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Comparison of R&D information disclosure of Chinese and foreign listed pharmaceutical enterprises – Take Hengrui Pharmaceutical and Pfizer Pharmaceutical as examples

Yating Cai*

Changsha University of Science & Technology, Changsha, Hunan, 410000, China

Abstract. Recently, the demand for epidemic prevention equipment and therapeutic drugs at home and abroad has surged. In order to improve their competitiveness, enterprises have invested a lot of money in drug research and development and medical device innovation.This paper focuses on the research and analysis of the background conditions of drug research and development and information disclosure in China in recent years, and combines and expounds two scientific theoretical foundations related to information disclosure and disclosure, namely information disclosure, asymmetry theory and information transmission theory. Based on the actual situation, a detailed analysis of the Chinese enterprise Hengrui Pharmaceutical and the American enterprise Pfizer Pharmaceutical, the R&D expenditure and the disclosure of R&D expenses of the company in recent years were explained, and the problems and the gap between the two enterprises were found. Finally, suggestions for improvement are made for the above problems.

1. Introduction

1.1 Research background and significance

According to EvaluatePharma, in 2021, the global pharmaceutical industry's R&D expenditure reached $195.3 billion; R&D spending in the global pharmaceutical industry is expected to reach $232.5 billion by 2026.According to statistics, in 2021, the global and Chinese innovative drug market size reached 978.7 billion US dollars, a year-on-year increase of 5.00%, and in 2021, China's innovative drug market reached 153.8 billion US dollars, up 8.46% year on year, accounting for 15.71% of the world, exceeding the growth rate of the generic drug market, and it is expected that the scale of China's innovative drug market is expected to exceed 200 billion US dollars in 2024. On the whole, from 2015 to 2022, the scale of China's innovative drug market has increased year by year, and its proportion in the world has gradually increased.The importance attached by enterprises to R&D and the increase in investment in R&D by enterprises are inevitable requirements for improving the quality of R&D expenditure information disclosure, whether from the perspective of enterprises or investors. High-quality R&D information disclosure can not only enable enterprise managers to better understand the development status of enterprises and formulate future development strategies, but also enable investors to better judge the profitability and future development potential of enterprises.

1.2 Literature Review

With the rise of high-tech industries, enterprises have strengthened the disclosure of R&D information in order to improve their competitiveness,[1] Zhang Yue and Wu Qifu (2018) believe that the motivations for enterprises to disclose R&D information are: as R&D activities become more important to enterprises, enterprises are more willing to disclose R&D information; meeting regulatory needs; Differentiate your competitive edge .

Enterprise managers understand the development status of the enterprise and formulate future development strategy through R&D information, and investors judge the future development trend of the enterprise through the R&D information disclosed by the enterprise to make better investment judgments. However, due to the still deficiencies in China's supervision of enterprise information disclosure, there are still problems in enterprise information disclosure. [2]Shi Xiaohui and Wu Lei (2013) used listed companies of high-tech enterprises from 2008 to 2011 as a sample and found that there are still problems in the information disclosure of listed enterprises: the proportion of R&D information disclosure is not high; lack of total R&D investment; The location of R&D information disclosure is not fixed and the name is not uniform.[3]Yang Huanyun (2010) Judging from the 2009 annual reports of 111 biopharmaceutical listed companies in Shanghai and Shenzhen, there are still problems in R&D information disclosure that are not standardized, the level of detail and content of disclosure are very different, there are

* Corresponding author: cyt25671225682021@163.com

many qualitative descriptions, and there are few basic data.[4]Yuan Yanhong (2009) selected a total of 60 pharmaceutical manufacturing and computer application service companies listed on the Shanghai and Shenzhen stock markets for analysis, arguing that the R&D information disclosure of listed companies still has problems such as not many companies disclosing basic R&D data, too simple disclosure of future R&D investment plans, and lack of individualization of accounting policies for disclosure of R&D expenditure.

