

Impact of digital transformation, business innovation on enterprise performance: Basis for Chinese commercial bank's operation continues improvement framework

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Abstract

The purpose of this study is to investigate how corporate digital transformation and business model innovation affect Chinese commercial banks' organizational performance. This describes the state of business model innovation, including operation and marketing models as well as the creation of the best possible financial environment. It also assesses China's commercial banks in terms of corporate digital transformation strategy, organizational structure digitalization, and banking business and service digitalization. Determine how business innovation and digital customer management affect a company's financial, operational, and innovative performance; test the relationship among enterprise performance, business model innovation, and digital transformation; to provide a framework that may be used to continuously optimize bank processes in order to increase organizational performance. This study used a questionnaire to gather data using 400 respondents. The finding showed that commercial banks' business model innovation and corporate digital transformation have a major effect on their overall success. Highly significant relationships exists among enterprise digital transformation strategy, business model innovation and their digital products and services.

Keywords: enterprise digital transformation strategy, business model innovation, enterprise performance, digital products and services

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1. Introduction

With the rapid expansion of the digital economy, commercial banks' enterprise digital transformation and business model innovation have a significant impact on business strategy and the accomplishment of organizational objectives. Chinese commercial banks have steadily implemented digital transformation and business model innovation in order to improve organizational performance, raise profitability, and position commercial banks favorably in the industry competitiveness. Continuously increase client retention, the organization, and the creation of value for the company and its shareholders. Digital transformation and business model innovation are critical aspects in improving commercial banks' organizational performance in the current economic context (Werder et al., 2020). The digital transformation of firms not only benefits commercial banks' core competitiveness but also promotes social and economic development. It comprises modifications to the interaction or dynamic mechanism between business modules as well as the invention of numerous modules of the business model. Commercial banks' business model innovation is reflected in the use of systematic technical tools, such as business intelligence, fintech means, big data models, and so on, to segment and canvas customers through multidimensional methods, re-determine customer needs, or develop new products and services, which is also related to organizational change and is a system change. Accelerating business model innovation is critical to achieving enterprise-level transformation, upgrading, and inventive development. In this context, business model innovation is a critical component of digital transformation for fostering digital transformation and increasing organizational performance.

China's commercial banks already have a certain foundation in digital transformation and business model innovation, and it is a high-level transformation based on digital transformation and digital upgrading, which further touches on the core business of enterprises and aims to create new business models, according to the path of digital transformation. The purpose of digital transformation is to create digital technologies, support capabilities, and dynamic digital business models. This demonstrates that a corporation can only prosper if it restructures its business systematically, fully, and comprehensively, not just in terms of computer technology but also in all elements of organizational activities, processes, business models, and employee competencies (Chen et al., 2019). Since 2013, many commercial banks in China have begun to offer customers internet banking and remote services in order to reduce the amount of time customers spend queuing at branches for offline transactions. In the last decade, with the promotion and rapid development of smartphones, the marketing and use of mobile banking apps has largely supplanted offline business. These applications contain specific customer data and fundamental information, creating the groundwork for bank digital administration. Several commercial banks have used advanced fintech tools to encourage the development of new mobile banking business models. The study of this innovation model's implementation mechanism has a significant impact on boosting customer happiness and producing value for customers, which includes customer digital management. An essential factor that commercial banks must consider is how to leverage a big data model to mine the demands of actual clients.

Objectives of the Study - The study aimed to investigate the impact of corporate digital transformation and business model innovation on Chinese commercial banks organizational performance. Specifically it aimed to: assess the digital transformation in terms of corporate digital transformation strategy, organizational structure digitalization, banking products and services digitization; describe the business model innovation in terms of operational models, marketing models, and the construction of an optimal financial environment. Determine the enterprise performance in terms of financial, operational and innovation performance. Test the significant relationship among digital transformation, business model innovation and enterprise performance and develop a framework that will enhance bank operations.

2. Methods

Research Design - This study used descriptive research design. This is used to systematically describe a phenomenon, situation, or population without manipulating variables, making it valuable for understanding characteristics, identifying relationships, and providing a detailed snapshot of trends or behaviors.

Participants of the Study - The questionnaire survey was conducted among employees of five state-owned commercial banks in Beijing. The Questionnaire Star program was used by corporate personnel of Bank of China, Industrial and Commercial Bank of China, Agricultural Bank of China, China Construction Bank, and Bank of Communications, to perform the questionnaire survey. As to respondents, 400 questionnaires was used. Quota sampling was used in determining the participants of the study.

