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THE IMPACT OF DIGITAL TECHNOLOGY, ORGANIZATIONAL CHANGE, OPERATION MANAGEMENT TOWARD NON-PERFORMING ASSET DISPOSAL PERFORMANCE OF NON-BANK IN CHINA

O IMPACTO DA TECNOLOGIA DIGITAL, DA MUDANÇA ORGANIZACIONAL E DA GESTÃO OPERACIONAL NO DESEMPENHO DA ALIENAÇÃO DE ATIVOS IMPRODUTIVOS DE INSTITUIÇÕES NÃO BANCÁRIAS NA CHINA

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Abstract
The profit level in China's non-performing asset disposal market is not high, transaction costs are high, tradable opportunities are limited, the industrial chain flow in the trading market is not smooth, and market transactions lack diversity. The maturity of the entire market, institutional activity, and asset richness all require further systematic optimization to enhance their contribution to resolving financial risks. In the new digital economy, where data serves as a key production factor, digital initiatives based on digital technology and linked by data are becoming important levers for driving capital market efficiency and driving force transformation, serving as a new impetus for financial technology. As the practical foundation of macroeconomics, asset management companies are active participants in digital transformation, shouldering the important task of implementing high-quality development of non-performing assets. Based on this, this study adopts a mixed research method to gain a deeper understanding of the business processes and performance dimensions of non-performing asset disposal. By studying digital dimensions such as digital technology, organizational change, and operational management, it demonstrates their

Resumo
O nível de lucratividade no mercado de alienação de ativos inadimplentes da China não é elevado, os custos de transação são altos, as oportunidades de negociação são limitadas, o fluxo da cadeia industrial no mercado de negociação não é fluido e as transações de mercado carecem de diversidade. A maturidade de todo o mercado, a atividade institucional e a variedade de ativos exigem uma otimização sistemática mais aprofundada para aumentar sua contribuição na resolução de riscos financeiros. Na nova economia digital, onde os dados atuam como um fator-chave de produção, as iniciativas digitais baseadas em tecnologia digital e interligadas por dados estão se tornando alavancas importantes para impulsionar a eficiência do mercado de capitais e a transformação da força motriz, servindo como um novo impulso para a tecnologia financeira. Como base prática da macroeconomia, as empresas de gestão de ativos são participantes ativas na transformação digital, assumindo a importante tarefa de implementar o desenvolvimento de alta qualidade de ativos inadimplentes. Com base nisso, este estudo adota um método de pesquisa misto para obter uma compreensão mais

impact on non-performing asset performance. It helps enterprises understand the mechanism and positive effects of digital technology on businesses, and assists governments and policymakers in further recognizing the impact of digitalization, weighing the costs and benefits of digital management, and formulating guiding policies for enterprise digitalization.

Keywords: Non-Performing Asset. Digital Technology. Organizational Change. Operation Management.

profunda dos processos de negócios e das dimensões de desempenho da alienação de ativos inadimplentes. Ao estudar dimensões digitais, como tecnologia digital, mudança organizacional e gestão operacional, ele demonstra seu impacto no desempenho dos ativos não produtivos. Isso ajuda as empresas a compreender o mecanismo e os efeitos positivos da tecnologia digital nos negócios e auxilia governos e formuladores de políticas a reconhecer melhor o impacto da digitalização, ponderar os custos e benefícios da gestão digital e formular políticas orientadoras para a digitalização empresarial.

Palavras-chave: *Ativos Não Produtivos. Tecnologia Digital. Mudança Organizacional. Gestão Operacional.*

1 INTRODUCTION

Non-performing assets (NPAs) have always had a negative impact on bank profitability, not only on the bank's monetary profitability but also on the long-term development of the financial system. A good NPA management system can have a positive impact on the banking industry, thereby promoting the economy. Non-performing assets are valuable assets. Accurate pricing can truly reflect the value of the assets. Through effective processing methods, these values can be quickly mined and restored. Efficiently handling non-performing assets can optimize the asset structure, increase the rate of return on capital, and enhance profitability. From a macro perspective, accelerating the disposal of non-performing assets can help financial institutions clarify their own risks and formulate reasonable avoidance plans, minimizing the risks involved in financial reforms. China's economic development is inseparable from monetary mechanisms and related policies. With the sharp increase in the scale of non-performing assets, the management of non-performing assets has attracted increasing attention. How to quickly complete the disposal of non-performing assets, improve capital liquidity, and then generate expected capital value (Dube, 2022; Jegadeeshwaran & Basuvaraj, 2019).

International experience has shown that in order to prevent and resolve financial risks and maintain national financial security, an effective solution is to strip non-

performing assets from bank balance sheets and establish specialized third-party institutions for takeover, known as Asset Management Company (AMC)(yang, 2022).

In the late 1990s, in response to the credit crisis caused by the outbreak of the Asian financial crisis, the Chinese government drew on international disposal experience and established four major financial asset management companies, namely Huarong, Changcheng, Dongfang, and Xinda, to properly dispose of the huge non-performing assets of state-owned commercial banks. Practice has proven that this creative reform has resolved systemic risks in the financial system, played a significant historical role in the reform of state-owned commercial banks, and maintained the stability of social credit (yang, 2022).

