Financial Analysis of Enterprises in Pharmaceutical Industry Based on the Harvard Analytical Framework —— Take TongRenTang, Guangzhou Baiyunshan, Yunnan Baiyao as Example

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Abstract. Under the pressure of aging population and impact of COVID-19, the importance of pharmaceutical industry cannot be neglected. This passage will utilize Harvard Analytical Framework to study the financial situation and development opportunities of three old public brands with analyzing information from their annual reports and East Money. Firstly, this passage will use PEST model to analyze the industrial advantages and disadvantages from four aspects, Politics, Economy, Society and Technology. Then this passage will focalize on specific analysis of companies, with accounting analysis and financial analysis. Compared with others, the pharmaceutical industry in China has little external interference. Generally, enterprises listed are promising and competitive. Despite a few adverse events, they all have good solvency and profitability. It will be the foundation of R&D. It is worth noting that with the support of government policies, the R&D of innovative drugs will be a crucial point in this thriving industry. This passage can be a reference for investors and managers of enterprises.

Keywords: Harvard Analytical Framework, Pharmaceutical enterprises, Financial analysis.

1. Introduction

Pharmaceutical industry is an essential industry in China with its economic value and social value. After the issue of the "14th Five-Year Plan", the whole pharmaceutical industry generate an annual growth rate of total primary business revenue with 9.3%. It is not only conductive to the development of medical area, but also has other benefits like promoting rural revitalization. As for the social value, it can also contribute to the prevention of illness and protection of people's health. Coupled with problem of aging of population, pharmaceutical industry could be prospective.

Under the rapid development of whole industry, how are those well-known brands doing recently? How will they go in the future? Based on these questions, this passage selects three old enterprises to do the research. They are TongRenTang (TRT), Guangzhou Baiyunshan (GYBYS), and Yunnan Baiyao (YNBY), respectively established in 1669, 1997 and 1902. They claimed the top3 in the brand ranking list from China Reports Hall.

As so far, there are many extant research about pharmaceutical industry in China. Wu and Guo utilized linear regression models and stock price analysis to study the development opportunities of traditional Chinese medicine enterprises [1]. Shi and Zhang used Financial Analysis to evaluate Fosun Pharmaceutical's financial performance and potential risk [2]. Zhang and Zhong analyzed TongRenTang's prospect with Harvard Analytical Framework [3]. Researches above either chose whole industry or single enterprise as the object, and mainly focused on the changes of data, but lack of the deep analyze of relative events.

Based on Harvard Analytical Framework, this passage selects tree enterprises and probe into important events of them in recent years to give a comparatively deep insight of their financial performance.

The remainder of this paper is organized as follows. In Segment 2, this passage introduced the theoretical basis of the Harvard Analytical Framework. In Segment 3, this paper described the data,

their sources and analyzed potential reasons behind them. Finally, this passage concludes by describing study results.

2. Introduction of Harvard Analytical Framework

Harvard Analytical Framework was developed by three scholars from Harvard, K.G. Palepu, P.M. Healy and V.L. Bernard. It mainly includes four parts with strategy analysis, accounting analysis, financial analysis and prospect analysis. This framework combines qualitative way with quantitative way, thus pointing the direction of study and assessment in a scientific method.

2.1. Strategy analysis

Strategy analysis is the starting point of analysis. It is aimed at identifying profit drivers and operational risk, assessing firm's profitability in a qualitative way. PEST model and SWOT model are often used to study the macro and micro environment.

2.2. Accounting analysis

Accounting analysis is the foundation of financial analysis. It belongs to quantitative analysis. According to data in financial statement and other information, people can judge the accounting information quality, including objectivity, integrity and accuracy.

2.3. Financial analysis

Based on strategy analysis and accounting analysis, financial analysis means selecting other companies with similar feature in the same industry to conduct horizontal and vertical analysis in a period with a series of scientific indicators. It helps analysts to evaluate company's solvency, profitability, operational performance and growth ability scientifically.

2.4. Prospect analysis

Prospect analysis is the results of above analysis, summarizing internal problems of enterprise, and predict its development direction and potential in the future. It benefits internal managers to adjust the strategic plan and acid external investors to make decisions.

3. Specific Analysis of Enterprises

3.1. Strategy Analysis

This passage will use PEST Analyzing Model to find the internal advantages and disadvantages of pharmaceutical enterprises and their external opportunities and threats, as illustrated in the Table1.