Instruments of the Study - The study used modified questionnaire. Part 1 about Digital Transformation. Enterprise Digital Transformation Metrics Digital Transformation Strategy, Product and Business Digitization, Organizational Structure Digitization, Digital Return on Investment, Customer Experience, Cost Effectiveness The scale has been modified from Chen et al. (2021) research scale on the digital transformation of manufacturing enterprises. A high-level transformation based on digital transformation and digital upgrading that reaches into the company's core business and strives to develop a new business model is referred to as digital transformation. Digital transformation refers to the development of digital technologies and support capabilities to establish a dynamic digital business model. Companies can only succeed if they undertake a systematic, radical, or major and full redefining of their business—not only IT, but all areas of organizational activities, processes, business models, and personnel capabilities (Chen et al.,2019).

Part 2 is about the Business Model Innovation. Business model innovation is a process in which the core logic of corporate value creation is altered in order to improve consumer value and business competitiveness. The adjustment of various business model parts, as well as the modification of the relationship between elements or the dynamic mechanism, can all be considered business model innovation (Law, 2016). The above studies are referenced in the design of the measuring quantity table. Part 3 is the Performance of Enterprises. In brief, financial performance, operational performance, and innovation performance are interconnected and mutually influence the total performance of organizations. Strong financial performance equips firms with additional resources for operations and innovation, whereas efficient operational performance minimizes costs and enhances product quality, hence fostering financial returns. Simultaneously, ongoing innovation propels corporate expansion and market share, hence improving financial and operational performance. Consequently, organizations must synchronize and enhance these three dimensions to attain comprehensive performance enhancement.

Table 1

Reliability Summary Table – Digital Transformation, Business Model Innovation, and Enterprise Performance

Indicators	Cronbach Alpha	Remarks
Enterprise Digital Transformation Strategy	0.794	Acceptable
Digitalization in Organizational Structure	0.917	Excellent
Digitalization of Products and Services	0.840	Good
Operational Models	0.861	Good
Marketing Models	0.971	Excellent
Construction of Optimized Financial Environment	0.893	Good
Financial Performance	0.843	Good
Operational Performance	0.882	Good
Innovation Performance	0.875	Good

George and Mallery (2003) provide the following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable”

All variables in the questionnaire were tested for reliability to confirm the consistency of the instrument in evaluating the effects of business model innovation in corporate digital transformation on the performance of commercial banks. This provides a summary of the reliability metrics employed to assess corporate digital

transformation, business model innovation, and corporate performance. The questionnaire's reliability was evaluated using Cronbach's Alpha, yielding consistent and dependable results for the study's important variables. George et al. (2003) stipulate the following criteria for interpreting Cronbach's Alpha: Scores greater than 9 are considered good, scores greater than 8 are good, scores greater than 7 are acceptable, scores greater than 6 are suspicious, scores equal to 5 are neutral, and scores less than 5 are deemed unsatisfactory. The findings indicate a strong consistency among corporate digital transformation, business model innovation, and corporate performance, Enterprise Digital Transformation Strategy evidenced by a Cronbach's Alpha value of 0.794. The findings confirmed that the instrument satisfied the reliability criteria, allowing researchers to utilize this validation tool for empirical investigations with confidence.

Data Gathering Procedure - The researcher submitted the proposal to request for opinions, and after the paper committee's acceptance, the questionnaire was sorted out and translated into both paper and electronic formats. The researcher sent the formal survey letter to the human resources department of the examined firm, and when approved, the questionnaires were distributed and collected from various personnel throughout the enterprise by the researcher. Prior to the survey, the researcher made a written promise to ensure the research's purpose and information security. After obtaining the necessary approvals, the survey was conducted through multiple channels: online platforms, mail, and face-to-face paper responses, targeting respondents who met the selection criteria. A total of 420 respondents participated in the survey, and after screening for completeness and accuracy, 400 valid responses were included in the final analysis. The survey results reflect the diversity of the sample through adequate data collection and stratified sampling categories according to gender, age, job position, and working years. Participation is voluntary and confidential throughout the process. Statistical tools such as descriptive statistics and cross tabulation were used to systematically sort out and analyze the collected data. These analyses provide valuable information for commercial banks to improve corporate performance, explore digital transformation and business model innovation.