After years of development, China has gradually built a "5+2+N+bank system AIC+foreign investment system " pattern, which specifically includes: "5" represents a national AMC; "2" represents two local AMCs in each province; "N" refers to unlicensed local AMCs. Asset management companies mainly undertake the grouping of small-scale non-performing assets with low disposal efficiency by the five major AMCs and local AMCs; the "banking system" was established with the beginning of this round of market-oriented debt-for-equity swaps, led by major state-owned banks. AMC subsidiary specializing in debt-for-equity swaps. As the end of the financial cycle, the disposal of non-performing assets is crucial to preventing secondary financial risks, improving the allocation of financial resources, and maintaining the stability of the financial system.

The profit level of the non-performing asset disposal market in China is not high, transaction costs are high and there are few tradable opportunities. The industrial chain flow in the trading market is not smooth. Market transactions are not diversified enough. There are not enough market participants. The maturity and institutional activity of the entire market, asset richness are still in their infancy, and further systematic optimization is needed to improve their contribution to resolving financial risks.

1. China has a large supply of non-performing assets, rapid growth, and insufficient disposal.

2. Non-performing asset classification and matching do not meet demand

3. The level of digitalization needs to be improved urgently

Chinese non-performing asset management companies urgently need to improve their digitalization and informatization levels to reduce costs. On the one hand, non-

performing asset disposal institutions can use the platform to expand channels and find more investors, and at the same time, it also allows suitable investors to find suitable assets more conveniently and improve transaction efficiency; on the other hand, relevant disposal institutions can use the platform to expand their channels and find more investors. Digitization and informatization facilitate participation in the asset disposal process to reduce management and business costs.

2 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Overview of NPA disposal formance in China

Non-performing assets (NPAs) have always had a negative impact on bank profitability, not only on the bank's monetary profitability but also on the long-term development of the financial system. A good NPA management system can have a positive impact on the banking industry, thereby promoting the economy. Through effective processing methods, these values can be quickly mined and restored. Efficiently handling non-performing assets can optimize the asset structure, increase the rate of return on capital, and enhance profitability. From a macro perspective, accelerating the disposal of non-performing assets can help financial institutions clarify their own risks and formulate reasonable avoidance plans, minimizing the risks involved in financial reforms. China's economic development is inseparable from monetary mechanisms and related policies. With the sharp increase in the scale of non-performing assets, the management of non-performing assets has attracted increasing attention. How to quickly complete the disposal of non-performing assets, improve capital liquidity, and then generate expected capital value. Disposal of non-performing assets plays an important role in preventing and defusing financial risks and serving economic transformation and adjustment (Dube, 2022; Jegadeeshwaran & Basuvaraj, 2019).

In the pilot work of non-performing loan transfer, AMCs have actively participated since the pilot. In the field of non-performing asset transfer in personal loans, local asset management companies have actively collected and disposed of non-performing asset packages launched by banks after the pilot work was launched. Up to now, local AMCs have acquired over 90% of the total transfer scale of non-performing

personal loans, making them the main force in this field. Under the guidance of regulatory authorities, AMCs actively play a countercyclical regulatory role, and with years of accumulated rich experience and professional skills, are increasingly participating in risk resolution in key areas. As a local AMC deeply rooted in the local area, with its natural geographical genes and good cooperation advantages with local governments, it actively participates in the resolution of non-performing assets of local state-owned enterprises. The non-performing assets of local state-owned enterprises are becoming an important source of acquisition for local AMCs (Jun, 2024).

The non-performing asset management industry in China has played a positive role in disposing of non-performing assets, revitalizing existing assets, preventing and resolving financial risks, and supporting the development of the real economy, from its inception to the formation of a systematic system. It has made outstanding contributions to the reduction of non-performing loan ratios in Chinese banks and the socio-economic development. During the policy oriented development stage from 1999 to 2006, the establishment and operation of the four major financial AMCs significantly reduced China's non-performing loan balance and non-performing loan ratio, causing the non-performing loan ratio to drop from the highest 30% to around 9% and the non-performing loan balance to around 1.3 trillion yuan. During the market-oriented transformation stage from 2007 to 2012, the non-performing loan ratio further decreased from 9% to around 1%, and the balance of non-performing loans decreased to around 0.5 trillion yuan. In 2013, China entered the stage of comprehensive marketization, and the establishment of local AMC and AIC institutions gradually improved the non-performing asset management industry in China. The non-performing loan ratio tended to stabilize and remained within the range of 1% to 2% (Chuanquan, 2024).

Although China's non-performing asset management industry has achieved good results, due to the gradual process of industry construction, there are inevitably certain operational and regulatory risks in the development process, and its development is not yet mature. In 2024, the State Administration for Financial Regulation issued the "Measures for the Management of Non Performing Asset Business of Financial Asset Management Companies", which starts from the entire process of acquiring, managing, and disposing of non-performing assets of AMCs, systematically expands the scope of non-performing asset acquisition, clarifies and refines the standards for non-performing

assets of non-financial institutions that can be acquired, and comprehensively regulates the non-performing asset business of AMCs. Intended to guide AMCs to focus on their main business of non-performing assets, improve their professional capabilities in acquisition, management, and disposal, leverage their financial rescue and countercyclical adjustment functions, and play a positive role in preventing and resolving financial risks and supporting the development of the real economy in the new situation. At the same time, it also encourages AMCs to cultivate differentiated core competitiveness and play an active role in the reform of insurance for small and medium-sized financial institutions. The orderly expansion of the scope of non-performing financial assets that financial asset management companies can acquire (songhui, 2024).

