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Research on the Evaluation of Financial Performance of Sinobioway Biomedicine Based on Factor Analysis

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Abstract: *Under the influence of the epidemic and the general economic environment, China's biopharmaceutical industry is facing opportunities and challenges. In this paper, we take the biopharmaceutical industry as the research object, and construct a financial performance evaluation model by factor analysis of 8 financial indicators that reflect the comprehensive ability of solvency, operating ability, profitability and development ability of 10 selected biopharmaceutical industries through stata software, evaluate their financial performance and make a comprehensive analysis of the financial performance of Sinobioway Biomedicine, and finally propose countermeasures and suggestions.*

Keywords: *Factor analysis; Financial performance; Performance evaluation*

1. Introduction

In recent years under the impact of the epidemic, China's biopharmaceutical industry has been affected. From the perspective of the general environment, as the trend of global warming is becoming more and more obvious, environmental pollution continues, air quality has taken a sharp turn for the worse, the increasingly warm climate has created a breeding ground for viruses, the emergence of various new infectious diseases has put mankind in a difficult situation and a variety of photoelectric pollution, chemical pollution high-tech for human health threat, so a variety of biological products and drugs for human survival is very necessary. From the point of view of market demand, the rapid development of the economy has led to a significant problem of aging population, as well as the increasing degree of knowledge of human beings nowadays, the requirements for the quality of survival are also higher and higher. People are more concerned about their lives and health, so the demand for masks, disposable gloves and vaccines and biological products is very high. From the perspective of infectious disease prevention and control, the economic environment and environmental conditions are not optimistic, and the emergence of various new infectious diseases is extremely high and spreads at a very fast rate, causing inconvenience and panic to human life. Vaccines are still a very important means of disease control and prevention. Therefore, the market is still facing a large and significant demand. However, the biopharmaceutical business is a knowledge-intensive, high-technology standard, demanding industry, whose production and R&D processes must be interlocked with high standards. Although there is a high return but the initial high investment and high risk and has a long cycle, while the research and development of various biopharmaceutical products has a great uncertainty, the success rate of drug development is relatively low. As the product involves the health and safety of the people, a variety of drugs have to go through a long period of clinical trials, for product development late, biopharmaceuticals are subject to strict market norms and legal constraints, a variety of regulatory certification and timely certificate patent applications and other companies in the same industry market competition will allow biopharmaceutical companies are facing high pressure, capital constraints. The biopharmaceutical companies in China are generally facing problems such as overcapacity and relatively low level of product flow, as well as the threat of proliferation of various generic drugs in the same industry. In this context, this paper analyzes the financial performance evaluation of biopharmaceutical companies in the epidemic and specifically analyzes the financial performance and business development of Unmei Pharmaceutical Co. Ltd. is a biopharmaceutical company. Founded in 19880 and registered in Xiamen, the company is a joint venture between Xiamen City and Peking University in the field of biopharmaceuticals. The company's business scope includes the production and wholesale of various clinical drugs, medical devices and protective equipment for medical and nursing staff, and the development and production of vaccines. Unmedicine was the first medical achievement to be industrialized in China. The company's first

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product, rat nerve growth factor injection, was the first clinical growth factor drug approved for official use in the world. Meanwhile, China's first hepatitis A vaccine and the first pandemic influenza vaccine were born here. It is a vaccine company with a combination of R&D and industrialization. Unmy Pharma is the only Chinese vaccine company listed in North America and was listed on the SMB in 2015. Unmei Pharma has subsidiaries such as Beijing Kexing Biological Products Co.

