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Financial Performance Evaluation of Vanke Group under the Background of Digital Transformation — Empirical Analysis based on the Factor Analysis Method

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Abstract: As the digital transformation has become an inevitable trend of global economic development, enterprises are facing unprecedented challenges and opportunities. In the context of digital transformation, this paper aims to analyze the financial performance by factor analysis. Article first summarizes the digital transformation of the global economy, industrial structure and the profound influence of enterprise operations, special emphasis on the data in the modern economy and the core position of artificial intelligence for social progress, then, in Vanke group, for example, introduced the digital transformation, including information stage, digital stage and intelligent stage of the concrete implementation and results. By comparing the financial performance changes of Vanke Group before and after the digital transformation of Vanke Group, it is found that the digital transformation has effectively improved the financial performance of Vanke Group.

Keywords: vanke group; financial performance; factor analysis method

Introduction

Human society has experienced a series of important changes, from the primitive way of life to the rise of agricultural civilization, and then to the tide of the industrial revolution, and is now in a new digital era. In this ever-changing era, innovative technologies and industrial models such as automation, digitalization and networking are emerging at an unprecedented speed, profoundly changing the global scientific and technological innovation ecology, industrial structure and economic trend (Bai, Liu, & Dong, 2022; Zhang, 2022; Xiong, 2022). Data has become the key factor of production in the modern economy, while artificial intelligence has become the main driving force for social progress. Digital transformation has become an inevitable trend of the development of todays world, which cannot be reversed (Liang, 2021; Wang, 2021; Xu, 2022).

Among them, the big data, artificial intelligence, the rapid development of the Internet of things technology for the digital transformation of the real estate industry provides a strong support, these technologies can help the real estate industry to realize rapid data collection, processing and analysis, improve the scientific and accuracy of decision-making, thus effectively promote the development of the real estate industry economy (Sun, 2021; Cha, 2021). At the same time, the real estate industry, as an important channel for employment creation, the foundation of urban construction and development, and an important source of fiscal revenue, is also of great significance to social and economic development. This paper will take Vanke Group as an example to analyze the changes of its enterprise performance before and after its digital transformation.

1. Vanke Group Digital Transformation Case Introduction

1.1. Introduction to Vanke Group

Vanke Group, full name is China Vanke Co., Ltd., headquartered in Shenzhen, Guangdong Province, China, was founded in May 1984. In these decades, it has become a leading enterprise in Chinas real estate industry through continuous innovation and development.

1.2. Digital transformation process of Vanke Group

1.2.1 Informatization stage from 2016 to 2018

At this stage, Vanke built an ERP system based on SAP to realize the integration and sharing of data on multi-business platforms. At the same time, the company also independently developed a number of core business systems and data platforms, as well as

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mobile and social marketing platforms, aiming to provide customers with more comprehensive and personalized service experience.

1.2.2 Digital phase from 2019 to 2021

In the face of the industry crisis and intensified competition, Vanke put forward the slogan of "survive" in 2018, and in 2019, through the strategic adjustment of "strengthening the foundation, following the way and practice", emphasizing basic management and digital empowerment. In particular, vanke through the "fertile soil plan" upgrade and the second stage, around the digital vanke and real estate construction of science and technology platform, using the Internet of things, image recognition, NLP technology, implements the data accommodation between multiple formats, application sharing, and build including development, property, production of the digital ability of each plate.

1.2.3 Intelligent stage from 2022 to the present

During this period, Vanke deeply applied advanced technologies such as big data, artificial intelligence, Internet of Things, VR / AR, to promote the innovation of business model and the improvement of service quality. These efforts not only met the personalized needs of customers, but also promoted the intelligent and sustainable development of the real estate industry.

2. Financial Performance Evaluation of Vanke Group Under the Background of Digital Transformation

By using SPSSAU software factor analysis, can extract the financial performance factor detailed separate analysis, and based on the analysis to construct the score ranking, this method not only helps to accurately identify the specific problems existing in the enterprise financial performance and short board, but also according to the analysis results, put forward targeted improvement strategy, so as to effectively improve the enterprises financial performance.

2.1. Sample selection and construct the financial performance index system

When using factor analysis method to evaluate the financial performance before and after the digital transformation of Vanke group, the first step is to identify and pick out the key factors affecting financial performance, to build a comprehensive and reasonable financial performance index system, through the correlation analysis of the financial indicators, select eight significant correlation indicators, based on these indicators, can build a financial performance evaluation index system, can accurately measure and compare the financial performance changes of Vanke group before and after the digital transformation, as shown in Table 3-1.