Subsequent AMCs should carry out asset management business in accordance with regulatory requirements. 1) Focus on the main responsibility business and enhance professional capabilities. Based on market demand and policy guidance, clarify the scope of assets that can be acquired, which should not only include bad debts within the banking system, but also include non-performing loans from other financial institutions and the real economy. Enhance internal professional capabilities to ensure efficient disposal of non-performing assets. 2) Accelerate the clearance of non-performing assets and improve the efficiency of market-oriented operations. Establish a more flexible asset auction and transfer mechanism, and introduce more market-oriented mechanisms in the process of asset transfer and disposal. Diversified asset disposal channels should also be established to enhance asset disposal flexibility through equity transfer, asset restructuring, and other means. 3)Be a good "firewall" for financial risks and a "stabilizer" for maintaining financial security. By acquiring and disposing of non-performing assets, we can effectively prevent the accumulation of non-performing assets and the transmission of risks. By accelerating the clearance of non-performing assets, reducing the accumulation of systemic risks, and maintaining the smooth operation of the financial market (yiming, 2024).

2.2 Digital technology and disposal performance

Through literature research, it has been found that measuring the performance of non-performing asset disposal can be approached from three dimensions: efficiency,

benefits, and disposal costs. In addition, measuring technological level can be approached from three dimensions: technology integration, trust, and data. The higher the technological maturity, the greater the positive impact on the performance of non-performing asset disposal. Therefore, the following hypothesis is proposed:

H1: Digital technology has a positive direct effect on the disposal performance.

2.3 Digital technology, organizational change and disposal performance

Through literature review, it was found that digital technology has a direct positive correlation with organizational change in the dimensions of digital technology integration, trust, and data. Organizational change has a direct positive correlation with disposal performance in the dimensions of organizational strategy, culture, and human resources. Organizational change plays a partial mediating role between digital technology and disposal performance. Disposal performance can be measured through three dimensions: efficiency, benefits, and disposal costs.

Therefore, based on the relationship and dimensions between digital technology, organizational change, and disposal performance, the following assumptions are proposed:

H2: Digital technology has a positive direct effect on the Organizational change.

H4: Organizational change has a positive direct effect on the disposal performance.

2.4 Digital technology, operation management and disposal performance

Technological factors have a direct positive correlation with operational management in the dimensions of digital technology integration, trust, and data. Operational management has a direct positive correlation with disposal performance in the dimensions of process, product, and business. Operational management plays a partial mediating role between digital technology and disposal performance. Disposal performance can be measured through three dimensions: efficiency, benefits, and disposal costs.

Therefore, based on the relationship and dimensions between digital technology, operational management and disposal performance, the following assumptions are proposed:

H3: Digital technology has a positive direct effect on the operational management.

H5: Operational management has a positive direct effect on the disposal performance.

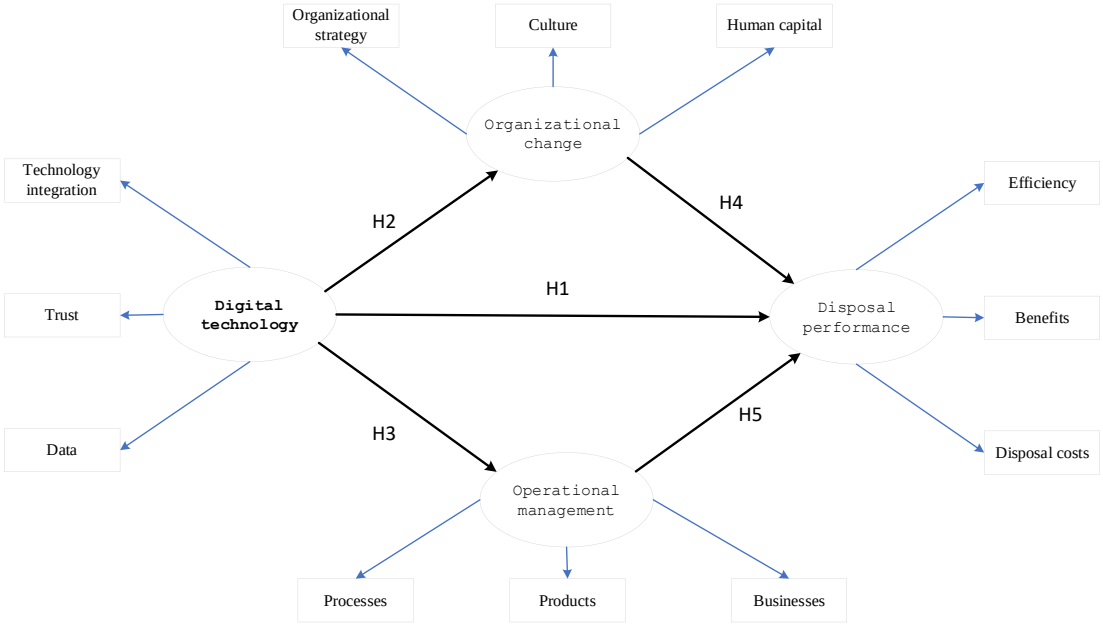
2.5 Conceptual framework

The impact of digital transformation on the asset management industry is profound, and together with financial innovation and management innovation, it promotes positive innovation. Digital information technology has a direct impact on the disposal of non-performing assets in various aspects. Research has found that innovation in digital information technology has caused corresponding changes in organizational and operational management, which in turn affects the effectiveness of non-performing asset disposal.

