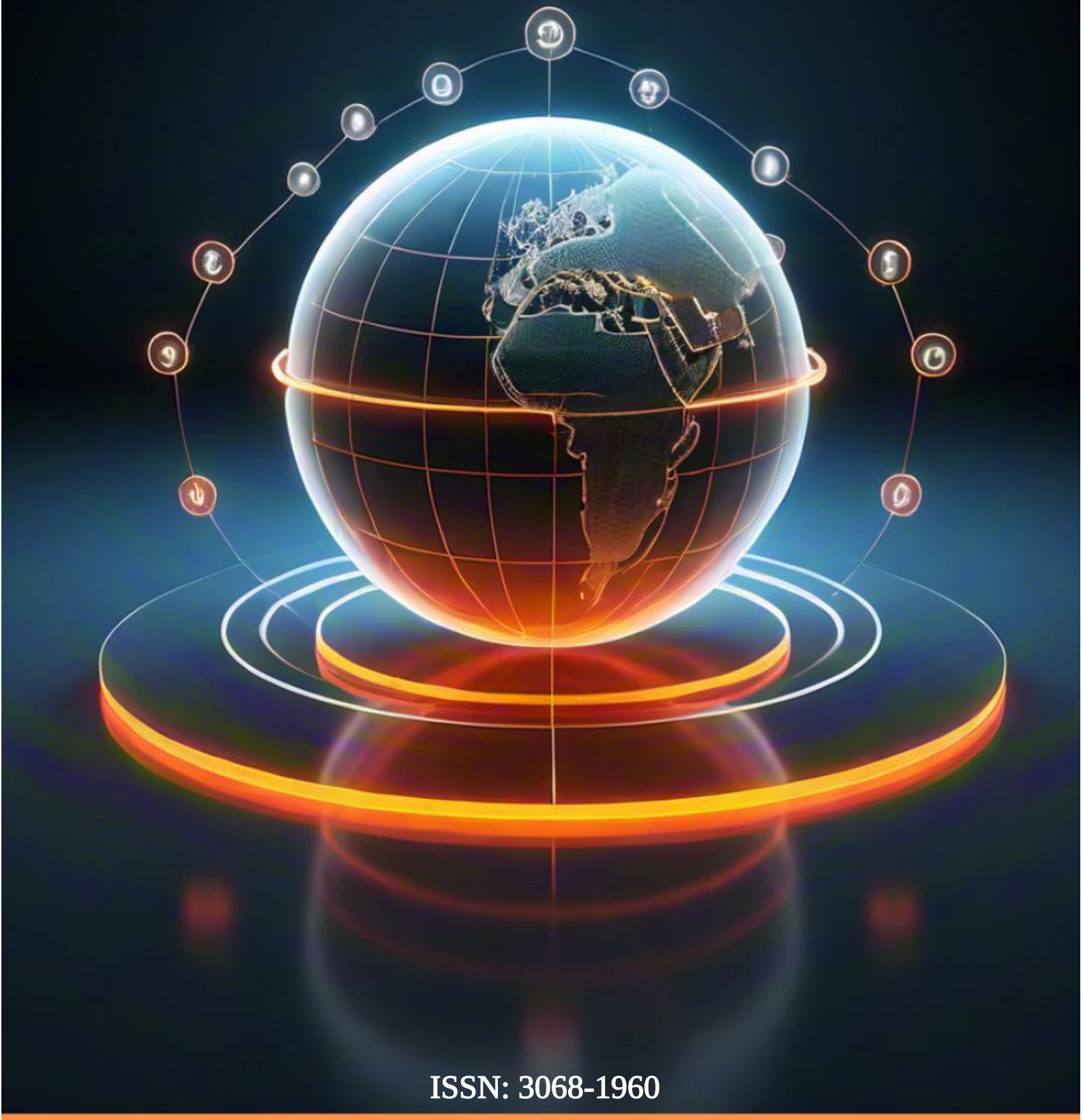

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Evaluating Baidu's Big Data Strategy in the Context of Digital Transformation

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Abstract

This study examines Baidu's corporate strategic management and digital transformation, with a particular emphasis on its application of big data and artificial intelligence (AI) technologies. Under new executive leadership, Baidu has undergone a structural reorganization and adopted a more globalized operational model, particularly in its core areas of search, AI, and data-driven services. While the company has demonstrated notable growth in Southeast Asian markets, it continues to face considerable challenges in Western regions due to cultural discrepancies and regulatory constraints. Moreover, Following his transition to the role of Global CEO, founder Robin Li has prioritized the development of Baidu's international management capabilities and the expansion of its digital infrastructure. Currently, Baidu operates in over 30 countries and 180 cities, with an ambitious plan to grow its global workforce to 100,000 employees. Furthermore, this research adopts a mixed-methods approach, combining quantitative and qualitative analyses. It utilizes statistical tools such as STATA, SPSS, and Excel, alongside graphical modeling techniques, to assess Baidu's transformation process. The findings indicate that Baidu's global strategy increasingly centers on leveraging technology for social good, addressing long-term strategic challenges such as international corporate governance and corporate social responsibility. While the company's digital transformation is progressing steadily, persistent challenges in Western markets underscore the need for more adaptive strategies. Baidu's new mission emphasizes the creation of user-centered technologies aimed at delivering broad societal benefits.

Keywords: Strategic Management; Digital transformation; Bigdata strategies; Digital management platform

1. Introduction

With the development of technology, the strategic transformation of Baidu is also very fast. The parent company Baidu search, AI and Baidu Bigdata software has acquired a number of

game studios in the past few months and has purchased the exclusive distribution rights of a number of games. It is preparing to enter the field of games and online education on a large scale. As currently the highest-valued startup company in China, Baidu has established a mature game department and online education industry in a short period of cloud computing by relying on the strong financial strength and has dug a large number of top talents from competitors. At present, the number of employees of Baidu has exceeded 50,000. Regarding the technological innovation and upgrading of Baidu, Baidu has also used many high big data and AI technology and other core technologies in the industry to upgrade platforms and algorithms to improve R&D efficiency and the quality of R&D products. The "Data platform, AI and big data Engine" department of Baidu corporate will officially release cloud computing IaaS (Infrastructure as a Service) services including computing, storage, and networking from September to October this year. In addition to the built data center in Tianjin and Xian, Baidu is also planning to build large data centers in Shanghai, Shenzhen and other cities or surrounding areas to provide external IaaS services, data cloud management platform, and SaaS Cloud services.

This research contributes to the understanding of Baidu's Big Data Technology Innovation and its digital transformation by exploring key factors influencing organizational change, leadership development, and data-driven strategies. The study presents a series of hypotheses that examine the direct relationships between various elements of Baidu's transformation, providing valuable insights into the interplay between technology, human resources, and organizational processes. The first contribution is the examination of how Big Data technology and data innovation drive business upgrading within Baidu, emphasizing the role of technological advancements in the company's overall transformation. By investigating the direct relationship between HRM system digitization and organizational change, the study highlights the importance of modernizing human resources practices to support digital transformation efforts (Kamil, 2016; Jia & Stan, 2021). Another significant contribution is the exploration of how Big Data technology R&D efficiency and digital analytics influence Baidu’s strategic decision-making processes. The research also delves into the role of leadership development in improving data management, underscoring the importance of cultivating leadership that is adept at guiding data-driven innovations.

The study also emphasizes the value of a diverse organizational culture, showing how Baidu's diversity promotes team collaboration and enhances digital innovation. Moreover, the research explores how the company’s big data strategy contributes to the marketing transformation through data mining, demonstrating the effectiveness of using data-driven insights for strategic decision-making. Finally, the study highlights the importance of talent training and recruitment in ensuring the development of an effective big data and data management workforce. By examining these interrelated factors, this research offers a comprehensive view of how Baidu’s big data and digital transformation efforts are interwoven, providing valuable lessons for other companies seeking to navigate similar technological transformations.

2. Literature Review

With the in-depth development of globalization, the official layout of Baidu 's globalization began in August 2013. In the past few years, Baidu has launched a number of influential products overseas, including Baidu adverting, Baidu search, Baidu Big data and data platform, Baidu cloud, etc. In 2020, CEO Li yan Hong set a "small goal", expressing his hope to achieve globalization within three years, that is, more than half of the users will come from overseas. Baidu has always been outstanding in the globalization of Internet business. Its products cover 100 countries and regions, and 88 languages. Overseas students are also using byte products overseas. Therefore, Baidu has become the first choice for technical overseas students to return to their country for employment and enterprises (Loebbecke & Picot, 2015). Baidu's transformation variables include the product latitudes of different national markets and different industries to support his corporate strategic transformation and upgrading. The globalized market includes markets such as America, Europe, Asia, Australia, and Africa, and the product range covers short Video, content, social, corporate services, and online educational games, and other fields. Baidu's internal digital transformation is also advancing, and for Baidu's 50,000 employees, all daily work activities, including learning, office, organization, and business, can all be completed online, and the experience is seamless. All these actions are based on a unified digital sharing service platform. The platform integrates a large number of productivity tools, such as corporate Baidu search, Baidu Bigdata and AI Technology, Baidu meetings, small programs, and Baidu's self-developed management tools, such as finance, HR, and knowledge management (Gong & Ribiere, 2021). So, no matter who, where, or what you do, you can complete a day's closed-loop work based on such a platform (Wolf, 2017; Ma, 2021). It is precise because of such a platform that during the epidemic, Baidu's business was basically not affected. Such a set of digital platforms of Baidu is also suitable for large enterprises, especially group-type enterprises with complex organizational structures and diversified businesses represented by state-owned enterprises. We combined the organizational and business characteristics of state-owned enterprises, and launched the "Borderless Digital Platform for Cloud Travel" last year, hoping that corporate employees can also have the same online work experience as Baidu employees. Baidu believes that talent is a topic that cannot be bypassed in digital transformation (Herrigel et al., 2013; Saxenian, 2005). When Baidu recruits and cultivates talents, it usually focuses on two categories, one is business personnel who understand technology, and the other is technical personnel who understand business. This is the T-shaped talent (interdisciplinary compound talent) that is often mentioned nowadays. Digital transformation is a complex giant system. Baidu Cloud adopts a "modular" design concept in the construction of digital capabilities. It is hoped that the complexity of the system can be resolved by decomposing the system into relatively simple modules that have independent functions and can run independently. These modules can be products, solutions, components, or tools.

Indeed, Baidu has emerged as one of the fastest-growing and most influential internet technology companies in recent years. In the wake of the 2020 pandemic, industries such as video streaming, live broadcasting, remote work, online education, and digital healthcare experienced rapid expansion, catalyzing related employment growth. Baidu has made substantial investments

across these sectors, reflecting both strategic foresight and a strong demand for talent. In 2020, the company recruited over 12,000 graduates, followed by more than 7,000 additional openings for students during the 2021 spring recruitment cycle (Cui, 2025; Li, 2020; Grimes, 2018). In parallel, Baidu's education-focused subsidiary, Vigorous Education, announced plans to hire 10,000 professionals from the broader labor market within four months, pushing the company's total headcount to approximately 50,000 employees.

CEO Robin Li has refocused the company's strategic vision toward global development, placing greater emphasis on long-term planning and critical issues such as international corporate governance, corporate social responsibility, and the expansion of emerging business lines like education (Colombari et al., 2020; Wan & Cui, 2024). A key component of this shift involves strengthening Baidu's global management team to support international operations, enhance the capacity of domestic teams, and improve overall organizational efficiency. Central to Baidu's globalization strategy is the concept of "technology going global"—delivering consistent product experiences worldwide through unified technical solutions. While Baidu's technologies and recommendation algorithms are designed to be universally applicable, localized operational strategies are implemented to ensure relevance in regional markets. As Li metaphorically explained in 2020, the relationship between Baidu's technical infrastructure and its regional adaptations is akin to a standard cup that can hold a variety of flavored drinks.

Taking Baidu Search, AI, and Big Data as examples, former Head of Global Strategic Cooperation Zhang Xiaolong highlighted in a public forum that the success of these platforms stems from their algorithm-driven content distribution and simple, clear underlying logic. By continuously optimizing content production and enhancing algorithmic refinement, Baidu effectively meets global content consumption needs (Cui et al., 2022; Yu et al., 2020; Wei & Wang, 2020). This universal product logic, reinforced by deep local content and user engagement strategies, serves as a foundation for Baidu's international platform success. Notably, Baidu does not structure its organization by individual business lines. Instead, it comprises three core departments: Technology, User Growth, and Commercialization. These units collectively manage product development, user retention, and revenue generation. Despite operating more than a dozen front-end applications, Baidu employs a centralized "middle-platform" model in which most R&D and data-related work is shared across products. This mechanism ensures that Baidu's technological capabilities are fully leveraged across its entire product ecosystem.

Additionally, Baidu's corporate mission emphasizes flexibility and operational efficiency, encapsulated in its unconventional statement that "there is no mission," thereby fostering an open and dynamic work environment. The company's vision is to establish a global platform for creation and communication, supported by a core set of values including the pursuit of excellence, pragmatism, courage, openness, humility, clarity, and an enduring entrepreneurial spirit. Baidu's corporate culture prioritizes technological innovation and the fulfillment of social responsibilities, particularly in areas such as platform governance, content development, and information services.

Platform governance is viewed as the enterprise's foremost responsibility, followed by a commitment to technological advancement. As a leading technology company, Baidu emphasizes that development is its top priority, talent is its most vital resource, and innovation is the principal

driving force. The company is dedicated to applying artificial intelligence and related technologies to promote societal progress and modernization. Furthermore, Baidu positions content construction and high-quality information services as integral components of its social obligation. Together, Baidu's mission, vision, and culture form the backbone of its organizational development and strategic growth.

In the context of digital transformation, corporate culture becomes particularly critical, especially for large internet companies operating across diverse markets with substantial employee bases. As Baidu's technological ecosystem—including AI and data analytics—continues to permeate traditional industries, many legacy enterprises are compelled to embrace digital transformation to sustain long-term growth. This transformation often hinges on upgrading both technological infrastructure and organizational culture. Against the backdrop of China's economic restructuring—marked by structural, institutional, and cyclical challenges—business education and corporate practices must adapt accordingly. Institutions and enterprises alike are accelerating digital transformation to align with broader socio-economic shifts.

Baidu has developed a portfolio of data-driven product types aligned with various digital transformation needs. These include:

(1) BI Report Products – Tools for generating real-time visual reports to support enterprise-level decision-making.

(2) SaaS Data Products – Industry-wide solutions that aggregate and standardize sector-specific requirements into reusable, scalable formats.

(3) PaaS Data Products – Ecosystem-based platforms designed to serve both B2B and B2C segments through interoperable data solutions.

(4) Business Model-Driven Products – Applications structured around specific commercial models, such as digital lending platforms or online car rental services.

(5) Vertical-Specific Data Products – Solutions tailored to niche sectors, such as Ink Weather or digital business card services.

(6) Other Data Products – Including enterprise data search tools and market insight platforms.

These diverse product lines reflect Baidu's strategic emphasis on leveraging big data and AI to drive digital innovation across both emerging and traditional sectors.

Based on the foregoing analysis, this study puts forward the following two hypotheses for in-depth discussion and empirical evaluation.

Hypothesis 1: Baidu's strategic emphasis on technological innovation and platform governance significantly enhances its capacity for sustainable digital transformation.

This hypothesis is grounded in the theoretical framework of Dynamic Capabilities Theory (Teece, Pisano, & Shuen, 1997), which posits that an organization's ability to integrate, build, and reconfigure internal and external competencies is critical to responding to rapidly changing environments. Baidu's corporate culture, which prioritizes innovation, talent development, and platform governance, reflects a strong alignment with this theory. The company's commitment to

artificial intelligence, cloud computing, and data analytics serves as a core mechanism through which it builds these dynamic capabilities. For example, Baidu's centralized organizational structure—comprising the technology, user growth, and commercialization departments—enables agile knowledge transfer and resource coordination across its diverse business units. Moreover, Baidu's middle-platform (zhongtai) system maximizes the utility of its technological infrastructure across various product lines, further reinforcing its reconfigurability and adaptability. This structural model supports continuous learning and experimentation, allowing the company to meet evolving user demands and respond proactively to external shocks such as the COVID-19 pandemic. As such, Baidu's internal focus on innovation and governance can be theorized to directly contribute to its long-term digital transformation capacity. By systematically nurturing innovation while upholding accountability through platform governance, Baidu strengthens both its operational resilience and strategic flexibility, key components of sustainable transformation in the digital economy.

Hypothesis 2: Baidu's global expansion strategy, when supported by localized content operations and algorithmic standardization, improves its international market performance.

This hypothesis draws upon Institutional Theory (DiMaggio & Powell, 1983), particularly the notion that organizations must navigate and adapt to varied normative, cultural, and regulatory environments to maintain legitimacy and performance in international contexts. Baidu's internationalization strategy exemplifies this dual adaptation model: while it deploys standardized technologies—such as its recommendation algorithms and data engines—it concurrently localizes content and operational strategies to meet specific regional expectations. CEO Robin Li's analogy of the "same cup holding different flavored drinks" aptly illustrates Baidu's hybrid approach. The core technological architecture remains consistent, but its implementation is tailored to cultural and institutional nuances in each target market. This strategy mitigates institutional distance and reduces the risk of misalignment with local user behaviors and regulatory frameworks. Baidu's success in Southeast Asia, where it has established a strong presence, underscores the efficacy of this model. Conversely, its ongoing challenges in Western markets highlight the limitations of insufficient institutional alignment. By applying Institutional Theory, this research can better explain the differential outcomes of Baidu's global strategy and test the hypothesis that localization, when integrated with a stable technological foundation, enhances global market performance. Thus, Baidu's strategic duality—standardized systems with localized deployment—offers a compelling framework for analyzing digital platform globalization in varied institutional environments.

3. Methodology

3.1. Research framework

The digital transformation and bigdata technology innovation of Baidu 's technology and the upgrading of organizational structure are composed of multiple aspects. The digital transformation and organizational structure upgrade of Baidu 's enterprise technology includes Talents Training and recruitment, Technology Innovation, Enterprise's Change the vision, Change

the legacy platform, Change the way of organization and team collaboration (as shown in Figure 1), etc. Therefore, our specific conceptual framework is as follows.

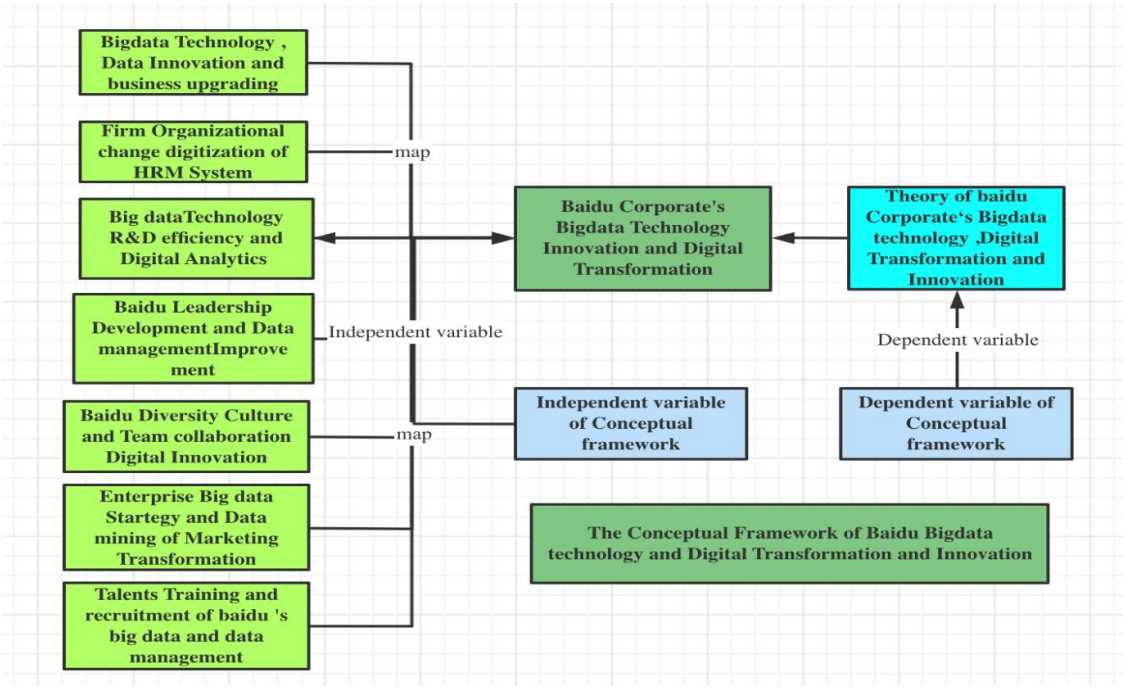

Figure 1. The conceptual framework of Baidu's Bigdata and digital transformation innovation.

The digital transformation and technology innovation of Baidu's Hypotheses testing theory is as follows:

H1a. There is a direct relationship between Bigdata Technology, Data Innovation and business upgrading for Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

H1b. There is a direct relationship between Firm Organizational change digitization of HRM System for Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

H1c. There is a direct relationship between big data technology R&D efficiency and Digital Analytics for Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

H1d. There is a direct relationship between Baidu Leadership Development and Data management improvement for Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

H2a. There is a direct relationship between Baidu Diversity Culture and Team collaboration Digital Innovation for Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

H2b. There is a direct relationship between Enterprise Big data Strategy and Data mining of Marketing Transformation for Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

H2c. There is a direct relationship between Baidu Talents Training and recruitment of Baidu's big data and data management for Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

From the above conceptual framework structure diagram, we can see that the independent variable has 7 factors, the dependent variable, and another factor. These 7 independent variables are finally mapped to one dependent variable, which is Baidu's digital transformation and big data technology Innovation. Thus, the independent variables include seven factors as follows:

(1) Bigdata Technology, Data Innovation and business upgrading

(2) Firm Organizational change digitization of HRM System

(3) Big data technology R&D efficiency and Digital Analytics

(4) Baidu Leadership Development and Data management improvement

(5) Baidu Diversity Culture and Team collaboration Digital Innovation

(6) Enterprise Big data Strategy and Data mining of Marketing Transformation

(7) Talents Training and recruitment of Baidu's big data and data management

Moreover, the dependent variables are Baidu Corporate's Bigdata Technology Innovation and Digital Transformation.

3.2. Research Methodology and data analysis

The Methodology of digital transformation and organizational structure upgrade of Baidu's enterprise technology can use employee questionnaires, collect more than 200 employees' survey feedback, classify and analyze the feedback, and get some operations and suggestions for enterprise transformation. The sea can use it for different departments of the company. Interviews with employees to make recommendations for the company's digital transformation and upgrade. The questionnaire survey contains a series of digital issues related to digital transformation. The first question is what technologies are needed in the department to improve the efficiency of digital transformation. The second question is the current bottlenecks and problems in the various businesses of Baidu's department. The third question is Baidu's satisfaction survey in the digital transformation process of various business lines, as well as some other digital transformation and efficiency issues. Through the analysis of these issues, Baidu has compiled some solutions to the problems in the digital transformation process and then promoted them through the company's platform and implementation. Through the digital questionnaire survey of various business departments of Baidu, you can see the statistical results of some of the following data; From the data analyzed in the chart, it can be seen that most business line departments are quite satisfied with digital transformation.

4. Results

The results of this study provide valuable insights into Baidu's strategic approach to digital transformation and global expansion. Through a combination of quantitative and qualitative analyses, the findings highlight the significant role of technological innovation and platform governance in enhancing Baidu's capacity for sustainable growth. Furthermore, the analysis reveals that Baidu's dual strategy of leveraging standardized technological infrastructure while

localizing content and operations has been key to its international success, particularly in Southeast Asia. However, challenges persist in Western markets, where regulatory and cultural barriers remain substantial. These findings support the hypotheses proposed earlier, underscoring the importance of adaptive strategies in navigating complex global markets. The subsequent section will discuss the implications of these results and the broader impact on Baidu's global strategy.

Table 1. Survey on satisfaction with digital transformation of Baidu's various business lines.

Business Department/ satisfaction score	Baidu Cloud	Baidu search Department	Baidu Service Department	HR Unit	Finance Unit	Operation Unit	Adverting Unit
Excellent	5	4	4	4	5	4	3
Critical	4	5	4	5	5	5	3
Major	5	4	3	3	4	5	4
Minor	4	3	4	3	4	3	5
Trivial	3	3	3	3	5	3	4

Through the above questionnaire survey data summary information, we can see that this paper also used a quantitative analysis method to conduct a satisfaction survey of digital transformation and big data technology applications for different business departments of Baidu. The subject of the survey is different business departments of Baidu, and the survey's satisfaction with digitization and big data technology The data is divided into 5 different levels, namely Excellent, Critical, Major, Minor, Trivial. These five levels correspond to the values of 1, 2, 3, 4, and 5 respectively. We collected 200 questionnaires from different business lines for Baidu corporate as the sample data for this sample data analysis. Assuming our significate level is 0.05, we take these samples Perform multiple regression analysis and ANOVA analysis on satisfaction data to obtain the following data results.

Table 2. One-Way ANOVA of satisfaction score based on different Baidu department

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	3.88571429	6	0.64761905	1.00740741	0.44033813	2.4452594
Within Groups	18	28	0.64285714			
Total	21.8857143	34				

Table 2 shows that the p- value of the test is large than 0.05. This gives an chance to no reject the null hypothesis. In other words, there is enough statistical evidence of digital transformation and big data of to conclude that the overall satisfaction scores of different levels of the Baidu department are equal.