How to measure the quality of enterprise R&D disclosure, there is no detailed judgment standard in China or internationally. According to the regulations on information disclosure at home and abroad and the evaluation of R&D information disclosure in relevant literature,[5] Wu Xueqing (2014) believes that the quality of R&D disclosure can be measured from the following aspects: (1) the external environment of R&D, including industry risks, industry development trends, and descriptions of competitors; (2) General description of R&D, including disclosure of project name, R&D objectives, government subsidies, sources of R&D funds, R&D project competition, R&D risk description, description of the possibility of R&D success, description of R&D failure, R&D model, R&D infrastructure, R&D accounting policy; (3) Disclosure of R&D investment, including the amount of R&D expenditure, the proportion of R&D expenditure to main revenue in the past three years, whether R&D expenditure is disclosed, whether R&D expenses are disclosed in management expenses, and R&D personnel disclosure; (3) Disclosure of R&D outputs, including the general description of patents and the description of new products that have been developed, that is, the listing of R&D results and the application prospects of R&D projects; (4) Future outlook for R&D, including future R&D investment direction, R&D strategy and plan. This paper plans to analyze the current situation and existing problems of Hengrui Pharmaceutical's R&D information disclosure from the description and disclosure of the above aspects in the annual report of Hengrui Pharmaceutical.

1.3 Research content and methods

1.3.1 Research content

This paper conducts relevant research on the current status of drug R&D and investment disclosure of listed companies in China, as well as the external disclosure status of relevant information and data of pharmaceutical R&D enterprises. The first part elaborates and analyzes the relevant theories and information disclosure rules of enterprise R&D information disclosure; In the second research part, Hengrui Pharmaceutical and Pfizer Pharmaceutical, the actual research sample companies of the enterprises, are contacted to explain the research status of the information disclosure of these two research enterprises. The third part comprehensively analyzes and studies the current situation of information disclosure of R&D activities of Hengrui Pharmaceutical and the specific problems based on the analysis of the current situation of public disclosure of scientific research information of Pfizer Pharmaceutical: The fourth part puts forward the main improvements and measures to solve the main problems in the information disclosure of Hengrui Pharmaceutical.

1.3.2 Research Methods

The research and writing process of this paper mainly uses the literature research method, case analysis method, comparative relationship analysis method, and content analysis method.

Through the literature analysis method and combined with the theory of information disclosure, the current situation and existing problems of R&D information disclosure in China under the new accounting standard are analyzed.

Through case analysis, this paper selects two Chinese and foreign companies of Hengrui Pharmaceutical and Pfizer as typical cases for analysis.

Through the content analysis method, the disclosure of R&D information in the annual reports of Hengrui Pharmaceutical Company and Pfizer Pharmaceutical Company is analyzed and the problems existing in the disclosure of R&D information are analyzed.

Through comparative analysis, Hengrui Pharmaceutical Company and Pfizer Pharmaceutical Company were compared horizontally, and the R&D information disclosure of Hengrui Pharmaceutical Company was evaluated accordingly.

2. Theoretical Analysis of R & D Information Disclosure

2.1 Voluntary and Mandatory Disclosure of Information

The voluntary information disclosure system mainly refers to the information voluntarily disclosed by listed companies due to various other objective reasons such as maintaining the company's image and investor relations, in addition to the relevant important information materials related to the securities market that the company is obliged to disclose and disclose in accordance with the law

Mandatory information disclosure is a system in which listed companies that are explicitly mandatory by relevant mandatory laws, regulatory documents and relevant articles of association must actively disclose information. Mandatory information shall disclose a complete company overview, explanation and relevant main and business information, basic company financial information, audit result opinions, shareholders and related directors and personnel information and other basic information content.

At present, domestic listed companies generally adopt the principle of combining mandatory information disclosure requirements with individual voluntary information disclosure in the timely disclosure of R&D

project information, but based on the principle of protecting trade secrets and the uncertainty existing in R&D activities, enterprises will not be willing to carry out too much voluntary information disclosure.