Digital information technology, as the dependent variable, mainly reflects the technological capabilities and readiness of digital transformation, and has a direct impact on the disposal of non-performing assets, operational management, and organization. Organizations, as intermediary variables, undergo varying degrees of transformation under the promotion of digital information technology, which indirectly affects the disposal of non-performing assets. As an intermediary variable, operational management has undergone varying degrees of changes under the promotion of digital information technology, indirectly affecting the efficiency of non-performing asset disposal.

Figure 1

Conceptual framework



3 METHODOLOGY

3.1 Research design

In this study, a mixed research method was adopted, which was divided into quantitative and qualitative research. This chapter will conduct quantitative analysis through structural equation modeling and qualitative analysis through content analysis. Validate the survey results of quantitative analysis through qualitative analysis to prove the credibility of the conclusions. This article will investigate and collect data through a survey questionnaire.

3.2 Quantitative methodological approach

3.2.1 Population and sampling

3.2.1.1 Population

The population surveyed in this study is about 3100 key personnels from local financial asset management companies in various provinces of China. They have high professional competence and rich experience in the field of acquiring and disposing of non-performing financial assets. They are familiar with the current situation and policy orientation of the non-performing financial asset market, and can make reasonable judgments from a professional perspective on the pattern, development trends, asset management and disposal performance of China's non-performing asset market.

According to a survey conducted by China Orient Asset Management Company: 65% of AMC personnel in the surveyed units are between 50-60 people, 5% have a staff size of less than 30 people, 24% have a staff size of 60-100 people, and 6% have a staff size of over 100 people (zhanfeng, 2024).

Due to the varying levels of financial activity in different provinces of China, the personnel responsible for AMC asset disposal also differ by region. There are more AMCs in the economically developed regions of Central, South, and East China, so the population proportion is relatively high, which meets the requirements of regional economic volume (zhanfeng, 2024).

3.2.1.2 Sample

This study has a total of 12 observed variables, and according to empirical rules, the sample size should be 20 times that of the observed variables in order to conduct reliable statistical analysis. Therefore, a minimum sample size of 240 is required. Due to the possibility of data loss or respondents not returning the questionnaire during the research process, in order to ensure sufficient sample size, we have expanded the survey sample to 336 with a 40% margin for error.

The resources invested in obtaining 336 data points are significant, but in order to meet the population size of the study, this data is necessary. This research data can prove the disposal of non-performing assets in China, as well as the impact of digital transformation on the disposal of non-performing assets in different regions, companies, and economic institutions.

3.2.2 Research tools

3.2.2.1 Structured survey questionnaire

The survey tool used in this study is a structured questionnaire, which aims to investigate the relevant evaluation data of 12 dimensions involved in five variables: digital technology, organizational change, operational management and disposal performance. The questionnaire is divided into three parts to survey the respondents. The first part is to understand the relevant information of the respondents and their companies. The second part is to evaluate the 12 dimensions related to the variables. The third part is the open-ended feedback of the respondents on the survey.

3.2.2.2 Likert-5 Scale

The Likert-5 scale is a closed ended measurement tool used to evaluate the impact of digital transformation on the performance of non-performing asset disposal. The scale will use a series of closed ended questions, and respondents will need to choose the option on a five level scale that best fits their perspective.

Likert-5 scale, with the following options:

1) Strongly agree
2) Agree
3) Neutral
4) Disagree
5) Strongly disagree

3.3 Qualitative methodological approach

3.3.1 Population and sampling

3.3.1.1 Population

Asset management companies are the main force in the financial non-performing asset market. As professional management and disposal institutions in the financial system, based on the positioning of stock risk resolution and rescue, they continue to increase their efforts in acquiring and disposing of financial non-performing assets, and actively participate in the reform and insurance of small and medium-sized financial institutions.

This study will conduct panel structured interviews with employees of AMCs to investigate the internal and external factors that affect the performance of non-performing asset disposal, and analyze the promoting effect of digital transformation on non-performing asset disposal performance.

In terms of sample size, 20 individuals for semi-structured interviews have been considered sufficient for this research. This number aligns with qualitative research standards, where the emphasis is on depth rather than breadth.

In qualitative research, the concept of data saturation is crucial. It is the point where no new themes or ideas emerge from the data. Based on past research studies in similar domains, it has been found that data saturation typically occurs within 20-30 interviews.

3.1.1.2 Sampling

The interviewee must meet the following requirements:

1) Business experience greater than 3 years

2) Managing assets with a scale greater than 100 million RMB

3) Willingness to participate in an interview.

To effectively leverage the cross cycle regulatory role of asset management companies, further enhance the quality and efficiency of serving the real economy,

smooth the virtuous cycle of the national economy, and serve high-quality development. This study will adopt a purposive sampling method to ensure the representativeness of the sampling

3.3.2 Data collection

This study conducted research using semi-structured interviews. A semi-structured interview is a combination of structured and unstructured interviews, where questions and their order can be randomly modified while ensuring clear themes. The purpose of a semi-structured interview is to set up different questioning scenarios based on the interviewee's preferences, allowing them to express their views and feelings on the interview topic in a relaxed state.