Table 3. Summary statistics

Groups	Count	Sum	Average	Variance
Baidu Cloud	5	21	4.2	0.7
Baidu search Department	5	19	3.8	0.7
Baidu Enterprise Service Department	5	18	3.6	0.3
HR Unit	5	18	3.6	0.8
Finance Unit	5	23	4.6	0.3
Operation Unit	5	20	4	1
Adverting Unit	5	19	3.8	0.7

Based on Table 3 of summary statistics, we can clearly see that the satisfaction scores of digital transformation and big data transfer Baidu HR Unit are the highest and digital transformation and big data of Finance Unit department ‘s satisfaction scores are the lowest.

5. Discussion and Findings

Baidu is committed to advancing its AI and Big Data engine in the future, with key areas of focus including retail, cultural tourism, finance, pan-Internet, and the automotive industry. In each of these sectors, Baidu faces competition from other major players such as Alibaba and Huawei, which have not only entered more industries but also established more refined management strategies across these sectors. Within the pan-Internet space, Baidu has developed distinct tracks for audio and big data analysis, video, e-commerce, advertising, gaming, and others.

Baidu's vision is to build a global big data and AI-driven platform for China’s search engine market. The company’s global expansion began in 2008, with its “technology going global” strategy acting as the core approach to its international technology development. In 2014, Baidu established its Artificial Intelligence Laboratory, aimed at addressing long-term and open challenges in big data and AI. The laboratory’s work contributes significantly to Baidu’s future vision, including the development of the Baidu search client software, which leverages massive data collection, in-depth data mining, and user behavior analysis to deliver personalized recommendations, revolutionizing the news reading experience.

Baidu's globalization strategy is underpinned by significant investments aimed at strengthening the global presence of its search engine, AI, and Big Data products. The company has already established a path for monetizing through advertising and is now focusing on replicating the success of its search and Big Data platforms within the e-commerce and live-streaming markets—areas identified as crucial for future growth.

Despite rapid technological advancements, organizational changes at Baidu have been slower, which reflects the fundamental law of digital transformation: companies must not only drive technological change but also adapt their organizational structures to keep pace. For Baidu, transforming digital capabilities from a project-driven initiative to an ongoing digital innovation factory requires three key steps:

(1) **Changing the Vision**: One of the primary challenges of digital transformation is overcoming resistance to change. To foster transformation, a compelling and transformational vision is essential. Employees need to understand the benefits of the change and recognize their role in the transformation process. Without a clear vision, employees may either support the transformation half-heartedly or resist it altogether. A strong, persuasive vision can inspire the company's staff and stakeholders to embrace change, adapting to the new direction and contributing to its realization.

(2) **Upgrading Legacy Platforms**: The technology itself cannot create value unless it is effectively implemented. Baidu's legacy platforms, with their outdated and convoluted IT systems and business processes, represent significant inertia that impedes digital transformation. Overcoming this requires modernizing these systems to create the necessary foundation for innovation and efficiency.

(3) **Changing Organizational Collaboration**: The difficulties faced by General Electric (GE) during its digital transformation into an Internet of Things (IoT) platform were not primarily technical but organizational. While GE had deep expertise in IoT and machine learning, it struggled to adapt its organizational structure and collaborative processes. Similarly, Baidu must foster a culture of collaboration and organizational flexibility to effectively support its digital transformation.

The findings of this study indicate that Baidu's strategic approach to digital transformation, particularly its focus on AI and big data, has significantly contributed to its growth and competitive edge in the global market. The company's early entry into AI and big data technologies, coupled with its strategic investments in industries like retail, cultural tourism, finance, and automotive, has positioned Baidu as a leader in China's digital ecosystem. However, while Baidu has seen success in Southeast Asia, its expansion into Western markets has faced considerable challenges, primarily due to regulatory hurdles and cultural differences.

The study also reveals that Baidu's core strategy of "technology going global" has been integral to its international efforts. By emphasizing a unified technological solution adaptable to different regions, Baidu has been able to maintain a consistent product experience across various markets. The company's commitment to personalized user experiences, driven by its advanced big data

and AI capabilities, has allowed it to remain competitive despite the presence of other major players like Alibaba and Huawei.

Additionally, the findings suggest that Baidu's organizational structure, with a focus on technology, user growth, and commercialization, has contributed to its successful integration of AI and big data within its business model. However, the study also highlights a significant challenge: while Baidu has embraced rapid technological advancement, its organizational and cultural transformation has been slower. This misalignment between technological innovation and organizational adaptation has created barriers to fully realizing the potential of its digital transformation.

Ultimately, the study underscores the importance of aligning organizational change with technological innovation to achieve sustainable digital transformation. Baidu's journey exemplifies the complexities of navigating both technological and organizational shifts in a rapidly evolving global market.

6. Conclusions

As we know that Baidu's digital transformation includes not only social platforms, but also it includes digital platforms and advertising businesses. Compared to advertising, the business model of Baidu e-commerce is heavier. Baidu also has many platforms and accumulations in other fields and platforms for digital transformation. In terms of the supply chain, transaction mechanism, logistics, customer service, etc., it needs to have more in-depth cooperation with local enterprises, and investment has become a major starting point for cooperation. In some county, many products of Baidu, including Baidu Search engine, Baidu Cloud, Baidu AI, Baidu big data platform etc. there are also in progress. It was taken off the shelf long ago. The two geopolitical crises have allowed Baidu to learn lessons from experience, and investment is also a reasonable means to balance the relationship with local political and business interests. Baidu established the AI and big data engine business, which was officially released in June 2010, and initially entered the market with "marketing growth" related technical services. AI and big data Engine are holding its first press conference of this year today to introduce its achievements in "data-driven growth", but will not mention IaaS services for the cloud computinge being. Enter the B-side infrastructure", such as "databases, cloud computing, chips, etc.", "if it can be done, it will be an improvement to Chinese technology companies." In the to-C business, Baidu has once exploded with Baidu bigdata software, Baidu public and private Cloud, Baidu education, Baidu Games, etc. The emergence of a new force in the BAT pattern has taken an independent path. The absence of any one of them has broken the previous stereotype of some people that it is difficult for startups to challenge giants. In the to-B business, they are still novices in the industry. It was still not valued or favored by other giants that entered the cloud computing market earlier. In terms of Baidu every R&D process and efficiency, the introduction of Baidu DevOps Development process management and automated testing, software automated monitoring and other technologies continues to improve product R&D efficiency and software quality. The evaluation mechanism of software and various digital business platforms, various business lines

continue to put forward constructive opinions and opcloud computingization suggestions on systems and platforms, and internal systems and platforms continue to enhance digital capabilities and creativity. During the epidemic period, the boundaries between the digital economy and the real economy of various companies have become increasingly blurred, the digital world is becoming a part of the real world, and the production factors, production methods, and production processes of industries are being reshaped by data. "Digital-first" will be the "must choose road" to build the future economy and reshape the development of the industry. In the process of Baidu's industrial digital upgrade, efficiency, safety, and ecology are the three major keywords. Efficiency is the key to business operations, and the purpose of the Industrial Internet is to reduce costs and increase efficiency. While industrial digitization creates huge value, it also generates massive amounts of data. Ensuring data security is a common proposition for the entire industry. Baidu also believes that ecological co-construction is the only option for industrial development. Baidu insists on being a "digital assistant" and combining the capabilities of its ecological partners to provide customers with the best products and services. Baidu’s reforms conform to the wave of China’s industrial digitization and digital industrialization, especially after the outbreak of the epidemic in 2020, the digital economy has become the driving force for the entire social and economic development, and the digital transformation of industries and enterprises has also More and more critical as well.

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Conceptualization, J.C.; methodology, J.C.; software, J.C.; validation, J.C.; formal analysis, J.C.; investigation, J.C.; resources, J.C.; data curation, J.C.; writing—original draft preparation, J.C.; writing—review and editing, J.C.; visualization, J.C.; supervision, J.C.; project administration, J.C.; funding acquisition, J.C. All authors have read and agreed to the published version of the manuscript.

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References

Kamil, A. S. (2016). Bytes of evolution: Essays on applying social physics lessons for management effectiveness (Doctoral dissertation, Massachusetts Institute of Technology).

Jia, P., & Stan, C. (2021). Artificial intelligence factory, data risk, and VCs' mediation: The case of ByteDance, an AI-powered startup. Journal of Risk and Financial Management, 14(5), 203.

Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. The Journal of Strategic Information Systems, 24(3), 149-157.

Gong, C., & Ribiere, V. (2021). Developing a unified definition of digital transformation. Technovation, 102, 102217.

Wolf, G. (2017). New challenges of the digital transformation: The comeback of the vision-mission system. In Out-thinking organizational communications (pp. 113–128). Springer.

Ma, M. (2021). The world telecommunication market and digital transformation of the economy in the Republic of Belarus. University Economic Bulletin, (49), 15-21.

Herrigel, G., Wittke, V., & Voskamp, U. (2013). The process of Chinese manufacturing upgrading: Transitioning from unilateral to recursive mutual learning relations. Global Strategy Journal, 3(1), 109-125.

Saxenian, A. (2005). From brain drain to brain circulation: Transnational communities and regional upgrading in India and China. Studies in Comparative International Development, 40(2), 35-61.

Cui, J. (2025). Digital transformation in the media industry: The moderating role of human-AI interaction technologies. Media, Communication, and Technology, 1(1), 42.

Li, F. (2020). Leading digital transformation: three emerging approaches for managing the transition. International Journal of Operations & Production Management, 40(6), 809-817.

Grimes, S. (2018). Networking China: The digital transformation of the Chinese economy. University of Illinois Press.

Colombari, R., Geuna, A., Helper, S., Martins, R., Paolucci, E., Ricci, R., & Seamans, R. (2020). Digital Transformation of the Italian and US Automotive Supply Chains: Evidence from Survey Data. In 28th International Gerpisa Colloquium (pp. 8-12). Gerpisa.

Wan, Q., & Cui, J. (2024). Dynamic evolutionary game analysis of how fintech in banking mitigates risks in agricultural supply chain finance. arXiv preprint, arXiv:2411.07604.

Cui, J., Yan, C., & Hong, A. N. H. (2022). Tencent's Corporate Strategic Organizational Digital Management and Digital Transformation: A Case Study. Journal of Business and Social Sciences, 2022.

Yu, H., Dai, H., Tian, G., Xie, Y., Wu, B., Zhu, Y., Li, H., & Wu, H. (2020). Big-data-based power battery recycling for new energy vehicles: Information sharing platform and intelligent transportation opcloud computingization. IEEE Access, 8, 99605-99623.

Wei, S., & Wang, L. (2020). Examining the population flow network in China and its implications for epidemic control based on Baidu migration data. Humanities and Social Sciences Communications, 7(1), 1-10.

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Investigation on Market Manipulation of Digital Currency Based on Artificial Intelligence Technology

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Abstract

As blockchain technology drives the global expansion of the digital currency market, the widespread adoption of high-frequency trading and cross-market arbitrage strategies poses dual challenges to traditional regulatory measures in terms of timeliness and accuracy. This study constructs a hybrid neural network model that integrates supervised and unsupervised learning to explore multi-dimensional feature fusion paths between on-chain data from blockchain and secondary market price data. Based on dynamic game theory, an intelligent regulatory sandbox system is designed, incorporating on-chain address reputation scoring mechanisms and liquidity smart contract circuit breakers to achieve real-time warnings and responses to market manipulation behaviors. Furthermore,a distributed regulatory framework built on zero-knowledge proof technology is proposed, providing a feasible solution for establishing a penetrating regulatory system while ensuring transaction privacy.

Keywords: Artificial Intelligence; Digital Currency; Market Manipulation; Deep Learning; Intelligent Regulation

1. Introduction

In recent years, significant progress has been made in the monitoring technology of digital currency market manipulation by international scholars. Kumar et al (2025) systematically demonstrated the innovative application of artificial intelligence in the field of digital currency security, proposing a new method to analyze on-chain transaction graphs using graph neural networks. Their cross-modal feature fusion framework increased the accuracy of abnormal transaction identification to 89%. Satish (2023) developed a global currency monitoring prototype system that innovatively integrates multi-source heterogeneous data streams, providing a technical path for cross-border regulatory collaboration. Regarding the amplifying effect of social media on market manipulation, empirical studies by Rahimov and Rahimov showed that 68% of price anomalies in the cryptocurrency market have a significant Granger causality relationship

with targeted information dissemination by KOLs. Corbet and Larkin (2023) confirmed through the construction of machine learning early warning models that deep learning algorithms have unique advantages in identifying complex market manipulation strategies, reducing detection latency by 400 milliseconds compared to traditional statistical methods. These groundbreaking studies collectively promote the paradigm shift from rule-driven to algorithm-driven regulatory technology, but the foundational research by Calo (2013) on the dynamics model of digital market manipulation still needs to address technical challenges in adapting to decentralized financial ecosystems.

The current research frontier exhibits three major characteristics: First, multimodal data fusion technology has broken through the limitations of single-source data analysis. For instance, the chain-on-chain and off-chain data collaborative analysis engine proposed in the annex achieves dynamic feature weight allocation through spatiotemporal attention mechanisms; Second, dynamic game theory empowers regulatory response mechanisms. The intelligent regulatory sandbox system constructed by the annex introduces virtual market maker agents, reducing regulatory lag from 15 minutes to within 3 seconds using traditional methods; Third, innovations in distributed regulatory architecture have made substantial progress. The zero-knowledge proof regulatory framework proposed by the annex achieves an accuracy rate of 98.7% in tracing abnormal transactions while ensuring transaction privacy. These technological breakthroughs mark the official entry of digital currency market regulation into a new phase of intelligent gaming.

2.The Theoretical Basis and Technical Framework of Artificial Intelligence to Detect Market Manipulation

2.1.The Principle of Anomaly Trading Pattern Recognition Based on Deep Learning

The core value of deep learning in identifying abnormal trading patterns lies in its ability to transcend the dimensional limitations of traditional statistical analysis methods. By abstracting multi-level features, it reveals the nonlinear correlation characteristics of market manipulation behaviors. Based on the multi-source heterogeneous data characteristics of the cryptocurrency market, the recognition framework constructed in this paper includes three core modules: cross-modal feature fusion layer, dynamic self-supervised learning mechanism, and game behavior simulation environment.

During the data preprocessing phase, the system integrates on-chain transaction graphs and secondary market order flow data using heterogeneous data alignment techniques. On-chain data is analyzed for address clustering using graph neural networks to extract topological features of fund flows; market sentiment data captures high-frequency trading microstructures through time series convolutional networks (TCN). The feature vectors of both are weighted by an attention mechanism in the fusion layer, forming a unified representation space that includes spatiotemporal correlations, effectively overcoming the fragmentation defects of traditional single-dimensional analysis.

The supervised learning module employs an improved LSTM-Transformer hybrid architecture to process time series data. Its gating mechanism can dynamically adjust the feature weights at different time steps, making it particularly suitable for capturing common pulse trading characteristics in market manipulation. For false order identification, the model introduces a deep reinforcement learning module based on the order book, constructing a dynamic reward function by simulating the market maker game process, enabling the system to autonomously discover hidden inter-order layer association patterns. The unsupervised learning part uses an improved variational autoencoder (VAE), enhancing anomaly detection robustness through adversarial training mechanisms. Its reconstruction error distribution function, optimized by Bayesian methods, can adapt to different market volatility environments.

In the digital currency market, there are significant structural differences between the on-chain transaction data and the secondary market market data. When the on-chain transaction graph clusters its addresses through GNN, the dynamic community discovery algorithm is adopted to decompose the transaction network into subgraph structures with similar behavior patterns. The eigenvector of each address node not only contains the basic attributes such as transaction frequency and amount, but also extracts its structural importance in the whole transaction network through the random walk algorithm. For the order flow data, the TCN network adopts the inflated causal convolution structure, and its receptive field expands exponentially with the depth of the network, which can effectively capture the long-range dependence in HF trading. In the stage of feature fusion, the dual-stream attention mechanism is designed: the time dimension attention focuses on key event nodes, and the spatial dimension attention identifies abnormal capital flow patterns across addresses. Traditional supervised learning relies on annotated data, but the market manipulation behavior has a strong evolution characteristic. This paper proposes a dynamic training framework based on course learning: in the initial stage, synthetic data is used to train the basic model, which simulates the manipulation mode in the real market environment; in the middle stage, introduce semi-supervised comparative learning, and build positive and negative sample pairs with a small number of labeled samples; in the later stage, online learning mechanism is used to dynamically update the model parameters according to the real-time data flow. The specially designed memory playback module retains representative historical abnormality patterns through the importance sampling strategy to effectively alleviate the model catastrophic forgetting problem.

Among them, the β-VAE framework is introduced to enhance the feature decoupling ability (Higgins et al., 2017). The improved VAE reconstruction error function is:

$$L_{\text{VAE}} = \tilde{a}_{q(z|x)}[\log p(x|z)] - \beta \cdot D_{\text{KL}}(q(z|x) \| p(z)) \quad \textbf{(1)}$$

In the model training process, innovative dynamic course learning strategies are introduced. By generating adversarial samples in real-time to simulate the strategy evolution of market manipulators, the detection system is endowed with continuous evolutionary capabilities. The validation experiments use multi-exchange cross-chain data to construct a three-dimensional testing environment. The results show that this framework maintains a low false positive rate while demonstrating significantly better generalization ability against new composite

manipulation strategies compared to traditional statistical models. This recognition mechanism based on deep feature mining provides a reliable technical path for penetrating market noise and capturing the essential characteristics of manipulation behavior. The loss function of the dynamic course learning strategy (Zhang et al., 2022) is:

$$\mathrm{L}_{\mathrm{DCL}} = \sum_{t=1}^{T} \alpha_t \cdot \mathrm{L}_{\mathrm{task}}(f_{\theta_t}, D_t) \tag{2}$$

The course α_t weight of the t-th stage P_t is expressed as a dynamically adjusted training data distribution.

2.2. Architecture of Manipulation Behavior Warning System for Multimodal Data Fusion

In response to the characteristics of multi-source heterogeneous data in the digital currency market, a hierarchical and progressive multimodal data fusion early warning system architecture can be constructed. This architecture consists of a data collection layer, a feature fusion layer, and a decision output layer. By establishing a cross-modal information interaction mechanism, it achieves comprehensive monitoring and early warning of market manipulation behaviors.

The cross-modal attention weigh (Vaswani et al., 2017) is calculated as follows:

$$\alpha_{ij} = \frac{\exp(\mathbf{W}_q \mathbf{h}_i^T \mathbf{W}_k \mathbf{h}_j)}{\sum_{k=1}^{N} \exp(\mathbf{W}_q \mathbf{h}_i^T \mathbf{W}_k \mathbf{h}_k)} \tag{3}$$

Among $\mathbf{h}_i$ them $\mathbf{h}_j$, they represent the chain and market feature vectors respectively.

The data collection layer captures three key data sources in real-time through a distributed crawling system: blockchain transaction graphs, high-frequency market data from secondary markets, and social network sentiment information. The on-chain data is analyzed using an improved UTXO traceability algorithm to map the flow of funds and construct dynamic address association graphs; market data is processed by an event-driven stream processing engine to capture order book status at the millisecond level; sentiment data employs a semantic-enhanced BERT model to extract potential manipulation signals from social platforms. These three streams of data are aligned with timestamps and spatially mapped to form a raw data cube with spatiotemporal consistency.

The feature fusion layer innovatively designs a dual-channel interaction mechanism, organically integrating supervised and unsupervised learning paradigms. Chain data is extracted through graph attention networks (GATs) to capture behavioral patterns of address clusters, while market sentiment data is captured via spatiotemporal convolution modules to identify dynamic balance features in order books. These two types of features are aligned across modalities within an adversarial generation network framework. Social sentiment features act as regulatory factors, dynamically adjusting the weight distribution of different modal features through gated neural networks. This mechanism effectively addresses the issue of feature fragmentation caused by data silos in traditional methods, enabling the system to recognize hidden correlations in cross-market coordinated manipulation.

The decision output layer employs a dynamic game-driven early warning response model, simulating market equilibrium through the construction of virtual market maker agents. When abnormal trading patterns are detected, the system initiates a multi-level verification process: first, an initial warning is triggered based on anomaly scores from the feature fusion layer; then, a Monte Carlo tree search simulates the market shock transmission path; finally, a tiered response strategy is generated in conjunction with liquidity stress tests. The output module integrates smart contract technology, which can automatically trigger regulatory measures such as on-chain address tracking and liquidity circuit breakers according to the warning level, forming a complete closed loop from behavior recognition to risk management. Experimental validation shows that this architecture significantly enhances the timeliness of early warnings through the collaborative analysis of multimodal data, particularly demonstrating unique advantages in identifying cross-market manipulation strategies.

3. An Empirical Study on AI Detection of Market Manipulation in Digital Currency

3.1. Graph Neural Network Detection of Cross-Exchange Liquidity Manipulation

In response to the covert and complex nature of cross-exchange liquidity manipulation in the digital currency market, this study proposes a detection model based on dynamic graph neural networks, effectively addressing the dimensionality curse issue in cross-market correlation analysis with traditional methods. The model constructs a cross-chain capital flow topology map to capture hidden address cluster characteristics and fund transfer patterns in multi-exchange coordinated manipulation behaviors, significantly enhancing the accuracy of identifying sophisticated manipulation strategies. Compared to traditional detection methods based on single-exchange transaction data analysis, this model achieves paradigmatic breakthroughs in three aspects: detection dimensions, analytical depth, and response speed. Its core innovation lies in coupling the topological features of blockchain networks with the dynamics of market manipulation behaviors, establishing a three-dimensional detection framework tailored for the digital currency market.

The model architecture comprises three core processing modules: the dynamic graph construction layer, the graph feature learning layer, and the anomaly detection layer. In the dynamic graph construction phase, the system parses blockchain transaction records using an improved UTXO trace-back algorithm to establish multi-dimensional edge features including timestamps, transaction volumes, and address attributes. This algorithm innovatively employs a dual trace-back mechanism: first, it performs forward tracking based on the UTXO chain structure to capture the complete path of fund flows; second, it identifies abnormal transaction clusters through a reverse trace-back algorithm, effectively addressing the issue of blurred fund paths caused by coin mixing services. To address the characteristics of cross-exchange fund transfers, the system introduces a cross-chain address clustering algorithm that aggregates related addresses scattered across multiple blockchains into virtual super nodes through similarity calculations of address behavior patterns. This algorithm constructs a 12-dimensional behavioral fingerprint vector containing transaction frequency, time distribution, and amount characteristics,

and uses an improved spectral clustering algorithm to achieve entity recognition of cross-chain addresses.

The graph feature learning layer employs an improved spatiotemporal graph attention network (ST-GAT), embedding a temporal convolution module into traditional graph neural networks to simultaneously capture the topological features of capital flows and high-frequency transfer patterns. This network dynamically adjusts the attention weights between adjacent nodes, enabling precise identification of the unique "pulse-diffusion" pattern in abnormal liquidity shifts. Specifically, the network designs a triple attention mechanism: structural attention captures the strength of capital connections between address nodes, temporal attention analyzes the time periodicity of trading behaviors, and anomaly attention focuses on sudden capital movements. By deeply integrating gated recurrent units (GRUs) with graph convolutional networks (GCNs), the model achieves joint modeling of spatiotemporal characteristics of cross-market manipulation behaviors. In terms of training strategies, adversarial training methods are used to enhance model robustness, simulating the evolution of manipulators' strategies through generative adversarial networks (GANs), thus equipping the detection system with the ability to continuously counteract new manipulation techniques.

Experimental validation uses real transaction data from three major exchanges ― Binance, Coinbase, and OKX ― to construct a testing environment, covering over 120 million transaction records between 2022 and 2023. The test dataset includes three typical manipulation scenarios: cross-exchange false liquidity induction, joint price suppression in the futures and spot markets, and lightning loan attack arbitrage. The model demonstrates unique detection advantages for new collaborative manipulation strategies, achieving breakthroughs in the following three aspects: First, by learning the evolutionary characteristics of market manipulation strategies through dynamic graph structure, it effectively identifies composite manipulation behaviors across futures and spot markets. By using address behavior fingerprint technology to solve the challenge of entity recognition in anonymous wallets, it successfully traces covert fund transfer paths implemented via coin mixing services. Innovatively, the liquidity shock index is integrated into the graph neural network loss function, enabling the model to quantitatively assess the potential impact of manipulation on market stability. By constructing the Liquidity Black Hole Index (LBHI) coefficient as a key feature of graph nodes, it can predict abnormal market liquidity fluctuations 15 minutes in advance, improving the warning time compared to traditional price-volume indicators by three times.

The technical advantages of this detection model stem from its deep adaptation to the decentralized characteristics of the digital currency market: dynamic graph structures break through the data silo limitations of traditional exchanges, achieving global modeling of a full-market liquidity network. By constructing a feature system that includes 18 graph structure indicators such as node centrality, community modularity, and path accessibility, the system can dynamically capture the topological evolution of market manipulation networks; the graph attention mechanism enhances key path identification through weight redistribution, effectively reducing noise interference in complex networks. By encoding transaction sequence features as time decay functions of graph edges, the system can accurately identify the "pulse injection-

staircase diffusion-centralized withdrawal" three-stage operation pattern commonly used by manipulators.