Table 1. Analysis statement based on the PEST model

Factors	Results
Politics	1. "the 14th Five-Year Plan" promotes the development of industry 2. "Regulations for Implementation of the Drug Administration" brings price pressure
Economy	1. GDP recovers slowly
Society	1. The aging population and increasing population base generate demands 2. COVID-19 pandemic has led more attention to health 3. Increasing spending power
Technology	1. Pressure of promising innovative drug 2. To combine TCM with modern life 3. Develop technology to cultivate rare medicinal materials resources

3.1.1 Political environment analysis

In January 30, 2022, National Medical Products Administration, National Medical Insurance Administration and other seven departments jointly issued the "14th Five-Year Plan". In May 9, 2022, Drug Administration revised the "Regulations for Implementing of the Drug Administration". The former mentioned that in 2035, China's medical industrial strength will get integral elevation. More competitive and innovative production will be developed. It will provide finance support for relative enterprises, sharpening the competitive edge of pharmaceuticals industry. However, according to the latter regulation, intensified costs control and the adjustment of generic drugs and high-value consumable materials will add the pressure to domestic market [4]. The increasing costs of raw material, energy and labor will also challenge to enterprises.

3.1.2 Economic environment analysis

In 2023, China's GDP recovered slowly and steadily. With the general economic situation recovered, the consumptive demand will go up. The economy of pharmaceutical industry will also gradually get better. In addition, the improved consumption level will also boost the development of total industry.

3.1.3 Social analysis

Based on the aging population and increasing population base, people's demands for pharmaceuticals industry will growth steadily. Besides, after COVID-19, the needs of diagnose and treat service recovered, while people's health awareness have been strengthened. It is also conductive to medical industry.

3.1.4 Technological analysis

To develop innovative drugs, companies should bring in talents and funds in R&D. Companies also need to improve their Traditional Chinese Medicine (TCM) products in modern way, to satisfy demands in contemporary life. Moreover, the lack of rare medical materials resources needs to be solved.

3.2. Accounting Analysis

3.2.1 Analysis of Total Revenue and Net Profit

Table 2. Analytical Statement of Revenue and Profit

		2022	2021	2020	2019	2018
Total Revenue (billion)	TRT	15.37	14.6	12.83	13.28	14.21
	GYBYS	70.79	69.01	61.67	64.95	42.23
	YNBY	36.49	36.37	32.74	29.66	27.02
Cost of Goods Sold (billion)	TRT	7.87	7.648	6.792	7.068	7.567
	GYBYS	57.51	55.78	51.23	52.73	32.16
	YNBY	26.88	26.5	23.66	21.19	18.57
Net Profit (billion)	TRT	2.199	1.891	1.616	1.562	1.823
	GYBYS	4.253	3.969	3.092	3.441	3.534
	YNBY	2.84	2.798	5.511	4.173	3.48
Net Profit Growth	TRT	16.32%	16.98%	3.51%	-14.32%	4.64%
	GYBYS	7.17%	28.38%	-10.16%	-2.62%	66.78%
	YNBY	1.53%	-49.24%	32.06%	19.90%	11.11%

Table 3. Quarterly Net Profit Growth of three enterprises

		30/09/2023	30/06/2023	31/03/2023	31/12/2022	30/09/2022	30/06/2022	31/03/2022
Net Profit Growth	TRT	48.91%	43.11%	46.22%	16.32%	3.97%	9.96%	16.43%
	GYBYS	6.62%	6.29%	4.10%	7.17%	5.00%	3.75%	11.00%
	YNBY	92.62%	106.84%	67.75%	1.53%	-12.72%	-24.05%	18.60%

Table 2 shows that the net annual profit growth of GYBYS and YNBY had significant fluctuation from 2018 to 2022. For YNBY, it is mainly due to its investing activity with over 7.21 billion in 2019, 13.834 billion in 2020 and investment of the same magnitude in 2021 [5]. It resulted in considerable

losses in 2021. As a response, YNBY reduced its holding-shares after that. As for GYBYS, from the further data in Table 3, GYBYS's quarterly net profit growth rate was constantly in a slump level that under 10% for recent six quarters. From the National healthcare Security Administration, it is known that GYBYS did falsely high drug pricing from 2017 to 2021 to profit from arbitrage. The impact on its total revenue and net profit in Table 2 is small, but its brand image of GYBYS will be significantly damaged [6]. In 2023, GYBYS only has a national collective procurement selection rate of 25%.

Good profitability is a crucial support to a company's R&D expenditures and other expenses [7]. So on the one hand, an enterprise should manage its controlling shareholders well and make scientific decisions. On the other hand, the event of GYBYS also sounding the alarm that decisions of a company should be consistent with ethics.

3.2.2 Analysis of Research and Development Expenses

In 2022, government claimed a plan regarding innovative development in pharmaceutical industry. So this passage will focus on R&D expenses to evaluate the reasonableness of this expenditure of selected companies. Assigned with accounting policy, they divided relative expenses into two parts: Research phase expenditure and development phase expenditure. Only capitalized expenses at latter stage will be recognized as the R&D expenses, while other spending will be classified into current profit and loss. So the figures in their annual report can reflect their actual situation.