To ensure the completeness and accuracy of data collection, the access process will be recorded through recording, note taking, and other means to facilitate subsequent data analysis and search for clues and basis.

All interviewees need to ensure that the interview is voluntary, objective, and impartial, without any vested interests. Prior to the interview, they will sign a letter of understanding and a commitment to integrity. The interview will be scheduled according to the appointment schedule to ensure a relaxed and uninterrupted interview time.

To ensure the completeness and accuracy of data collection, the access process will be recorded through recording, note taking, and other means to facilitate subsequent data analysis and search for clues and basis

All interviewees need to ensure that the interview is voluntary, objective, and impartial, without any vested interests. Prior to the interview, they will sign a letter of understanding and a commitment to integrity. The interview will be scheduled according to the appointment schedule to ensure a relaxed and uninterrupted interview time.

Before the interview, a brief introduction will be sent to the interviewee to help them understand the purpose of the interview and reflect on the topic to ensure the effectiveness of the interview.

After obtaining the consent of the interviewee, the recording, notes, and other related materials of the interview will be backed up and analyzed to provide data basis for qualitative research on the disposal of non-performing assets in digital transformation.

4 DATA ANALYSIS AND RESULTS

This chapter focuses on the analysis of data collected using mixed research methods, including both quantitative and qualitative approaches. The analytical aspects covered in this chapter include: 1) descriptive analysis of research variables and demographic information; 2) Investigate the causal relationship between four potential variables: disposal performance, digital technology, valuation change, and operational management; 3) The mediating role of organizational change in the impact of digital technology on disposal performance, and the mediating role of operational management in the impact of digital technology on disposal performance.

4.1 Reliability reliability test

Table 1

Reliability Test for Each Variable

Dimensions of variables	Cronbach's Alpha	Items
Efficiency (EF)	0.905	6
Benefits (BE)	0.885	6
Disposal costs (DC)	0.867	6
Disposal performance (DP)	0.916	18
Technology integration (TI)	0.911	8
Trust (TR)	0.854	4
Data (DA)	0.912	6
Digital technology (DT)	0.950	18
Organizational strategy (OS)	0.950	7
Culture (CU)	0.885	6
Human capital (HC)	0.882	6
Organizational change (OC)	0.935	19
Processes (PC)	0.945	7
Products (PD)	0.918	6
Businesses (BU)	0.930	6
Operational management (OM)	0.953	19

Table 1 shows that Cronbach's Alpha scores for various first-order and second-order dimensions range from 0.854 to 0.953. These scores demonstrate that each dimension is classified as either "excellent" or "good" in terms of reliability. A significant number of these dimensions are rated as having "excellent" reliability, with their Cronbach's Alpha scores surpassing 0.9. Some dimensions score slightly lower yet still

reside within the "good" reliability bracket. These scores further demonstrate the good internal consistency of the methods used in the scale sample study.

4.2 Validity analysis

4.2.1 Confirmatory factor analysis of the disposal performance scale

Table 2

Model Fit Assessment Results

Indicator	Reference Criteria	Results
CMIN/DF	1 to 3 indicate excellence, 3 to 5 indicate good performance	1.415
GFI	>0.9 indicate excellence, >0.8 indicate good performance	0.928
CFI	>0.9 indicate excellence, >0.8 indicate good performance	0.979
IFI	>0.9 indicate excellence, >0.8 indicate good performance	0.979
NFI	>0.9 indicate excellence, >0.8 indicate good performance	0.931
RMSEA	<0.05 indicate excellence, <0.08 indicate good performance	0.040

As shown in Table 2, in the model fitting evaluation results, the CMIN/DF (chi-square to degrees of freedom ratio) is 1.415, which falls within the desirable range of 1 to 3. The RMSEA (root mean square error of approximation) is 0.040, within the desirable range of below 0.05. The GFI, CFI, IFI, and NFI indices are all greater than 0.9, indicating excellent fit. Therefore, based on these results, the Confirmatory factor analysis (CFA) model of the digital technology scale demonstrates good model fit.

Table 3

Results of disposal performance scale CFA model convergent validity and composite reliability test

Items	Path	Dimensions	Estimate	P-value	AVE	CR
DP01	<---	EF	0.835	***	0.624	0.908
DP02	<---		0.786	***		
DP03	<---		0.741	***		
DP04	<---		0.842	***		
DP05	<---		0.837	***		
DP06	<---		0.685	***		

DP07	<---	BE	0.802	***	0.576	0.890
DP08	<---		0.796	***		
DP09	<---		0.749	***		
DP10	<---		0.765	***		
DP11	<---		0.775	***		
DP12	<---		0.656	***		
DP13	<---	PC	0.804	***	0.535	0.873
DP14	<---		0.713	***		
DP15	<---		0.694	***		
DP16	<---		0.798	***		
DP17	<---		0.741	***		
DP18	<---		0.621	***		

Table 3 details the results of the Confirmatory Factor Analysis (CFA) for digital technology scale. It shows that the standardized factor loadings for the 18 items related to digital technology scale vary from 0.630 to 0.941 demonstrating their statistical relevance. The comprehensive reliability (CR) scores of the three observable variable techniques integration (TI), trust (TR), and data (DA) of latent variable data technology all exceed 0.7. In addition, the average extracted variance (AVE) of these categories is higher than 0.5. This indicates that each dimension possesses good convergent validity and composite reliability.