2.2 Information asymmetry theory

Information asymmetry mainly refers to the difference in information available to the people involved in the buyer and seller transactions. In many social activities, some people can have some information that is completely unavailable to others, resulting in a certain asymmetry between the so-called information. In the various market economic activity processes, there may be slight differences between various types of people in their specific knowledge and degree of knowledge about a particular source of information; A person who has more information is often in a relatively advantageous position, while a person with relatively little information is in a relatively unfavorable position.

3. Comparison of the general description of R&D information of Hengrui Pharmaceutical and Pfizer

This part compares the general description of the R&D information of Hengrui Pharma and Pfizer（Table1 comparison between Hnegrui Pharmaceutical&Pfizer）

Table 1. Comparison of the general description of R&D information of Hengrui Pharmaceutical and Pfizer

Describe content	Hengrui	Pfizer
Disclosure of R & D Projects	10 innovative drugs such as irexib have been approved for marketing in China	Comirnaty/BNT162b2(PF-07302048) and other innovative drugs
R & D goals	Improve the efficiency of clinical trials worldwide, carry out clinical trials of innovative drugs in an orderly manner, and improve the efficiency of clinical research and development of rare disease drugs	Deliver breakthroughs that change patients' lives
Government subsidy	The drug research and development project was 61,900,520.00 yuan, the local financial subsidy was 154,165,521.27 yuan, and the other was 6,229,158.87 yuan	
R & D funding sources		The revenues from vaccines,hospital,oncology,internal medicine,inflammation&immunology ， rare diseases.
R & D project competition		Have more comprehensive products lines
R & D Risk Description	The cycle of drugs from development, clinical trial approval to production is long and there are many links. New review and regulatory policies and measures have been introduced, and the national review standards for new drug development are also constantly improving	Risks Related to Our Business, Industry and Operations, and Business Development Government Regulation and Legal Proceedings: Risks Related to Intellectual Property, Technology and Security COVID-19 PANDEMIC
Description of the possibility of successful R & D	Excellent team execution, excellent early research and development capabilities, clinical demand-oriented translational medicine capabilities, advanced technology platform construction, and strong global clinical development capabilities	Considerable resources have been invested in research and development activities.
Description of R & D failure		Errors in the analysis of preclinical and clinical data
R & D model	The company adheres to the differentiated R&D strategy, takes clinical needs as the guide, establishes a sound R&D management system, and the company's R&D departments work together efficiently and efficiently to promote R&D work in an orderly manner and jointly ensure that the project achieves the expected goals.	Drugs and biologics take more than a decade from development to potential regulatory approval.Information concerning several of our drug candidates in development, as well as supplemental filings for existing products.
R & D infrastructure		
R & D Accounting Policy		We record advances and pre-approved milestone payments due to partners as R&D expenses.

4. Compared with Pfizer, Hengrui Pharmaceutical's R&D information disclosure problem analysis

As a leader in the pharmaceutical industry, Pfizer attaches great importance to the innovation and research and development of the company's products, and its annual R&D investment is also in the leading position in the industry. According to the financial report, Pfizer's R&D investment in 2021 reached 13.029 billion US dollars, second only to Roche and Johnson & Johnson's investment of 16.1 billion US dollars and 14.7 billion US dollars. By reading Pfizer's annual report, it was found that Pfizer's R&D information disclosure content is more complete and the format is more standardized, so Pfizer's R&D information disclosure is used as a comparison sample.

4.1 R & D investment information is not comprehensive

In Hengrui's annual report, the information on R&D expenditure only discloses the amount of R&D investment, the growth amount of R&D investment and the growth rate, but in addition to the amount of R&D investment, growth and growth rate of Pfizer, the reason for the increase in R&D investment this year is also disclosed.(Table2,R&D input information of Hengrui Medicine&Pfizer)

Table 2. R&D input information

Disclosure project	Hengrui Medicine	Pfizer
R & D expenditure amount	6.203 billion yuan	$13,829 million
Increase in R & D expenditure	1.214 billion yuan	4 billion dollars
R & D expenditure amount growth rate	24.34%	47%
Reasons for growth		A charge for acquired IPR&D related to our acquisition of Trillium; Increased investments across multiple therapeutic areas, including additional spending related to the development of the oral COVID-19 treatment program.

