# Analysis on the Financial Performance of Emerging Listed IT Technology Companies Based on DEA

HUANG Lulu[a],*

[a]Finance Department, Jiangsu University of Science and Technology, Zhenjiang, Jiangsu.
*Corresponding author.

## Abstract

A sample data of 22 selected IT technology companies are collected for three consecutive years to establish a suitable input-output index system. The BCC model is chose to analyze the sample to obtain the relative efficiency of each IT technology company, and improvement goals and improvement value are determined based on the theoretical analysis. Finally, this article provides some suggestions for improvement based on the analysis results.
**Key words:** DEA; IT technology; Listed company; Performance evaluation

## INTRODUCTION

With the rapid development of the IT industry, IT technology companies will encounter challenges and opportunities at different levels. How to improve the performance and competitiveness of IT technology companies has become the focus of the industry. On the other hand, listed IT technology companies reflect the current status of the IT industry in some degrees and represent the research and analysis in this field. Considering the fact that the annual report data of IT listed companies is easy to collect, it is convenient to select them as the object of discussion and analysis.

However, the performance evaluation of the IT industry in China is not very comprehensive. For example, some theoretical researches pay too much attention to evaluation methods and model research while neglecting its connection to the reality. Therefore, the performance evaluation of the IT industry cannot be too theoretical, nor can it be a rough combination of the theory and practice. Instead, it should be a good practice based on theoretical knowledge.

This paper evaluates the performance of listed IT technology companies by using the DEA method, which not only provides a reference for problems in the company's operation, but also offers solutions to the problems. In addition, a performance comparison between different companies allows the company to understand its position in the industry and use this as a reference to develop its business strategy.

## 1. CURRENT SITUATION BOTH IN CHINA AND AROUND THE WORLD

Zhiying Liu and Xiaomin Zhang (2007) applied the DEA method and financial analysis method of the technical efficiency, pure technical efficiency and scale efficiency of listed IT companies in China under the relevant theoretical conditions of efficiency analysis. Hongmei Tan (2010) conducted both vertical and horizontal performance evaluations of listed IT technology companies using the DEA method. By evaluating the comprehensive technical efficiency, pure technical efficiency, and scale benefit of listed IT technology companies, the slack variable of invalid DMU and the effective frontier of the companies are analyzed (Tan, 2010). Yu Gai (2012) used the DEA method to analyze the pure technical efficiency of the overall and two phases of IT technology companies, separate the model into BCC models and scale efficiency models, analyze the sources of invalid data, and calculate

the relative efficiency of the level of venture capital from the perspective of investors (Gai, 2012). Based on the analysis mentioned above, this paper intends to analyze the financial performance of emerging listed IT technology companies from 2014 to 2016 for possible improvements of these companies.

# 2. STANDARD SELECTION AND ESTABLISHMENT OF THE STANDARD SYSTEM

## 2.1 Input Index: Fixed Assets, Main Operating Expenses, Intangible Assets, And Liquid Assets.

Fixed assets are tangible assets of enterprise with a service life of more than one year. The input index selects fixed assets because it is the basic input of the production activities of the enterprise and can reflect the effectiveness of the company's scale. In the same industry, it will affect the production scale of enterprises to a certain extent. If the proportion is too large, it will cause insufficient of the liquid assets of the enterprise and affect the turnover rate of funds. Therefore, it is selected as one of the input indexes.

The main operating expense is an indicator of the main operating revenue in the output index. It shows the investment of the main business, and the profit level of the enterprise is directly affected by its amount. High revenue of a company does not necessarily lead to high profits, and its management of expense will be crucial.

Intangible assets are selected as an input index because listed IT technology companies have more technologies, patents, and scientific research results than normal companies. Technology advantage is one of the most important competitiveness of listed IT technology companies. Intangible assets are one of the most influential factors in the operation and development of listed companies. Therefore, intangible assets are selected as one of the input indexes to examine the comprehensive efficiency of enterprises.

Liquid assets are short-term assets that an enterprise can convert to cash or operate in one business cycle. It holds an important position in the asset structure of an enterprise. If the company's liquidity allocation is not good, the lack of effective use of funds will affect its profitability, which in turn will affect the production efficiency of the company (Wang, 2012, pp.32-46).