Table 4

Discriminant validity test of digital technology scale

Dimensions	AVE	EF	BE	DC
EF	0.624	**0.790**		
BE	0.576	0.531	**0.759**	
DC	0.535	0.513	0.537	**0.731**

As shown in the analysis results in Table 4, in this discriminant validity test, the standardized correlation coefficients between each pair of dimensions are all less than the

square root of the corresponding AVE values for those dimensions. This indicates that each dimension possesses good discriminant validity.

4.2.2 Confirmatory factor analysis of the digital technology scale

Table 5

Model Fit Assessment Results

Indicator	Reference Criteria	Results
CMIN/DF	1 to 3 indicate excellence, 3 to 5 indicate good performance	1.725
GFI	>0.9 indicate excellence, >0.8 indicate good performance	0.913
CFI	>0.9 indicate excellence, >0.8 indicate good performance	0.972
IFI	>0.9 indicate excellence, >0.8 indicate good performance	0.972
NFI	>0.9 indicate excellence, >0.8 indicate good performance	0.935
RMSEA	<0.05 indicate excellence, <0.08 indicate good performance	0.040

As shown in Table 5 in the model fitting evaluation results, the CMIN/DF (chi-square to degrees of freedom ratio) is 1.725, which falls within the desirable range of 1 to 3. The RMSEA (root mean square error of approximation) is 0.040, within the desirable range of below 0.05. The GFI is 0.913, within the desirable is greater than 0.9. Additionally, the CFI, IFI, and NFI indices are all greater than 0.9, indicating excellent fit. Therefore, based on these results, the Confirmatory factor analysis (CFA) model of the digital technology scale demonstrates good model fit.

Table 6

Results of digital technology scale CFA model convergent validity and composite reliability test

Items	Path	Dimensions	Estimate	P-value	AVE	CR
DT01	<---	TI	0.865	***		
DT02	<---		0.736	***		
DT03	<---		0.789	***		
DT04	<---		0.843	***	0.573	0.914
DT05	<---		0.821	***		
DT06	<---		0.614	***		
DT07	<---		0.648	***		

DT08	<---		0.700	***		
DT09	<---	TR	0.911	***		
DT10	<---		0.855	***		
DT11	<---		0.846	***	0.751	0.923
DT12	<---		0.852	***		
DT13	<---	DA	0.857	***		
DT14	<---		0.781	***		
DT15	<---		0.860	***		
DT16	<---		0.829	***	0.642	0.914
DT17	<---		0.655	***		
DT18	<---		0.808	***		

Table 6 details the results of the Confirmatory Factor Analysis (CFA) for digital technology scale. It shows that the standardized factor loadings for the 18 items related to digital technology scale vary from 0.614 to 0.865 demonstrating their statistical relevance. The comprehensive reliability (CR) scores of the three observable variable techniques integration (TI), trust (TR), and data (DA) of latent variable data technology all exceed 0.7. In addition, the average extracted variance (AVE) of these categories is higher than 0.5. This indicates that each dimension possesses good convergent validity and composite reliability.

Table 7

Discriminant validity test of digital technology scale

Dimensions	AVE	DA	TR	TI
DA	0.642	**0.801**		
TR	0.751	0.704	**0.867**	
TI	0.574	0.693	0.728	**0.757**

As shown in the analysis results in Table 7, in this discriminant validity test, the standardized correlation coefficients between each pair of dimensions are all less than the square root of the corresponding AVE values for those dimensions. This indicates that each dimension possesses good discriminant validity.

4.2.3 Confirmatory factor analysis of the organizational change scale

Table 8

Model Fit Assessment Results

Indicator	Reference Criteria	Results
CMIN/DF	1 to 3 indicate excellence, 3 to 5 indicate good performance	1.773
GFI	>0.9 indicate excellence, >0.8 indicate good performance	0.899
CFI	>0.9 indicate excellence, >0.8 indicate good performance	0.968
IFI	>0.9 indicate excellence, >0.8 indicate good performance	0.968
NFI	>0.9 indicate excellence, >0.8 indicate good performance	0.929
RMSEA	<0.05 indicate excellence, <0.08 indicate good performance	0.037

As shown in Table 8, in the model fitting evaluation results, the CMIN/DF (chi-square to degrees of freedom ratio) is 1.773, which falls within the desirable range of 1 to 3. The RMSEA (root mean square error of approximation) is 0.037, within the desirable range of below 0.05. The GFI is 0.899, within the desirable is greater than 0.8. Additionally, the CFI, IFI, and NFI indices are all greater than 0.9, indicating excellent fit. Therefore, based on these results, the Confirmatory factor analysis (CFA) model of the organizational change scale demonstrates good model fit.