Ethical Considerations - To ensure the quality and integrity of the research, all of the information collected and processed in this study is solely utilized for academic research. The researchers will contact the research institution's human resources department, write a formal letter to the interviewed firms, and then ask the respondents by email or a mini-questionnaire program. To safeguard respondents' information privacy, the researcher will respect their voluntary filling and will not jeopardize their interests. Consistent with the stringent privacy standards of the chosen online survey platforms, participants were guaranteed that their replies will be handled with utmost confidentiality and that only aggregated anonymized data will be included in the final analysis. The voluntary aspect of involvement was highlighted, underscoring the autonomy of participants in selecting which questions to respond to. Moreover, the research stressed the safety and well-being of the participants, ensuring a secure and comfortable online survey experience. This thorough ethical framework complies with academic research norms and aligns with the confidentiality criteria established by online survey platforms, fostering confidence and integrity in the research process.

Data Analysis - Weighted mean and rank were used to assess the digital transformation in terms of corporate digital transformation strategy, organizational structure digitalization, banking products and services digitization; Describe the business model innovation in terms of operational models, marketing models, and the construction of an optimal financial environment. Determine the impact of Digital Customer Management and business innovation model on enterprise performance in terms of financial, operational and innovation performance. The result of Shapiro-Wilk Test showed that p-values of all variables were less than 0.05 which means that the data set is not normally distributed. Therefore, Spearman rho was used to test the significant relationship as part of the non-parametric tests. All analyzes were performed using SPSS version 28.

3. RESULTS AND DISCUSSION

Among the indicators under the summary table of enterprise digital transformation variables for commercial banks, presented in Table 2, indicates that the foremost factor is the enterprise digital transformation

Impact of digital transformation, business innovation on enterprise performance: Basis for Chinese commercial strategy, which received a score of 2.81.

Table 2

Summary Table on Digital Transformation

Key Result Areas	Composite Mean	VI	Rank
Corporate Digital Transformation Strategy	2.81	Agree	1
Organizational Structure Digitalization	2.79	Agree	2.5
Banking Products and Services Digitization	2.79	Agree	2.5
Grand Composite Mean	2.80	Agree	

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

This indicates that enterprise digital transformation is not an instantaneous occurrence, nor is it limited to a single business or department; rather, it encompasses a number of ongoing and protracted processes, necessitating a concomitant adjustment of strategy. The digital transformation strategy of enterprises necessitates that senior management in commercial banks develop long-term strategies and allocate resources for technical support and research and development investment, thereby facilitating the sequential transformation of products, services, and organizational structure, ultimately leading to cost reduction and enhanced efficiency (Amiri, 2023).. The scores for the digitalization of company organizational structure and the digitalization of products and services are both 2.79, with identical rankings, indicating that the impact of enterprise digital transformation is intrinsically linked to these two facets. The core of bank digital transformation is organizational transformation. Primarily, it is essential to implement strategic transformation, establish the development direction via the strategy, and align the actions of banks. The prevailing strategy for banks is to acclimate to the digital environment. To attain the new strategic objectives, it is essential to modify the internal organizational structure and reformulate the value chain (Bachir, 2021).

Table 3

Summary Table on Business Innovation

Key Result Areas	Composite Mean	VI	Rank
Operational Models	2.76	Agree	1
Marketing Models	2.74	Agree	2
Construction of an Optimal Financial Environment	2.71	Agree	3
Grand Composite Mean	2.74	Agree	

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

Table 3 illustrates the significance of business model innovation in operational models, marketing models, and the establishment of a high-quality financial environment, yielding a weighted average score of 2.74, which is the consensus result. Conversely, business model innovation is more methodical, necessitating the proper integration and mutual influence of the application model and the marketing model. Extensive demonstration and research indicate that the primary objective of business model innovation is not the advancement of technology or the creation of novel markets, but rather the enhancement of the rarity and value of current products produced with existing technology in the established market. This approach aims to bolster enterprises' capacity to capitalize on opportunities or mitigate environmental threats by leveraging existing resources, thereby ensuring sustainable competitive advantages for businesses (Teece, 2018).