From the Table 4, the portion of R&D expenses in total revenue of these companies shows an increasing trend. Specifically, developers of TRT, GYBYS, YNBY have share with 2.78%, 2% and 14.7% in 2022, which are all lower than 15%, but generally increased. It shows their attention on R&D and company's innovative development and their R&D are efficient. Additionally, the most invested project of TRT, GYBYS, respectively are cow-bezoar bolus for resurrection is the most of total revenue and respectively has market share of 57.5% and 64%. It proves that their relative products have considerable market acceptance. This shows that they did well in understanding demand of market.

Table 4. Analytical Statement of R&D

		2022	2021	2020	2019	2018
Research and Development Expenses (billion)	TRT	0.217	0.176	0.138	0.112	0.093
	GYBYS	0.820	0.875	0.612	0.577	0.586
	YNBY	0.337	0.331	0.181	0.174	0.112
R&D to Total Revenue	TRT	1.4%	1.2%	1.1%	0.8%	0.7%
	GYBYS	1.2%	1.3%	1.0%	0.9%	1.4%
	YNBY	0.9%	0.9%	0.6%	0.6%	0.4%
		2022			2021	
Developers	TRT	502			501	
	GYBYS	491			520	
	YNBY	1290			1106	
Proportion of Developers	TRT	2.8%			2.7%	
	GYBYS	2.0%			2.0%	
	YNBY	14.7%			13.1%	

3.3. Financial Analysis

3.3.1 Solvency Analysis

The current ratio and cash ratio reflects firm's ability to cover short-term obligations when they are matured. Low ratio may indicate poor solvency. Whereas, excessive may also mean inefficient utilization of funds. Generally, current ratio with 2.0 and cash ratio exceed 0.5 is reasonable [8].

Total debt to total assets ratio reflects firm's ability to pay long-term obligations, which implies the portion of the total assets financed by debtors and creditors. Higher ratio means worse situation due to higher cost of interests. Commonly, a ratio under 0.5 is good.

The Table 5 and Figure 1 shows that YNBY has a downtrend of current ratio. In a certain extent, it is because the balance of financial products was cleared from 1.7 billion in 2020 and there is a cost of external equity subscription in 2022. Despite the decrease, the average current ratio exceeded 2.0. It means that even when half of current assets cannot be liquidated in short-term, all current liabilities can be repaid.

Table 5. Solvency ability analysis statement of enterprises

		2022		2021		2020		2019		2018
Current Ratio	TRT	3.24	13%	2.88	-2%	2.95	-10%	3.29	-1%	3.31
	GYBYS	1.52	-7%	1.64	1%	1.62	3%	1.57	-2%	1.60
	YNBY	2.63	-27%	3.58	2%	3.51	-25%	4.65	23%	3.79
Cash Ratio	TRT	1.83	16%	1.58	6%	1.49	-3%	1.54	9%	1.41
	GYBYS	0.60	-13%	0.69	4%	0.67	6%	0.63	5%	0.60
	YNBY	0.96	-35%	1.48	51%	0.98	-27%	1.35	160%	0.52
Total Debt to Total Assets	TRT	0.32	-5%	0.34	16%	0.29	-4%	0.30	3%	0.29
	GZBYS	0.55	4%	0.53	0%	0.53	-3%	0.54	-1%	0.55
	YNBY	0.28	4%	0.27	-13%	0.31	31%	0.23	-10%	0.26

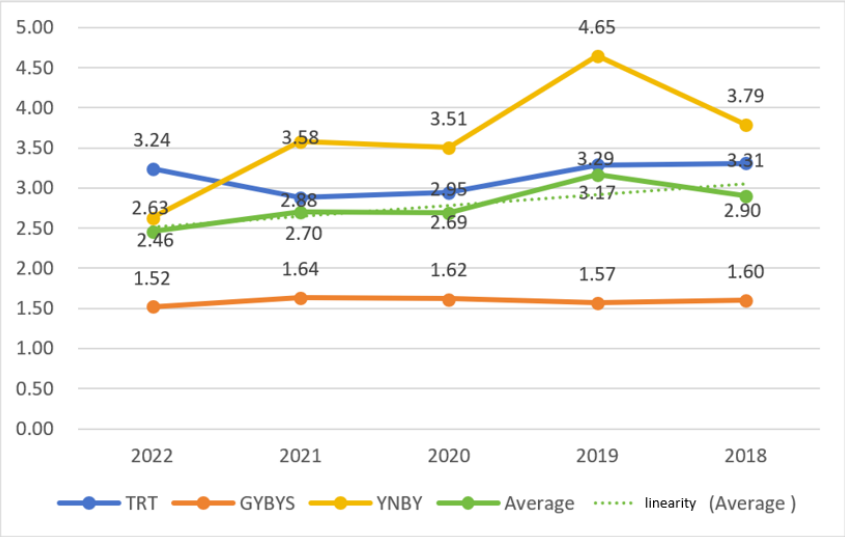

Figure 1. The line chart of current ratio from 2018 to 2022 (Picture credit: Original)

In the Figure 2, the average of cash ratio shows an increasing trend from 2018 to 2022, and has exceeded 1.0 after 2019. It shows that they are flush with cash and have low financial risk.