Table 9

Results of organizational change scale CFA model convergent validity and composite reliability test

Items	Path	Dimensions	Estimate	P-value	AVE	CR
OC01	<---	OS	0.870	***	0.743	0.953
OC02	<---		0.830	***		
OC03	<---		0.828	***		
OC04	<---		0.904	***		
OC05	<---		0.915	***		
OC06	<---		0.910	***		
OC07	<---		0.767	***		
OC08	<---	CU	0.827	***	0.577	0.890
OC09	<---		0.821	***		

OC10	<---		0.743	***		
OC11	<---		0.853	***		
OC12	<---		0.613	***		
OC13	<---		0.671	***		
OC14	<---	HC	0.800	***	0.568	0.886
OC15	<---		0.790	***		
OC16	<---		0.751	***		
OC17	<---		0.847	***		
OC18	<---		0.640	***		
OC19	<---		0.671	***		

Table 9 details the results of the Confirmatory Factor Analysis (CFA) for organizational change scale. It shows that the standardized factor loadings for the 19 items related to organizational change scale vary from 0.613 to 0.915 demonstrating their statistical relevance. The comprehensive reliability (CR) scores of the three observable variable Organizational strategy (OS), Culture (CU) and Human capital (HC) of latent variable organizational change all exceed 0.7. In addition, the average extracted variance (AVE) of these categories is higher than 0.5. This indicates that each dimension possesses good convergent validity and composite reliability.

Table 10

Discriminant validity test of organizational change scale

Dimensions	AVE	HC	CU	OS
HC	0.568	**0.753**		
CU	0.577	0.553	**0.760**	
OS	0.743	0.559	0.523	**0.862**

As shown in the analysis results in Table 10, in this discriminant validity test, the standardized correlation coefficients between each pair of dimensions are all less than the square root of the corresponding AVE values for those dimensions. This indicates that each dimension possesses good discriminant validity.

4.2.4 Confirmatory factor analysis of the operational management scale

Table 11

Model Fit Assessment Results

Indicator	Reference Criteria	Results
CMIN/DF	1 to 3 indicate excellence, 3 to 5 indicate good performance	1.666
GFI	>0.9 indicate excellence, >0.8 indicate good performance	0.914
CFI	>0.9 indicate excellence, >0.8 indicate good performance	0.977
IFI	>0.9 indicate excellence, >0.8 indicate good performance	0.977
NFI	>0.9 indicate excellence, >0.8 indicate good performance	0.944
RMSEA	<0.05 indicate excellence, <0.08 indicate good performance	0.028

As shown in Table 11, in the model fitting evaluation results, the CMIN/DF (chi-square to degrees of freedom ratio) is 1.666, which falls within the desirable range of 1 to 3. The RMSEA (root mean square error of approximation) is 0.028, within the desirable range of below 0.05. The GFI is 0.914, within the desirable is greater than 0.9. Additionally, the CFI, IFI, and NFI indices are all greater than 0.9, indicating excellent fit. Therefore, based on these results, the Confirmatory factor analysis (CFA) model of the operational management scale demonstrates good model fit.

Table 12

Results of operational management scale CFA model convergent validity and composite reliability test

Items	Path	Dimensions	Estimate	P-value	AVE	CR
OM01	<---	PC	0.867	***	0.727	0.949
OM02	<---		0.846	***		
OM03	<---		0.819	***		
OM04	<---		0.892	***		
OM05	<---		0.904	***		
OM06	<---		0.870	***		

OM07	<---		0.764	***		
OM08	<---	PD	0.840	***	0.661	0.921
OM09	<---		0.847	***		
OM10	<---		0.831	***		
OM11	<---		0.895	***		
OM12	<---		0.684	***		
OM13	<---		0.765	***		
OM14	<---	BU	0.850	***	0.698	0.932
OM15	<---		0.923	***		
OM16	<---		0.829	***		
OM17	<---		0.852	***		
OM18	<---		0.822	***		
OM19	<---		0.724	***		

Table 12 details the results of the Confirmatory Factor Analysis (CFA) for operational management scale. It shows that the standardized factor loadings for the 19 items related to operational management scale vary from 0.684 to 0.923 demonstrating their statistical relevance. The comprehensive reliability (CR) scores of the three observable variable organizational processes(PC), products(PD) and businesses(BU) of latent variable organizational change all exceed 0.7. In addition, the average extracted variance (AVE) of these categories is higher than 0.5. This indicates that each dimension possesses good convergent validity and composite reliability.

Table 13

Discriminant validity test of operational management scale

Dimensions	AVE	BU	PD	PC
BU	0.698	**0.835**		
PD	0.661	0.671	**0.813**	
PC	0.727	0.649	0.640	**0.853**

As shown in the analysis results in Table 13, in this discriminant validity test, the standardized correlation coefficients between each pair of dimensions are all less than the

square root of the corresponding AVE values for those dimensions. This indicates that each dimension possesses good discriminant validity.

4.3 Structural equation model (SEM)

4.3.1 Results of hypothesis testing for path relationships in the SEM model

Table 14

Results of Hypothesis Testing for Path Relationships in the SEM Model

Hypotheses	Path			Estimate	S.E.	C.R.	P-value	Std Path coefficient	Results
H1	DP	<---	DT	0.267	0.071	3.745	***	0.304	True
H2	OC	<---	DT	0.253	0.033	7.577	***	0.734	True
H3	OM	<---	DT	0.650	0.085	5.212	***	0.551	True
H4	DP	<---	OC	0.272	0.052	5.212	***	0.422	True
H5	DP	<---	OM	0.300	0.047	6.351	***	0.402	True

As shown in the analysis results in table 14, in the hypothesis testing of path relationships in this study, digital technology significantly and positively predicts disposal performance ($\beta = 0.304$, $p < 0.001$), thus supporting Hypothesis H1. Digital technology significantly and positively predicts organizational change ($\beta = 0.734$, $p < 0.001$), supporting Hypothesis H2. Digital technology also significantly and positively predicts operational management ($\beta = 0.551$, $p < 0.001$), supporting Hypothesis H3. Organizational change significantly and positively predicts disposal performance ($\beta = 0.422$, $p < 0.001$), supporting Hypothesis H4. Operational management also significantly and positively predicts disposal performance ($\beta = 0.402$, $p < 0.001$), supporting Hypothesis H5.