Business model innovation encompasses operational model innovation, marketing model innovation, and an optimized financial environment. The operational model scores 2.76 points, ranking first, indicating that bank employees concur that an effective operational model enhances enterprise efficiency. The marketing model also scores 2.74 points, corroborating this conclusion. The marketing personnel have adjusted to the evolution of digital marketing and have prepared for online marketing and services. Regarding the favorable financial environment, the interviewed employees indicated that the current domestic commercial banking and financial market conditions are generally positive, attributed to the clarity and efficacy of domestic regulation (Burlea-Schiopoiu et al.,2020).

Table 4*Summary Table on Enterprise Performance*

Key Result Areas	Composite Mean	VI	Rank
Financial Performance	2.74	Agree	1.5
Operational Performance	2.74	Agree	1.5
Innovation Performance	2.71	Agree	3
Grand Composite Mean	2.73	Agree	

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

Table 4 summarizes enterprise success across critical result areas: financial performance, operational performance, and innovation performance. The overall composite mean of 2.73, classified as Agree, shows that respondents predominantly see the bank's performance favorably in these domains. This indicates a balanced strategy for attaining organizational objectives, emphasizing the necessity of sustaining strengths in financial and operational performance while concurrently prioritizing innovation. The top scores for "Financial Performance" and "Operational Performance" are both 2.74, based on a weighted mean. This indicates respondents' confidence in the bank's management of its financial resources and operational operations. Robust financial management is frequently associated with operational efficiency, which is essential for maintaining competitive advantage in the banking industry (Mikalef et. al, 2021). The intermediary indicator is "Innovation Performance," with a composite mean of 2.71, suggesting that innovation is perceived well, while there remains potential for enhancement. The indicator with the lowest score is "Innovation Performance," which has a weighted mean of 2.71. This indicates that respondents believe the bank's creative initiatives may be enhanced to more effectively address client requirements and market difficulties. Research suggests that banks frequently encounter challenges in adopting innovation due to regulatory limitations and a risk-averse culture, underscoring the necessity for improved innovation strategies to maintain competitiveness (Burlea-Schiopoiu et al.,2020).

Table 5*Relationship Between Digital Transformation and Business Innovation*

Corporate Digital Transformation Strategy	rho	p-value	Interpretation
Operational Models	-0.021	0.679	Not Significant
Marketing Models	-0.005	0.926	Not Significant
Construction of an Optimal Financial Environment	0.051	0.309	Not Significant
Organizational Structure Digitalization			
Operational Models	0.351**	<.001	Highly Significant
Marketing Models	0.346**	<.001	Highly Significant
Construction of an Optimal Financial Environment	0.374**	<.001	Highly Significant
Banking Products and Services Digitization			
Operational Models	0.325**	<.001	Highly Significant
Marketing Models	0.333**	<.001	Highly Significant
Construction of an Optimal Financial Environment	0.347**	<.001	Highly Significant

***.* Correlation is significant at the 0.01 level

Table 5 examines the correlation between different facets of digital transformation and business model innovation within the banking industry. It displays correlation coefficients (rho) and p-values, signifying the strength and importance of these associations. The findings indicate that the correlation coefficients for the corporate digital transformation strategy vary from -0.021 to 0.051, implying exceedingly poor associations with operational models, marketing models, and the establishment of an ideal financial environment. The p-values for these associations exceed 0.01, signifying that they lack statistical significance. The correlation coefficients for the digitalization of organizational structure range from 0.346 to 0.374, signifying a weak direct association with operational models, marketing models, and the establishment of an ideal financial environment. The p-values for these associations are below 0.01, indicating statistical significance. This indicates that the digitization of banks' organizational structures significantly enhances their business model innovation. The rho values for the digitization of banking products and services range from 0.325 to 0.347, indicating a weak direct correlation with characteristics of business model innovation. The associated p-values are below 0.01, signifying a statistically significant correlation. This underscores that the digitization of banking products and services significantly

impacts the innovation of business models within the bank. The findings indicate that corporate digital transformation strategies have weak and non-significant associations with business model innovation, whereas both organizational structure digitization and the digitization of banking products and services demonstrate significant positive correlations, highlighting their critical role in fostering innovation within the banking sector. The digital transformation significantly impacts business model innovation through technology integration, enhanced value creation, increased agility, customer focus, and improved collaboration, enabling organizations to thrive in a dynamic environment (Saade et al., 2020).