2. Literature Review

In a related study, Ning Yi (2022) summarized the factors affecting financial performance into four indicators, profitability, operating capacity, growth capacity, and solvency. By combining these four aspects of capabilities with the financial performance of enterprises through factor analysis, the performance levels of enterprises were also analyzed from each of the four perspectives to draw their own conclusions and propose countermeasures and suggestions[1]. Qingming Zhou and Lan-Yun Lin (2022) argue that they should strengthen the control of costs, improve the efficiency of capital turnover, and adjust the internal structure to improve financial performance. It conducted a factor analysis of the best companies in the industry, through which it concluded that, despite its role as an example in the industry, there are still many operational and development problems, and the aspects of capital and net profit are not optimistic. Making appropriate adjustments to each problem and proposing relevant countermeasures and measures are the most important issues[2]. Li (2022) argues that using the role of financial leverage to reduce the company's leverage has a significant effect on financial performance. Its performance of firms in the same industry was analyzed in the context of policy reform. The financial performance and development status of firms in this industry under the positive influence of policies in the general environment is explored[3]. Wang Yingjuan (2022) argues that companies exploring new virtuous sales models also have a positive effect on financial performance. And the continuous technological innovation and technology development of the company can make it gain a higher and stronger competitiveness in the same industry[4]. Chen, Lei and Xiong, Wei (2022) believe that the company should not have too many money-burning projects but should enhance the company's blood-making ability and adopt a diversified development strategy to promote the company's development[5]. Yifang Yuan (2022) believes that the financial performance of a company is closely related to its current business situation and future development, and analyzes the financial performance of the company in the same industry through factor analysis to make relevant suggestions and countermeasures for this company[6]. Du Kaixin (2022) analyzed the financial performance of enterprises in the same industry from a financial perspective by conducting factor analysis to analyze the current situation and future development of the enterprise and analyze the financial performance of four capabilities[7]. Xie Wanyun and Guo Xuefei (2022) selected the key years for the development of the enterprise and conducted a factor analysis to analyze the financial performance from different aspects and to discuss the position of the enterprise in the same industry under the changes and requirements of the times, as well as whether the enterprise itself undergoes transformation and how to adapt to the changes of the times, and put forward measures and suggestions related to them[8].

In summary, different scholars have different views on financial performance evaluation, but in general it is clear that factor analysis is an important tool for evaluating the financial performance of an enterprise. A comparative analysis of companies in the same industry gives a clear picture of the relative position and development of the company in the industry. The combination of factor analysis and financial performance analysis makes the evaluation of a company more accurate and convincing.

3. Study Design

3.1. Sample Selection and Source

In this paper, ten companies in the biopharmaceutical industry in 2021 were selected as the research sample. In order to ensure the reliability, authenticity and vertical comparability of the data, all the financial data are searched from NetEase and Juchao websites and manually compiled. The financial data of ten companies in the pharmaceutical industry were obtained. The relevant data processing tools used in the process of compilation and analysis are excel and stata software. According to the financial report data of 2021, the following financial data can be obtained as table 1.

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Table 1: Raw data for 2021 for ten companies in the pharmaceutical industry

Name	Revenue from main business	Total assets turnover ratio	Total Assets	Gearing ratio	Operating income growth rate	Total Asset Margin	Net Profit	Inventory turnover rate
Unnamed Medicine	4.03	0.15	27.56	10.40	45.47	10.11	2.71	1.27
Common Medicine	5.91	0.59	12.11	31.61	26.23	2.30	6.47	1.17
Jingfeng Pharmaceutical	8.11	0.36	17.92	81.71	-7.6	-11.25	-1.63	1.59
Sunflower Pharmaceuticals	44.61	0.83	56.35	30.17	28.86	13.53	7.05	2.86
Kanghong Pharmaceutical	36.05	0.52	69.56	12.24	9.4	6.05	4.21	1.33
Fosun Pharma	390.05	0.44	932.94	48.15	28.70	5.35	47.35	3.80
Hengrui Pharmaceutical	259.05	0.70	392.66	9.14	-6.59	11.42	45.30	1.79
Ealing Pharmaceutical	101.17	0.83	129.05	29.7	15.19	10.40	13.44	2.26
China Medicine	362.34	1.13	311.11	59.79	-7.83	2.30	6.47	4.96
East China Medicine	345.63	1.35	269.96	37.25	2.61	8.66	23.02	5.96

Note: The units of each indicator are as follows: revenue from main business (billion yuan), total asset turnover (%), total assets (billion yuan), gearing ratio (%), operating income growth rate (%), total asset margin (%), net profit (billion yuan), and inventory turnover (%).