4.3.2 The mediating effect

Table 15

The path coefficient of the mediating effect model

Standard effect	Path	Effect coefficient	S.E.	P-value	95% confidence interval		Results
					Lower	Upper	
Total effect	DT--->DP	0.836	0.030	***	0.770	0.890	

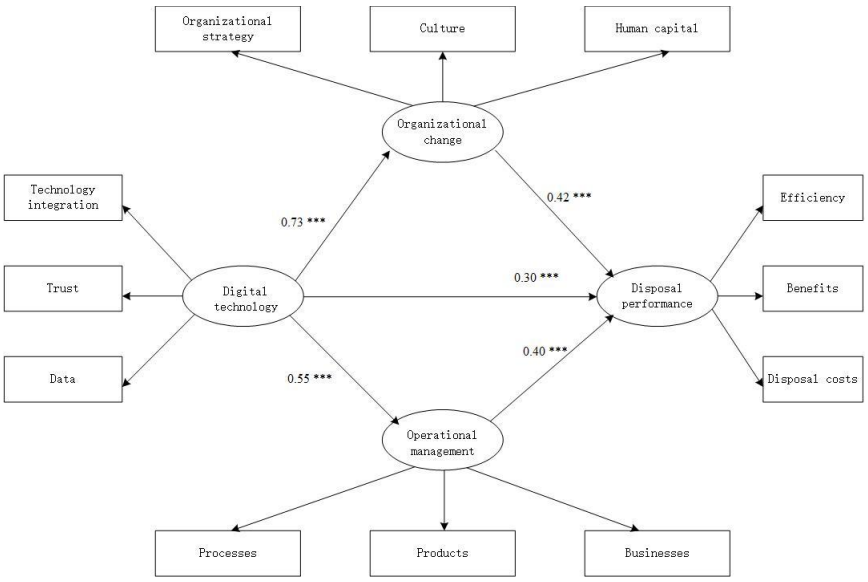
Direct effect	DT--->DP	0.304	0.079	***	0.140	0.455	Mediating effect
Indirect effect	DT---> OC--->DP	0.309	0.055	***	0.203	0.419	
	DT---> OM--->DP	0.222	0.036	***	0.155	0.298	
	DT---> OC&OM---->DP	0.531	0.064	***	0.409	0.659	

As shown in the path analysis results in table 15, organizational change and operational management as mediating variables for the mediating effect of digital technology on disposal performance, presents significant results with a 95% confidence level.

In term of the mediating effect of organizational change and operational management in the influence of digital technology on disposal performance, the total effect's confidence interval ranges from 0.770 to 0.890. The interval for the direct effect lies between 0.140 and 0.455, while the interval for the total indirect effect extends from 0.409 to 0.659. Among them, the indirect effect range of organizational change on the impact of digital technology on disposal performance is from 0.203 to 0.419, and the indirect effect range of operational management on digital technology on disposal performance is from 0.155 to 0.298. The absence of 0 in these intervals strongly indicates that organizational change and operational management play a significant mediating role in the impact of digital technology on disposal performance.

Figure 2

SEM Analysis Model Diagram



5 CONCLUSION

This study adopts a mixed research method combining quantitative analysis and qualitative analysis to investigate the impact of digital technology, organizational change, and operational management on the non-performing asset disposal performance of non-financial institutions through a survey of 60 local AMCs in China. This study analyzed four latent variables, namely disposal performance (DP), digital technology (DT), organizational change (OC), and operational management (OM). The study used structural equation modeling (SEM) for modeling and analysis. Through the study of 260 valid samples, it was found that: 1) digital technology has a significant positive correlation with the disposal of non-performing assets. 2) Digital technology has a significant positive correlation with organizational change. 3) Digital technology has a significant positive correlation with operational management. 4) Organizational changes have a significant positive correlation with the disposal of non-performing assets. 5) Operational management has a significant positive correlation with the disposal of non-performing assets.

The conclusions of these quantitative analyses were also validated in subsequent qualitative analyses, and valuable audio and text materials were collected through interviews with key personnel from 20 non-performing asset management companies. Through the analysis of these data, not only has the reliability of quantitative analysis results been demonstrated, but the richness of research results has also been further supplemented. This study theoretically demonstrates that the promotion effect of digital technology on asset management companies is multifaceted, clarifying the relationship between digital technology, organizational change, operational management, and disposal performance, and enriching the effect of digital technology on the micro level economic impact of enterprises. It helps enterprises recognize the mechanism and positive effects of digital technology on enterprises, and helps governments and policy makers further understand the impact of digitalization, weigh the costs and benefits of digital management, and formulate digital guidance policies for enterprises. In practice, most non-performing asset management companies have recognized the substantial promoting effect of digital technology and are actively deploying digital technology applications to enhance new quality productivity.

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All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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