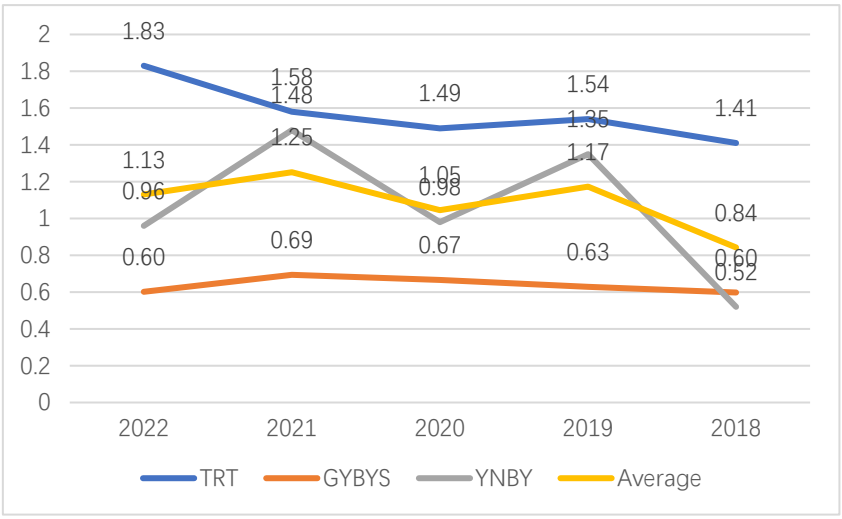

Figure 2. The Line Chart of Cash Ratio from 2018 to 2022 (Picture credit: Original)

In the Table 5 and Figure 3, the average of their total debt to total assets ratio has been below 0.4 in the past five years. This illustrates that these companies have less loan demand.

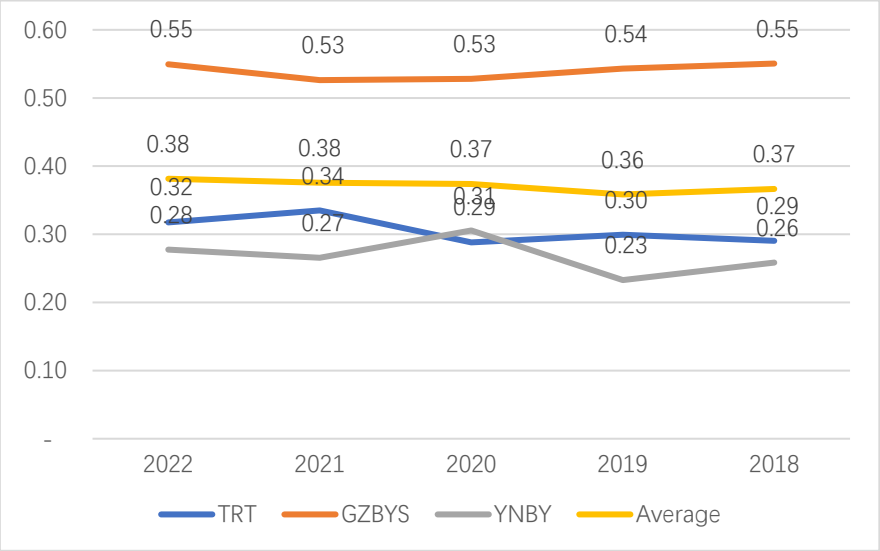

Figure 3. The Line Chart of Total Debt to Total Assets from 2018 to 2022 (Picture credit: Original)

To a certain extent, it can be inferred that debt can be a s small proportion of assets in pharmaceutical industry. Well-operated companies in this industry can provide a healthy and robust cash flow.

3.3.2 Profitability Analysis

Return on assets (ROA) and gross margin reflect firm's profitability. ROA can be used to examine firm's strategy to generate profits.

According to the data from 2011-2015, the average ROA of listed companies in the traditional Chinese medicine industry was around 8%~10%. Gross margin was about 45%-55%. And net profit margin was around 10%-20% [1].

In the Table 6 and Figure 4, the ROA ratios of selected companies in this passage were generally higher than average in that period, but went down in recent years. For YNBY, it is mainly due to the increase of Cost of Goods Sold, which lead to the decrease of net profit. That is because of an increasing cost of raw material and purchasing (it has large proportion of cost). For GYBYS and TRT, their net profit increased, but the increase in total assets offset this effect. It shows that companies in pharmaceutical industry should take care of assets management.