Table 6*Relationship Between Digital Transformation and Enterprise Performance*

Corporate Digital Transformation Strategy	rho	p-value	Interpretation
Financial Performance	0.130**	0.009	Significant
Operational Performance	0.104*	0.038	Significant
Innovation Performance	0.117*	0.019	Significant
Organizational Structure Digitalization			
Financial Performance	0.313**	<.001	Highly Significant
Operational Performance	0.282**	<.001	Highly Significant
Innovation Performance	0.303**	<.001	Highly Significant
Banking Products and Services Digitization			
Financial Performance	0.309**	<.001	Highly Significant
Operational Performance	0.303**	<.001	Highly Significant
Innovation Performance	0.305**	<.001	Highly Significant

** . Correlation is significant at the 0.01 level/* . Correlation is significant at the 0.05 level

As seen in the table, the computed rho-values ranging from 0.104 to 0.313 indicate a very weak to weak direct relationship among the sub variables of digital transformation and enterprise performance. There was a statistically significant relationship between digital transformation and enterprise performance because the obtained p-values were less than 0.01/0.05. This analyzes the correlation between various aspects of digital transformation and organizational success in three principal domains: financial performance, operational performance, and innovation performance. The findings demonstrate that all associations are statistically significant, indicating a favorable correlation between digital transformation and organizational success (Huang et al., 2021). The correlation coefficients (rho) indicate a favorable association with financial performance (0.130, $p=0.009$), operational performance (0.104, $p=0.038$), and innovation performance (0.117, $p=0.019$). The results suggest that as banks adopt corporate digital transformation initiatives, their performance in these domains enhances, though with comparatively lower relationships. The correlation coefficients demonstrate a robust positive association with all three performance metrics: financial performance (0.313, $p<0.001$), operational performance (0.282, $p<0.001$), and innovative performance (0.303, $p<0.001$). This indicates that the digitization of organizational structures substantially improves overall firm performance, rendering it a crucial determinant of success. Financial Products and Services Digitization demonstrates substantial positive relationships with financial performance (0.309, $p<0.001$), operational performance (0.303, $p<0.001$), and innovative performance (0.305, $p<0.001$). This signifies that the digitization of banking goods and services is crucial for enhancing overall performance (Huang et al., 2022).

Table 7*Relationship Between Business Model Innovation and Enterprise Performance*

Operational Models	rho	p-value	Interpretation
Financial Performance	0.306**	<.001	Highly Significant
Operational Performance	0.259**	<.001	Highly Significant
Innovation Performance	0.250**	<.001	Highly Significant
Marketing Models			
Financial Performance	0.249**	<.001	Highly Significant
Operational Performance	0.197**	<.001	Highly Significant
Innovation Performance	0.197**	<.001	Highly Significant

Construction of an Optimal Financial Environment			
Financial Performance	0.303**	<.001	Highly Significant
Operational Performance	0.254**	<.001	Highly Significant
Innovation Performance	0.243**	<.001	Highly Significant

****.** Correlation is significant at the 0.01 level

Table 7 analyzes the correlation between business model innovation (BMI) and organizational performance across three principal dimensions: operational models, marketing models, and the establishment of an appropriate financial environment. The findings reveal highly substantial positive correlations across all dimensions and performance metrics, indicating a robust association between BMI and enterprise performance. The computed rho-values ranging from 0.197 to 0.306 indicate a very weak to weak direct relationship among the sub variables of business model innovation and enterprise performance. There was a statistically significant relationship between business model innovation and enterprise performance because the obtained p-values were less than 0.01. Correlation coefficients indicate a strong positive association with financial performance (0.306, $p < 0.001$), operational performance (0.259, $p < 0.001$), and innovative performance (0.250, $p < 0.001$). Results demonstrate that efficient operational models improve overall organization performance, highlighting the significance of operational efficiency and innovation in achieving financial success.

Marketing Models: This aspect exhibits substantial positive connections with financial performance (0.249, $p < 0.001$), operational performance (0.197, $p < 0.001$), and innovation performance (0.197, $p < 0.001$). The results indicate that innovative marketing techniques enhance financial performance and operational efficiency, underscoring marketing's significance in business model innovation. **The establishment of an Optimal Financial Environment:** The correlation coefficients demonstrate a robust positive association with financial performance (0.303, $p < 0.001$), operational performance (0.254, $p < 0.001$), and innovation performance (0.243, $p < 0.001$). This underscores the significance of a well-organized financial framework in enhancing overall performance and promoting innovation.