## 2.2 Output Index: Main Operating Revenue and Net Profit.

The main business revenue, as the basis for the survival and sustainable development of the enterprise, is a relative index of the main operating expense mentioned above. Good main operating revenue can make the company's funds flow normally. To ensure that the expense remains the same, the company's profitability level can only be increased through increasing revenue.

Net profit is the total profit of the company after deducting income tax, which represents the actual income of the company. It reflects the company's profitability, which reflects the overall profitability status of a listed company, as well as its enterprise management level and input and output efficiency (Wang, 2013, pp.123-132).

# 3. PERFORMANCE EVALUATION USING THE DEA METHOD

## 3.1 Selection of the DEA Model

In this study, the BCC model, which is based on variable returns to scale, is considered in order to take the scale benefits as well as the technical benefits into account. It satisfies the requirements for the number of input and output indexes and the requirements for the production set.

## 3.2 Sources of Data

The annual report of listed IT technology companies contains the essence information of the companies. Considering the reliability of information sources, this article chooses the financial annual report of the listed companies that is open to the public as the source of data. Considering the different disclosure time of the annual report of the listed IT technology companies, the reports of three consecutive years from 2014 to 2016 of 22 listed IT companies were selected as the original data. Table 1 shows the efficiency values and rankings of decision-making units of the 22 companies for three years.

**Table 1**
**Decision-Making Unit Efficiency Value and Ranking of Each Company for Three Years**

| No | DMU | Score(2014) | Score(2015) | Score(2016) |
|---|---|---|---|---|
| 1 | TongTech | 1 | 1 | 1 |
| 2 | Jieshun Tech | 1 | 1 | 1 |
| 3 | KDG | 1 | 1 | 1 |
| 4 | NSFOCUS | 1 | 1 | 1 |
| 5 | Transinfo | 1 | 1 | 1 |
| 6 | Sunsea AIoT | 1 | 1 | 1 |
| 7 | Digital China | 1 | 1 | 1 |
| 8 | HopeRun | 1 | 1 | 0.918 |
| 9 | BRC | 1 | 1 | 0.866 |

Continued

| No | DMU | Score(2014) | Score(2015) | Score(2016) |
|---|---|---|---|---|
| 10 | Netac | 1 | 0.969 | 1 |
| 11 | Join-Cheer | 1 | 0.916 | 1 |
| 12 | Multiway | 0.942 | 1 | 1 |
| 13 | Hengda Hi-Tech | 0.924 | 0.906 | 0.962 |
| 14 | Hanvon | 0.92 | 1 | 0.982 |
| 15 | Hodgen | 0.904 | 0.871 | 0.908 |
| 16 | Mason Tech | 0.897 | 0.95 | 0.872 |
| 17 | Wiscom Tech | 0.871 | 1 | 1 |
| 18 | EleFirst Sci&Tech | 0.864 | 0.871 | 0.891 |
| 19 | Fenghua Hi-Tech | 0.829 | 0.864 | 0.811 |
| 20 | Dynavolt | 0.789 | 0.878 | 1 |
| 21 | Tat Fook | 0.788 | 0.905 | 1 |
| 22 | Rongji Software | 0.752 | 0.866 | 1 |