Table 3-1 Financial performance evaluation index system of Vanke Group

Rssortment	Variable name	Variable symbol
Profitability	Return on equity	X1
	Rate of return on total assets	X2
Debt paying ability	Current ratio	X3
	Asset-liability ratio	X4
Growth ability	Sustainable growth rate	X5
	Net profit growth rate	X6
Operation capacity	Average accounts receivable turnover ratio	X7
	Turnover of current assets	X8

2.2. Feasibility test

Before the in-depth analysis of the financial performance of Vanke Group before and after the digital transformation, the selected series of financial indicators were KMO (Kaiser-Meyer-Olkin) and Bartlett sphericity test to determine whether these data are suitable for the use of factor analysis method. According to the data in Table 3-2, the KMO value reached 0.619, which exceeds the base line of 0.6, showing good sample data applicability. At the same time, the P value of Bartlett sphericity test was only 0.000 * * * much less than the significance level of 0.05, which indicates a significant correlation between the selected financial indicator variables. Based on these test results, the financial index data of Vanke Group from 2013 to 2023 meet the prerequisites for factor analysis. Therefore, factor analysis can be conducted on these data to further explore the impact of digital transformation on its financial performance.

Table 3-2 Test of KMO and Bartlett

KMO value	0.619	
Bartlett spherical test	Approximate chi square	112.783
	df	28
	P value	0.000***

Note: * * *, * * and * represent the significance levels of 1%, 5% and 10%, respectively

2.3. Extract the common factor, and name it

On the basis of confirming that factor analysis is applicable to financial performance analysis, the extraction of common factor is further examined. According to the data in Table 3-3, the extracted value of all common factors exceeded 0.8. This result shows that the extracted common factors can explain the original information contained in the selected financial indicators very effectively, which further verifies the applicability and accuracy of factor analysis in financial performance analysis

Table 3-3 Ftorial variance

Financial index	Extraction value	Common degree
Return on equity X1	1.000	0.966
Rate of return on total assets X2	1.000	0.967
Current ratio X3	1.000	0.933
Asset-liability ratio X4	1.000	0.956
Sustainable growth rate X5	1.000	0.963
Net profit growth rate X6	1.000	0.904
Average accounts receivable turnover ratio X7	1.000	0.925
Turnover of current assets X8	1.000	0.809

In the process of using factor analysis, specific criteria were followed to ensure that the extracted factor feature root value was greater than 1, and that the cumulative variance contribution of these factors reached at least 80%. As can be seen from Table 3-4, after accurate analysis process, two key factors are successfully extracted, the variance of the two common factors after rotation is 46.947% and 45.845% respectively, the cumulative variance interpretation rate of the two is as high as 92.792%, this data means that the original information is very high, reached 92.792%, fully proved that the two common factors can effectively explain the key information contained in the original financial indicators. Therefore, through these two public factors, the financial performance of Vanke Group can be objectively and accurately evaluated.

Table 3-4 Table of variance interpretation

Ingredient	Characteristic root	Rate of variance interpretation before rotation			Rate of variance interpretation after rotation		
		Characteristic root	The rate of variance interpretation (%)	Accumulative total (%)	Characteristic root	The rate of variance interpretation (%)	Accumulative total (%)
1	5.329	5.329	66.61	66.61	375.573	46.947	46.947
2	2.095	2.095	26.182	92.792	366.761	45.845	92.792
3	0.294	0.294	3.679	96.47			
4	0.134	0.134	1.674	98.144			
5	0.096	0.096	1.201	99.346			
6	0.042	0.042	0.52	99.866			

7	0.009	0.009	0.11	99.977			
8	0.002	0.002	0.023	100			

As shown in Table 3-4, the size of the eigenvalues shows a trend of gradual reduction. It is worth noting that the characteristic values of the two main principal components shown in the table exceed the threshold value of 1. From the perspective of statistics and data analysis, it is appropriate and feasible to select and extract the first two factors in the table above as the principal components for analysis. This selection not only ensures the effectiveness of the analysis, but also makes full use of the key information in the data.

In this paper, the maximum variance rotation method is used to rotate the factor load matrix acquired above, which step optimizes the explanatory ability of the factor. After rotation processing, a clearer factor component matrix is obtained, as shown in Table 3-5. After observing the rotating matrix, it is found that the return on equity, sustainable growth rate and net profit growth rate are large on the public factor F1. These indicators all reflect the profitability and growth potential of the company. Therefore, according to these characteristics, the common factor F1 is named as the profit and growth factor. At the same time, in the common factor F2, the load of current ratio, asset-liability ratio, accounts receivable turnover ratio and current asset turnover ratio is relatively large. These indicators mainly reflect the solvency and operating efficiency of the company, so the common factor F2 is named as the debt repayment and operating factor.