The significant relationship between business model innovation and enterprise performance arises from enhanced operational efficiency, market responsiveness, improved customer engagement, value creation, integrated financial strategies, and a culture that fosters innovation. These factors collectively contribute to stronger overall performance in organizations. Innovative operational models streamline processes, reduce costs, and improve service delivery. This efficiency leads to better financial performance and operational outcomes. Business model innovation enables organizations to adapt quickly to changing market conditions and customer preferences. This agility allows firms to seize new opportunities and respond effectively to competition, ultimately enhancing their performance (Teece, 2018). Innovative marketing models help organizations connect more effectively with customers, leading to improved customer satisfaction and loyalty. Enhanced customer engagement positively influences financial performance and operational metrics, as satisfied customers are more likely to contribute to revenue growth (Lusch et al., 2019). **Effective business model innovation focuses on creating and delivering value to customers.** **Integrated Financial Strategies:** The construction of an optimal financial environment supports innovative initiatives by providing the necessary resources and stability for experimentation.

4. Conclusions and recommendations

Respondents moderately agreed that commercial banks have successfully implemented corporate digital transformation, primarily evident in corporate strategy, organizational structure, and the digital transformation of products and services; The respondent employees moderately agreed on the influence of business innovation of commercial banks to the optimization of operational modes, enhancement of marketing strategies, and improvement of the financial environment of enterprises; The respondents moderately agreed that financial performance, operational performance, and innovation performance of commercial banks substantially affect the enhancement of corporate performance. There is highly significant relationship among Enterprise digital,

business innovation and enterprise performance. A framework for Chinese commercial banks operation continuous improvement was developed.

Research Output

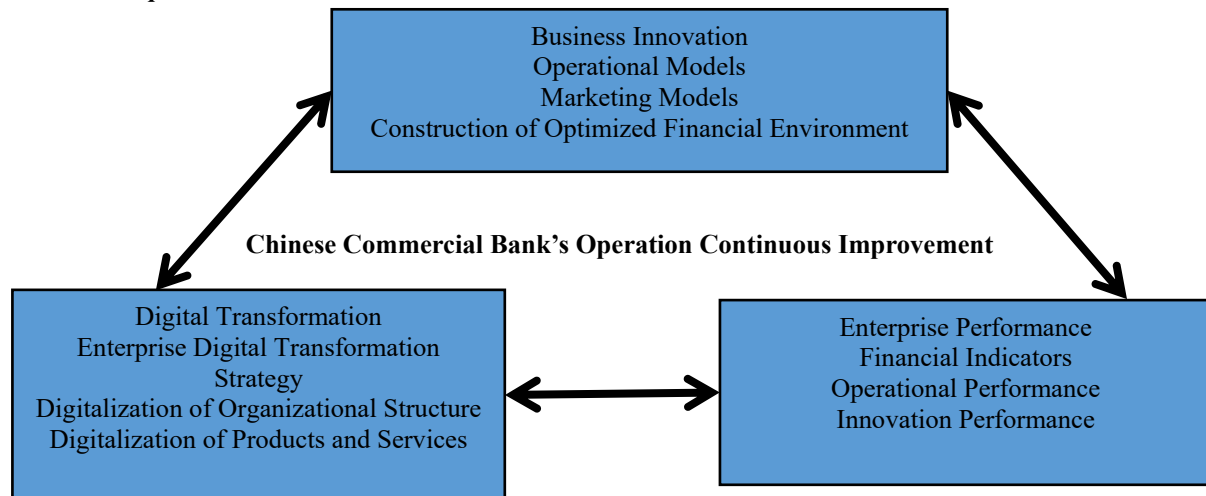


Figure 1. Chinese Commercial Bank Operation Continuous Improvement Framework

Commercial banks may consistently advocate for corporate digital transformation through a strategic lens, facilitating the digitalization of organizational structures and offerings to enhance corporate performance; Commercial banks may reformulate and innovate their business models to instigate fundamental shifts in the corporate value growth paradigm; Commercial banks may leverage the synergistic potential of corporate digital transformation and business innovation to perpetually enhance corporate performance. The developed framework may be adopted by the commercial banks for their continuous improvement. Future studies may incorporate perspectives from various stakeholders, including employees, customers, and policymakers, to evaluate the broader impact of digital transformation and innovation.

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