In addition, Hengrui Pharmaceutical did not disclose the specific investment amount of specific R&D projects; However, Pfizer's annual report discloses the specific amount of R&D investment for each project.(Table3,Investment of R&D project)

Table 3. Investment of each research and development project

Hengrui Medicine	Pfizer
	Example Valneva's Lyme disease vaccine $130 million AKCEA-ANGPTL3-LRx $250 million Collaboration with Beam $300 million Develop and commercialize ARV-471 $706 million Develop and commercialize Orgovyx (relugolix) in advanced prostate cancer $650 million

It can be seen from Table 4 that Hengrui Pharmaceutical's disclosure of R&D projects includes four aspects: drug name, main function, whether it is a prescription drug and the R&D stage, but only mentions the clinical stage in the disclosure of information in the R&D stage. Pfizer, on the other hand, disclosed clinical and research progress in more detail (Table 4, using Paxlovid as an example)

Table 4. Disclosure of research and development projects

Drug name	Clinical and Research Developments
Paxlovid	In November 2021, Pfizer announced positive topline results from an interim analysis of 1,219 adults enrolled in the Phase 2/3 EPIC-HR (Evaluation of Protease Inhibition for COVID-19 in High-Risk Patients) randomized, double-blind study of non-hospitalized adult patients with COVID-19, who are at high risk of progressing to severe illness. The scheduled interim analysis showed an 89% reduction in risk of COVID-19-related hospitalization or death from any cause compared to placebo in patients treated within three days of symptom onset. Similar risk reductions were observed in patients treated within five days of symptom onset. Treatmentemergent adverse events were comparable between Paxlovid and placebo, most of which were mild in intensity.

4.2 Irregular disclosure of R & D information

In February 2006, the Ministry of Finance issued the Accounting Standard for Business Enterprises No. 6 - Intangible Assets, which clearly stipulates the information disclosure specifications for R&D funds invested by listed companies, and enterprises should disclose in the notes the amount of R&D expenditure included in the current profit and loss and recognized as intangible assets according to the category of intangible assets. If the R&D product is recognized as an intangible asset during the reporting period, the amortization method and age of the intangible asset should be disclosed. The disclosure of intangible assets in the annual reports of Hengrui Pharmaceutical and Pfizer is now 8compared.(Table5 &6,Intangible assets disclosure in Hengrui&Pfizer)

Table 5. Intangible assets disclosure in Hengrui

project	Amount incurred in the current period	Amount incurred in the previous period
Personnel and labor costs	2,010,729,785.56	1,402,210,223.50
Direct input cost	1,036,956,442.67	1,068,062,784.39
Depreciation expense	193,637,163.86	161,468,872.65

Amortization of intangible assets	4,692,181.41	6,048,950.29
Design test fee	1,907,669,453.42	1,724,231,766.02
Equity incentive fee	95,307,154.94	122,606,583.04
Other related expenses	694,313,823.25	504,329,052.46
Total	5,943,306,005.11	4,988,958,232.35

Table 6. Intangible assets disclosure in Pfizer

Amortization of intangible assets	Amortization of intangible assets $3700m, increased $353 million.
Amortization method of intangible assets	we record any milestone payments in Identifiable intangible assets, less accumulated amortization and, unless the asset is determined to have an indefinite life, we typically amortize the payments on a straight-line basis over the remaining agreement term or the expected product life cycle.
Intangible asset class	Amount
IPR&D asset	Trillium：$2.1 billion Array：$2.8 billion
Developed technology	Array: $2.0 billion
licensing agreements	Array:$1.2 billion for technology in development— indefinite-lived ；$360 million for developed technology—finite-lived

However, in Hengrui Pharmaceutical's annual report, only the amortization of intangible assets is roughly disclosed, while Pfizer's annual report not only discloses the amortization amount of intangible assets, but also the amortization method and the amount of each item recognized as intangible assets.