Table 3-5 Table of the composition matrix after the rotation

Financial index	I ngredient	
	1	2
Return on equity X1	0.913	0.363
Return on total assets X2	0.981	-0.076
Flow ratio X3	-0.278	-0.925
Asset-liability ratio X4	0.476	0.854
Sustainable growth rate of X5	0.862	0.468
Net profit growth rate: X6	0.936	0.168
Accounts receivable turnover rate X7	0.187	0.944
Current assets turnover rate X8	0.047	-0.898

2.4. Construct the factor score formula

After determining the common factor F1 (profit and growth factor) and F2 (debt and operating factor) named, the next calculation of the two common factor score, through the score calculation, can quantify the performance of each common factor in the observation sample, based on these scores, also can further calculate a comprehensive consideration F1 and F2 two common factor performance comprehensive score. In this paper, using the regression method in SPSSAU statistical software, the component score coefficient matrix details the score coefficients of each factor, and the specific data are shown in Table 3-6.

Table 3-6 component score coefficient matrix

Financial index	ingredient	
	1	2
Return on equity	0.248	-0.01
rate of return on total assets	0.333	-0.167
current ratio	0.043	-0.271
asset-liability ratio	0.033	0.218
Sustainable growth rate	0.216	0.033

net profit growth rate	0.283	-0.079
average accounts receivable turnover ratio	-0.075	0.29
turnover of current assets	0.145	-0.309

Based on the results of the above processed indicators and the above load matrix, the score results of F1 and F2 can be calculated respectively, as follows:

F1=0.248*X1+0.333*X2+0.043*X3+0.033*X4 +0.216*X5+0.283*X6-0.075*X7+0.145*X8

(3-1)

F2=-0.01*X1-0.167*X2-0.271*X3+0.218*X4+ 0.033*X5-0.079*X6+0.29*X7-0.309*X8

(3-2)

According to the score of the common factor F1 and F2 and the contribution rate of the variance, the comprehensive score function of the financial performance of Vanke Group is obtained. The calculation formula is:

F=(0.469/0.928)*F1+(0.458/0.928)*F2 =0.505*F1+0.494*F2

(3-3)

2.5. Comprehensive score evaluation and analysis

The analysis entering this step uses a formula for the composite score based on the sum of the scores of different principal component factors multiplied by their respective corresponding weights. Specifically, is the first principal component factor (F1) score multiplied by its weight (w1), plus the second principal component factor (F2) score multiplied by its weight (w2), and so on, until the last principal component factor score and the product of the weight is added, in this way got a total score, the total score is used to rank the indicators. In this paper, the specific scores and the corresponding rankings of the two principal components were calculated by using the SPSSAU software, and the detailed results are shown in Table 3-7:

Table 3-7 Score and ranking of Vanke Group factors from 2013 to 2023

aparticular year	F1	ranking	F2	ranking	F (Combined Score)	ranking
2013	0.848	2	-1.037	10	-0.082	7
2014	0.361	6	-0.834	8	-0.229	8
2015	1.140	1	-1.186	11	-0.008	6
2016	0.546	5	-0.502	7	0.029	5
2017	0.640	3	0.672	4	0.656	3
2018	0.597	4	1.319	2	0.953	1
2019	0.264	7	1.459	1	0.854	2
2020	-0.040	8	0.884	3	0.416	4
2021	-1.553	10	0.600	5	-0.490	9
2022	-0.968	9	-0.403	6	-0.689	10
2023	-1.835	11	-0.972	9	-1.409	11

According to the comprehensive score F, after the digital transformation in 2016, all its capabilities have been improved, and the overall financial performance level of the enterprise has increased. In 2018, its comprehensive score reached a peak of 0.9530. However, in 2020, the world was hit by the impact of COVID-19, the global economy fell into recession, the real estate market was seriously affected, and Vankes investment strategy in some cities appeared too aggressive and too optimistic about the market judgment. As a result, the investment expectation of some projects was not realized, and its performance declined significantly after 2020.

Conclusion

Through the empirical analysis of the financial performance of Vanke Group under the background of digital transformation, this paper deeply discusses the impact of digital transformation on the financial performance of enterprises. The research results show that Vanke Group has significantly improved the financial performance of its enterprises through the implementation of the digital transformation and

the gradual evolution from information to digital to intelligent. By comparing the changes in the financial performance before and after the digital transformation, it can be seen that the digital transformation plays a positive role in improving the financial performance of enterprises. Digital transformation has become the only way for enterprises to enhance their competitiveness and achieve sustainable development. For Vanke Group, the digital transformation has not only brought about a significant improvement in its financial performance, but also laid a solid foundation for the companys future development. For other enterprises, the digital transformation case of Vanke Group provides valuable experience and inspiration, which is worth learning from and learning from. With the continuous development and application of digital technology, more enterprises will join the ranks of digital transformation in the future, and jointly promote the prosperity and development of the global economy.

Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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