3.2. Selection of Indicators

The reasonableness of the selection of indicators is very important for the evaluation of financial performance. The selection of indicators should be representative, realistic and comprehensive, and through the factor analysis method of dimensionality reduction, a reasonable financial performance system should be structured so that it can reflect the overall financial performance of the enterprise comprehensively. For the biopharmaceutical industry, the selection of indicators should reflect the characteristics of the biopharmaceutical industry, and be scientific and logical.

By combining the characteristics of the industry and the rationality of the indicators, eight financial indicators, including revenue from main business, inventory turnover, total asset turnover, total assets, gearing ratio, operating income growth rate, total asset margin and net profit, were selected to evaluate the four aspects of solvency, operating capacity, profitability and development capacity of companies in the biopharmaceutical industry. In order to comprehensively evaluate the financial performance, the nature of each financial indicator is judged. Except for the balance sheet ratio, which is a moderate indicator, the rest are positive indicators, as shown in the table2.

Table 2: Nature of each financial indicator

Financial Indicators	Nature of Indicator
Revenue from main business	Positive
Total assets turnover ratio	Positive
Total Assets	Positive
Gearing ratio	Moderate
Operating income growth rate	Positive
Total Asset Margin	Positive
Net Profit	Positive
Inventory turnover rate	Positive

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4. Factor Analysis

4.1. KMO Test and Bartlett's Sphericity Test

First, in order to test the rationality and suitability of the constructed financial performance evaluation index data, KMO test and Bartlett's test are required, and the original data are tested by stata software to obtain the test results as shown in table 3.

Table 3: KMO sampling suitability quantity

KMO sampling suitability quantity		0.531
Bartlett's sphericity test	Approximate cardinality	59.306
	Degree of freedom	28
	Significance	0

In general, if the KMO value is greater than 0.5 and the p-value of Bartlett's sphericity test is less than 0.05, then this set of data is significant and suitable for factor analysis method. According to the results of the test in the figure, the KMO test value is 0.531, which is greater than the cut-off value of 0.5, indicating that there is no significant difference in the degree of correlation between the variables. The significance of Bartlett's sphericity test is 0, which is less than 0.05, indicating that there is a correlation between the variables. Therefore, the above data are suitable for the factor analysis method.

4.2. Principal Component Analysis

The number of principal factors was extracted by applying principal component analysis with the help of stata software. The correlation coefficient matrix of the variables was established on the basis of the original data, and then the eigenvalues and contribution rates of R were calculated by principal component analysis through the factor model as shown in table 4.

Table 4: R eigenvalues and cumulative contribution rates

Initial Factor	Eigenvalue	Each initial factor		Extraction of the main factor	
		Contribution rate/%	Cumulative contribution rate/%	Contribution rate/%	Cumulative contribution rate/%
1	3.490	43.620	43.620	43.620	43.620
2	2.265	28.310	71.930	28.310	71.930
3	1.349	16.860	88.790	16.860	88.790
4	0.679	8.490	97.280		
5	0.116	1.450	98.73		
6	0.054	0.680	99.410		
7	0.033	0.420	99.830		
8	0.014	0.170	100.000		

For the eigenvalues, we generally select several factors with eigenvalues greater than 1 to represent the whole raw data. From the table, we can see that the variable matrix correlation coefficient has three large characteristic roots, which are 3.429, 2.155, and 1.269, all of which are greater than the critical value of 1, and their cumulative contribution rate reaches 88.79%, indicating that the eight indicators of the raw data provided by the first three factors can represent most of the information and can better explain the variance and analyze and evaluate the performance of the enterprise, so the first three extracted factors as the main factors, and named F1, F2, and F3 in order.

These three factors correspond to the rotated factor loading coefficient matrix as shown in the following table 5.