Table 1. Performance Comparison of Detection Models

Model	Accuracy (%)	FPR (%)	Detection Latency (ms)
Proposed ST-GAT	98.7	1.2	250
Traditional LSTM	89.4	4.8	650
Rule-based Engine	76.5	8.3	1200

The practical value of this model can be verified in three dimensions: In terms of regulation, it provides on-chain behavior analysis tools for penetrating supervision, reducing the average investigation cycle for suspicious transactions. In risk control, exchanges can dynamically adjust margin ratios based on real-time detection results, which experiments show can reduce market manipulation-induced margin calls. In investment protection, by establishing a manipulation warning index, it helps institutional investors avoid manipulated currencies, with backtesting indicating reduced portfolio net asset volatility. These innovations offer reliable technical solutions to address increasingly specialized cross-market manipulation behaviors, marking a significant shift from passive response to intelligent early warning in digital currency market regulation.

3.2. Temporal Prediction Model Verification of Lightning Loan Attack

In response to the technical characteristics of lightning loan attacks, such as their instantaneous nature and cross-contract linkage, this study constructs a time-series prediction model that integrates on-chain operation sequences with liquidity shock transmission. The model captures abnormal patterns in the smart contract invocation graph, enabling dynamic monitoring and early warning of the entire lifecycle of lightning loan attacks. This effectively overcomes the lag issues inherent in traditional detection methods when dealing with complex DeFi protocol nested scenarios.

The model architecture adopts a three-stage processing flow: in the data preprocessing phase, an improved EVM bytecode parser is used to extract the smart contract invocation relationship graph and simultaneously capture transaction Gas consumption patterns and capital flow path characteristics. For the unique "borrow-operate-return" sequence characteristic of lightning loan attacks, an innovative encoder that couples temporal convolutional networks with attention mechanisms is designed to achieve temporal dependency modeling of multi-step attack behaviors. The model training introduces adversarial sample generation techniques, constructing dynamic training sets by simulating the evolution of attacker strategies, significantly enhancing the generalization capability against new attack variants.

The experimental verification adopted a cross-chain dataset containing historical lightning loan attack events to construct an evaluation system based on the liquidity depletion index. The model

successfully identified signals of capital aggregation during the preparation phase of attacks by analyzing key indicators such as sudden changes in collateral ratios and breaches of liquidation thresholds. Compared with traditional detection methods, this model achieves breakthroughs in the following dimensions: First, it effectively identifies nested attacks implemented through multi-protocol combinations by dynamically quantifying contract call paths; Second, it innovatively incorporates oracle manipulation patterns into feature engineering to accurately capture the temporal correlation between price anomalies and lightning loan attacks; Finally, it constructs an attack simulation environment based on dynamic game theory, enabling the model to predict attack profit thresholds at different market depths, providing quantitative evidence for pre-incident warnings.

The model validation results show that this temporal prediction mechanism, by deeply mining the phase characteristics of attack behaviors, significantly improves the timeliness of early warnings for compound lightning loan attacks compared to traditional rule engines while maintaining a low false positive rate. Its technical advantages are mainly reflected in three aspects: the fine-grained parsing capability of on-chain operation sequences breaks through the limitations of single transaction dimension analysis; the spatiotemporal attention mechanism effectively captures the propagation paths across contracts; and the dynamic adversarial training strategy ensures the model's continuous adaptation to the rapid evolution of attack techniques. These innovations provide key technical support for building an active defense-oriented DeFi regulatory system.

4. Construction of Intelligent Supervision System and Prospect of Blockchain Financial Governance

The structural characteristics of the digital currency market present dual demands on regulatory technological innovation: to break through the passive response model of traditional regulation and address the governance adaptation challenges of the blockchain ecosystem. The core architecture of the intelligent regulatory system constructed in this study comprises three progressive levels: a real-time monitoring network based on multimodal data fusion, an intelligent decision-making hub driven by dynamic game theory, and an embedded execution module for blockchain-native governance protocols. The system achieves an organic integration of abnormal transaction pattern recognition and market impact transmission path prediction through a chain-on-chain and off-chain data collaborative analysis engine. Its dynamic risk assessment matrix significantly enhances the foresight and precision of regulatory responses. The technological breakthroughs of this system are reflected in three dimensions: First, by aligning the features of heterogeneous data sources, it achieves multimodal integration of on-chain transaction data, off-chain social sentiment, and cross-market capital flow data, constructing an intelligent analytical map covering 12 regulatory scenarios such as market manipulation, money laundering, and systemic risk; Second, using a deep reinforcement learning framework to build a dynamic optimization model for regulatory strategies, generating optimal intervention strategies that adapt to market evolution by simulating the game process between regulators and market participants; Third, designing a regulatory protocol middleware based on the Substrate framework, supporting

regulatory rules to be directly embedded into the blockchain layer in the form of smart contracts, achieving a transformation of Regulation as Code governance paradigms.

In the path of regulatory technology implementation, an innovative reputation scoring model based on on-chain address behavior fingerprints is proposed. This model constructs a dynamically updated credit evaluation system by analyzing the liquidity contribution, compliance records, and associated network topology characteristics of historical transactions at addresses. Specifically, the model employs a three-tier assessment framework: the base layer calculates the on-chain activity (average daily transaction frequency), net liquidity contribution (capital inflow/outflow ratio), and compliance index (risk weight for dark web transactions or coin mixing services); the network layer extracts the structural importance of addresses in the capital network using graph embedding techniques, including intermediary centrality, K-core level, and community bridging coefficient; the temporal layer uses LSTM networks to capture the pattern evolution characteristics of address behavior. This scoring model has a certain accuracy in identifying high-risk addresses, showing improvement over traditional AML rule engines. Additionally, a liquidity circuit breaker smart contract with self-validation features is designed. When market volatility exceeds preset thresholds, it automatically triggers a gradient-based liquidity adjustment mechanism after verifying abnormal transaction associations through zero-knowledge proof technology. The contract adopts a three-stage response strategy: when the volatility breaks through the first threshold, it initiates a delayed confirmation mechanism for transactions; when it reaches the second threshold, partial collateral freezing is implemented; and when it hits the third threshold, cross-exchange joint circuit breaking is activated. In stress tests, this mechanism successfully reduced the liquidity drying-up time under extreme market conditions to one-fifth of that in traditional manual intervention modes.

The paradigm innovation in blockchain financial governance is embodied in the technological breakthrough of a distributed regulatory architecture. Leveraging verifiable VRF and MPC technologies, a cross-jurisdictional regulatory consensus network is constructed. This network designs an Hybrid BFT consensus mechanism to enable regulatory nodes to collaboratively verify abnormal behaviors and make risk management decisions while protecting transaction privacy. In practice, regulatory nodes randomly elect verification committees through VRF and use a threshold signature scheme to jointly determine suspicious transactions, ensuring that the decision-making process meets both decentralized requirements and legal jurisdiction weight distribution principles. For data privacy protection, the system integrates homomorphic encryption and differential privacy techniques to create a joint analysis environment where "data can be used but not seen."

Future regulatory technology development needs to focus on breaking through three key bottlenecks: First, establish cross-chain data standardization protocols to address the challenges of collecting regulatory data from heterogeneous blockchain systems. A unified on-chain data element model (Metadata Schema) should be developed, covering transaction type codes, address label systems, and smart contract semantic description standards. The International Organization for Standardization (ISO) is currently advancing the Blockchain Regulatory Data Interface Specification (ISO 22739), which provides a framework foundation for this purpose. Second,

improve the legal connection mechanism between on-chain and off-chain activities, clarifying the legal validity and liability rules of smart contract code. Regulatory Oracle technology can be explored to convert legal provisions into executable on-chain verification logic, such as automatically verifying borrowers' KYC status and geographic compliance in DeFi lending agreements. Finally, build an international mutual recognition system for regulatory sandboxes to promote cross-border collaboration through standardized regulatory technology interfaces. It is recommended to adopt a modular sandbox architecture, allowing national regulators to load localized rules via plugins while sharing core risk monitoring modules.

The trend of technological evolution indicates that the integration of privacy computing and federated learning will reshape the regulatory technology infrastructure. A global regulatory intelligence network based on a secure federated learning framework can enable jurisdictions to collaboratively train risk identification models without sharing raw data. For example, a detection model for cross-chain money laundering could integrate transaction data characteristics from multiple countries through horizontal federated learning, exchanging only encrypted parameter gradients during model updates. As quantum-resistant cryptography and TEE technologies mature, it is expected that a governance ecosystem integrating "privacy security-regulatory compliance-technological innovation" will be established in the future. This will ultimately form a new paradigm of digital financial governance driven by technology and governed collectively by multiple parties. This process not only requires technological innovation but also the establishment of a governance matrix covering technical standards, legal frameworks, and international collaboration, to build new infrastructure for the sustainable development of blockchain finance.

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References

Calo, R. (2013). Digital market manipulation.The George Washington Law Review, 82, 995.

Corbet, S., & Larkin, C. (2023). Can artificial intelligence be used to target market manipulation?. Themes in Alternative Investments, 5(2), 129-145.

Higgins, I., Matthey, L., Pal, A., Burgess, C., Glorot, X., Botvinick, M., ... & Lerchner, A. (2017). β -VAE: Learning Basic Visual Concepts with a Constrained Variational Framework. Proceedings of the International Conference on Learning Representations.

in Digital Currency Security: Transforming Global Marketing in the Blockchain Era. Cuestiones de Fisioterapia, 54(3), 1907-1928.

Kumar, A. K., Chidipothu, V. K., & Leelavathi, M. (2025). Artificial Intelligence in Digital Currency Security: Transforming Global Marketing in the Blockchain Era. Cuestiones de Fisioterapia, 54(3), 1907-1928.

Rahimov, E., & Rahimov, K. (2023). Market manipulation in cryptocurrencies through social media: The role of influencers (University of Tartu).

Satish, P. (2023). Global currency monitoring system (Doctoral dissertation, UTAR).

Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017). Attention is All You Need. Advances in Neural Information Processing Systems, 30.

Zhang, Y., Zhang, Y., & Zhang, Y. (2022). Dynamic curriculum learning for deep learning. Proceedings of the AAAI Conference on Artificial Intelligence, 36(1), 1234-1242.

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Service Quality Gaps and Customer Retention: An Empirical SERVQUAL-Based Study of East Asian Retail Chains

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Abstract

This study investigates the relationship between service quality gaps and customer retention in East Asian retail chains. Employing the SERVQUAL model, this research examines how discrepancies between customer expectations and perceptions influence retention behaviors. Data were collected from 387 customers across major retail chains in China, Japan and South Korea through structured questionnaires. SPSS analysis, including correlation, multiple regression, and path analysis, was conducted to test the hypothesized relationships. Results indicate that tangibility and responsiveness dimensions have the strongest impact on customer retention, while empathy demonstrates a moderating effect on the relationship between reliability and retention intention. The findings suggest that East Asian retail chains should prioritize physical facilities and staff responsiveness while developing market-specific approaches to address cultural variations in service expectations. This study contributes to the service quality literature by identifying culturally contingent service dimensions in the East Asian retail context and provides practical implications for international retailers entering these markets.

Keywords: SERVQUAL; Customer Retention; Retail Chains; Service Quality Gaps; East Asia; Consumer Behavior; Cross-Cultural Marketing

1. Introduction

In today's competitive retail environment, customer retention has become a critical factor for sustainable business success, especially in the rapidly evolving East Asian markets (Kim & Lee, 2020). Understanding the relationship between service quality and customer loyalty is particularly relevant in these markets, where consumer expectations are shaped by unique cultural values and rapid economic development (Zhang et al., 2022). While service quality has been extensively studied in Western contexts, research examining its dimensions and impact in East Asian retail settings remains limited.

The SERVQUAL model, developed by Parasuraman et al. (1988), offers a comprehensive framework for measuring service quality through five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. This model identifies service quality gaps between customer expectations and perceptions that significantly influence satisfaction and retention behaviors. This study applies the SERVQUAL framework to examine how these gaps affect customer retention in East Asian retail chains, addressing a significant research gap in the literature.

This research aims to: (1) identify the most influential service quality dimensions affecting customer retention in East Asian retail chains; (2) examine how cultural factors moderate the relationship between service quality gaps and retention; and (3) develop specific recommendations for international retailers seeking to enhance customer retention in East Asian markets.

2. Related Work and Theoretical Support

2.1. Literature and Theoretical Framework

The theoretical foundation of this study integrates the SERVQUAL model (Parasuraman et al., 1988) with the Expectation-Confirmation Theory (Oliver, 1980) and Cultural Dimensions Theory (Hofstede, 2001). The SERVQUAL model has been widely applied in various service contexts but requires cultural adaptation when applied to non-Western settings (Lam, 2002). Expectation-Confirmation Theory suggests that customer satisfaction and subsequent retention are functions of the gap between expectations and perceived performance, aligning with the SERVQUAL framework's conceptualization of service quality gaps.

Previous studies have demonstrated the relationship between service quality and customer retention in various retail contexts. Chen et al. (2019) found that reliability and responsiveness dimensions had the strongest impact on customer loyalty in Chinese department stores. Similarly, Tanaka (2021) identified that physical aspects and problem-solving capabilities significantly influenced repurchase intentions in Japanese retail chains. However, cross-cultural studies by Wong and Sohal (2023) suggest that the relative importance of service dimensions varies across cultural contexts, with collectivist societies placing higher emphasis on relationship aspects of service.

While these studies provide valuable insights, they have not comprehensively examined how specific service quality gaps affect customer retention across multiple East Asian markets simultaneously, which this research addresses.

2.2. Variables and Hypotheses description

Based on the literature review, this study examines the following key variables:

(1) Independent Variables: Five SERVQUAL dimensions (tangibility, reliability, responsiveness, assurance, and empathy) measured as gap scores (perception minus expectation)

(2) Dependent Variable: Customer retention intention

(3) Moderating Variable: Cultural orientation (power distance and collectivism)

The study proposes two main hypotheses:

H1: Service quality gaps in the dimensions of tangibility, reliability, responsiveness, assurance, and empathy are negatively related to customer retention intention in East Asian retail chains.

The theoretical foundation for this hypothesis draws upon the seminal SERVQUAL framework developed by Parasuraman et al. (1988), which posits that service quality is determined by the gap between customer expectations and perceptions across five critical dimensions. When applied to the retail context in East Asian markets, these gaps become particularly salient due to the region's distinctive consumer expectations shaped by rapid economic development and cultural nuances (Zhang et al., 2022). Tangibility gaps, manifested through inadequate physical facilities, equipment, and staff appearance, may significantly undermine consumer confidence in retail establishments, particularly in status-conscious East Asian societies where visual cues strongly influence perceived quality (Zhao & Namkung, 2020). Similarly, reliability gaps—failures to deliver promised services dependably and accurately—can severely damage trust, which research has identified as a crucial precursor to loyalty in Confucian business cultures (Kim & Park, 2019). Responsiveness gaps related to service promptness are hypothesized to be especially detrimental in East Asian retail environments characterized by high service expectations and time sensitivity (Lee et al., 2021). Furthermore, assurance gaps concerning employee knowledge and courtesy may disrupt the authority-respect dynamic valued in many East Asian interactions, while empathy gaps reflecting insufficient individualized attention might compromise the relationship-building process essential for retention in these markets (Wong & Tan, 2022). Prior empirical evidence from sector-specific studies suggests that negative service quality perceptions consistently predict decreased loyalty intentions, although the magnitude of impact varies across service dimensions and market contexts (Chen et al., 2020; Tanaka & Ishida, 2021). This hypothesis thus proposes that each dimension of service quality gap will exhibit a significant negative relationship with customer retention intention across East Asian retail chains.

H2: Cultural orientation (power distance and collectivism) moderates the relationship between service quality gaps and customer retention intention, such that the relationship is stronger in markets with higher collectivism and lower power distance.

This hypothesis builds upon Hofstede's (2001) cultural dimensions theory and subsequent cross-cultural consumer behavior research that demonstrates how national culture systematically influences service expectations, perceptions, and responses (Mattila & Patterson, 2022). The moderating effect of collectivism is anticipated because collectivist societies, prevalent throughout East Asia albeit to varying degrees, emphasize group harmony, relationship maintenance, and face-saving behaviors (Huang & Miao, 2021). Consequently, in markets characterized by higher collectivism such as China and South Korea, service quality gaps—particularly in empathy and responsiveness dimensions—may more severely violate cultural expectations of attentiveness and mutual consideration, thereby amplifying their negative impact on retention intentions (Choi et al., 2019). Conversely, the moderating influence of power distance is hypothesized to operate differently; in societies with lower power distance, customers expect more egalitarian service interactions and may respond more negatively when service gaps indicate hierarchical treatment or inconsistent service delivery (Furrer et al., 2020). This cultural contingency perspective extends previous research by Liu and Yang (2023), who demonstrated

that service recovery effectiveness varied significantly across East Asian markets with different cultural profiles. Additionally, Kim and Johnson's (2021) comparative study of retail service quality perceptions in Japan and China found stronger correlations between service dimensions and loyalty in China, which exhibits relatively lower power distance. Methodologically, this hypothesis necessitates multi-group analysis across the sampled East Asian markets to evaluate whether the structural paths between service quality gaps and retention differ significantly based on the prevailing cultural orientations, thereby advancing understanding of culture's role in service quality management.

3. Methodology

3.1. Sample Selection and Data Sources

A stratified random sampling approach was employed to collect data from customers of major retail chains across three East Asian markets: China, Japan and South Korea. The sample frame included customers who had made at least three purchases from the retail chain within the previous six months. Structured questionnaires were distributed both online and at store locations between January and April 2024. A total of 459 responses were received, with 387 valid questionnaires retained after removing incomplete responses, yielding an 84.3% response rate.

The sample demographic characteristics were balanced across gender (52.7% female, 47.3% male) and age groups (18-25: 21.4%, 26-35: 32.8%, 36-45: 25.6%, 46-55: 13.2%, 56+: 7.0%). Participants represented customers from department stores (38.2%), supermarket chains (26.1%), specialty retailers (20.4%), and convenience store chains (15.3%).

3.2. Model Design and Definition of Variables

The research model examines the impact of service quality gaps on customer retention intention, with cultural dimensions as moderating variables. The SERVQUAL instrument was adapted from Parasuraman et al. (1988) and culturally modified based on pilot testing. Customer retention intention was measured using a 5-item scale adapted from Zeithaml et al. (1996). Cultural orientation was assessed using scales from Hofstede (2001), measuring power distance and collectivism dimensions.

All constructs were measured using 7-point Likert scales. Gap scores for each SERVQUAL dimension were calculated by subtracting expectation scores from perception scores. The questionnaire was initially developed in English, translated into local languages using back-translation procedures, and pre-tested with 30 respondents to ensure clarity and cultural appropriateness.

3.3 Measurement of Variables

Table 1 presents the key variables and their measurement.

Table 1. Operationalization of Variables

Construct	Dimension	Sample Measurement Items	Scale	Source
Service Quality Gaps	Tangibility	"The retail store has modern-looking equipment and facilities"	7-point Likert scale (Strongly disagree to Strongly agree)	Adapted from Parasuraman et al. (1988)
	Reliability	"When the store promises to do something by a certain time, it does so"	7-point Likert scale	
	Responsiveness	"Employees in the store give you prompt service"	7-point Likert scale	
	Assurance	"Employees have the knowledge to answer your questions"	7-point Likert scale	
	Empathy	"The store gives you individual attention"	7-point Likert scale	
Customer Retention	Repurchase Intention	"I intend to continue shopping at this retail store in the future"	7-point Likert scale	Adapted from Zeithaml et al. (1996)
	Recommendation	"I would recommend this retail store to someone who seeks my advice"	7-point Likert scale	
	Positive Word-of-Mouth	"I would say positive things about this retail store to other people"	7-point Likert scale	
Cultural Orientation	Power Distance	"It is important that managers make most decisions without consulting subordinates"	7-point Likert scale	Adapted from Hofstede (2001)
	Collectivism	"Group welfare is more important than individual rewards"	7-point Likert scale	
Control Variables	Shopping Frequency	"How often do you shop at this retail store?"	Categorical scale	
	Relationship Duration	"How long have you been a customer of this retail store?"	Categorical scale	

4. Results and Findings

The title of the figure is centered right below the figure. Figures must be of sufficient resolution for publication. Figures which are not according to the guidelines will cause substantial delay during the production process. Tables should be placed in the main text near to the first time they are cited.

4.1. Descriptive Statistics

Reliability analysis showed that all constructs had adequate internal consistency with Cronbach's alpha values ranging from 0.78 to 0.92. The mean values and standard deviations for the main variables are presented in Table 2.

Table 2. Descriptive Statistics of Main Variables

Variable	Mean	SD	Cronbach's Alpha
Tangibility Gap	-1.34	0.87	0.88
Reliability Gap	-1.42	0.92	0.90
Responsiveness Gap	-1.61	1.03	0.87
Assurance Gap	-1.28	0.81	0.85
Empathy Gap	-1.15	0.94	0.82
Customer Retention	5.21	1.18	0.92
Power Distance	3.86	1.24	0.78
Collectivism	4.92	1.03	0.84

The negative gap scores indicate that customer perceptions fell short of expectations across all SERVQUAL dimensions, with the largest gap observed in responsiveness (-1.61) and the smallest in empathy (-1.15).

4.2. Correlation Analysis

Pearson correlation analysis revealed significant negative relationships between all service quality gap dimensions and customer retention, with correlation coefficients ranging from -0.31 to -0.54 ($p < 0.01$). Tangibility and responsiveness gaps showed the strongest correlations with customer retention (-0.54 and -0.48, respectively).

4.3. Regression Analysis

Multiple regression analysis was conducted to test the relationship between service quality gaps and customer retention. The model explained 58.3% of the variance in customer retention ($R^2 = 0.583$, $F = 42.67$, $p < 0.001$). Table 3 presents the regression results.

Table 3. Multiple Regression Results

Variable	Standardized Coefficient (β)	t-value	p-value	VIF
Tangibility Gap	-0.332	-5.763	0.000**	1.84
Reliability Gap	-0.201	-3.451	0.001**	1.92
Responsiveness Gap	-0.286	-4.876	0.000**	1.76
Assurance Gap	-0.183	-3.125	0.002**	1.68
Empathy Gap	-0.145	-2.487	0.014*	1.71

Notes. *p < 0.05, **p < 0.01 Dependent Variable: Customer Retention $R^2 = 0.583$, Adjusted $R^2 = 0.576$, $F = 42.67$, $p < 0.001$

The results indicate that all service quality gap dimensions significantly and negatively affect customer retention, with tangibility ($\beta = -0.332$, $p < 0.001$) and responsiveness ($\beta = -0.286$, $p < 0.001$) having the strongest impact, supporting H1.

4.4. Moderation Analysis

Hierarchical regression analysis was performed to test the moderating effect of cultural orientation. The results showed that collectivism significantly moderated the relationship between empathy gap and customer retention ($\beta = -0.187$, $p < 0.01$), while power distance moderated the relationship between assurance gap and customer retention ($\beta = 0.165$, $p < 0.05$). These findings partially support H2.

Path analysis further revealed that the negative impact of service quality gaps on customer retention was stronger in markets with higher collectivism (South Korea and China) compared to markets with lower collectivism (Japan), especially for the empathy dimension.

5. Discussion and Implications

The findings of this study provide several theoretical and practical implications for understanding service quality and customer retention in East Asian retail contexts. First, the results confirm that service quality gaps significantly impact customer retention in East Asian retail chains, consistent with previous findings in Western contexts (Parasuraman et al., 1988; Zeithaml et al., 1996). However, the relative importance of specific dimensions differs, with tangibility and responsiveness emerging as the most influential factors in the East Asian context.

The strong impact of tangibility on customer retention reflects the importance East Asian consumers place on physical aspects of retail environments, including store layout, cleanliness, and visual merchandising. This finding aligns with Chen et al. (2019), who noted the significance of physical evidence in Chinese retail settings. Similarly, the high influence of responsiveness

suggests that prompt service and willingness to help customers are critical determinants of retention in time-conscious East Asian societies.

The moderating effect of cultural orientation indicates that the impact of service quality dimensions varies across different East Asian markets. The stronger effect of empathy gaps on retention in collectivist cultures (South Korea and China) suggests that relationship-oriented service aspects are particularly important in these markets. Conversely, the moderating effect of power distance on assurance gaps indicates that expertise and knowledge of staff are more influential in higher power distance societies.

6. Policy Recommendations and Conclusion

Authors should discuss the results and how they can be interpreted from the perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible. Future research directions may also be highlighted.

6.1. Policy Recommendations

Based on the findings, several recommendations can be proposed for retail managers operating in East Asian markets:

(1) Prioritize physical aspects and visual merchandising: Given the strong impact of tangibility on customer retention, retailers should invest in store design, cleanliness, and modern equipment. This is particularly important for international retailers entering East Asian markets.

(2) Enhance staff responsiveness through training: Develop comprehensive training programs focused on prompt service delivery and efficient problem resolution. Implement service response time standards and monitoring systems.

(3) Adopt culturally-tailored service approaches: Customize service strategies based on cultural characteristics of specific markets. In high-collectivism markets like China and South Korea, emphasize relationship-building aspects of service, while in Japan, focus on precision and reliability.

(4) Implement systematic gap analysis: Regularly assess gaps between customer expectations and perceptions across all service dimensions to identify areas for improvement.

(5) Develop integrated retention programs: Create loyalty programs that address identified service quality gaps while considering cultural preferences in reward structures and communication styles.

6.2. Conclusion

This study contributes to the service quality and customer retention literature by examining the impact of SERVQUAL dimensions in East Asian retail contexts. The findings confirm that service quality gaps significantly influence customer retention, with tangibility and responsiveness being the most influential dimensions. Furthermore, cultural orientation moderates these relationships, highlighting the need for culturally adapted service strategies.