Although the disclosure of the amount of research and development of intangible assets is not mandatory disclosure, the disclosure in more detail in the company's annual report is more conducive to the user of the report to have a more accurate judgment of the company's ability to transform from research to development.

4.3 Insufficient disclosure of R & D information

Current Accounting Standard 6 – Intangible Assets requires companies to divide R&D efforts into research and development phases and only allows capitalization of development expenditures. Therefore, the criteria for dividing research and development phases will affect the amount of R&D expenditure capitalized and expensed. The research and development phases are not explained in Hengrui Pharmaceutical's annual report.The division of research expenses and development expenses in Pfizer's annual report is as follows: During the development phase,advances and pre-approved milestone payments due to our partners are recorded as R&D expenses. (Advance payment and pre-approval milestone payment are recorded as research expenses and development expenses respectively).Hengrui Pharmaceutical's ambiguity in the research and development stage classification criteria will make report users have a wrong understanding of the company's research and development situation

5. Measures of Hengrui Pharmaceutical to Improve R & D Information Disclosure

5.1 Improve the content of R & D information disclosure

China's regulatory authorities do not clearly regulate the content and format of R&D information disclosure, so in terms of voluntary information disclosure, most companies choose to reduce the disclosure of R&D investment and R&D project progress in order to protect the information of core technologies to maintain the competitive advantage of enterprises, and most of them only disclose information that is beneficial to themselves. Therefore, the content of the disclosure of R&D information detailed subjects should be improved, including but not limited to setting up R&D expenses, R&D investment and other sections, and at the same time increasing the disclosure of R&D project progress, clinical information and other capabilities, so that investors can more intuitively and clearly understand the progress and potential risks of the company's R&D projects, so that investors can better judge the company's R&D capabilities and product R&D risks.

5.2 Formulate measures to strengthen the supervision of enterprise R & D information

Since R&D information involves the trade secrets of enterprises, enterprises are not willing to disclose voluntary information in order to ensure their competitiveness. Therefore, the regulatory authorities should formulate relevant measures and strengthen supervision to urge enterprises to disclose more detailed information, such as the classification criteria for the research and development stages of enterprises; Capitalization and expense of R&D investment. Give investors access to more detailed and effective information.

5.3 Improve the professional ability and professional ethics of accountants

In terms of business capabilities, due to the elaborate and complex research and development of pharmaceuticals, accountants are not proficient in pharmaceutical technology, so the division of pharmaceutical research and development stages is not accurate. Therefore, accountants need to understand the relevant technologies of the enterprise in order to more accurately judge the research and development stage, as well as the cost and capitalization, and improve the accuracy of information disclosure.

As the formulator of financial statements, accountants will inevitably be tempted by interests and threats of power, and some accountants cannot comply with professional ethics, and the compilation of false information has greatly reduced the accuracy of enterprise information disclosure. Therefore, enterprises should regularly conduct professional ethics training for their accounting personnel, and comprehensively, objectively and accurately disclose company information in order to safeguard the interests of all parties. Improve the quality of corporate information disclosure

6. Conclusion

After research, it has been found that at this stage, most of China still has incomplete disclosure content and irregular disclosure format. This paper selects the case study of Hengrui Pharmaceutical, and finds that the R&D information disclosure of Hengrui Pharmaceutical mainly includes incomplete R&D information disclosure; Non-standard disclosure of R&D information; Three problems of insufficient disclosure of R&D information. In response to these three problems, this paper preliminarily proposes three measures to improve information disclosure: first, enterprises should improve the content of R&D information disclosure; Second, the regulatory authorities formulate measures to strengthen the supervision of enterprise R&D information; Third, improve the professional ability and professional ethics of accounting personnel.

While increasing R&D investment, listed companies should also improve the quality of R&D information disclosure, so that investors can have a better understanding of the company's R&D capabilities, more accurately judge the future development prospects and investment risks of the enterprise, and better accept social supervision. More detailed disclosure of R&D information by enterprises is not only to attach importance to R&D, but also to be responsible for the interests of investors.

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