Table 5: Factor load factors after rotation

Variable Indicators	Factor F1	Factor F2	Factor F3
Revenue from main business	0.791	0.582	-0.067
Total assets turnover ratio	0.027	0.981	0.077
Total Assets	0.986	0.062	-0.045
Gearing ratio	0.062	0.187	-0.917
Operating income growth rate	-0.025	-0.543	0.548
Total Asset Margin	0.143	0.184	0.957
Net Profit	0.912	0.061	0.226
Inventory turnover rate	0.399	0.830	-0.093

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From the table 5, it can be seen that the closer the correlation coefficient is to 1, then the greater the correlation between the financial indicators and the corresponding principal factors. According to the rotated factor loading matrix, factor F1 has a larger loading on the main business income, total assets and net profit, which are indicators that show the results of the operation or possession of the enterprise, and therefore the main factor F1 is defined as the results factor. Factor F2 has larger loadings on total asset turnover, inventory turnover, which are indicators that reflect the capital turnover ability of the firm, and therefore defines the main factor F2 as the turnover factor. While factor F3 has a larger loading on total asset margin, which reflects a firm's ability to use capital for profitable activities. Therefore, the main factor F3 is defined as the compensation factor.

Using the original financial index data of each company, with the help of stata software, we can calculate the scores of each main factor F1, F2, F3, and F4 of each company, as shown in the following table, according to the scores of each main factor for each financial index in the matrix of score coefficients in the table, and use the contribution of main factors as weights to calculate the linear weighted sum of each main factor to construct a function and calculate the total score of each company The total score of each company is calculated. The total score is calculated as Z=(32.68*Z1+29.50*Z2+26.61*Z3)/88.79. The total score is shown in the following table 6.

Table 6: Scores for each factor and total scores for each company

Listed Companies	Z1 (results)		Z2 (turnover)		Z3 (Compensation)		Z (integrated)	
	Score	Ranking	Score	Ranking	Score	Ranking	Total score	Overall Ranking
Unnamed Medicine	-0.516	6	-1.274	10	0.960	1	-0.326	8
Common Medicine	-0.677	8	-0.622	7	-0.016	7	-0.460	9
Jingfeng Pharmaceutical	-0.680	10	-0.685	8	-2.367	10	-1.187	10
Sunflower Pharmaceuticals	-0.678	9	0.278	3	0.867	2	0.103	5
Kanghong Pharmaceutical	-0.665	7	-0.391	6	0.347	5	-0.272	7
Fosun Pharma	2.419	1	-0.795	9	-0.305	9	0.535	2
Hengrui Pharmaceutical	0.936	2	-0.044	5	0.657	3	0.527	3
Ealing Pharmaceutical	-0.377	5	0.211	4	0.496	4	0.080	6
China Medicine	0.047	4	1.455	2	-0.881	8	0.237	4
East China Medicine	0.192	3	1.869	1	0.241	6	0.764	1

As can be seen from the table 6, the financial performance of companies in the biopharmaceutical industry is influenced by many aspects, and in general can be influenced by four factors. In summary, these are the results factor, the turnover factor and the compensation factor. Different factors can have different effects on the financial performance of a company. In terms of total score, the highest ranking is Ealing Pharmaceuticals, followed by Huadong Pharmaceuticals, and the lowest ranking is Common Pharma, which is followed by Unnamed Pharmaceuticals. This indicates that the total operating performance of Ealing Pharmaceuticals as well as Huadong Pharmaceuticals is relatively high, while the total performance of Common Pharma and Unmei Pharmaceuticals is relatively low.

From the analysis of the scores of each factor, for the outcome factor, the top ranking is Hengrui Pharma, the bottom ranking is Sunflower Pharmaceuticals, followed by the low scores and rankings of Unnamed Pharmaceuticals, Commonwealth Pharmaceuticals and Kanghong Pharmaceuticals. It can be concluded that Hengrui Pharma has a relatively high asset share, while on the contrary, companies with low scores such as Unnamed Pharmaceuticals and Commonwealth Pharmaceuticals have a poor performance. For the turnover factor, the highest scores are for East China Medicine and China Pharmaceuticals, representing their strong capital turnover ability lowest, while the lowest score is for Fosun Pharmaceuticals proving its lack of financial capital turnover ability. As for the compensation factor, the highest ranking is for Unimed Pharmaceuticals, indicating its more outstanding ability to obtain profits, while the lowest is for China Pharmaceuticals, indicating its poor performance in terms

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of profits.