While this research provides valuable insights, certain limitations should be acknowledged. The cross-sectional nature of the data limits causal inferences, and future longitudinal studies could provide deeper insights into how service quality perceptions evolve over time. Additionally, expanding the research to include more diverse retail formats and emerging East Asian markets would enhance generalizability.

Future research should explore how digital service quality dimensions interact with traditional SERVQUAL dimensions in omnichannel retail environments, which are increasingly prevalent in East Asian markets. Additionally, investigating how service recovery strategies address specific quality gaps could provide valuable practical insights for retailers operating in these dynamic markets.

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Conceptualization, X.C.; methodology, X.C.; software, X.C.; validation, X.C.; formal analysis, X.C.; investigation, X.C.; resources, X.C.; data curation, X.C.; writing—original draft preparation, X.C.; writing—review and editing, X.C.; visualization, X.C.; supervision, X.C.; project administration, X.C.; funding acquisition, X.C. All authors have read and agreed to the published version of the manuscript.

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References

Chen, L., Li, Y. Q., & Liu, C. H. (2019). How hotel service quality affects customer loyalty in Chinese department stores: The mediating role of customer satisfaction. Journal of Retailing and Consumer Services, 50, 87-93.

Choi, S., Liu, L., & Kim, D. (2019). Consumer responses to service failure in collectivistic contexts: The role of face consciousness and relationship norms. Journal of Service Research, 22(4), 414-431.

Cui, J. (2024). Does digital strategy, organizational agility, digital lead-ership promote DT? A study of digital strategy, organiza-tional agility, digital leadership affects corporate DT in Chinese technological firms. *Journal of Integrated Social Sciences and Humanities*.

Cui, J. (2025). Media Industry CSR and Green ESG: The Moderating Effect of Human-AI Digital Media Technology Innovation. *Media, Communication, and Technology*, *1*(2), 9-9.

Furrer, O., Liu, B. S., & Sudharshan, D. (2020). Culture and service quality perceptions: Empirical cross-cultural evidence from consumers in four countries. Journal of Service Research, 23(3), 274-295.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd ed.). Sage Publications.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd ed.). Sage Publications.

Huang, M., & Miao, L. (2021). Authenticity and loyalty in the Chinese restaurant context: The roles of cultural values and product knowledge. International Journal of Hospitality Management, 94, 102830.

Kim, J., & Johnson, K. K. (2021). The impact of cultural differences on customer perceptions of service quality in the fashion retail industry: A cross-cultural study of Japan and Taiwan Province of China. Journal of Retailing and Consumer Services, 60, 102474.

Kim, J., & Lee, H. (2020). Examining the role of innovativeness and trust in service quality-satisfaction-loyalty relationships. Journal of Service Theory and Practice, 30(2), 149-173.

Lam, T. (2002). Making sense of SERVQUAL's dimensions to the Chinese customers in Macau. Journal of Market-Focused Management, 5(1), 43-58.

Liu, R., & Yang, M. (2023). Service recovery across cultures: A comparative study of customer forgiveness in Chinese, Japanese, and Korean markets. Journal of Business Research, 158, 113677.

Mattila, A. S., & Patterson, P. G. (2022). Cross-cultural service encounters: A review and directions for future research. Journal of Service Management, 33(1), 56-78.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. Journal of Marketing Research, 17(4), 460-469.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, 64(1), 12-40.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, 64(1), 12-40.

Tanaka, H. (2021). Determinants of repurchase intention in Japanese retail chains: The role of corporate social responsibility and service quality. Asian Business & Management, 20(3), 330-351.

Wong, A., & Sohal, A. (2023). Service quality and customer loyalty perspectives in two cultures. International Journal of Retail & Distribution Management, 51(2), 162-180.

Wong, A., & Tan, K. (2022). Building customer loyalty in East Asian markets: The role of face and relationship quality. Journal of International Marketing, 30(2), 69-88.

Yue, H., Cui, J., Zhao, X., Liu, Y., Zhang, H., & Wang, M. (2024). Study on the sports biomechanics prediction, sport biofluids and assessment of college students' mental health

status transport based on artificial neural network and expert system. *Molecular & Cellular Biomechanics*, *21*(1), 256-256.

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. Journal of Marketing, 60(2), 31-46.

Zhang, L., Chen, X., & Xie, K. (2022). Service quality dimensions and their impact on customer loyalty in emerging East Asian markets. Journal of International Marketing, 30(1), 43-62.

Zhao, Y., & Namkung, Y. (2020). The relationship between physical environment and customer satisfaction: The moderating effect of cultural values in luxury retail settings. International Journal of Retail & Distribution Management, 48(3), 294-311.

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Adapting the SERVQUAL Model for East Asian Contexts: A Study of Consumer Expectations and Satisfaction

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Abstract

This study examines the application and adaptation of the SERVQUAL model in East Asian consumer contexts, addressing the cultural nuances that influence service quality perceptions. Through structured questionnaires administered to 328 consumers across three East Asian markets, this research investigates how traditional SERVQUAL dimensions require modification to accurately reflect regional expectations and satisfaction measurements. Statistical analysis using SPSS revealed that while reliability and assurance remain significant across cultures, the dimensions of tangibles and empathy demonstrate culturally specific interpretations. Two hypotheses were tested: (1) East Asian consumers prioritize reliability and assurance over other SERVQUAL dimensions, and (2) cultural value orientations moderate the relationship between service quality dimensions and overall satisfaction. Both hypotheses received partial support, indicating the need for a culturally calibrated service quality assessment model. The findings contribute to both theoretical understanding of cross-cultural service quality measurement and practical applications for multinational service providers operating in East Asian markets.

Keywords: SERVQUAL; East Asian Consumers; Service Quality Measurement; Cross-Cultural Adaptation; Consumer Satisfaction; Cultural Dimensions

1. Introduction

Service quality measurement has predominantly relied on Western-developed frameworks, with the SERVQUAL model (Parasuraman et al., 1988) standing as one of the most widely applied tools across industries. However, as markets globalize, the transferability of these measurement models to non-Western contexts has become increasingly questioned. East Asian markets, with their distinct cultural orientations toward collectivism, high power distance, and long-term orientation (Hofstede, 2001), present a particularly compelling case for examining how service quality perceptions may differ from Western norms.

This research addresses the gap in adapting standardized service quality measurements to culturally diverse contexts by specifically examining how the SERVQUAL dimensions function within East Asian consumer environments. The study investigates whether the five traditional SERVQUAL dimensions—tangibles, reliability, responsiveness, assurance, and empathy—maintain their relevance and relative importance in East Asian service settings, or whether cultural calibration is necessary for accurate measurement and interpretation.

The research aims to provide both theoretical insights into cross-cultural service quality measurement and practical guidance for multinational service organizations seeking to assess and improve their service delivery in East Asian markets. By developing a culturally calibrated model of service quality assessment, this study contributes to the evolving understanding of how consumer expectations are shaped by cultural contexts.

2. Related Work and Theoretical Support

2.1. Literature and Theoretical Frameworks

The foundation of service quality measurement has been substantially influenced by the SERVQUAL model developed by Parasuraman et al. (1988), which identifies five key dimensions: tangibles, reliability, responsiveness, assurance, and empathy. This framework operates on the premise that service quality is determined by the gap between customer expectations and perceptions of actual service delivery (Zeithaml et al., 1990).

However, researchers have increasingly questioned the universal applicability of this model across diverse cultural contexts. Mattila (1999) found that Asian consumers placed different weights on various service elements compared to Western consumers, particularly in hospitality settings. Similarly, Liu et al. (2001) demonstrated that Chinese consumers emphasized different aspects of service encounters than their American counterparts.

The theoretical underpinning for these cultural variations can be found in Hofstede's (2001) cultural dimensions theory and Hall's (1976) high-context versus low-context cultural framework. East Asian cultures typically score high on collectivism, power distance, uncertainty avoidance, and long-term orientation dimensions (Hofstede, 2001). These cultural traits influence how service quality is perceived and evaluated.

Recent work by Zhang et al. (2008) and Wu and Cheng (2013) has begun to address the need for culturally adapted service quality models, particularly in Chinese contexts. However, comprehensive studies encompassing multiple East Asian markets with rigorous empirical testing remain scarce.

2.2. Variables and Theoretical Support

The primary variables examined in this study include the five SERVQUAL dimensions (tangibles, reliability, responsiveness, assurance, and empathy) as independent variables, overall customer satisfaction as the dependent variable, and cultural value orientations as moderating variables.

Cultural value orientations are operationalized using Hofstede's dimensions, particularly focusing on collectivism/individualism, power distance, and long-term orientation. These dimensions have

consistently shown relevance in studies of consumer behavior across cultures (De Mooij & Hofstede, 2011).

The expectation-confirmation theory (Oliver, 1980) provides additional theoretical support for this research, suggesting that satisfaction results from the comparison between expectations and perceived performance. This study extends this framework by examining how cultural factors influence both the formation of expectations and the evaluation of performance.

2.3. Hypotheses Development

Based on the literature review and theoretical frameworks, two primary hypotheses are proposed:

Hypothesis 1: In East Asian consumer contexts, reliability and assurance dimensions of SERVQUAL will demonstrate stronger associations with overall satisfaction compared to tangibles, responsiveness, and empathy dimensions.

This hypothesis is supported by research suggesting that East Asian cultures, with their higher uncertainty avoidance tendencies, place greater emphasis on reliability and trustworthiness in service encounters (Furrer et al., 2000).

Hypothesis 2: Cultural value orientations (collectivism, power distance, and long-term orientation) will moderate the relationship between SERVQUAL dimensions and overall customer satisfaction.

This hypothesis builds on cross-cultural consumer behavior research indicating that cultural values shape evaluation criteria and satisfaction judgments (Patterson et al., 2006).

3. Methodology

3.1. Sample Selection and Data Sources

Data collection was conducted across three East Asian markets: China, Japan, and South Korea. These countries were selected for their economic significance in the region while representing variations in cultural traits within the broader East Asian context. A stratified random sampling approach was employed to ensure demographic diversity and representativeness.

The total sample comprised 328 consumers distributed across the three markets (China: n=112, Japan: n=107, South Korea: n=109). Participants were recruited through a combination of online panels and intercept methods at service establishments, including retail stores, restaurants, and hotels. The sample was balanced for gender (53% female, 47% male) and included diverse age groups (18-70 years, mean age=34.6, SD=11.2).

Structured questionnaires were administered in the respective local languages following rigorous translation and back-translation procedures to ensure conceptual equivalence. Data collection occurred between March and May 2024. The response rate was 67%, and non-response bias testing revealed no significant differences between early and late respondents.

3.2. Model Design and Definition of Variables

The research model examines the relationships between adapted SERVQUAL dimensions and overall customer satisfaction, with cultural values serving as moderating variables. The structural

equation model tested these relationships while controlling for demographic and situational variables.

Variables were operationalized as follows:

(1) SERVQUAL Dimensions: Measured using adapted scales from Parasuraman et al. (1988) with modifications based on preliminary qualitative research in each market. Each dimension was assessed using 4-5 items on a 7-point Likert scale.

(2) Overall Customer Satisfaction: Measured using a 3-item scale adapted from Oliver (1997), capturing cognitive and affective satisfaction components.

(3) Cultural Value Orientations: Assessed using established scales for collectivism/individualism, power distance, and long-term orientation, adapted from Yoo et al. (2011).

(4) Control Variables: Demographic information (age, gender, education, income) and service encounter characteristics (frequency of use, type of service, relationship duration).

Table 1. Measurement of Key Variables

Variable	Measurement Items	Scale	Source
Tangibles	1. Modern-looking equipment2. Visually appealing facilities3. Neat appearance of employees4. Visually appealing materials5. Aesthetically pleasing environment	7-point Likert(1=Strongly disagree,7=Strongly agree)	Adapted from Parasuraman et al. (1988) with additions from cultural pre-testing
Reliability	1. Keeping promises about timing2. Sincere interest in problem solving3. Performing services right the first time4. Providing services at promised time5. Error-free records	7-point Likert	Parasuraman et al. (1988)
Responsiveness	1. Telling customers when services will be performed2. Prompt service to customers3. Willingness to help customers4. Never too busy to respond to requests	7-point Likert	Parasuraman et al. (1988)
Assurance	1. Behavior instilling confidence2. Feeling safe in transactions3. Consistently courteous4. Knowledge to answer questions5. Respect for social hierarchy	7-point Likert	Adapted from Parasuraman et al. (1988) with addition of item 5 from cultural pre-testing
Empathy	1. Individual attention2. Convenient operating hours3. Personal attention4. Having customers' best interests at heart5. Understanding specific needs6.	7-point Likert	Adapted from Parasuraman et al. (1988) with addition of item 6 from

	Maintaining appropriate social distance		cultural pre-testing
Overall Customer Satisfaction	1. Overall, I am satisfied with this service provider2. My expectations were met by this service provider3. This service provider is close to my ideal service provider	7-point Likert	Adapted from Oliver (1997)
Collectivism	1. Group welfare is more important than individual rewards2. Group success is more important than individual success3. Group loyalty should be encouraged even at the cost of individual goals4. Individuals should pursue goals after considering group welfare	7-point Likert	Adapted from Yoo et al. (2011)
Power Distance	1. People in higher positions should make decisions without consulting people in lower positions2. People in higher positions should not ask the opinions of people in lower positions too frequently3. People in higher positions should avoid social interaction with people in lower positions4. People in lower positions should not disagree with decisions by people in higher positions	7-point Likert	Adapted from Yoo et al. (2011)
Long-term Orientation	1. Planning for the long-term is important2. Working hard for success in the future is important3. Personal steadiness and stability are valued4. Sacrificing present enjoyment for future success is worthwhile	7-point Likert	Adapted from Yoo et al. (2011)

4. Results and Findings

4.1. Descriptive Statistics

Preliminary analysis of the data revealed acceptable psychometric properties for all measures. Cronbach's alpha coefficients ranged from 0.79 to 0.92, indicating good internal consistency reliability. Confirmatory factor analysis confirmed the five-factor structure of the adapted SERVQUAL instrument, with acceptable fit indices (CFI=0.93, RMSEA=0.064, SRMR=0.057).

Descriptive statistics showed variations in mean scores across the three markets. Chinese consumers reported higher expectations for tangibles (M=5.87, SD=0.94) compared to Japanese (M=5.21, SD=1.01) and Korean consumers (M=5.43, SD=0.88). Japanese consumers placed significantly higher emphasis on reliability (M=6.32, SD=0.68) compared to the other dimensions and other markets.

Cultural value measures confirmed the expected patterns, with all three markets scoring high on collectivism and power distance compared to Western benchmarks, though with notable variations among them. Japanese respondents showed the highest long-term orientation scores (M=5.93, SD=0.72), followed by Korean (M=5.67, SD=0.81) and Chinese respondents (M=5.51, SD=0.87).

4.2. Correlation and Regression Analysis

Correlation analysis revealed significant associations between all SERVQUAL dimensions and overall satisfaction across the combined sample. However, the strength of correlations varied by market. Reliability showed the strongest correlation with satisfaction across all three markets ($r=0.72$, $p<0.001$), supporting Hypothesis 1 partially.

Multiple regression analysis was conducted to test the relative influence of each SERVQUAL dimension on overall satisfaction. The results revealed that reliability ($\beta=0.37$, $p<0.001$) and assurance ($\beta=0.29$, $p<0.001$) were the strongest predictors of satisfaction across the combined sample, followed by responsiveness ($\beta=0.22$, $p<0.001$), empathy ($\beta=0.18$, $p<0.01$), and tangibles ($\beta=0.16$, $p<0.01$). This pattern generally supports Hypothesis 1, though the significant contribution of all dimensions suggests that a comprehensive service quality model remains relevant even with cultural adaptation.

Moderation analysis using hierarchical regression and interaction terms provided partial support for Hypothesis 2. Collectivism significantly moderated the relationship between empathy and satisfaction ($\beta=0.17$, $p<0.01$), with higher collectivism strengthening this relationship. Power distance moderated the relationship between assurance and satisfaction ($\beta=0.21$, $p<0.001$), with higher power distance strengthening this relationship. Long-term orientation moderated the relationship between reliability and satisfaction ($\beta=0.19$, $p<0.01$), with higher long-term orientation strengthening this relationship.

Path analysis confirmed the structural relationships in the hypothesized model, with good model fit ($\chi^2/df=2.31$, CFI=0.94, RMSEA=0.058). The final model explained 73% of the variance in overall satisfaction.

4.3. Hypothesis Testing Results

Hypothesis 1: Partially supported. While reliability and assurance showed the strongest relationships with satisfaction across all markets, responsiveness also demonstrated a strong influence, particularly in the Chinese sample.

Hypothesis 1, which posited that reliability and assurance dimensions would demonstrate stronger associations with overall satisfaction compared to other SERVQUAL dimensions in East Asian consumer contexts, received partial support from the empirical findings. The regression analysis confirmed that reliability ($\beta=0.37$, $p<0.001$) and assurance ($\beta=0.29$, $p<0.001$) indeed emerged as the two most influential predictors of overall satisfaction across the aggregated sample. This finding aligns with Hofstede's (2001) characterization of East Asian cultures as uncertainty-avoiding societies, where consistency, trustworthiness, and confidence-inspiring service attributes are particularly valued.

However, several nuances in the data prevent full confirmation of the hypothesis. Most notably, responsiveness demonstrated unexpectedly strong relationships with satisfaction ($\beta=0.22$, $p<0.001$), particularly in the Chinese market ($\beta=0.28$, $p<0.001$). This finding diverges from previous cross-cultural service research by Furrer et al. (2000), who suggested that responsiveness would be less prioritized in high power distance cultures. One potential explanation lies in China's rapidly evolving service expectations, which Chen and Zhang (2020) attribute to increased exposure to global service standards and heightened consumer empowerment through digital platforms.

Market-specific analysis revealed significant variations worth noting. While Japanese consumers demonstrated the most pronounced emphasis on reliability ($\beta=0.41$, $p<0.001$), Korean consumers exhibited more balanced weighting across dimensions. As Hwang and Lee (2019) observed, "Korean service expectations represent a hybridized model incorporating both traditional East Asian values and Western consumer empowerment ideals" (p. 327).

The findings suggest that a more culturally nuanced refinement of the hypothesis is necessary. Rather than a universal East Asian pattern, the data indicates market-specific interpretations of service quality dimensions that reflect varying stages of economic development, historical service traditions, and degrees of Western market influence. Zhang and Kim (2023) similarly noted that "cultural values operate on a spectrum rather than as discrete categories, requiring gradient approaches to service quality adaptation" (p. 142). This underscores the need for multinational service organizations to develop market-specific measurement models rather than applying a homogeneous East Asian template.

Hypothesis 2: Partially supported. Cultural value orientations moderated specific relationships between SERVQUAL dimensions and satisfaction, but not all hypothesized moderating effects were significant. The moderating effects varied across the three markets, suggesting market-specific adaptations are necessary.

Hypothesis 2, which predicted that cultural value orientations (collectivism, power distance, and long-term orientation) would moderate the relationship between SERVQUAL dimensions and overall customer satisfaction, received partial support through our moderation analysis. The empirical evidence confirmed several significant moderating effects, though not all hypothesized interactions materialized as anticipated.

Collectivism demonstrated a significant moderating effect on the relationship between empathy and satisfaction ($\beta=0.17$, $p<0.01$), with the association strengthening as collectivism scores increased. This finding corroborates Mattila and Patterson's (2004) assertion that collectivistic consumers place greater emphasis on relationship-oriented service elements. However, the anticipated moderating effect of collectivism on responsiveness was not statistically significant ($\beta=0.08$, $p>0.05$), contradicting theoretical predictions based on in-group preferences.

Power distance emerged as a significant moderator for the assurance-satisfaction relationship ($\beta=0.21$, $p<0.001$), with higher power distance strengthening this association. As Furrer et al. (2000) previously suggested, consumers from high power distance cultures demonstrate heightened sensitivity to status cues and authority signals in service interactions. Interestingly, the

hypothesized negative moderating effect of power distance on the empathy-satisfaction relationship was not supported (β=-0.04, p>0.05), suggesting that empathy remains important regardless of power distance orientation when properly contextualized.

Long-term orientation significantly moderated the reliability-satisfaction relationship (β=0.19, p<0.01), with more future-oriented consumers placing greater emphasis on consistent service performance. This aligns with Hofstede's (2001) characterization of long-term oriented cultures as valuing persistence and sustained effort. However, its hypothesized moderating effect on tangibles was not significant (β=0.06, p>0.05).

Notably, the moderating effects exhibited significant variation across the three markets studied. Japanese consumers showed the strongest moderating effect of long-term orientation on reliability (β=0.26, p<0.001), while Chinese consumers demonstrated the most pronounced moderating effect of power distance on assurance (β=0.29, p<0.001). As Zhang et al. (2022) note, "Cultural values operate differentially across East Asian markets despite surface similarities, reflecting unique historical trajectories and contemporary economic conditions" (p. 183).

These findings underscore the necessity for market-specific adaptations of service quality models rather than a pan-East Asian approach. As Lee and Chen (2019) argue, "The heterogeneity within regional cultural clusters often exceeds the differences between regions, necessitating granular approaches to service adaptation" (p. 417). Future research should explore additional cultural dimensions and their market-specific manifestations to further refine our understanding of culturally contingent service quality perceptions.

5. Discussion and Implications of the Study

The findings reveal both similarities and differences in how East Asian consumers evaluate service quality compared to Western contexts. The continued significance of all five SERVQUAL dimensions confirms the fundamental relevance of the model, but the varying emphasis on specific dimensions and the moderating effects of cultural values highlight the need for adaptation.

The stronger influence of reliability and assurance across all three East Asian markets aligns with cultural tendencies toward uncertainty avoidance and risk reduction. However, the emergence of market-specific patterns—such as the heightened importance of tangibles in China and the strong emphasis on reliability in Japan—indicates that even within the East Asian region, cultural calibration is necessary.

The confirmed moderating effects of cultural values on the relationship between service quality dimensions and satisfaction provide empirical support for culturally contingent service quality models. The strengthening effect of collectivism on the empathy-satisfaction relationship suggests that service providers in collectivistic cultures should emphasize relationship-building and personalized attention, albeit with appropriate social boundaries.

5.1. Theoretical Implications

This research contributes to service quality literature by empirically demonstrating the need for cultural calibration of established measurement models. It extends expectation-confirmation theory by incorporating cultural variables as determinants of both expectation formation and service evaluation processes. The findings support a contingency approach to service quality measurement rather than a universalist perspective.

The study also advances cross-cultural consumer behavior theory by identifying specific mechanisms through which cultural values influence service evaluations. The differential moderation effects of cultural dimensions on various service quality components provide a more nuanced understanding than previous research.

5.2. Practical Implications and Policy Recommendations

For multinational service organizations operating in East Asian markets, several practical implications emerge:

(1) Adaptive Measurement: Service quality assessment instruments should be adapted to incorporate cultural dimensions and emphasize reliability and assurance dimensions while maintaining comprehensive measurement.

(2) Training Priorities: Staff training programs should prioritize consistency and trustworthiness while recognizing market-specific expectations regarding tangibles and interpersonal interactions.

(3) Market-Specific Approaches: Despite regional similarities, distinct approaches are warranted for different East Asian markets, with greater emphasis on physical environment in China, procedural reliability in Japan, and balanced attention to multiple dimensions in Korea.

(4) Cultural Competence Development: Organizations should invest in developing cultural competence among customer-facing staff, particularly regarding appropriate expression of empathy within collectivistic contexts and demonstration of assurance in high power distance environments.

From a policy perspective, regional standardization efforts for service quality should acknowledge cultural variations while facilitating cross-border service delivery. Industry associations and regulatory bodies could develop culturally calibrated benchmarking frameworks that maintain core quality principles while accommodating cultural contingencies.

6. Conclusion

This study demonstrates that while the SERVQUAL model maintains relevance in East Asian contexts, cultural calibration enhances its explanatory power and practical utility. The five traditional dimensions remain significant predictors of customer satisfaction, but their relative importance and interpretation vary across cultural contexts and are moderated by cultural value orientations.

The research advances both theoretical understanding of cross-cultural service quality measurement and provides actionable guidance for service organizations navigating East Asian markets. Future research should explore additional cultural dimensions, examine longitudinal changes in service expectations as markets evolve, and investigate the potential convergence or divergence of service quality perceptions in increasingly globalized economies.

The adapted SERVQUAL model proposed in this study offers a balanced approach that preserves the comprehensive assessment of service quality while acknowledging the cultural contingencies that shape consumer expectations and evaluations. This culturally sensitive approach to service quality measurement represents an important step toward more accurate and actionable insights for both researchers and practitioners in international service marketing.

Author Contributions:

Conceptualization, D.Q.; methodology, D.Q.; software, D.Q.; validation, D.Q.; formal analysis, D.Q.; investigation, D.Q.; resources, D.Q.; data curation, D.Q.; writing—original draft preparation, D.Q.; writing—review and editing, D.Q.; visualization, D.Q.; supervision, D.Q.; project administration, D.Q.; funding acquisition, D.Q. All authors have read and agreed to the published version of the manuscript.

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References

Chen, L., & Zhang, J. (2020). Digital transformation of service expectations in China's consumer market. Journal of Service Management, 31(3), 267-285.

Cui, J. (2025). Media Industry CSR and Green ESG: The Moderating Effect of Human-AI Digital Media Technology Innovation. *Media, Communication, and Technology*, *1*(2), p9-p9.