Table 6. Profitability Ability Analysis Statement of Enterprises

		2022	2021	2020	2019	2018	2017	2016	2015	2014
ROA	TRT	8.4%	8.1%	7.6%	7.5%	9.3%	9.7%	9.9%	10.7%	10.1%
	GYBYS	6.0%	6.3%	5.3%	6.4%	8.9%	7.8%	7.5%	8.9%	9.1%
	YNBY	5.4%	5.2%	10.5%	8.1%	8.5%	12.0%	13.4%	15.5%	17.1%
Gross Margin	TRT	48.8%	47.6%	47.0%	46.8%	46.8%	46.2%	46.0%	45.9%	43.2%
	GYBYS	18.8%	19.2%	16.9%	18.8%	23.8%	37.7%	33.1%	36.2%	35.3%
	YNBY	26.3%	27.2%	27.8%	28.6%	31.3%	31.2%	29.9%	30.5%	30.2%
Net Profit Margin	TRT	14.3%	13.0%	12.6%	11.8%	12.8%	13.0%	12.9%	13.5%	13.0%
	GYBYS	6.0%	5.8%	5.0%	5.3%	8.4%	10.1%	7.8%	7.0%	6.4%
	YNBY	7.8%	7.7%	16.8%	14.1%	12.9%	12.9%	13.1%	13.3%	13.3%

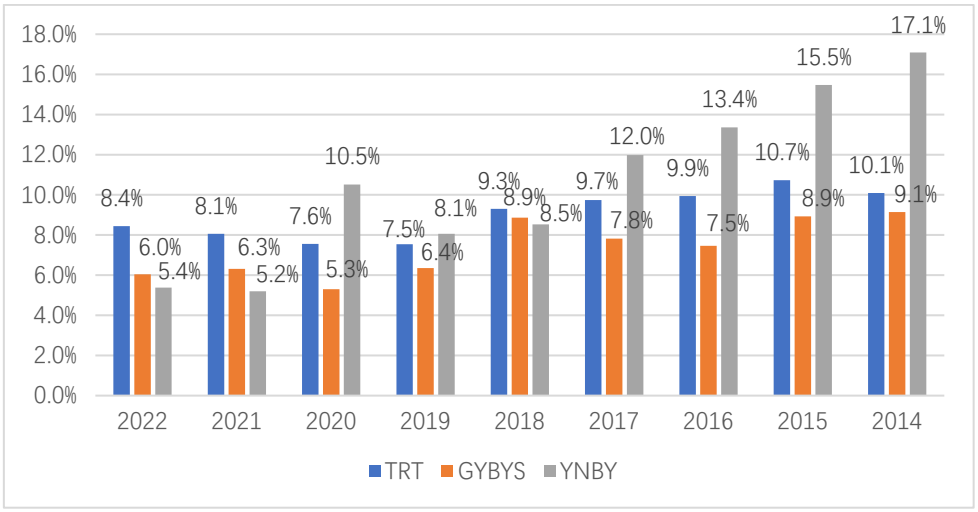

Figure 4. The Clustered Column of ROA (Picture credit: Original)

In the Figure 5, the gross margin of these company is relatively stable. Besides the increasing trend of TRT, GYBYS and YNBY have a slow downward trend.

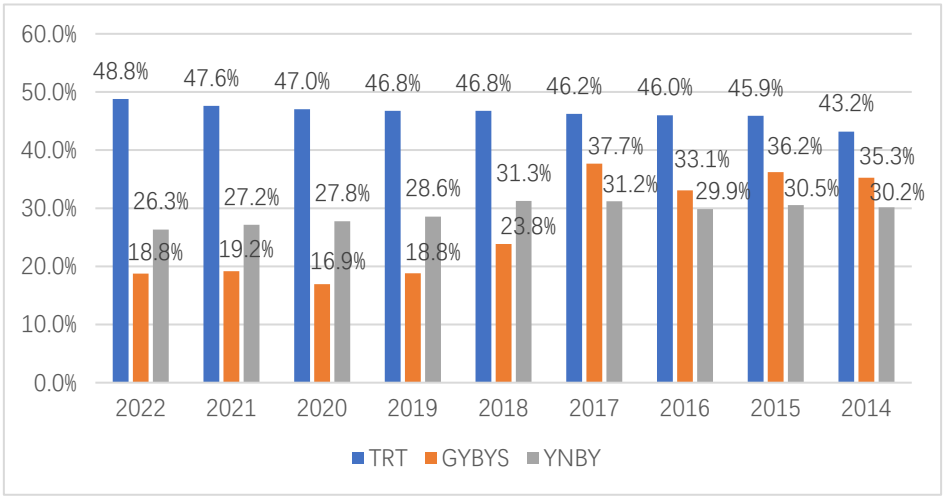

Figure 5. The Clustered Column of Gross Margin (Picture credit: Original)

In Figure 6, the net profit margin of YNBY shows a decreasing trend, which is lower than the average from 2011-2015. That generates a significant difference in gross margin and net profit margin between TRT and others. It is consistent with the growth of costs discussed above. High selling expenses have been a common phenomenon in the industry recently [9]. It alerts other companies to keep an attention on costs control.