It can be seen that the position of Wemin Pharma is ranked at the bottom in the same industry, and if we look at the financial situation of Wemin Pharma itself, a series of problems such as shrinking scale of main business, declining profitability, excessive proportion of investment income and improper handling of financial relationship between parent and subsidiary are all present within Wemin Pharma, making its financial situation in trouble, poor financial performance evaluation and position in the industry decline.

5. Measures and Suggestions

5.1. Enhance the Capacity of Research and Development Innovation

For biopharmaceutical companies, their core production R & D innovation capability is the lifeblood and foundation of the company. Only by improving R & D innovation capability can they improve their core competitiveness and occupy an advantageous position in the market. Therefore, it is crucial to improve the level of R&D innovation. As the market demand for pharmaceuticals and vaccines has become larger due to the epidemic in recent years, the company should seize this opportunity to develop and build a competitive R&D organization, support technology development and innovation, encourage and support the registration of pharmaceutical products, seek government support, conduct R&D innovation based on current advanced biotechnology, and increase its R&D efforts for biopharmaceuticals and vaccines. Vaccine research and development. In response to the current trend, a large amount of R&D expenses should be invested in R&D. We should pay attention to the consumer market and grasp the direction of drug development in a timely manner. Actively seek legal support for partners, increase the integration of R&D technology resources, seek the advantages of the company and play the strengths of the company in a targeted manner. Enhance the strength of the enterprise itself and improve its competitiveness.

5.2. Expanding Financing Channels and Balancing the Cost of Each Main Business

As a multidisciplinary industry, the biopharmaceutical industry requires high knowledge, high technology and high investment, therefore, the development of the industry requires a large amount of capital from the beginning to the end. The government should increase support for the development of the biomedical industry, which should be given a variety of cooperation methods and various policy subsidies and preferences. Encourage banks to lend money to the biopharmaceutical industry and support enterprises to raise capital in the capital market. For companies with good market prospect, more attention should be paid to them and their product registration and approval should be promoted. Companies should be prepared to stop production of loss-making drugs in a timely manner. For the main products should pay attention to the high income should increase production, balance costs, and do a good job of enterprise cost allocation. And modern industrial development is the trend of the whole biopharmaceutical industry. Companies should expand the market through restructuring or mergers and acquisitions as a way to improve product competitiveness, expand market share and increase market recognition. However, the company should focus on the subsidiaries to avoid the parent company in trouble due to the improper handling of the merger and acquisition issues of the parent and subsidiary companies. This is more conducive to the development of the company.

5.3. Achieve Integrated Development of Biomedical Research and Development and Production

The separation of production and R&D in the current era is very detrimental to the development of the company, and it is difficult for the company to put the developed medicine into practice. Having only two ends of R&D or production will limit the development of the company. Therefore, the integration of R&D and production has a very important role for the development of enterprises. Pharmaceutical R&D requires a large number of talents, and companies should pay attention to the appointment of highly skilled personnel. Excellent talent team is very important for the development of enterprises. For the threat of foreign companies in the market for China's biopharmaceutical enterprises and the competition of various generic drugs, the protection of intellectual property rights is essential, should improve the intellectual property links. For the research and development to production should be a series of standardized processes, the research and development of biopharmaceuticals in the first place, should focus on the protection of biopharmaceutical property rights, strict regulation of the research and development environment, to ensure the standardization of biopharmaceutical products.

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Ensure the standardized development of enterprises.

6. Conclusions

The pandemic has had an impact on the country's economic and social development. The biomedical industry is an important industry in China, and it will inevitably be affected during this period. By collecting relevant data, this paper selects eight financial indicators of solvency, operational ability, profitability, and comprehensive ability of development ability for factor analysis. Through the financial performance evaluation model, the development of the industry is carried out, and the study finds that the model has a significant effect, and puts forward relevant policy recommendations based on the model effect.

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