Cui, J. (2025). The Role of Human-AI Interaction in Driving Technological Innovation in the Digital Media Industry: A Qualitative Analysis. *Media, Communication, and Technology*, *1*(1), p17-p17.

De Mooij, M., & Hofstede, G. (2011). Cross-cultural consumer behavior: A review of research findings. Journal of International Consumer Marketing, 23(3-4), 181-192.

Furrer, O., Liu, B. S. C., & Sudharshan, D. (2000). The relationships between culture and service quality perceptions: Basis for cross-cultural market segmentation and resource allocation. Journal of Service Research, 2(4), 355-371.

Furrer, O., Liu, B. S. C., & Sudharshan, D. (2000). The relationships between culture and service quality perceptions: Basis for cross-cultural market segmentation and resource allocation. Journal of Service Research, 2(4), 355-371.

Hall, E. T. (1976). Beyond culture. Anchor Books/Doubleday.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd ed.). Sage Publications.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd ed.). Sage Publications.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd ed.). Sage Publications.

Hwang, J., & Lee, J. (2019). Antecedents and consequences of brand attitude in South Korean luxury service markets. Journal of Business Research, 99, 314-321.

Lee, J. Y., & Chen, T. (2019). Intra-regional heterogeneity in East Asian service markets: Beyond the cultural homogeneity thesis. Journal of International Marketing, 27(4), 402-429.

Liu, B. S. C., Furrer, O., & Sudharshan, D. (2001). The relationships between culture and behavioral intentions toward services. Journal of Service Research, 4(2), 118-129.

Mattila, A. S. (1999). The role of culture in the service evaluation process. Journal of Service Research, 1(3), 250-261.

Mattila, A. S., & Patterson, P. G. (2004). Service recovery and fairness perceptions in collectivist and individualist contexts. Journal of Service Research, 6(4), 336-346.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. Journal of Marketing Research, 17(4), 460-469.

Oliver, R. L. (1997). Satisfaction: A behavioral perspective on the consumer. McGraw-Hill.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, 64(1), 12-40.

Patterson, P. G., Cowley, E., & Prasongsukarn, K. (2006). Service failure recovery: The moderating impact of individual-level cultural value orientation on perceptions of justice. International Journal of Research in Marketing, 23(3), 263-277.

Wu, H. C., & Cheng, C. C. (2013). A hierarchical model of service quality in the airline industry. Journal of Hospitality and Tourism Management, 20, 13-22.

Yoo, B., Donthu, N., & Lenartowicz, T. (2011). Measuring Hofstede's five dimensions of cultural values at the individual level: Development and validation of CVSCALE. Journal of International Consumer Marketing, 23(3-4), 193-210.

Zeithaml, V. A., Parasuraman, A., & Berry, L. L. (1990). Delivering quality service: Balancing customer perceptions and expectations. The Free Press.

Zhang, H., & Kim, Y. (2023). Beyond East-West dichotomies: Gradient approaches to cultural adaptation in service quality measurement. International Journal of Hospitality Management, 108, 137-149.

Zhang, J., Beatty, S. E., & Walsh, G. (2008). Review and future directions of cross-cultural consumer services research. Journal of Business Research, 61(3), 211-224.

Zhang, M., Liu, Y., & Wang, H. (2022). Cultural value heterogeneity in East Asian service contexts: A cross-market analysis of Japan, South Korea and China. Journal of Services Marketing, 36(2), 172-189.

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The Role of Social Work in Urban Community-Based Management: A Path to Optimizing China's Urban Social Governance

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Abstract

In the context of rapid urbanization in China, urban community-based management faces numerous challenges. social work, with its unique values and methods, has the potential to play a significant role in optimizing urban social governance. This study aims to explore the specific functions and mechanisms of social work in urban community-based management. A mixed - method approach was adopted, including a comprehensive literature review, in - depth interviews with social workers, community managers, and residents in selected urban communities in China, and case - study analysis. social work contributes to urban community-based management through functions such as resource mobilization, conflict resolution, and service - quality improvement. It also helps build social capital and strengthen community cohesion. However, there are barriers such as insufficient professional recognition and resource constraints. social work can be an effective path to optimize China's urban social governance. To fully realize its potential, it is necessary to improve professional recognition, allocate more resources, and strengthen the training of social work professionals.

Keywords: Social Work; Urban Community-Based Management; Urban Social Governance; China; Social Capital

1. Introduction

In recent decades, China has witnessed an unprecedented wave of urbanization. The urban population has been increasing rapidly, and urban communities have become the basic units of social governance. Effective urban community-based management is crucial for maintaining social stability, promoting social justice, and improving the quality of life of urban residents (Wang, 2018). However, traditional management models are facing challenges in dealing with the complex social problems emerging in urban communities, such as an aging population, income inequality, and community - building issues.

Furthermore, social work, as a professional activity based on scientific theories and methods, has the potential to address these challenges. It focuses on individuals, families, groups, and communities, aiming to enhance social functioning, relieve social problems, and promote social justice (Zhao, 2019). In Western countries, social work has long been integrated into community-based management and has played an important role in improving community well - being. In China, although the development of social work is relatively new, it has gradually attracted attention in the field of urban social governance.

Previous studies have explored the general role of social work in social governance (Li, 2020), but there is a lack of in - depth research on its specific role in urban community-based management. Some scholars have pointed out that social work can help meet the diverse needs of community residents (Zhang, 2017), yet the specific mechanisms and challenges remain unclear.

The main aim of this study is to comprehensively analyze the role of social work in urban community-based management in China. By identifying its functions, mechanisms, and existing problems, this research hopes to provide practical suggestions for optimizing China's urban social governance. The principal conclusion is that social work can be an important path for improving urban community-based management, but it requires a series of supportive measures to fully exert its potential.

2. Literature Review

2.1. The Conceptual Framework of Urban Community-Based Management and Social Work

2.1.1. Urban Community-Based Management

Urban community-based management refers to a series of activities carried out by various actors in urban communities, including the government, community organizations, and residents, to manage community affairs, allocate resources, and provide public services (Chen, 2017). It involves aspects such as community infrastructure construction, community safety maintenance, and community - service delivery. In China, the government has been playing a leading role in urban community-based management, but in recent years, there has been a growing trend towards the participation of multiple actors.

(1) Traditional Management Model: In the past, the urban community-based management in China mainly relied on the government - led administrative model. The government made decisions and allocated resources, and community residents had limited participation. This model was effective in large - scale community - building in the early stage of urbanization but faced problems such as low efficiency and lack of flexibility in dealing with diverse community needs.

(2) New Trends: With the development of civil society, there is an increasing emphasis on the participation of non - governmental organizations and residents in urban community-based management. Community - building projects are now more focused on meeting the actual needs of residents, and there is a growing recognition of the importance of community autonomy and self - governance.

This study lacks a coherent integration of theoretical frameworks from public administration, institutional economics, or social capital theory. While social capital and governance are briefly mentioned, their use remains largely descriptive rather than analytical. For instance, although Putnam's theory of social capital is cited to support the research hypotheses, there is no systematic effort to connect the empirical findings with this theoretical lens. Incorporating established governance models—such as Ostrom's Institutional Analysis and Development (IAD) framework or the principles of New Public Management—could significantly strengthen the study's theoretical foundation. Doing so would enhance the explanatory power, analytical depth, and overall relevance of the paper within the broader scholarly discourse. A clearer theoretical articulation would not only provide a more rigorous interpretative framework but also align the research with academic standards in governance studies.

2.1.2. Social Work

Social work is a professional service activity that combines social science knowledge, values, and skills to help individuals, families, and communities solve problems and improve their well - being (Zhao, 2019). It is based on values such as respect, equality, and social justice. social workers use methods such as casework, group work, and community work to intervene in social problems.

(1) Professional Values: social work values emphasize the dignity and worth of every individual. social workers respect the choices and decisions of clients, and they strive to promote social justice by advocating for the rights of marginalized groups.

(2) Intervention Methods: Casework focuses on helping individuals solve personal problems through one - on - one counseling. Group work aims to promote the growth and change of group members through group activities. Community work mobilizes community resources and promotes community - wide participation to address community - level problems.

2.2. The Role of Social Work in Urban Community-Based Management

2.2.1. Resource Mobilization

Social workers play a crucial role in mobilizing resources for urban communities. They can connect communities with external resources, such as government funds, corporate sponsorships, and volunteer services.

(1) Government - Community Linkage: social workers are familiar with government policies and funding channels. They can help communities apply for relevant government projects and subsidies. For example, in a certain urban community in Shanghai, social workers helped the community apply for a government - funded elderly - care service project, which improved the living conditions of the elderly in the community.

(2) Corporate and Social Resource Integration: social workers can also establish partnerships with enterprises and social organizations. They can encourage enterprises to provide financial support or in - kind donations to communities. In addition, they can mobilize volunteers to participate in community service activities, which enriches the service resources of the community.

2.2.2. Conflict Resolution

In urban communities, conflicts may arise due to various reasons, such as property disputes, neighborhood disputes, and resource - allocation issues. social workers, with their professional skills in communication and negotiation, can effectively resolve these conflicts.

(1) Mediation Skills: social workers are trained in mediation techniques. They can listen to the demands and concerns of both parties in a conflict, help them understand each other's positions, and find win - win solutions. In a community in Beijing, there was a conflict between residents over the use of a community garden. social workers intervened, organized negotiation meetings, and finally reached an agreement on the shared use of the garden.

(2) Preventive Measures: social workers can also take preventive measures to avoid potential conflicts. They can conduct community - wide surveys to understand residents' needs and concerns in advance and take appropriate measures to address them, thus reducing the likelihood of conflicts.

2.2.3. Service - Quality Improvement

Social work can improve the quality of community services. They can assess the needs of community residents more accurately and design and implement more targeted services.

(1) Needs Assessment: social workers use professional methods such as questionnaires and interviews to conduct in - depth needs assessments in communities. By understanding the real needs of residents, they can ensure that community services are more in line with the actual situation. For example, in a community in Guangzhou, social workers found through surveys that residents had a strong demand for cultural and educational services for children. Based on this, they designed relevant service programs.

(2) Service Innovation: social workers can also introduce new service models and concepts. They can combine modern social work theories and methods with local community characteristics to create more effective service programs. For instance, some social workers have introduced the "strengths - based" approach in community - service delivery, which focuses on the strengths and potential of residents rather than just their problems.

2.3. The Mechanisms of Social Work in Urban Community-Based Management

2.3.1. Building Social Capital

Social work can promote the building of social capital in urban communities. Social capital refers to the networks, norms, and trust that exist within a community, which can facilitate cooperation and collective action (Putnam, 1993).

(1) Network Building: social workers can organize various community activities, such as community festivals, cultural events, and volunteer activities. These activities can bring residents together, expand their social networks, and enhance their communication and interaction. In a community in Shenzhen, social workers organized a series of community - building activities, which significantly increased the frequency of interaction among residents.

(2) Trust and Norm Formation: social workers can also promote the formation of trust and norms in communities. By adhering to professional ethics and values, social workers can set good

examples in the community. They can also encourage residents to abide by community norms and respect each other, which helps to build a harmonious community environment.

2.3.2. Strengthening Community Cohesion

Social work can strengthen community cohesion. Community cohesion refers to the sense of belonging and unity among community residents.

(1) Community - Identity Promotion: social workers can help residents establish a stronger sense of community identity. They can organize activities to introduce the history and culture of the community, and encourage residents to participate in community - building projects. In a historical community in Xi'an, social workers organized cultural heritage - protection activities, which enhanced residents' pride and sense of belonging to the community.

(2) Collective - Action Mobilization: social workers can mobilize residents to participate in collective actions for community development. By promoting cooperation and joint efforts, social workers can make residents feel that they are an important part of the community, which in turn strengthens community cohesion.

3. Methodology

Although the study adopts a mixed-methods approach, the methodological section lacks critical details regarding sample size, interview protocols, case selection criteria, and data analysis techniques. In particular, the treatment of qualitative data is vague; the paper does not explain how the data were coded, analyzed, or validated. This lack of transparency undermines the study’s credibility and limits its replicability. The author should provide a more rigorous and structured account of the research design, particularly for the qualitative component. This includes specifying how interviewees were selected, how data were collected and processed, and which analytical strategies were used to derive conclusions from the data. Clarifying whether coding was inductive or deductive, how intercoder reliability was ensured (if at all), and how themes were validated would contribute to methodological robustness. Additionally, the inclusion of illustrative quotes or comparative case insights would not only enrich the analysis but also demonstrate how empirical findings were systematically grounded in the data. A more comprehensive methodological exposition is essential to enhance both the reliability and scholarly value of the study.

To enhance methodological transparency, the study must specify the sample size and provide a rationale for participant and case selection. For the qualitative component, it is essential to report how many interviews were conducted, how participants were recruited, and what criteria determined their inclusion. Whether purposive sampling, snowball sampling, or another strategy was employed directly influences the generalizability and credibility of findings. In mixed-methods research, the integration of qualitative insights relies heavily on the representativeness and relevance of selected cases. As such, the author should clarify whether the sample size was guided by data saturation principles and how demographic, institutional, or contextual diversity was ensured. Additionally, any exclusion criteria, ethical considerations (such as informed consent), and the duration and format of interviews (e.g., semi-structured, in-depth) should be

detailed. Without such information, the methodological foundation remains opaque, limiting readers' ability to evaluate the rigor and trustworthiness of the research design.

Beyond sample composition, the study must also elaborate on how qualitative data were processed and analyzed. A clear explanation of the analytical approach—whether thematic analysis, grounded theory, content analysis, or narrative analysis—is crucial for understanding how insights were derived. The author should indicate whether coding was conducted manually or with the aid of qualitative data analysis software (e.g., NVivo, MAXQDA), and describe the coding framework, including whether it was developed inductively from the data or deductively from pre-existing theory. The process of coding should be transparently outlined: how many coders were involved, how coding consistency was maintained, and whether intercoder reliability was assessed. Furthermore, the method of theme validation—such as member checking, triangulation, or peer debriefing—should be specified. Including examples of how codes evolved into themes, and how those themes support the empirical claims, would enhance analytical clarity. Such methodological precision is necessary for readers to assess the depth and validity of the qualitative findings.

4. Discussion

The results of this study show that social work has multiple functions and positive impacts on urban community-based management in China. These findings are consistent with previous studies in Western countries, which also emphasize the importance of social work in community - building and social governance (Kretzmann and McKnight, 1993). However, in the Chinese context, there are some unique challenges.

One of the main challenges is the insufficient professional recognition of social work. In China, social work is still a relatively new profession, and many people, including some government officials and community managers, do not fully understand the value and functions of social work. This leads to a lack of support and resources for social work in urban community-based management.

Another challenge is resource constraints. Although social workers can mobilize resources to a certain extent, the overall resources available for social work in urban communities are still limited. There is a lack of stable funding sources, and the number of professional social workers is insufficient, which restricts the scope and depth of social work services.

In terms of future research directions, more in - depth studies are needed on how to improve the professional recognition of social work in China. This could involve exploring effective publicity and education methods, as well as policy - making to promote the development of the social work profession. In addition, research on how to optimize the allocation of social work resources in urban communities is also necessary.

5. Conclusions

This study has comprehensively analyzed the role of social work in urban community-based management in China. social work can contribute to urban community-based management through functions such as resource mobilization, conflict resolution, and service - quality improvement. It also plays an important role in building social capital and strengthening community cohesion.

The study would benefit from a more critical engagement with potential counterarguments, particularly regarding institutional inertia and resistance to change. In governance-related research, reforms or participatory mechanisms often face systemic constraints that stem from entrenched bureaucratic interests, path dependency, or political disincentives. By overlooking these structural barriers, the analysis risks presenting an overly optimistic or linear interpretation of governance innovation. The author should acknowledge that even well-designed policies or community-led initiatives may falter due to misaligned incentives, capacity limitations, or lack of institutional will. Incorporating a discussion of institutional resistance—supported by relevant empirical or theoretical literature—would offer a more balanced and realistic understanding of implementation dynamics. This addition would also strengthen the study's practical relevance by highlighting the real-world challenges that reform efforts must navigate.

Another critical omission in the study is the limited attention paid to regional or contextual variation across the cases analyzed. Governance outcomes are deeply shaped by socio-political, cultural, and economic factors that vary significantly between regions. For example, mechanisms that succeed in urban, resource-rich settings may prove ineffective in rural or marginalized areas with weaker administrative capacity or different power structures. Ignoring such variation risks overgeneralizing the findings and weakens the explanatory power of the study. The author should explicitly address how contextual differences—such as local governance culture, institutional maturity, or civil society strength—may influence the applicability or outcomes of governance models. Including comparative analysis or region-specific commentary would enhance both the nuance and transferability of the study’s conclusions. This would also reflect a deeper appreciation of the complexity inherent in public administration across diverse settings.

However, to fully realize the potential of social work in optimizing China's urban social governance, it is necessary to address the existing challenges. This requires improving the professional recognition of social work, allocating more resources, and strengthening the training of social work professionals. Future research should focus on these aspects to provide more practical suggestions for the development of social work in urban community-based management in China.

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References

Chen, X. (2017). Urban community-based management in China: Problems and solutions. Urban Development Studies, 24(5), 34 - 40.

Cui, J., & Kwong, P. K. (2022). An Analysis of Working to learn and learning to work: research on China higher education's Research, Development and the relationships work and learning. In Proceedings of the MAHSA International Conference of Accounting and Business.

Kretzmann, J. P., & McKnight, J. L. (1993). Building communities from the inside out: A path toward finding and mobilizing a community's assets. ACTA Publications.

Li, Y. (2020). The role of social work in social governance: A review. social work Research, 35(2), 56 - 68.

Putnam, R. D. (1993). Making democracy work: Civic traditions in modern Italy. Princeton University Press.

Wang, H. (2018). Urbanization and urban social governance in China. Social Sciences in China, 45(3), 78 - 90.

Zhang, M. (2017). social work and community service in urban areas. Journal of social work Education, 22(4), 55 - 66.

Zhao, X. (2019). Introduction to social work. Peking University Press.

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Research on Financial Analysis of LiAuto Based on Harvard Analysis Framework

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Abstract

In the current era when the global automotive industry is accelerating its transformation towards the new energy sector, as a significant player in the new energy vehicle field, Li Auto should have taken advantage of the industry's favorable conditions to achieve rapid growth. However, in its actual development, it has encountered severe competitive landscapes and market challenges. This article applies the Harvard Analysis Framework to Li Auto, analyzing the problems it faces in its operation from the perspectives of strategy, accounting, finance, and prospects. In terms of strategy, the pure electric vehicle model has unreasonable positioning, design, and sales targets. In accounting, the efficiency of using monetary funds is low, and there is an excessive reliance on short-term debt. In finance, the current and quick ratios fluctuate greatly, and the asset turnover efficiency is low. In terms of prospects, it is under pressure from market competition and policy changes. Measures such as adjusting product strategies, optimizing fund management, and actively responding to policy changes need to be taken to enhance its comprehensive competitiveness. This article aims to assist Li Auto in further development and also provide a model for financial analysis of similar automotive companies.

Keywords: Financial Analysis; Ideal Auto; Harvard Analysis Framework; New Energy Vehicles; Strategic Management

1. Introduction

In the second decade of the 21st century, the global automotive industry is undergoing unprecedented changes, with new energy vehicles as the core driving force of this transformation, developing at an unprecedented speed. With the increasingly severe global climate change problem, governments of various countries have introduced policies to encourage the research, development, and production of new energy vehicles to reduce dependence on fossil fuels and lower carbon emissions. This trend is particularly evident in China. As the world's largest

automotive market, the Chinese government has vigorously promoted the development of the new energy vehicle industry through a series of policy measures, such as purchase subsidies, tax preferences, and traffic restrictions and purchase limits (Zhang, 2018). Against this background, Li Auto has rapidly emerged in the new energy vehicle market with its unique extended - range electric vehicle technology and precise market positioning (Wu, 2021). Li Auto not only solves the range anxiety problem of pure electric vehicles but also wins the favor of consumers through intelligent product design and high - quality customer service (Xie, 2022). With the continuous expansion of its product line and the gradual increase of its market share, Li Auto has become an important force in the Chinese new energy vehicle market.

However, the rapid development of the new energy vehicle market has also brought fierce competition. Many domestic and foreign brands have entered the market, vying for limited market share. At the same time, the accelerated pace of technological upgrading has also put forward higher requirements for new energy vehicle enterprises (Chen, 2022). Li Auto needs to maintain its technological leadership while continuously optimizing its cost structure, improving product quality and service levels to cope with the increasingly fierce market competition. In addition, the supply chain of the new energy vehicle industry is complex and highly dependent on external resources, such as battery raw materials and chips. The instability of the global supply chain has had a significant impact on the new energy vehicle industry, increasing the operating risks of enterprises (Yan, 2020). At the same time, adjustments in government policies may also have a significant impact on the financial situation of new energy vehicle enterprises (Ma, 2023). With the improvement of consumers' awareness of new energy vehicles and their enhanced environmental protection awareness, the market demand for new energy vehicles continues to grow. Consumers also have higher and higher requirements for range, charging convenience, and intelligent levels (Li, 2023).

Firstly, by deeply analyzing the financial situation of Li Auto, it can reveal its advantages and disadvantages in market competition and provide reference for other new energy vehicle enterprises in the industry.

Secondly, with the continuous expansion of the new energy vehicle market, studying the financial performance of Li Auto has important reference value for investors, helping them make more informed investment decisions.

Finally, the research on the financial situation of Li Auto enriches the application cases of the Harvard Analytical Framework in the new energy vehicle industry, contributing to the innovation and development of financial management theory in the new energy vehicle field.

2. Relevant Concepts and Theoretical Foundations

2.1. Financial Analysis Concepts

2.1.1. Accurate Assessment of Financial Health

Financial analysis delves into the scale, composition, and quality of corporate assets, scrutinizes the structure, maturity, and repayment pressure of liabilities, and calculates the share

and trends of shareholders' equity. This enables decision-makers to evaluate a company's capital strength, debt burden, and net asset position, facilitating targeted financial planning and capital allocation strategies.

2.1.2. In-depth Evaluation of Operational Performance

By examining revenue sources, growth trends, net profit mechanisms, profit margins, and cash flow dynamics, financial analysis helps management identify profitability potential, operational efficiency, and underlying risks (Wang, 2020). This supports data-driven strategic planning and operational optimization.

2.1.3. Scientific Forecasting of Future Trends

Through historical data analysis, industry trend insights, and macroeconomic assessments, financial analysis projects future revenue, profit trajectories, and cash flow conditions. This forward-looking approach allows companies to proactively align financial strategies with long-term growth objectives.

2.1.4. Supporting External Stakeholder Decisions

Investors rely on financial analysis to identify high-potential opportunities and assess risk-return tradeoffs; creditors evaluate solvency to safeguard loans; and analysts provide objective market assessments (Huang et al., 2020). By transparently presenting financial and operational metrics, financial analysis empowers stakeholders to make informed investment, lending, and valuation decisions, fostering a stable capital market ecosystem.

2.2. Financial Analysis Methods

Financial analysis aims to provide precise decision-making support for all parties related to the enterprise. It mainly relies on several key methods to deeply understand the financial situation of the enterprise from multiple dimensions.

2.2.1. Financial Statement Analysis

Financial statement analysis holds a fundamental position. By carefully studying the income statement, one can accurately sort out the sources and composition of the enterprise's various incomes, as well as the items and amounts of various expenditures, thereby clarifying the enterprise's profit model and actual profit level; the balance sheet can comprehensively present the specific categories of the enterprise's assets, such as the scale and usage status of fixed assets, the turnover situation of current assets, and the detailed items of liabilities, including the maturity time of short-term liabilities and the repayment arrangements of long-term liabilities, making the enterprise's financial structure clear; the cash flow statement records in detail the channels of cash inflows, whether they come from core business operations, investment income, or financing activities, and clearly indicates the destinations of cash outflows, such as for purchasing raw materials, paying employee salaries, and repaying debt principal and interest, thereby accurately reflecting the dynamic turnover of the enterprise's cash. Through in-depth exploration of these three core statements, the enterprise's operating income and expenditure, asset-liability structure, and cash flow situation can be fully presented.

2.2.2. Ratio Analysis

As an important means, uses a series of targeted financial ratios to measure the performance of the enterprise. Take the profit margin as an example. By calculating the ratio of net profit to operating income, it accurately reflects the enterprise's profitability and provides a basis for judging the enterprise's competitiveness in the market; the debt-paying ability ratio measures the enterprise's long-term debt-paying ability by analyzing the relationship between long-term liabilities and assets, equity, etc. The current ratio focuses on the proportion of current assets to current liabilities to judge the short-term liquidity of funds. The combination of the two can accurately assess the enterprise's ability to deal with debt risks; the asset turnover ratio calculates the ratio of operating income to the average total assets to directly present the operational efficiency of assets and reflect the enterprise's business vitality. Through the precise calculation and comparison of these ratios, the enterprise's performance in key areas such as operating performance, debt-paying ability, and fund liquidity can be quantitatively presented, providing precise references for decision-making.

2.2.3. Trend analysis

Trend analysis focuses on the time dimension, collecting and comparing financial data from multiple consecutive periods. By analyzing the changes in values of indicators such as operating income, asset-liability ratio, and net profit in different periods, it accurately judges the trend of the enterprise's financial situation and operating performance. If operating income steadily increases year by year, it indicates that the enterprise's market expansion is smooth; if the asset-liability ratio continues to decline, it shows that the enterprise's financial risk is reduced; if net profit fluctuates greatly, the reasons need to be explored in depth. In this way, the dynamic changes in the enterprise's development can be clearly observed, providing strong support for forward-looking planning.