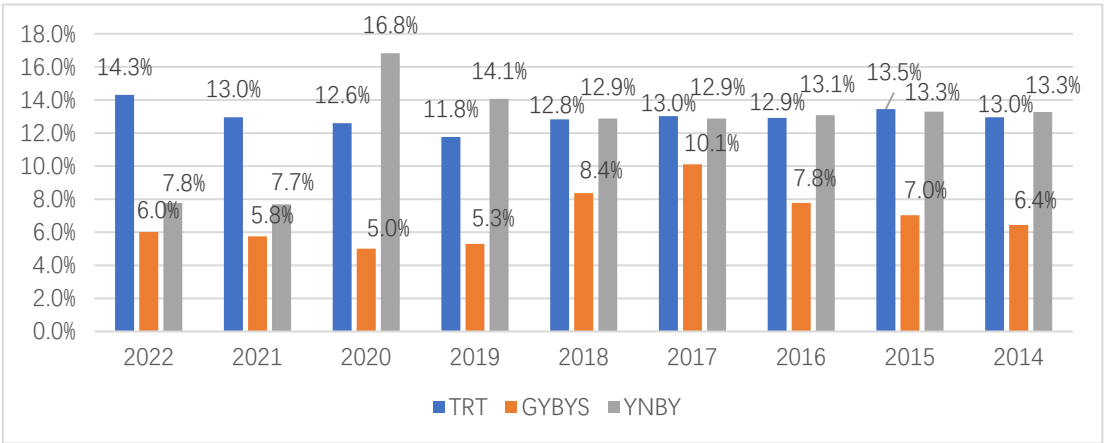

Figure 6. The Clustered Column of Net Profit Margin (Picture credit: Original)

3.3.3 Operational analysis

Total assets turnover is used to measure company's efficiency to generate revenues with its total assets.

Inventory turnover reflects how efficiently the inventory is managed. Having too low inventory turnover may cause waste of holding obsolete inventory, and having too high one may lead to stock-out.

Accounts receivable reflects the speed of firm to collect its accounts receivable, and it also shows company's position in customers' mind.

In the Table 7 and Figure7, it is clear that generally total assets turnover of selected companies went down in the past nine years. It shows that their efficiency of using assets has remained to be improved [10].

Table 7. Operational Analysis Statement of Enterprises

		2022	2021	2020	2019	2018	2017	2016	2015	2014
Total Assets Turnover	TRT	0.59	0.62	0.60	0.64	0.73	0.75	0.77	0.80	0.78
	GYBYS	1.01	1.10	1.06	1.20	1.06	0.77	0.96	1.27	1.42
	YNBY	0.69	0.68	0.62	0.57	0.66	0.93	1.02	1.16	1.29
Inventory Turnover	TRT	1.22	1.25	1.13	1.16	1.24	1.28	1.26	1.22	1.25
	GYBYS	5.45	5.52	5.32	5.63	4.97	4.03	5.04	4.76	5.05
	YNBY	3.28	2.74	2.08	1.86	1.89	2.15	2.51	2.72	2.70
Accounts Receivable Turnover	TRT	9.42	10.11	8.24	6.64	6.14	6.38	7.97	10.21	12.54
	GYBYS	4.72	5.01	4.47	4.68	5.13	7.58	7.68	7.68	7.88
	YNBY	4.196	5.16	6.28	6.69	5.119	4.64	4.66	4.68	5.083

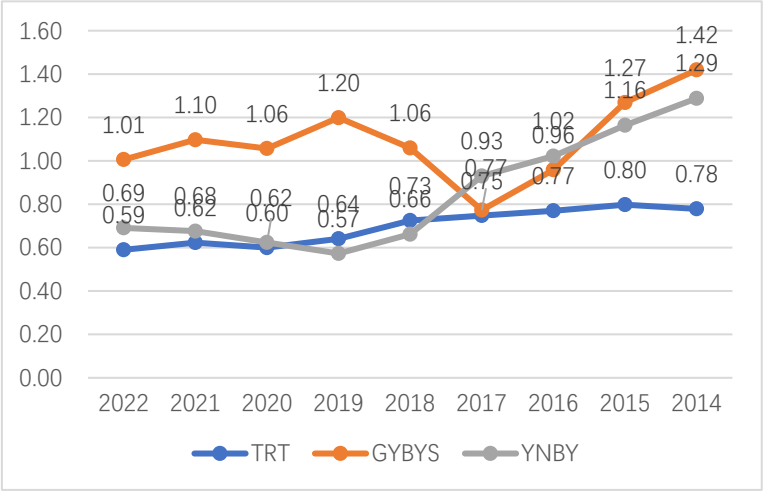

Figure 7. The Chart Line of Total Assets Turnover (Picture credit: Original)