It can be seen from Table 1 that the seven listed companies such as TongTech, Jieshun Technology, KDG, NSFOCUS, Transinfo Technology, Sunsea a lot, and Digital China have an effective DMU for three consecutive years. They are the most stable and efficient companies. A comparative analysis of the remaining 15 companies is shown in Figure 1.
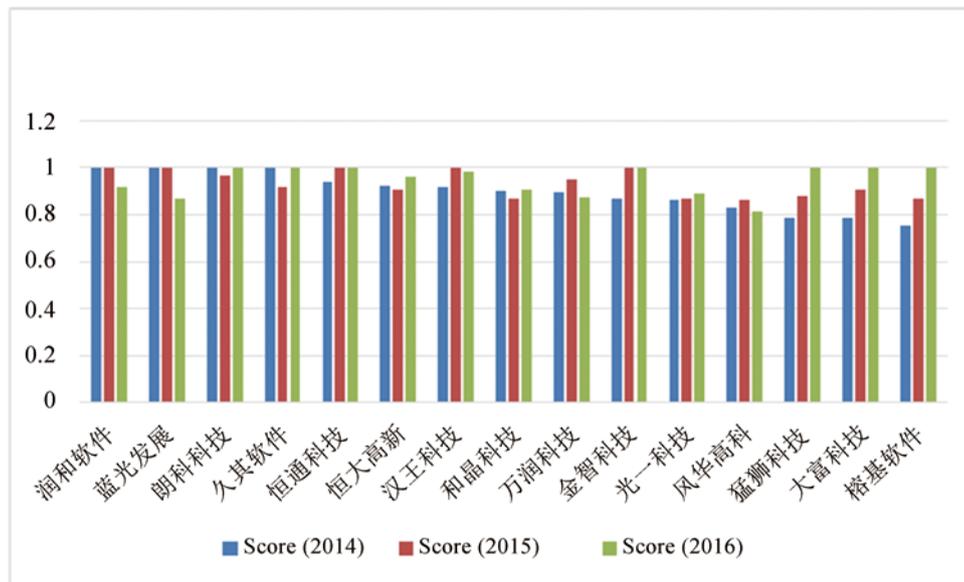


**Figure 1**
**Diagrams of Decision-Making Unit Efficiency Value and Ranking of Companies**

It can be seen from Figure 1 that HopeRun, BRC, Netac Technology, Join-Cheer Software, Multiway Technology, and Wiscom Technology can maintain the best efficiency for two consecutive years, and the business status and performance are relatively good.

The efficiency of the decision-making unit is stable for the following companies: Hanvon Technology, Hengda Hi-Tech, EleFirst Science &Technology, Tat Fook Technology, Hodgen Technology, Dynavolt Technology, and Rongji Software. These seven companies have relatively stable operating environments. Among them, the decision-making efficiency value of Rongji Software increased by 0.248, and the decision-making efficiency value of Tat Fook Technology increased by 0.212. The rest are companies with declining efficiency values in

decision-making units and/or declines in technology. We will use Rongji Software as an example. The company's three-year liquid assets, fixed assets, and intangible assets have not changed significantly, but the main operating expense increased from ¥621,662,911.8 in 2014 to ¥651,933,237.0 in 2015, and then increased to ¥716,197,918.24 in 2016. With three years of continuous investment on production factors, the main operating revenue also increased from ¥598,305,165.28 in 2014 to ¥623,602,054,84.84 in 2015, and ¥70,259,231,11.9 in 2016. The main operating revenue increased by 17.4% over the past three years. Meanwhile, the net profit over the past three years also increased from ¥15,450,227.32 to ¥24,977,171.12. By expanding the scale of production and increasing the production factors, the company has

obtained huge output benefits, which verifies the results calculated by MaxDEA software.

For the companies with decreasing efficiency values of decision-making units and declines in technology, the example of Fenghua Hi-Tech is analyzed. The company's fixed assets has increased from ¥1,740,707,278.37 in 2014 to ¥1,193,569,028.45 in 2015, and then to ¥1,598,543,266.4 in 2016. The net profit increased from ¥146,209,483.6 in 2014 to ¥95,911,396.33 in 2015, and then to ¥64,780,471.42 in 2016. The profit over the past three years fell by an average of 62.8%. These are consequences of insufficient effective production factors and capital investment of the companies.

## CONCLUSIONS

This article uses the DEA method to collect relevant research data and setup a model. The performance of 22 listed Chinese IT technology companies from 2014 to 2016 is analyzed through analysis of the data of the input and output from their financial annual reports. Based on the analysis results, the data envelopment analysis method is relatively objective in the performance evaluation and analysis of listed IT technology companies. The results are close to the reality, so it can be concluded that the data envelopment analysis method is suitable for the performance evaluation of listed IT technology companies and can be widely applied. The research results provide a reference for the improvement of listed IT technology companies and the investment decisions of investors.

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