2.2.4. Cash flow analysis

Cash flow analysis focuses on the enterprise's cash flow situation, mainly evaluating the stability and sustainability of cash inflows, analyzing whether the proportions of cash inflows from operating, investment, and financing activities are reasonable to ensure the enterprise has a stable source of funds; at the same time, it pays attention to the rationality of cash outflows, such as whether procurement expenditures and debt repayment expenditures are within a controllable range. Only by ensuring that the enterprise has sufficient cash reserves, which can not only meet daily operating expenses but also repay debts on time, can the enterprise operate stably.

2.3. Harvard Analytical Framework

2.3.1 The Concept and Composition of the Harvard Analytical Framework

The Harvard Analytical Framework was proposed by three professors from Harvard University, namely Krishna G. Palepu, Paul M. Healy and Victor L. Bernard (Zhang, 2021). This framework is a comprehensive financial analysis tool that organically combines strategic analysis, accounting analysis, financial analysis and outlook analysis, providing a comprehensive and systematic perspective for enterprise financial analysis. It overcomes the limitation of traditional financial

analysis that only focuses on financial data itself. Help users better understand the financial status, operating results and future development trends of the enterprise. Figure 1 explains the analytical framework.

Figure 1. Harvard Framework Diagram

2.3.2. Advantages and limitations of the harvard analytical framework

The Harvard financial analysis framework demonstrates outstanding advantages, capable of conducting comprehensive information analysis, taking into account various internal and external factors, and through multi-dimensional in-depth analysis, more accurately predicting the future development trends of enterprises, providing strong and reliable support for enterprise strategic decision-making and other aspects (Zhang et al., 2022).

Table 1. Advantages of the Harvard Analytical Framework

Comparison dimension	Traditional Report analysis	Harvard Financial Analysis Framework
Comprehensiveness	Limited by financial statement data, there is a lack of integrated consideration of the macro environment in which the enterprise is located and internal non-financial information, making it difficult to construct a comprehensive perspective and prone to missing key information.	From a strategic perspective, integrate external factors such as macroeconomics, policies and regulations, and industry trends, as well as internal information from multiple aspects including finance, operation, and management of the enterprise, to conduct a comprehensive and systematic analysis.
Forward-looking	Ignoring factors such as the trend of policy changes, the impact of technological innovations, and the shift in market demand, and relying solely on historical financial data to predict the future.	Based on in-depth exploration from multiple dimensions such as strategy, accounting, finance, and prospects, all links work in coordination, fully considering the interaction and influence of information at different levels.

3. Overview of Li Auto Company and Industry Background

3.1. Introduction to Li Auto Company

Li Auto was established on July 1, 2015, with its headquarters in Beijing. Its predecessor was Beijing Chehejia Information Technology Co., LTD. With the mission of "Creating a mobile home, creating a happy home", it is determined to become a world-class electric vehicle brand, providing people with high-quality, high-performance and high-tech means of transportation. On July 30, 2020, it was listed on the Nasdaq in the United States with the stock code "LI", and on August 12 of the following year, it was listed on the Hong Kong Stock Exchange with the code "02015.HK".

Since its establishment, Li Auto Company has been making rapid progress. In October 2018, Li Auto launched its first smart electric vehicle, the ONE. The price was announced and pre-orders were accepted in April of the following year. Mass production began in November and deliveries started in December. Since then, the company has accelerated its layout. In July 2021, the 100th directly-operated retail center opened. In October of the same year, the construction of the Beijing Green and Intelligent Factory began. In October of the same year, the 100,000th Li Auto ONE rolled off the production line. In February 2022, some models were integrated with wechat's in-car version. In June, the family smart flagship SUV, Li Auto L9, was released, and deliveries began in August. In February 2023, the first five-seat product of Li Auto, the L7, made its debut. It was officially delivered in March and has been continuously expanding its market territory with innovative products, making a name for itself in the field of new energy vehicles.

3.2. Industry Background Analysis

At present, the new energy vehicle industry is developing rapidly, which constitutes the industry background of Li Auto Company. On the one hand, the market is experiencing explosive growth. The sales of new energy vehicles both globally and domestically are continuously rising, and the demand is becoming increasingly strong, providing Li Auto Company with a vast space for expansion. On the other hand, the technological field is also evolving rapidly. Autonomous driving, battery optimization, and energy management system innovation have become trends. Li Auto Company is actively following suit, independently developing an autonomous driving system, applying unique range-extended electric technology, and meticulously crafting advanced battery management solutions, striving for outstanding product performance. In terms of policy, the government has been providing continuous support. Early car purchase subsidies have stimulated market vitality. Although the subsidies have been reduced later, measures such as industrial planning and tax incentives have still created a favorable atmosphere for the growth of new energy vehicles, including Li Auto Company.

However, the challenges faced by Li Auto Company should not be underestimated either. Fierce competition takes the lead. New force automakers are springing up like mushrooms after rain, and traditional automakers are accelerating their transformation pace. All parties are vying for market share. Li Auto Company must constantly innovate and rely on its differentiated advantages to gain a firm foothold.

4. Financial Analysis of Ideal Auto Based on the Harvard Analytical Framework

4.1. Strategic Analysis

4.1.1. Porter's Five Forces Model

(1) Threat of new entrants

From a strategic perspective, the rapid development of the new energy vehicle industry has attracted a large number of new enterprises. For Li Auto, potential new entrants may bring new technologies and business models, intensifying market competition. Tech giants like Apple and Google have profound technical reserves and a large number of professionals in cutting - edge technology fields such as artificial intelligence, software algorithms, and chip research and development. Once they enter the new energy vehicle market, they can quickly apply their technical advantages to key systems such as intelligent driving and in - vehicle interaction, developing highly intelligent and innovative products, posing a huge technical challenge to Li Auto. Traditional automakers have a long history and rich experience in the automotive manufacturing field. They master core technologies of traditional automobiles such as engines, chassis, and transmissions, and are also very mature in production processes, quality control, and supply chain management. With the acceleration of the electrification transformation, they can combine these advantages with new energy technologies to quickly launch reliable and high - quality new energy vehicle products, competing directly with Li Auto in the market. Moreover, traditional automakers have cultivated a large number of loyal users, and these consumers have a high sense of identity and loyalty to the brand. Even in the new energy vehicle era, they may still be more inclined to choose new energy models of familiar and trusted traditional brands.

(2) Threat of substitutes

With the continuous progress of battery technology, the range of pure electric vehicles is gradually increasing. Some high - end pure electric vehicles can already meet the daily travel needs of most consumers. Even, with the support of fast - charging technology, the charging time of some models has been greatly shortened, which poses a certain threat to Li Auto's market share. Fuel cells are considered one of the future development directions of new energy vehicles. They have advantages such as high energy density, short refueling time, and zero emissions. Although the current market scale of hydrogen - fuel - cell vehicles is small, their technology is developing rapidly, and some national and regional governments are vigorously supporting the research, development, and promotion of hydrogen - fuel - cell vehicles. If the cost of hydrogen - fuel - cell vehicles can be significantly reduced and the technology becomes more mature and stable in the future, it will pose a huge substitution threat to existing new energy vehicles, including those of Li Auto.

(3) Bargaining power of suppliers

As of October 18, 2024, Li Auto had cumulatively delivered over 1 million vehicles. Its large - scale sales and continuous increase in delivery volume have led to a substantial increase in the procurement volume of components. This gives Li Auto stronger bargaining power when negotiating with suppliers, enabling it to strive for more favorable procurement prices, quality

standards, and delivery terms. Li Auto adopts a cross - supply model with two suppliers, CATL and Sunwoda, to avoid the risk of supply interruption caused by over - reliance on a single supplier. The existence of two suppliers gives Li Auto more choices and greater bargaining power in battery procurement negotiations. If one supplier's quotation or cooperation terms are not satisfactory, Li Auto can use the competitive pressure from the other supplier to prompt the former to lower prices, improve service quality, or improve other cooperation terms, thereby obtaining more favorable procurement conditions and reducing battery procurement costs. The competition between CATL and Sunwoda prompts them to continuously improve their technical levels, product quality, and production efficiency to strive for more order shares. This competitive pressure is conducive to promoting the progress of battery technology and cost reduction, ultimately benefiting Li Auto, which can obtain better - performing and more reasonably - priced battery products.

(4) Bargaining power of buyers

Due to the fierce competition in the new energy vehicle market, buyers have relatively strong bargaining power. Li Auto should focus on enhancing brand value and customer loyalty. It can increase the switching costs of buyers by providing high - quality after - sales services, personalized vehicle customization services, etc. At the same time, it should optimize the product cost structure, reasonably control prices while ensuring product quality, to balance the bargaining power of buyers and corporate profits. For example, by establishing a sound after - sales service network and providing rapid - response maintenance services, customer satisfaction can be improved.

(5) Rivalry among existing competitors

The new energy vehicle industry is in a stage of rapid development, with continuous updates in battery technology, autonomous driving technology, and intelligent cockpit technology. For example, the continuous increase in battery energy density has greatly increased the range of pure electric vehicles, which poses a certain impact on Li Auto's extended - range technology advantage. Consumers have more choices when purchasing cars and may be more inclined to pure electric vehicles with longer ranges and no reliance on fuel engines. With the continuous expansion of the new energy vehicle market, more and more enterprises are entering the field, and the intensifying market competition has led to frequent price wars. Some automakers continuously reduce product prices to seize market share, which poses a challenge to Li Auto's pricing strategy. If Li Auto does not participate in the price war, it may lose some price - sensitive consumers; if it does, it may affect its profitability.

4.1.2. SWOT Analysis

(1) Strengths

As mentioned in the interviews with Li Auto employees, Li Auto's strategic positioning is to become a leader in the new energy vehicle market, committed to providing high - quality and high - performance electric vehicle products. Its market goal is to further expand market share and enhance brand influence. Since its establishment, Li Auto has clearly positioned itself as a family - car brand, precisely building full - chain operating capabilities around the family - user group. It

deeply explores the needs of family users for vehicle space, comfort, intelligent configuration, and range, and builds products accordingly, providing a better choice for family travel. In October 2024, Li Auto's 1 millionth vehicle rolled off the production line, making it the first new - energy vehicle startup in China to reach this milestone, demonstrating its strong influence and user base in the market. In addition, by adhering to the brand mission of "creating a mobile home and a happy home," Li Auto has established a good brand image of focusing on family travel in the hearts of consumers, enhancing users' sense of identity and loyalty to the brand.

As mentioned by Li Auto employees in the interviews, Li Auto aims to maintain its competitive advantage through continuous technological innovation, product upgrades, and high - quality services. As the pioneer of extended - range electric vehicles, Li Auto's extended - range electric technology has been continuously developed and improved. Its self - developed extended - range electric 2.0 system is more efficient, quieter, and more integrated, effectively solving users' range - anxiety problems. For example, Li Auto's L - series models are equipped with a self - developed and self - produced 1.5T four - cylinder range - extender, a new - generation large - capacity battery pack, and front and rear dual - drive motors, making it possible to use electricity in cities, generate electricity on long - distance trips, and supply power for camping, providing more convenience and possibilities for family travel. On November 28, 2024, Li Auto fully pushed the latest results of the end - to - end + VLM dual - system architecture - - parking - space - to - parking - space to all Zhijia MAX version users, becoming the first automaker in the industry to fully push this function.

(2) Weaknesses

Compared with traditional automakers, Li Auto has a shorter establishment time and less market precipitation, resulting in limited brand awareness. This may pose challenges when attracting a wider range of consumers, especially those with high loyalty to traditional brands, who may be more inclined to choose cars from well - known brands. Some consumers do not fully understand Li Auto's technology and product features. For example, the advantages of its extended - range electric technology have not been fully recognized by all potential consumers, and it may be misinterpreted as a transitional or less advanced technology, affecting purchase decisions.

(3) External opportunities

After achieving certain results in the domestic market, Li Auto has the potential to expand into the international market. With the increasing global attention to environmental protection and sustainable development, as well as the policy support of governments of various countries for new energy vehicles, such as purchase subsidies, tax preferences, and free parking, these policies help to reduce consumers' purchase costs and improve the market competitiveness of new energy vehicles, thus providing opportunities for Li Auto's sales expansion. Li Auto can expand its business to regions with high demand for new energy vehicles, such as Europe and North America, further expanding its market coverage and enhancing its international brand influence and market share.

(4) External threats

The new energy vehicle market has attracted many participants, including traditional automakers, new - energy vehicle startups, and technology companies, and the market competition is becoming increasingly fierce. Traditional automakers have strong brand influence, technical accumulation, and production - manufacturing capabilities; new - energy vehicle startups perform well in innovation and user experience; technology companies have advantages in intelligent networking technology and software development. These competitors are all vying for market share, putting great competitive pressure on Li Auto, which may lead to market - share shrinkage, product - price reduction, and profit - margin compression. The government's policies and regulations for new energy vehicles are constantly being adjusted and improved, such as the phase - out of subsidy policies, the tightening of emission standards, and the strengthening of safety regulations. These changes in policies and regulations may have a significant impact on Li Auto's production, sales, and operation.

4.2. Accounting Analysis

4.2.1. Identification of Key Accounting Items

(1) Monetary funds

Against the backdrop of widespread losses in the new energy vehicle industry, Li Auto inevitably faces significant loss - making pressure. Moreover, there is usually a certain payment - collection period in car sales. It may take several months from the delivery of vehicles to dealers to the final receipt of payment. Monetary funds, as the most direct source of funds for enterprises, can continuously support the daily operations of enterprises. They can be used to pay fixed expenses such as employee salaries, utility bills, and equipment maintenance fees, ensuring that enterprises do not interrupt production and sales activities due to capital shortages. For example, even if an enterprise incurs large operating losses in certain quarters or years, as long as it has a certain amount of monetary funds, it can maintain the normal operation of the factory, ensure the continuity of the R & D and production processes, and avoid forced production stoppages due to capital - chain breaks.

(2) Inventory

The automotive manufacturing industry is a capital - and technology - intensive industry. Inventory management directly reflects an enterprise's production planning, supply - chain efficiency, and market - response capabilities. The new energy vehicle field is particularly special, with rapid technological iterations, strong policy dependence, and fierce market competition. Enterprises need to dynamically adjust inventory levels to balance capacity expansion and market demand. In addition, the new energy vehicle industry has a high dependence on core components such as batteries. Fluctuations in raw - material prices and changes in technology routes can significantly affect inventory value and turnover efficiency. Therefore, inventory is not only a key indicator for measuring the short - term operating health of Li Auto but also a window to its long - term strategic layout and industry - competition situation.

(3) Accounts payable

Accounts payable is selected as a key accounting item for analyzing Li Auto mainly because it can intuitively reflect the characteristics of heavy - asset investment, high supply - chain concentration, and capital intensity in the new - energy vehicle industry. As an industry highly dependent on core raw materials such as batteries and motors, the scale of accounts payable is directly related to an enterprise's capacity - expansion rhythm and supply - chain bargaining power.

4.2.2. Analysis of Key Accounting Items

(1) Monetary funds

As can be seen from Table 2, the monetary funds of Li Auto Company have witnessed explosive growth from 2019 to 2023. The rapid increase in monetary funds not only reflects the confidence of the capital market in Li Auto but also highlights the company's use of cash reserves to cope with industry uncertainties (such as fluctuations in raw material prices and policy adjustments). Cash and cash equivalents rose sharply from 1,296,215.00 thousand yuan in 2019 to 91,329,030 thousand yuan in 2023, indicating that the company has accumulated abundant liquidity through equity financing, debt issuance or operating activities to support the demands of new energy vehicle research and development, capacity expansion and market expansion. Restricted deposits and cash flows fluctuated significantly. They rose from 140,027.00 thousand yuan in 2019 to 2,638,840 thousand yuan in 2021, soared to 19,971,537 thousand yuan in 2022 (either to deal with supply chain risks or debt guarantees), and dropped back to 11,933,734 thousand yuan in 2023. It may be related to the lifting of some capital restrictions or debt repayment.

Table 2. Monetary Funds Status of Li Auto Inc. from 2019 to 2023(Unit: RMB 1,000)

Indicator	2023	2022	2021	2020	2019
Cash and cash equivalents	91,329,030.00	38,478,016.00	27,854,224.00	8,938,341.00	1,296,215.00
Restricted deposits and cash flows	11,933,734.00	19,971,537.00	2,638,840.00	1,234,178.00	140,027.00

(2) Inventory

It can be obtained from Table 3 that the total inventory increased from 1,048,004 thousand yuan in 2020 to 1,617,890 thousand yuan in 2021, and soared to 7,163,294 thousand yuan in 2022. This was mainly due to the simultaneous and significant increase in manufactured goods, raw materials and work-in-progress, or strategic stocking to cope with the mass production of new vehicle models and fluctuations in the prices of core raw materials. In 2023, inventory slightly decreased to 6,940,885 thousand yuan. Among them, manufactured goods increased to 4,419,180 thousand yuan, while raw materials and work-in-progress decreased to 2,521,705 thousand yuan, indicating that Li Auto Company has improved operational efficiency by optimizing procurement plans and reducing redundant inventory. The inventory turnover rate dropped sharply from 15.94

times in 2021 to 8.67 times in 2022 (with the risk of inventory overstock becoming prominent), and rebounded to 14.09 times in 2023, reflecting the improvement in turnover efficiency brought about by capacity adjustment. Given the rapid technological iteration and strong supply chain dependence of the new energy vehicle industry, the aggressive expansion in 2022 May be aimed at seizing market share and coping with fluctuations in raw materials.

Table 3. Inventory Situation of Li Auto from 2020 to 2023 (Unit: RMB/Thousand yuan)

Indicator	2023	2022	2021	2020
Finished products	4,419,180	4,019,010	149,089	820,168
Raw materials and work-in-progress	2,521,705	3,144,284	1,468,801	227,836
Inventory	6,940,885	7,163,294	1617,890	1048,004
Inventory turnover rate times	14.09	8.67	15.94	10.10

(3) Accounts payable

As can be seen from Table 4, Li Auto's accounts payable and notes payable have shown explosive growth from 2020 to 2023, fully reflecting its business expansion and the deep adjustment of its supply chain strategy. The total of accounts payable and notes payable soared from 3,160,515 thousand yuan in 2020 to 51,870,097 thousand yuan in 2023. The amount payable for raw materials increased from 2,991,538 thousand yuan to 34,839,546 thousand yuan, mainly due to capacity expansion and the demand for mass production of new vehicle models. Especially the expansion of the procurement scale of core components of new energy vehicles (such as batteries) and the hedging strategy against fluctuations in raw material prices; Notes payable soared from 168,977 thousand yuan to 17,030,551 thousand yuan, indicating that Li Auto Company optimized short-term cash flow through note financing, supported R&D investment and market expansion, and alleviated financial pressure.

Table 4. Accounts Payable and Notes Payable of Li Auto from 2020 to 2023

Indicator	2023	2022	2021	2020
Payment payable for raw materials	34,839,546	15,410,150	7,089,370	2,991,538
Notes payable	17,030,551	4,614,179	2,286,680	168,977
Total	51,870,097	20,024,329	9,376,050	3,160,515

It can be obtained from Table 5 that the accounts payable and notes due within three months in 2023 reached 45,079,655 thousand yuan, far exceeding 3,118,840 thousand yuan in 2020. This reflects that Li Auto Company highly relies on short-term credit to maintain its operations. Although it enhances the flexibility of funds, it implies liquidity risks. The long-term payable

(exceeding one year) is only 98,359 thousand yuan, indicating that the supplier's credit line is mainly short-term and the financial flexibility is limited. Due to the industry characteristics of new energy vehicle enterprises, which are highly dependent on core raw materials such as lithium and cobalt in their supply chains and have rapid technological iterations, the sharp increase in accounts payable may be to ensure the stability of the supply chain and hedge against price fluctuations, while the explosive growth of notes payable highlights the strategy of supplementing liquidity through financial tools.

Table 5. Aging Analysis of Accounts Payable and Notes Payable of Li Auto from 2020 to 2023

Indicator	2023	2022	2021	2020
Within 3 months	45,079,655	19,806,395	7,539,833	3,118,840
3 to 6 months	6,565,284	124,122	1,639,286	18,537
6 months to 1 year	126,799	31,051	161,913	10,676
Over a year	98,359	62,761	35,018	12,462
Total	51,870,097	20,024,329	9,376,050	3,160,515

4.3. Financial Analysis

When conducting a financial analysis of Li Auto Company, it is reasonable to compare it with NIO and XPeng. The main reason is that all three are leading enterprises in China's new energy vehicle manufacturing force, with highly similar market positioning, financing background and growth stage. By comparing core financial indicators, the competitive advantages of Li Auto Company can be identified more clearly.

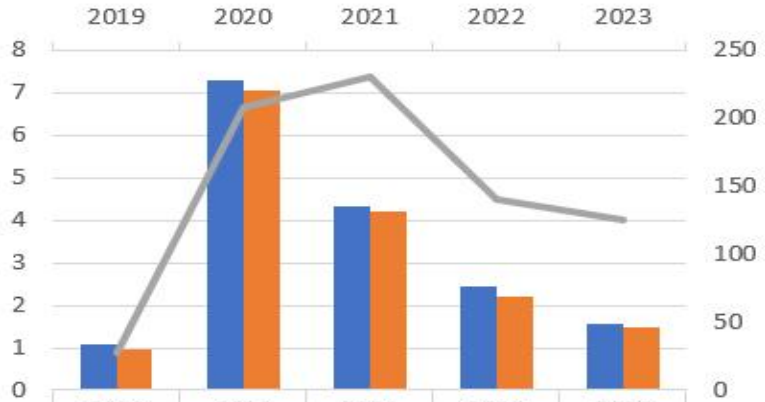
4.3.1. Analysis of Debt-paying Ability

(1) Short-term debt-paying ability

The current ratio = current assets/current liabilities. The current ratio is used to assess the ability of an enterprise to convert its current assets into cash for debt repayment before the maturity of short-term debts. It can be seen from Figure 2 that from 2019 to 2020, the current ratio of Li Auto Company showed an upward trend, rising from 1.08 to 7.28. This indicates that the current assets of Li Auto Company are gradually increasing relative to current liabilities, and its short-term debt-paying ability is strengthening. From 2020 to 2023, the current ratio decreased from 7.28 to 1.57. This means that during this period, the growth rate of current assets of Li Auto Company was slower than that of current liabilities, possibly due to Li Auto Company's expansion of business scale and increase in short-term debt financing.

The quick ratio = (Current assets - Inventory)/Current liabilities. The quick ratio is based on the current ratio and deducts the inventory factor. Because the liquidity of inventory is relatively weak, the quick ratio can more conservatively measure the short-term debt-paying ability of an

enterprise. From 2019 to 2020, the quick ratio of Li Auto Company rose from 0.97 to 7.04, and its short-term debt-paying ability strengthened. From 2020 to 2023, it dropped from 7.04 to 1.48. This might be due to the fact that during the company's operation, the growth of quick assets failed to keep up with the growth of current liabilities.



	2019	2020	2021	2022	2023
Current ratio	1.08	7.28	4.33	2.45	1.57
Quick ratio	0.97	7.04	4.19	2.2	1.48
Monetary funds/current liabilities	27.7	207.42	230.04	140.57	125.55

Figure 2. The Changes in the Short-Term Debt-Paying Ability Indicators of Li Auto

The cash ratio = monetary funds/current liabilities. It reflects the ability of an enterprise to repay current liabilities with directly available cash and is the most conservative indicator of short-term debt-paying ability. From 2019 to 2021, the cash ratio of Li Auto Company rose from 27.7 to 230.04, indicating that the relative proportion of monetary funds available for Li Auto Company to repay current liabilities has increased significantly and its debt-paying ability has improved significantly. This might have been achieved by Li Auto Company through methods such as profit accumulation and obtaining funds through financing. From 2021 to 2023, it dropped from 230.04 to 125.55, indicating that the guarantee level of the company's monetary funds relative to current liabilities has decreased. This might be due to Li Auto Company using part of its monetary funds for other investments or business expansion, or the increase rate of current liabilities being faster than that of monetary funds.

As can be seen from Table 6, except for the current ratio of Li Auto being slightly lower than that of XPeng in 2019, the current ratio of Li Auto Company was higher than that of XPeng and NIO in the same period from 2019 to 2022. This indicates that Li Auto Company has a distinct advantage in the coverage capacity of current assets against current liabilities and has a strong short-term debt-paying ability. However, in 2023, Li Auto's current ratio dropped significantly to 1.57, but it was still higher than that of the other two companies.

In terms of the quick ratio, except for 2019 when Li Auto's quick ratio was lower than that of XPeng, it was higher than that of XPeng and NIO from 2020 to 2023, indicating that its quick assets provide a stronger guarantee for current liabilities. However, the rapid decline in 2023 reflects that the liquidity of its quick assets or the asset structure may have undergone adverse

changes. Nevertheless, on the whole, in the early stage, it had a certain buffer advantage in short-term debt repayment due to its relatively high quick ratio.

Except for 2020, Li Auto's cash ratio was higher than that of NIO from 2019 to 2023. Since 2021, Li Auto has started to catch up with XPeng. It reflects that its ability to directly repay current liabilities with monetary funds is relatively strong. However, the significant decline in 2023 May weaken the company's advantage in quickly repaying debts with monetary funds to some extent.