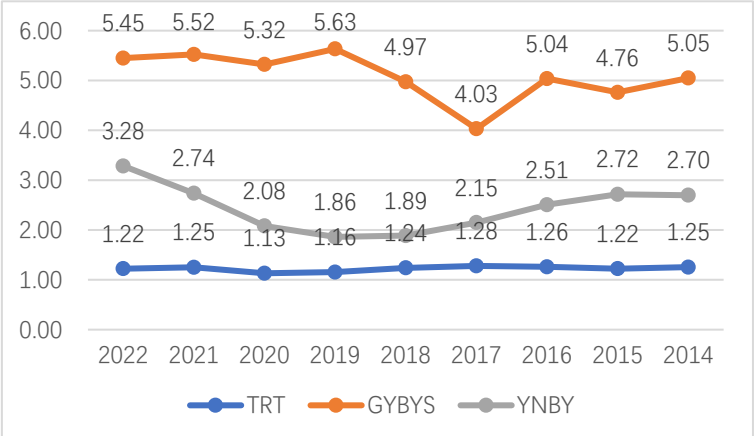

Figure 8. The Chart Line of Inventory Turnover (Picture credit: Original)

In Figure 8, the inventory turnover of GYBYS and YNBY has an overall increasing trend, which indicates that the proportion of inventory in assets shrunk. Nontheless given that the price volatility of material mentioned before. Companies may need to consider increasing the amount of inventory properly.

The account receivable turnover fluctuated significantly in Figure 9. It may be due to pledge loan and loans from some provincial hospitals. It shows that the collection of money is slow, so company's operational ability needs to be improved.

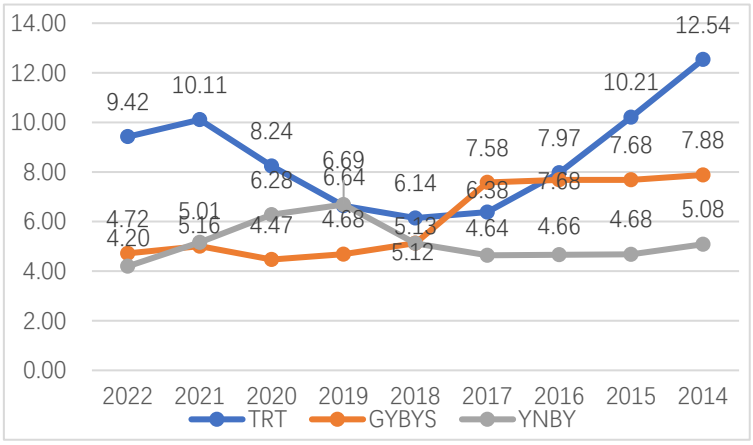

Figure 9. The Chart Line of Accounts Receivable Turnover (Picture credit: Original)

3.3.4 Prospect analysis

Revenue growth rate and net profit rate belong to horizontal analysis, which can be used to evaluate company's development and potential in the future.

In Table 8 and Figure10, the dramatic increase of total revenue of GYBYS in 2018 is led by its purchasing of 30% shares from Guangzhou Pharmaceutical Holdings Limited and 48.0465% from Wong Lo Kat. And the negative revenue growth rate of GYBYS and TRT in 2020 is mainly caused by the decreasing sales of products in hospital. This is because of fewer patients in relative hospital, the restriction of logistics and the decrease of terminal demands during the pandemic. But it has a short-term impact on pharmaceutical industry

Table 8. Prospect Analysis Statement of Enterprises

		2022	2021	2020	2019	2018	2017	2016	2015	2014
Revenue Growth Rate	TRT	5.3%	13.9%	-3.4%	-6.6%	6.2%	10.6%	11.0%	12.5%	11.1%
	GYBYS	2.6%	11.9%	-5.1%	53.8%	101.6%	4.6%	4.8%	1.6%	6.9%
	YNBY	0.3%	11.1%	10.4%	9.8%	11.1%	8.5%	8.1%	10.2%	19.0%
Net Profit Growth Rate	TRT	16.2%	19.0%	4.7%	-13.1%	11.5%	9.0%	6.6%	14.6%	16.4%
	GYBYS	6.6%	27.6%	-8.6%	-7.3%	66.9%	36.7%	16.0%	8.9%	21.9%
	YNBY	7.0%	-49.2%	31.9%	19.8%	11.1%	7.7%	5.4%	10.6%	8.0%

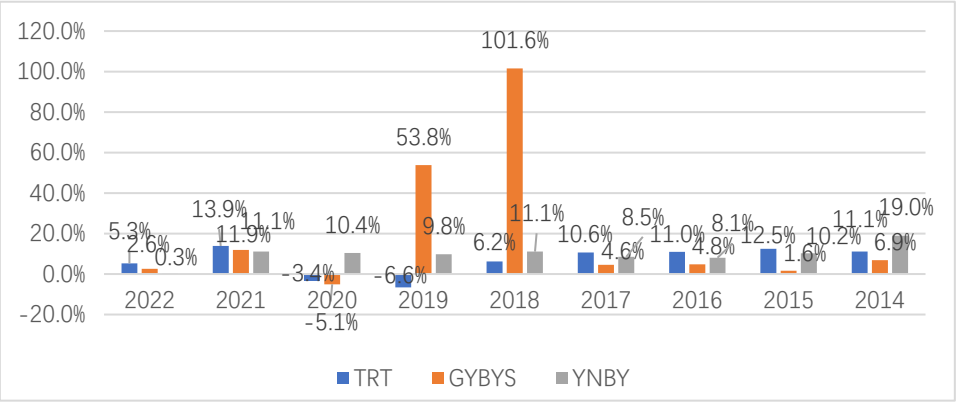

Figure 10. The Clustered Column of Revenue Growth Rate (Picture credit: Original)

As for the net profit growth in Table 8 and Figure 11, the fluctuation of YNBY and GYBYS in table11 has been discussed in the accounting analysis before.

Generally, as the pandemic ends, pharmaceutical enterprises are less exposed to trouble from outside and have great potential for development. An enterprise should pay attention on their internal control and make scientific decisions.

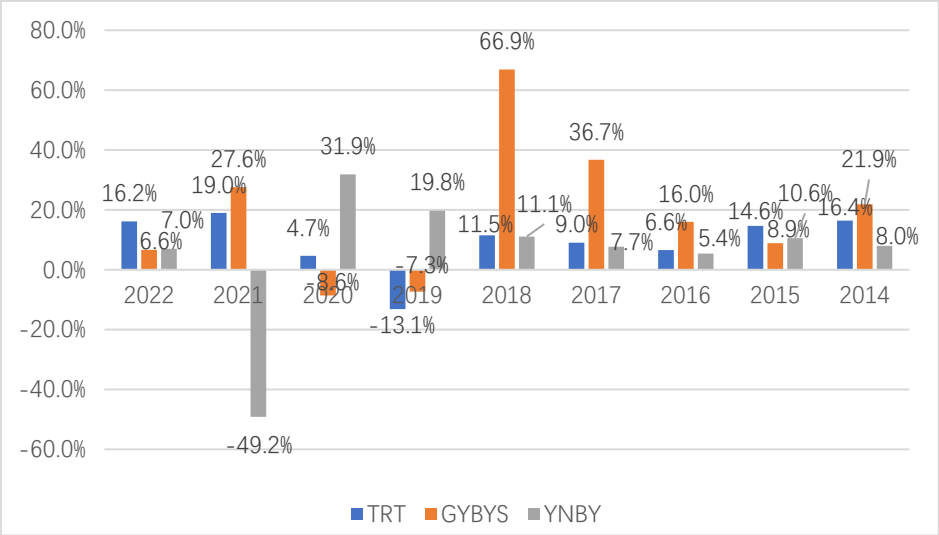

Figure 11. The Clustered Column of Net Profit Growth Rate (Picture credit: Original)

4. Conclusion

Firstly, relative plan announced by government encourages enterprises to develop innovative medicine. Companies should to be in tune with the government, paying attention on the effective R&D to promote their competitiveness and reposition their brands. At the same time, the case of GYBYS's arbitrage alarms that companies shouldn't take any chances and need to comply with their professional ethics. Secondly, the increasing selling expenses of listed companies indicates that firms should focus on the cost control. Well maintained profitability is an essential support to R&D expenditures. Lastly, as an internal drive, the growing demand guarantees the steady growth of pharmaceutical industry. So the large companies in this area are promising in the future.

From the perspective of investors, I think the pharmaceutical industry is worth investing in. The companies listed above have good profitability and stability. Compared with GYBYS and YNBY, TRT's manager seems more cautious without running the risk of investing activity and arbitrage. So it is well worth investing TRT for risk-adverse investors.

In the view of managers, firstly, to ensure the efficiency of R&D, managers should institutional reform talent and human resources development to utilize industrial talents better. Additionally it is vital to minimize non-essential expenditures with optimizing their supply chain and focuses on managing their inventory to minimize the dead stock.

This passage only focus on three large listed companies, which have been steadily and healthily operating for a long time. So the conclusion is not applicable as a reference for small growth enterprise. So the research in this passage has a particular limitation in application.

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