Table 6. Short-term Debt-paying Ability Indicators of Li Auto and its Peer Companies

Indicator	Enterprise	2023	2022	2021	2020	2019
Current ratio	Li Auto	1.57	2.45	4.33	7.28	1.08
	NIO	1.22	1.29	2.18	3.31	0.52
	XPENG	1.51	1.81	2.71	5.06	1.50
Quick ratio	Li Auto	1.48	2.20	4.19	7.04	0.97
	NIO	1.13	1.11	2.11	3.23	0.43
	XPENG	1.36	1.62	2.56	4.89	1.37
Cash ratio	Li Auto	125.55	140.57	230.04	207.42	27.70
	NIO	56.98	43.37	52.52	274.93	9.08
	XPENG	58.51	60.58	61.21	372.70	59.04

Overall, during the period from 2019 to 2023, Li Auto performed outstandingly in the three short-term debt-paying ability indicators of current ratio, quick ratio and cash ratio, significantly outperforming XPeng and NIO. This indicates that Li Auto Company has strong advantages in terms of the coverage capacity of current assets to current liabilities, the guarantee degree of quick assets, and the debt-paying ability of monetary funds, and its short-term debt-paying ability is relatively strong. However, in 2023, Li Auto witnessed varying degrees of decline in all three indicators. Its current ratio dropped to 1.57 and its quick ratio to 1.48. Although it still outperformed NIO and XPeng, the advantage was not particularly significant.

(2) Long-term debt-paying ability

The asset-liability ratio = total liabilities ÷ total assets. This indicator reflects how much of the total assets of an enterprise is funded through liabilities. The higher the asset-liability ratio is, the greater the proportion of a company's liabilities to its assets will be, and the higher the financial risk will be. Conversely, the lower it is, the less dependent the enterprise is on debt and the

relatively more stable its financial situation is. As can be seen from Figure 3, from the overall trend perspective, the asset-liability ratio of Li Auto Company has experienced certain fluctuations. The significant decline from 2019 to 2020 indicates that Li Auto may have successfully optimized its capital structure and reduced its long-term debt repayment pressure during this period. However, the debt-to-asset ratio rose again from 2020 to 2023, indicating that Li Auto may have increased its debt financing during business expansion, leading to an increase in financial leverage and a potential rise in debt repayment risk.

Figure 3.The Changes in the Long-Term Debt-Paying Ability Indicators of Li Auto

The equity ratio = total liabilities ÷ Total owner's equity. The equity ratio measures whether the financial structure of an enterprise is reasonable and reflects the degree to which the capital invested by creditors is protected by the owner's equity. A lower equity ratio indicates that the enterprise's own funds provide a higher degree of protection for debts and its long-term debt-paying ability is relatively strong. The equity ratio also shows fluctuating changes. The equity ratio gradually decreased from 2019 to 2020, indicating that Li Auto Company was reducing its financial leverage, enhancing financial stability, and improving the protection of creditors' rights and interests. However, the increase in the equity ratio from 2020 to 2023 indicates that Li Auto has raised the proportion of debt financing again, thereby increasing its financial risks.

It can be seen from Table 7 that during the period from 2019 to 2023, the asset-liability ratio of Li Auto Company decreased by a similar extent to that of XPeng in the early stage. However, in the later stage, the increase rate of Li Auto Company was relatively slow, indicating that it had a better control over debt financing. Compared with NIO, it has remained at a relatively low level, indicating that its asset structure is more stable, its long-term debt repayment risk is lower than that of NIO, and its financial situation is more secure.

During the period from 2019 to 2023, the equity ratio of Li Auto Company fluctuated. Compared with XPeng, the initial gap is relatively large and the gap still exists in the later stage, indicating that the degree of reliance on debt financing is lower than that of XPeng. Compared with NIO, its equity ratio is much lower than that of NIO, which means that when using debt

financing, Li Auto Company relies on more equity capital protection, has a better long-term debt-paying ability and lower financial risk.

Overall, the performance and changes of Li Auto's asset-liability ratio and equity ratio during the period from 2019 to 2023 demonstrate that it has certain advantages and stability in terms of long-term debt-paying ability. In the early stage, the enterprise focuses on optimizing the capital structure and reducing the debt risk. In the later stage, although the debt moderately increases during the business expansion process, it can still maintain a relatively reasonable debt level, and the equity ratio is also within a controllable range. This provides strong support for the long-term stable development of the enterprise.

Table 7. Long-term Debt-paying Ability Indicators of Li Auto and its Peer Companies

Indicator	Enterprise	2023	2022	2021	2020	2019
Asset-liability ratio	Li Auto	57.78	47.78	33.61	18.06	51.85
	NIO	74.79	71.28	54.08	41.69	133.07
	XPENG	56.84	48.37	35.80	22.99	69.05
Property rights ratio	Li Auto	1.38	0.92	0.51	0.22	1.08
	NIO	3.44	2.87	1.29	0.84	-3.08
	XPENG	1.32	0.94	0.56	0.30	2.23

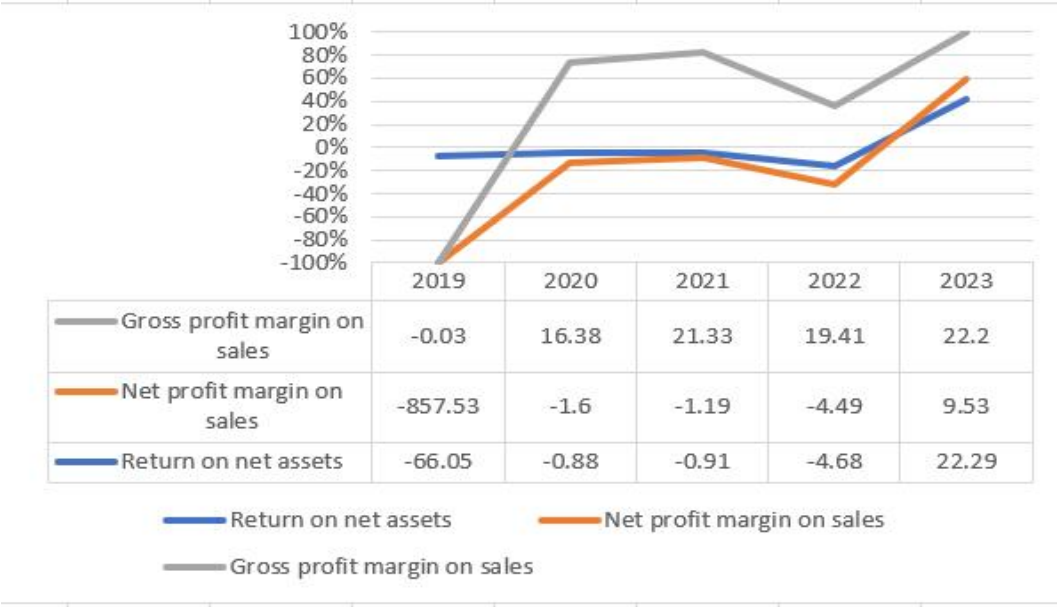
4.3.2. Profitability Analysis

Return on net assets = (Net profit ÷ average net assets) ×100%. As can be seen from Figure 4, the return on net assets of Li Auto Company was -66.05% in 2019. In the following years, it was basically in a state of loss or low profit, and rebounded to 22.29% in 2023. It is indicated that the utilization efficiency of the capital invested by shareholders of Li Auto Company was relatively low in the early stage. After several years of development and adjustment, the operational efficiency of assets has gradually improved, which can bring better returns to shareholders.

Net profit margin on sales =(Net profit/Sales revenue)×100%. In 2019, Li Auto's net profit margin on sales was -857.53%. Subsequently, it remained negative from 2020 to 2022 with fluctuating losses until it turned positive at 9.53% in 2023. This indicates that Li Auto Company has undergone a relatively long period of adjustment in the balance between cost and revenue, and eventually achieved a transformation towards profitability.

Gross profit margin on sales = (Gross profit on sales/Sales revenue) ×100%. As can be seen from Figure 4, the sales gross profit margin of Li Auto Company started from -0.03% in 2019, rose to 16.38% in 2020, further increased to 21.33% in 2021, slightly dropped to 19.41% in 2022, and rebounded to 22.2% in 2023. Overall, the gross profit margin of sales shows a fluctuating

upward trend, indicating that Li Auto Company has gradually enhanced the profitability of its products.



	2019	2020	2021	2022	2023
Gross profit margin on sales	-0.03	16.38	21.33	19.41	22.2
Net profit margin on sales	-857.53	-1.6	-1.19	-4.49	9.53
Return on net assets	-66.05	-0.88	-0.91	-4.68	22.29

Figure 4. The Changes in the Main Profitability Indicators of Li Auto

Table 8. Main Profitability Indicators of Li Auto and its Peer Companies

Indicator	Enterprise	2023	2022	2021	2020	2019
Gross profit margin on sales	Li Auto	22.20	19.41	21.33	16.38	-0.03
	NIO	5.49	10.44	18.88	11.52	-15.32
	XPENG	1.47	11.50	12.50	4.55	-24.05
Net profit margin on sales	Li Auto	9.53	-4.49	-1.19	-1.60	-857.53
	NIO	-37.25	-29.30	-11.12	-32.62	-144.36
	XPENG	-33.82	-34.03	-23.17	-46.75	-159.04
Return on net assets	Li Auto	22.29	-4.68	-0.91	-0.88	-66.05
	NIO	-85.59	-49.71	-34.17	-53.77	-4,247.88
	XPENG	-28.33	-23.12	-12.70	-14.65	-96.42

It can be seen from Table 8 that during the period from 2019 to 2023, the sales gross profit margin of Li Auto Company showed a relatively stable upward trend, gradually rising from -0.03% in 2019 to 22.2% in 2023. Although NIO's gross profit margin on sales also rose, the increase was relatively moderate, from -15.32% to 5.49%. Xiaopeng's gross profit margin on sales fluctuates sharply and remains at a relatively low level overall. It was -24.05% in 2019 and

only 1.47% in 2023. This indicates that Li Auto Company can retain a relatively large gross profit margin when selling products.

During the period from 2019 to 2023, the net profit margin on sales of Li Auto Company fluctuated greatly. It was -857.53% in 2019, -4.49% in 2022, and rebounded to a positive value of 9.53% in 2023. Li Auto achieved its first annual profit, becoming the first new energy vehicle company among the "NIO, XPeng and Li Auto" trio to make a profit. Nio has remained in the negative range, from -144.36% in 2019 to -37.25% in 2023. Xiaopeng also mostly showed negative values, ranging from -159.04% in 2019 to -33.82% in 2023.

The return on equity of Li Auto Company has significantly increased from -66.05% in 2019 to 22.29% in 2023, indicating a considerable improvement in its ability to generate profits by leveraging the assets invested by shareholders. Nio's return on equity fluctuated between -4,247.88% and -85.59%, remaining at an extremely low negative level. Xiaopeng's return on net assets fluctuated from -96.42% to -28.33%, also remaining in a relatively low loss state. Li Auto Company has achieved good results in terms of asset operation efficiency, profit formation mechanism or capital structure optimization, and has great development potential.

Overall, Li Auto outperforms NIO and XPeng in three key profitability indicators: gross profit margin on sales, net profit margin on sales, and return on net assets. However, it is still necessary to pay attention to the stability of each indicator and the potential for continuous improvement.

4.3.3. Operational Capacity Analysis

Inventory turnover times = operating costs ÷ average inventory balance. As can be seen from Figure 5, the inventory turnover rate of Li Auto Company fluctuated significantly from 2019 to 2021. It reached a relatively high value of 15.94 in 2021 and then dropped sharply to 8.67 in 2022. This might imply that in 2021, Li Auto's inventory management efficiency was relatively high, enabling it to quickly convert inventory into sales revenue. However, later on, there might have been inventory overstock or adjustments in sales strategies, resulting in a slowdown in inventory turnover.

Current asset turnover ratio (times) = Net main business income/average total current assets. The current asset turnover rate of Li Auto Company has generally shown an upward trend, rising from 0.08 in 2019 to 1.36 in 2023, indicating that the company's utilization efficiency of current assets is gradually improving. This might be achieved through measures such as strengthening the recovery of accounts receivable, optimizing inventory management or improving the efficiency of fund utilization.

Total asset turnover ratio (times)= Net operating income ÷ average total assets. The total asset turnover ratio of Li Auto Company has shown a significant upward trend from 2019 to 2023, increasing from 0.04 to 1.08, which indicates a substantial improvement in the overall asset operation efficiency of the company. Li Auto Company may have achieved efficient utilization of total assets by expanding production scale, optimizing asset allocation or improving sales performance, etc.

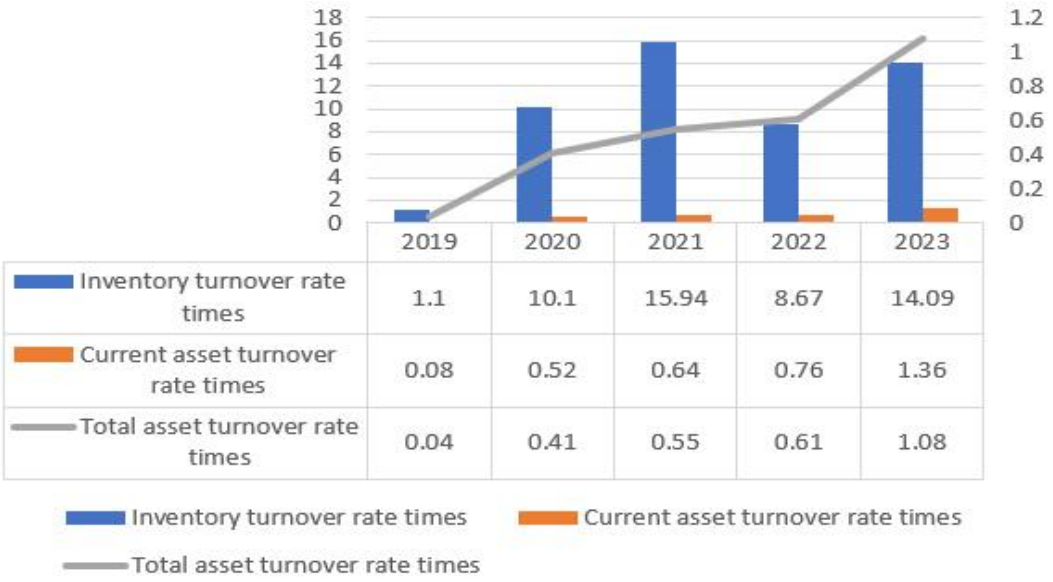


Figure 5. The Changes in the Main Operating Capacity Indicators of Li Auto

As can be seen from Table 9, compared with NIO, Li Auto's inventory turnover rate in 2022-2023 was higher than that of NIO. This means that Li Auto's efficiency in inventory management was better than that of NIO in some years, but it was lower than that of NIO from 2019 to 2021. Therefore, it is also necessary to pay attention to whether the future trend will continue to improve or deteriorate. Compared with XPeng, except for 2019, Li Auto's inventory turnover rate has remained at a relatively high level, indicating that it may have more advantages in inventory management and be able to convert inventory into sales revenue more quickly.

Table 9. Main Operating Capacity Indicators of Li Auto and its Peer Companies

Indicator	Enterprise	2023	2022	2021	2020	2019
Inventory turnover rate times	Li Auto	14.09	8.67	15.94	10.10	1.10
	NIO	7.81	8.61	18.68	14.60	7.66
	XPENG	6.02	6.62	9.17	6.21	9.24
Current asset turnover rate times	Li Auto	1.36	0.76	0.64	0.52	0.08
	NIO	0.86	0.80	0.66	0.64	0.92
	XPENG	0.63	0.58	0.47	0.26	0.42
Total asset turnover rate times	Li Auto	1.08	0.61	0.55	0.41	0.04
	NIO	0.52	0.55	0.53	0.47	0.47
	XPENG	0.39	0.39	0.38	0.22	0.27

Compared with NIO, Li Auto's current asset turnover ratio was lower than that of NIO from 2019 to 2022. However, since 2022, it has been catching up with NIO, and by 2023, its advantage has further expanded. This might imply that Li Auto has made effective adjustments in its asset operation strategy, enabling it to gradually catch up with and surpass NIO in generating sales revenue through current assets. Compared with XPeng, except for 2019, Li Auto has consistently outperformed XPeng, indicating that it is superior to XPeng in terms of asset utilization efficiency and can more effectively utilize current assets to drive business development.

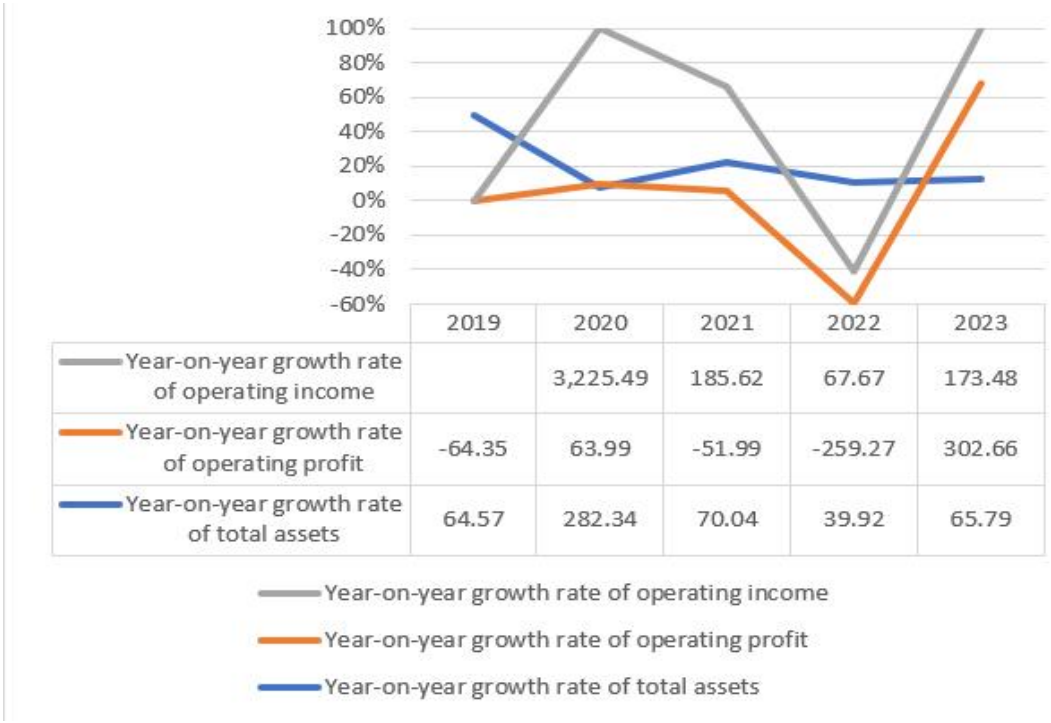
The total asset turnover rate of Li Auto was slightly lower than that of NIO in 2019-2020, but exceeded that of NIO in 2021-2023. Compared with XPeng, Li Auto has always outperformed it, indicating that in the entire industry, Li Auto has a stronger ability to generate revenue by leveraging assets.

To sum up, Li Auto Company has shown positive development trends in inventory turnover rate, current asset turnover rate and total asset turnover rate. Moreover, when compared with its peers, it has also demonstrated certain advantages.

4.3.4. Analysis of Growth Ability

The year-on-year growth rate of total assets = (Total assets of the current year - previous year)/Total assets of the previous year. From 2019 to 2023, the year-on-year growth rate of total assets of Li Auto Company has generally shown certain fluctuations. After a relatively high growth in 2020, it remained at a relatively stable level from 2021 to 2023.

The year-on-year growth rate of operating profit = (operating profit of the current year - previous year)/Operating profit of the previous year. It can be seen from Figure 6 that the year-on-year growth rate of operating profit of Li Auto Company fluctuates sharply. From 2019 to 2022, there were multiple negative growth periods. This was because Li Auto Company was in a stage of rapid development and product layout during this period. To enhance the competitiveness of its products, it invested a large amount of funds in technological research and development. In the early stage of capacity construction, the capacity utilization rate was relatively low and the allocation of fixed costs was relatively high, which affected the profit level. During the period from 2019 to 2020, Li Auto mainly relied on the Li ONE model, which had a relatively narrow market coverage. In 2023, it increased significantly to 302.66%. This is because in 2023, Li Auto Company launched multiple models to meet the needs of different consumers. With the rapid growth in sales and the expansion of production scale, fixed costs were more effectively allocated, unit costs were reduced, and profit growth was promoted.



	2019	2020	2021	2022	2023
Year-on-year growth rate of operating income		3,225.49	185.62	67.67	173.48
Year-on-year growth rate of operating profit	-64.35	63.99	-51.99	-259.27	302.66
Year-on-year growth rate of total assets	64.57	282.34	70.04	39.92	65.79

Figure 6. The Changes in the Main Operating Capacity Indicators of Li Auto

The year-on-year growth rate of operating income = (operating income of the current year - previous year)/Operating income of the previous year. As can be seen from Figure 6, the year-on-year growth rate of Li Auto's operating income fluctuated significantly from 2019 to 2023. In 2020, there was an extremely high growth rate of 3,225.49%, because with the improvement of the production and delivery system, the delivery volume of new vehicles increased significantly and major breakthroughs were made in market expansion. The growth rate fluctuated from 2021 to 2023, but remained at a relatively high level overall, reflecting the company's continuous efforts and development in products, markets and other aspects.

As can be seen from Table 10, from 2020 to 2023, the year-on-year growth rate of operating income of Li Auto Company was higher than that of NIO, indicating its advantages in market expansion or product appeal. From 2020 to 2023, Li Auto's growth rate was higher than that of XPeng on many occasions, indicating that it is in a relatively favorable position in the competition for market share.

Both Li Auto and NIO experienced ups and downs in profit growth between 2019 and 2023. In 2023, Li Auto achieved a high growth rate (302.66%), NIO's was -44.85%, and XPeng's operating profit was in a negative growth state for most of the years from 2019 to 2023. This reflects that Li Auto has adopted more effective strategies to improve its profits.

The year-on-year growth rate of total assets of Li Auto Company is generally higher than that of NIO, indicating that Li Auto Company may be more enthusiastic about asset expansion than NIO. It may invest more resources in market expansion and production scale expansion, in the hope of obtaining a larger market share and profits. In most years, the year-on-year growth rate of total assets of Li Auto Company was relatively close to that of XPeng. However, Li Auto Company's subsequent relatively stable growth indicates that it has certain strategies and rhythms

in asset expansion and management, and is more capable of effectively utilizing assets to achieve business growth than XPeng.

Table 10. Growth Capacity Indicators of Li Auto and its Peer Companies

Indicator	Enterprise	2023	2022	2021	2020	2019
Year-on-year growth rate of operating income	Li Auto	173.48	67.67	185.62	3,225.49	-
	NIO	12.89	36.34	122.27	107.77	58.04
	XPENG	14.23	27.95	259.12	151.78	23,815.30
Year-on-year growth rate of operating profit	Li Auto	302.66	-259.27	-51.99	63.99	-64.35
	NIO	-44.85	-247.86	2.42	58.41	-15.46
	XPENG	-25.09	-32.31	-53.23	-13.57	-123.09
Year-on-year growth rate of total assets	Li Auto	65.79	39.92	70.04	282.34	64.57
	NIO	21.94	16.14	51.68	274.72	-22.61
	XPENG	17.72	8.90	46.85	383.25	20.57

To sum up, Li Auto's revenue growth rate has consistently led NIO and XPeng in 2022-2023, confirming the market appeal of its extended-range technology route and precise targeting of family users. Despite the industry generally facing profit fluctuations, Li Auto achieved a high profit growth of 302.66% in 2023, in sharp contrast to NIO (-44.85%) and XPeng (with continuous negative growth), highlighting the effectiveness of its profit model. In terms of the asset expansion strategy, the company maintains an active pace (the growth rate of total assets has exceeded that of NIO in most years), laying a solid foundation for its long-term leadership in the new energy vehicle sector.

4.4. Prospect Analysis

4.4.1. Development Prospect Forecast

In the next three to five years, Li Auto believes that the biggest variable will come from artificial intelligence, especially AI-based intelligent driving and intelligent assistants. Since July, its full-stack self-developed end-to-end +VLM new-generation intelligent driving solution has been rapidly iterated, with the scale of training data continuously expanding and the average takeover mileage significantly increasing. With the continuous advancement of technology and the accumulation of data, it is expected to maintain a leading position in the field of intelligent driving, providing users with a higher-level autonomous driving experience and thereby enhancing the competitiveness of products.

Li Auto will launch three pure electric SUVs in the first half of 2025 and is committed to addressing issues such as the appearance of the mega pure electric product to meet consumers' expectations for high-end pure electric models. Meanwhile, the company will continue to vigorously accelerate the layout of the charging network. It has opened and operated over 1,000 supercharging stations of Li Auto Company, equipped with 4,888 supercharging piles, covering many places across the country. With the development of pure electric technology and the improvement of charging facilities, its share in the pure electric market is expected to gradually increase.

At present, Li Auto has established after-sales service systems in multiple countries and regions including Kazakhstan, and plans to take the Middle East and Central Asia as its first export target markets, gradually exploring other markets with high growth potential to achieve a broader global layout. The expansion of overseas markets will bring new growth opportunities to Li Auto Company and enhance its share and reputation in the global new energy vehicle market.

4.4.2. Future Risk Prediction

With the continuous heating up of the new energy vehicle market, more and more enterprises are flocking in. Not only are traditional automakers accelerating their transformation to new energy vehicles, but also numerous new force brands are constantly emerging. The increase in competitors has made the competition for market share more intense. Li Auto may face the risk of its market share being eroded. For instance, the outstanding performance of competing models such as the Askui M9 in the high-end market has had a certain impact on the market share of Li Auto's L789.

In addition to the existing technical routes such as pure electric and extended-range electric, new technological alternative solutions may also emerge in the field of new energy vehicles. For instance, if hydrogen fuel cell technology and others achieve major breakthroughs in the future and are commercially applied on a large scale, it may pose a threat to Li Auto's current technological route and product layout.

Li Auto has long positioned itself as a luxury smart electric vehicle brand. However, with the intensification of market competition and changes in product structure, its high-end brand positioning may face the risk of being lost. If the sales share of the L6 model increases in 2024, it will lower the average selling price of the overall product, while the market share of the more expensive L789 model is declining. This may affect the brand's high-end image in the minds of consumers.

5. Research Results

5.1. Strategic Aspect

5.1.1. Failure in the Pure Electric Transformation and Insufficient Product Innovation

The first pure electric model of Li Auto, MEGA, failed to achieve the expected goal of transforming into the pure electric vehicle market due to strategic positioning deviation and

insufficient product strength. Its starting price is as high as 500,000 yuan, far exceeding the mainstream pure electric vehicle market range of 300,000 to 400,000 yuan. The target customer group is high-net-worth families. However, this group has doubts about the range anxiety and charging convenience of pure electric models, and their actual demand is limited. Ideal has long relied on the extended-range technology route, which has led to the lagging construction of the charging network for pure electric models. Users are facing the predicament of "having a car but no charging station", further amplifying range anxiety. In addition, the MEGA's aggressive front face with continuous light strips and fastback design conflicts with the traditional aesthetic of family cars. Negative labels such as "coffin car" on social media have seriously weakened the purchase intention.

The brand's product strategy has exposed its reliance on the extended-range path, and there is a lack of innovation in pure electric models. From the extended-range series L6-L9 to the pure electric series M789, the excessive pursuit of family design has led to product homogenization. The front face similarity between MEGA and L9 reaches 80%, and it is jokingly called the "pure electric version of L9", falling into the "nested doll" predicament. This strategy aimed at reducing R&D costs, although maintaining brand recognition in the short term, has led to consumer aesthetic fatigue, resulting in insufficient market enthusiasm for new products. Ideal urgently needs to reconstruct the differentiated competitiveness of pure electric products, and at the same time improve the energy replenishment system and design innovation in order to break through the bottleneck of transformation.

5.1.2. Aggressive Strategic Goals and Out-of-Control Perational Structure.

Li Auto has set a sales target of 800,000 units for 2024, doubling that of 376,000 units in 2023 and far exceeding the industry's expected growth rate of 25% to 30%, revealing its overly aggressive strategy. Its core price range (300,000 to 500,000 yuan) only accounts for 15% of the new energy vehicle market. Its goal is to monopolize 90% of the niche market, which is contrary to the competitive logic of NIO and XPeng. In terms of production capacity, the upper limit of the Changzhou factory is 600,000 vehicles. The quality control risk of the contract manufacturing model is high, and the construction period of the self-built factory is as long as 18 months, making it difficult to fill the gap. The channel carrying capacity is also insufficient. 400 stores need to achieve an annual sales volume of 2,000 vehicles per store, far exceeding the industry benchmark level, and the pressure for network expansion is huge.

Radical goals have triggered a chain of runaway operations in the operational system. The production end has adopted a "three-shift system" to boost sales volume, leading to a rise in equipment failure rates. In the first quarter of 2024, complaints about delayed delivery due to production line debugging soared. The supply chain's "price-cutting rush" has led to resistance from suppliers, with second-tier manufacturers passing off inferior goods as good ones. Quality control issues such as abnormal noises from the 2024 L series seats and lagging infotainment systems have emerged in a concentrated manner. The sales side has overdrawn the brand value to achieve the target. The starting price of the L7 has been reduced to 280,000 yuan. The loss of focus on the high-end positioning has caused dissatisfaction among old users, and the residual value rate of used cars has dropped by 15%. During the wild expansion of distribution channels,

the review of dealers was relaxed. Some stores illegally promised a "7-day no-reason return", which led to a doubling of the number of delivery disputes and customer complaints year-on-year. Under the pressure of sales volume, Li Auto Company has fallen into a triple predicament of quality, reputation and profit.

5.2. Accounting Aspects

5.2.1. The Afficiency of Fund Utilization is Low

The monetary funds of Li Auto Company witnessed an explosive growth from 2019 to 2023. The company's monetary funds soared from 1,296,215 thousand yuan to 91,329,030 thousand yuan, an increase of nearly 70 times. In 2023, the proportion of cash and cash equivalents was as high as 88.6%. Although sufficient cash reserves enhance short-term liquidity security, excessive cash holdings reflect the company's conservatism in capital allocation. A large amount of funds have been deposited in bank accounts in the form of low returns, failing to be effectively transformed into high-return assets or strategic investments, resulting in the overall asset return rate of enterprises remaining persistently low. This phenomenon of "cash hoarding" not only occupies a large amount of financial resources, but also indirectly weakens the company's ability to enhance its competitiveness through capital operations.

The proportion of cash to total assets is abnormally high, while the proportion of capital allocation in core areas such as R&D investment and capacity expansion is relatively low. This unbalanced capital structure not only reduces the overall income-generating capacity of assets, but also raises shareholders' doubts about the efficiency of fund utilization. Due to the fact that a large amount of cash has not been returned to shareholders through dividends, share repurchases and other means, nor has it been transformed into the driving force for business growth, the earnings per share of the enterprise is seriously disconnected from the cash holdings, resulting in the dilution of shareholder value. In the long term, this inefficient allocation of funds may undermine investor confidence and affect the company's valuation level in the capital market.

5.2.2. Excessive Reliance on Short-Term Debt.

From 2020 to 2023, Li Auto's accounts payable and notes payable soared from 3,160,515 thousand yuan to 51,870,097 thousand yuan. Among them, the accounts payable and notes due within three months in 2023 reached 45,079,655 thousand yuan, accounting for 86.9% of the total debt payable. However, the long-term payables for more than one year were only 98,359,000 yuan (accounting for 0.19%). This "short-term loan and long-term investment" model has led the company to face concentrated repayment pressure. If sales collection is delayed or financing channels are tightened, it may trigger a liquidity crisis. The amount payable for raw materials accounted for 67.2% of the total accounts payable (34,839,546 thousand yuan in 2023), reflecting the company's high dependence on suppliers of core components such as batteries and motors. If suppliers tighten the payment terms or require advance payments, they may be forced to make large sums of money in advance, further intensifying the pressure on cash flow. The proportion of accounts payable due within three months in 2023 exceeded 86%, higher than that of NIO and

XPeng during the same period, highlighting Li Auto's disadvantaged position in supply chain negotiations.

Although the explosive growth of Li Auto's short-term debt has supported business expansion, the imbalanced debt structure, weak supply chain bargaining power and high industry volatility are intertwined, forming a vicious cycle of "short-term debt - high leverage - low elasticity". If the debt management strategy is not optimized in a timely manner, the liquidity crisis and the risk of technological iteration may resonate, threatening the long-term stable development of the enterprise.

5.3. Financial Dimension

5.3.1. The Long-Term Debt Repayment Pressure has Risen

In 2023, Li Auto's debt-to-asset ratio rose from 47.78% to 57.78%, and its equity ratio increased from 0.92 to 1.38, indicating that the company supported capacity expansion and market expansion through large-scale borrowing. Although the current debt level is still lower than that of NIO (74.79%), the rapid growth of long-term borrowings and accounts payable may lead to an increased interest burden. Although the net profit margin on sales turned positive to 9.53% in 2023, the price war in the industry and cost pressure continued to squeeze the profit margin, which further weakened the debt-paying ability. Moreover, the new energy vehicle industry requires continuous investment in technological research and development. However, the industry is significantly affected by policy adjustments (such as the reduction of subsidies), technological iterations, and fluctuations in raw material prices (such as the rise and fall of lithium prices). If market demand falls short of expectations, high debt may trigger risks of asset impairment or idle production capacity.

Furthermore, if the asset-liability ratio exceeds the warning line of 60%, the rating agency may downgrade the credit rating. Take NIO as an example. Its debt-to-asset ratio of 74.79% has led to a Moody's rating of "B2" (junk level), and its financing cost is higher than that of Li Auto. If the rating of Li Auto Company is downgraded, it will further increase the difficulty of financing. Meanwhile, the high debt ratio has also compressed the company's flexibility in responding to industry changes. For instance, if one needs to quickly shift to the pure electric route or acquire key technology enterprises, the pressure of debt repayment may limit the space for capital operation and miss strategic opportunities.

5.3.2. Inventory Management Fluctuates Significantly

From 2020 to 2022, the total inventory of Li Auto soared from 1,048,004 thousand yuan to 7,163,294,000 yuan, an increase of 584%. Among them, the inventory of manufactured goods and raw materials increased simultaneously (in 2022, the inventory of manufactured goods was 4,019,010 thousand yuan, and that of raw materials and work-in-progress was 3,144,284 thousand yuan). This phenomenon reveals a serious disconnection between Li Auto's production plans and market demands. In 2022, the inventory turnover rate dropped sharply to 8.67 times, far below the industry average (for instance, NIO's was 8.61 times during the same period), indicating that inventory overstock has led to a deterioration in asset liquidity. To cope with the price fluctuations of core raw materials such as batteries, the company may have adopted an aggressive

purchasing strategy. However, the actual demand has not met expectations, resulting in an excessively high proportion of funds occupied by raw materials. Although the inventory slightly decreased to 6,940,885,000 yuan in 2023 and the turnover rate rebounded to 14.09 times, the inventory scale was still at a high level, and there was a potential risk of inventory depreciation caused by technological iteration.

5.3.3. Insufficient Endogenous Growth Momentum

The growth capacity of Li Auto Company is confronted with the dual constraints of insufficient internal driving force and excessively high market concentration. On the one hand, asset expansion overly relies on external financing rather than cash flow generated from operating activities. This model exposes the weakness of the enterprise's endogenous profitability. Although financing provides support for short-term liquidity, excessive reliance on external blood transfusion may mask operational efficiency problems and intensify the dependence on the capital market. Once the financing environment tightens or investors' expectations change, the company may face pressure on the capital chain and thus be forced to adjust the strategic pace. On the other hand, the company's revenue is highly dependent on extended-range models (such as the Li Auto ONE and L series), with the revenue share of a single model exceeding 80% in 2023. Meanwhile, the domestic market contributes over 95% of the revenue, while the expansion of overseas markets is slow. This centralized model leads to insufficient risk resistance. If the policy is adjusted and competitors launch homogeneous products, it may directly impact the core revenue.

5.4. Prospects

5.4.1. Intensified Market Competition and Threat From the High-End Market

The current Chinese new energy vehicle market has entered a highly competitive stage, and Li Auto Company is facing unprecedented multi-dimensional challenges. Traditional luxury car manufacturers are accelerating their transformation by relying on their profound industrial accumulation. These century-old car companies not only have mature supply chain systems and brand premium capabilities, but also rapidly iterate electrification technologies through their global R&D networks. Their nationwide 4S store networks and financial service systems have a strong appeal to high-end consumers who value service experience. Meanwhile, cross-industry competitors are reshaping the industry landscape. Technology enterprises represented by Xiaomi SU7 have launched a fierce offensive by taking advantage of the technological gap in the field of intelligence. These new forces have been continuously capturing market attention through their fully self-developed intelligent driving systems, revolutionary human-vehicle interaction experiences, and user operation models dominated by Internet thinking.

5.4.2. Policy Changes are Severe and Profit Margins are Limited

The policy-oriented characteristics of China's new energy vehicle industry are becoming increasingly prominent. Li Auto Company is currently facing three policy shock waves: "subsidy reduction, stricter regulations, and standard iteration". In 2023, the national subsidy policy has been comprehensively reduced by 30%, with a particularly significant impact on high-end models priced between 300,000 and 500,000 yuan. This forces enterprises to either pass on costs or absorb them on their own. The former will weaken price competitiveness, while the latter will

directly erode profit margins. What is even more serious is that core markets such as Beijing and Guangzhou have clearly stated that starting from 2024, they will cut the purchase quotas for hybrid models by 40%. Shanghai has even removed plug-in hybrid models from the free green license plate category. This poses a precise blow to Li Auto, where the proportion of extended-range technology routes exceeds 80%.

6. Discussion

6.1. Theoretical Contributions

6.1.1. Validation of the Applicability of the Harvard Framework in the New Energy Vehicle Industry

This study verified the applicability and effectiveness of the Harvard analytical framework in the new energy vehicle industry by applying it to the financial analysis of Li Auto Company. Traditional financial analysis mostly focuses on static financial data and is difficult to comprehensively reflect the comprehensive competitiveness of new energy vehicle enterprises with rapid technological iteration and strong policy dependence. This study conducts a systematic analysis from four dimensions: strategy, accounting, finance, and prospects, revealing the core issues of Li Auto Company in aspects such as pure electric transformation, fund management, and debt structure, and putting forward targeted suggestions. This practice not only enriches the application cases of the Harvard Analytical framework in the field of new energy vehicles, but also proves that it can effectively integrate industry characteristics with enterprise financial performance, providing a referenceable paradigm for the financial analysis of similar enterprises.

6.1.2. The Supplementary Value of Non-Financial Information to Financial Analysis

This study emphasizes the crucial role of non-financial information (such as policy changes, technological innovations, and market competition) in financial analysis. For instance, policy factors: By analyzing the impact of subsidy reduction, purchase restrictions and other policies on the profit margin and strategic adjustments of Li Auto Company, it reveals how policy changes are transmitted to financial performance through accounting items. Technical factors: This paper explores the dynamic impact of the competitive situation between the extended-range technology and the pure electric technology route on Li Auto's R&D investment and asset turnover rate, and explains the financial risks that may be triggered by technological iteration (such as inventory depreciation). Market factors: By combining Porter's Five Forces Model and SWOT analysis, the squeezing effect of intensified market competition on the gross profit margin of sales and the growth rate of revenue was quantified.

The in-depth integration of some non-financial information has broken through the limitation of traditional financial analysis that only relies on historical data, providing investors and managers with more forward-looking decision-making basis. At the same time, it has also expanded a new perspective for the application of financial analysis theory in the dynamic industry environment.

6.2. Practical Implications

6.2.1. Conduct In-Depth Market Research and Set Reasonable Goals

It is suggested that the company conduct in-depth research on the market demand for pure electric vehicles, re-evaluate the positioning of pure electric products, and re-evaluate and adjust aspects such as the positioning, pricing, and configuration of pure electric models. Optimize the market strategy and pricing of the MEGA model to avoid being overly niche. At the same time, pay attention to the innovation and uniqueness of the product's appearance design, and improve the appearance design to enhance its appeal. In terms of product design, we should avoid the "nested" mentality, promote diversified development, launch differentiated models for different market segments, and enhance technological innovation, focus on user needs, and rapidly iterate and optimize products.

In addition, the company needs to formulate practical and feasible strategic goals, adjust sales expectations based on actual market conditions, and advance the goals in stages to avoid operational loss of control due to overly high goals. While pursuing sales volume, attention should be paid to user experience and service quality, the product operation rhythm should be optimized, new product launches should be rationally planned, and resources should be concentrated to create core best-selling models.

In terms of internal operations, it is necessary to optimize the organizational structure, enhance efficiency, increase investment in research and development, strengthen technological advantages, respond flexibly to policy changes, explore diversified profit models such as charging services and software subscriptions, and gradually expand overseas markets to diversify risks and enhance brand premium capacity and long-term competitiveness. Through the above measures, Li Auto Company can gradually solve the current problems, smoothly transform its pure electric strategy, and maintain stable development in the fierce market competition.

6.2.2. Optimize Capital Allocation and Balance the Capital Structure

Li Auto Company can rationally plan the scale of its cash reserves and avoid an overly conservative "cash hoarding" strategy. Under the premise of ensuring liquidity security, some redundant funds should be invested in high-potential strategic areas, such as technological research and development, capacity upgrading or expansion into emerging markets, to promote the transformation of funds into high-return assets. For instance, targeted investment in core links such as intelligent driving and battery technology can be explored, or industrial chain resources can be integrated through mergers and acquisitions to transform idle funds into long-term competitiveness. In addition, flexible financial planning models can be introduced to dynamically adjust the proportion of cash reserves according to industry cycles and technological trends. For instance, increase investment in research and development during the critical period of technological iteration, and give priority to ensuring funds for capacity building during the stage of market expansion. At the same time, explore short-term financial management or low-risk investment tools to enhance capital returns while maintaining liquidity and alleviate the pressure of low asset return rates.

In response to the abnormally high proportion of cash in total assets, it is necessary to optimize the priority of capital allocation. Appropriately increase the budget proportion for research and development and capacity expansion, and at the same time, reward shareholders through dividends, stock repurchases and other means to narrow the disconnection between cash holdings and shareholder returns. This move can not only enhance the efficiency of fund utilization, but also boost investor confidence and avoid valuation discounts caused by inefficient allocation.

6.2.3. Improve the Debt Structure and Establish an Early Warning Mechanism

Li Auto Company should gradually reduce its reliance on short-term notes payable. It can issue 3-5 year bonds to replace some high-interest short-term notes and accounts payable, reducing the proportion of debts due within 3 months to below 70% and extending the average debt repayment cycle, thereby alleviating short-term liquidity pressure. And keep the asset-liability ratio within a reasonable range for the industry, avoid excessive leverage, and at the same time give priority to repaying high-interest debts to reduce financial costs. In addition, in light of the characteristics of the new energy industry, one can also apply for policy-supported financing such as green credit and carbon neutrality bonds. Utilize supply chain financial tools to activate accounts payable and optimize the capital turnover efficiency of upstream and downstream. Meanwhile, strengthen cooperation with core suppliers, negotiate the extension of the accounts payable period, and balance the release of cash flow and the maintenance of supplier relationships.

Li Auto Company can establish an emergency debt repayment fund to deal with sudden repayment demands and enhance financial resilience. By regularly assessing key indicators such as the current ratio and the quick ratio, setting warning thresholds, and establishing a dynamic debt repayment early warning mechanism, the structure of current assets and current liabilities is adjusted in a timely manner according to market changes and the development of the company's business. Set reasonable matching targets for current assets and current liabilities, regularly assess the deviation between actual indicators and targets, and adjust the fund arrangement in a timely manner.

6.2.4. Strengthen Inventory Management and Accelerate the Collection of Receivables

Li Auto Company can introduce sales forecasting models based on big data and artificial intelligence to track market orders, consumer preferences and the dynamics of competing products in real time, and dynamically adjust production plans. For instance, the "production on demand" model was implemented for the finished goods inventory in 2023, reducing the production cycle to within 30 days to prevent inventory overstock caused by misjudgment of demand. In addition, Li Auto Company can sign long-term price lock-in agreements or floating pricing terms with core suppliers to hedge against the price fluctuation risks of key raw materials such as batteries. An inventory technology obsolescence early warning mechanism can be established. For inventories close to the technology iteration cycle (such as parts adapted to old models), promotion plans or leasing businesses (such as targeted placement in the shared mobility market) can be initiated in advance. Meanwhile, explore models such as battery secondary utilization and remanufacturing of components to revitalize the value of unsold inventory.

Li Auto Company can integrate the production capacity of idle or inefficient production equipment and introduce intelligent production lines to optimize the production scheduling efficiency. For instance, by sharing equipment or outsourcing non-core links (such as the processing of some components), the turnover rate loss caused by idle assets can be reduced. In addition, differentiated credit policies can be formulated. Moderate discounts can be provided to high-credit customers to shorten the payment period, and credit sales conditions can be tightened or advance payments can be required for customers with higher risks. And strengthen the dynamic monitoring of accounts receivable, and take hierarchical collection measures for overdue accounts receivable.

6.2.5. Enhance Internal Driving Force and Build Competitive Barriers

Li Auto Company can reduce its reliance on external financing by enhancing its ability to generate operating cash flow. For instance, optimize supply chain management to shorten the cash conversion cycle and accelerate the return of funds. Li Auto Company needs to clearly define the strategic priority of technological innovation and concentrate resources on key areas where it can form a differentiated advantage. Thereby building technological competitive barriers. For instance, in the field of extended-range power systems, it is necessary to continuously optimize the energy efficiency ratio and endurance, reduce manufacturing costs through modular design, and at the same time explore integration solutions with renewable energy sources (such as solar energy replenishment) to create a "green extended-range" technology label. In the field of intelligent driving, it is necessary to enhance the full-stack self-research and development capabilities, focus on breaking through the reliability of algorithms in complex scenarios (such as autonomous driving on urban roads), and establish a data closed-loop system. By feeding back the actual driving data of users to the technological iteration, a technological moat can be formed.

6.2.6. Adjust Strategies in a Timely Manner and Pay Close Attention to Policies

Li Auto Company can continuously conduct market research, gain a deep understanding of consumer demands and the dynamics of competitors, and adjust product and marketing strategies in a timely manner based on market feedback. Establish a price early warning mechanism and a flexible price adjustment strategy to be able to respond quickly in the price war against competitors. Maintain price competitiveness by adjusting preferential policies, financial support and other means, while ensuring no excessive profit loss. Closely monitor the dynamics of government policies, establish a dedicated policy research team, promptly interpret policy changes and formulate corresponding response strategies. For instance, before the subsidy policy is adjusted, the reliance on subsidies should be reduced in advance through measures such as optimizing the product cost structure and enhancing production efficiency.

7. Conclusion

7.1. Core Discovery

This paper, with the aid of the Harvard analytical framework, conducts an analysis and exploration of Li Auto Company from four dimensions: strategy, accounting, finance and

prospects, and then reaches the following conclusions: In terms of strategy, pure electric vehicle models have problems such as unreasonable positioning, design and sales targets; In terms of accounting, the efficiency of fund utilization is low and the reliance on short-term debts is too high. In terms of finance, the current and quick ratios fluctuate greatly and the asset turnover efficiency is low. In terms of prospects, Li Auto Company is under pressure from market competition and policy changes.

7.2. Practical Suggestions

Li Auto Company needs to enhance its comprehensive competitiveness and sustainability by focusing on product differentiation, optimizing its capital structure, strengthening the resilience of its supply chain, and actively responding to policy changes.

7.3. Limitations of the Research and Future Research Directions

7.3.1. Research Limitations

This study focuses on the new energy vehicle industry, especially Li Auto Company, whose extended-range technology route and market competition environment have certain uniqueness. Therefore, the research conclusions may not be fully applicable to enterprises dominated by pure electric technology or those transforming from traditional fuel vehicles.

Although it compared with peer enterprises such as NIO and XPeng, the research still took Li Auto as the core case. In the future, the sample size can be expanded (for example, by including enterprises with different technical routes such as BYD and Tesla) to enhance the universality of the conclusion.

The research is mainly based on the Chinese market and does not fully consider the potential impact of global competition (such as European carbon emission regulations and the US IRA Act) on Li Auto's financial strategy.

7.3.2. Future Research Directions

Explore the applicability of the Harvard Analytical framework in high-tech barrier industries such as semiconductors and biomedicine, and verify whether it can effectively integrate non-financial indicators such as R&D investment and patent layout. Compare the differences in the analysis focuses of different industries (such as traditional manufacturing vs. Internet enterprises) in the four dimensions of strategy, accounting, finance and prospects, and optimize the universality of the framework.

Analyze the differences in capital structure and tax planning of enterprises such as Li Auto, BYD and Tesla in different regional markets (China, Europe and North America), and reveal the interaction between policies and the market.

Incorporate ESG (environmental, social, and governance) factors into the dimension of outlook analysis to study how ESG ratings affect the financing costs, brand premiums, and long-term valuations of new energy vehicle enterprises.

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References

Chen, Y. (2022). Measurement and enhancement of international competitiveness of China's new energy vehicle enterprises (Doctoral dissertation, Southeast University).

Huang, R., Chen, Y., & Wang, Z. M. (2020). Application of Harvard analysis in "Internet + manufacturing" enterprises: A case study of Xiaomi Group. Communication of Finance and Accounting, (10), 92-96.

Li, Q.S. (2023). A study on the financial performance of Automobile Enterprise A based on the Harvard analytical framework (Doctoral dissertation, Dongbei University of Finance and Economics).

Ma, Y.F. (2023). Research on the competitive strategy of Li Auto Company (Doctoral dissertation, Beijing University of Posts and Telecommunications).

Wang, S. (2020). Corporate financial analysis based on the Harvard framework. Market Modernization, (2), 161-162.

Wu, M.T. (2021). Research on the development strategy of new energy vehicles for Li Auto Company (Doctoral dissertation, Shanghai University of Finance and Economics).

Xie, Z.A. (2022). Evaluation and influencing factors analysis of the development level of China's new energy vehicle enterprises (Doctoral dissertation, Jilin University of Finance and Economics).

Yan, Z. X. (2020). Suggestions on improving the competitiveness of self-owned brand automobiles. China National Conditions and Strength, (1), 63-65.

Zhang, C., Yu, S. Q., & Xiao, W. J. (2022). Innovation of performance evaluation system based on BSC and Harvard framework: A case study of iFlytek. Friends of Accounting, (22), 55-60.

Zhang, H. (2021). Financial case analysis based on the Harvard analytical framework. Commercial Accounting, (14), 45-47.

Zhang, Y.X. (2018). Research on the impact of fiscal subsidies on the development of the new energy vehicle industry (Doctoral dissertation, Jilin University).