

The Effectiveness Analysis of the E-commerce Listed Companies under the Background of “Internet +”

Yu Gao¹, JinQuan Dong¹, Xiaoyan Zhang¹

¹School of Management, Inner Mongolia University of Technology, Inner Mongolia, China

Abstract: Based on 24 electronic commerce annual report data collection and analysis of listed companies, this article uses data envelopment analysis (DEA) method to evaluate performance of the companies. We could work out the industry technical efficiency, pure technical efficiency, scale efficiency and increase-decrease characteristics by DEAP2.1, and put forward some opinion in allusion to the relative nullity companies. The relative invalid enterprise improvement opinions are put forward.

Keywords: E-commerce, data envelopment analysis, efficiency analysis, “Internet +”

1. INTRODUCTION

The file “The guidance on promoting “Internet +” action” issued by the state council on July ,2015 says, to enhance the level of industrial development rapidly and increase innovation ability of all industries, combining Internet and various industries has become the important way of continuous development . Electronic commerce, as the industry which combines with the Internet most closely, its efficiency reflects the efficiency production and scale which the Internet has in the development of China.

More and more scholars pay attention to the Efficiency evaluation about e-commerce in recent years. E-commerce (Electronic Commerce) takes information network technology as the means and takes commodity exchange as the center of business activities, according to the date in 2015, the scale of Electronic Commerce market reached 16.2 trillion yuan and is up 21.2% from a year earlier. Barnes and Vidgen (2002) evaluated the operation of electrical business based on site quality. XingYing (2009) analyzes the efficiency of the third electrical B2B enterprise on the basis of the longitudinal and the transverse by using data envelopment analysis (dea) method. GanPing (2012) studies on the efficiency of listed companies and gives suggestions for improvement by the analysis of DEA and the difference variable. Li xiaoyu (2013) does the analysis of e-commerce enterprise efficiency from static and dynamic two aspects by using DEA - Malmquist model.

With the development of Electronic commerce in our country, this paper selects 24 typical listed companies of China's e-commerce industry to do empirical analysis and puts forward suggestions for the improvement of enterprise performance level, by DEAP2.1 software, and C2R and BC2 model in data envelopment analysis (dea) method.

2. RESEARCH METHODS AND DATA SOURCES

2.1. The Data Envelopment Analysis (DEA) Method

Farrell M J (1957) studied the efficiency of production frontier and balance firstly, and proposed data envelopment analysis (dea) for the first time and applied to the evaluation of the technical efficiency of agricultural productivity of a single output in United States. Charnes, Cooper, Rhodes E (1978) was proposed based on multiple input multiple output of CCR model. Banker, Charnes, Cooper, further optimization of the model, adding a hypothesis, and the comprehensive efficiency can be divided into pure technical efficiency and scale efficiency, namely the BCC model, and marks the DEA become one of the most mature analysis method.

2.2. DEA Model

The Data Envelopment Analysis is a multidisciplinary cross subject. If a decision making units in the economic activities of an input vector $X = (x_1, x_2, \dots, x_i, \dots, x_m)$, x_i expresses the input index of DMU_i; and the output vector $Y = (y_1, y_2, \dots, y_j, \dots, y_s)$, y_j expresses the output index of DMU_i. (x_j, y_j) expresses the input and output vector of DMU_j, (X_0, Y_0) expresses the corresponding indicators of evaluation decision unit.

Banker, Charnes, Cooper put forward the BC² model by adding a postulated conditions of

$$\sum_{j=1}^n \lambda_j :$$

$$(D_{BC^2}^o) \begin{cases} \min \theta \\ \sum_{j=1}^n \lambda_j X_j + S^- = \theta X_0 \\ \sum_{j=1}^n \lambda_j Y_j - S^+ = Y_0 \\ \sum_{j=1}^n \lambda_j = 1 \\ \lambda_j \geq 0, j = 1, 2, \dots, n \\ S^- \geq 0, S^+ \geq 0 \end{cases}$$

The conclusions of the BC² model:

1. The necessary and sufficient conditions of DMU_{j0} which is effective, are the optimal value of θ is equal to 1 and every optimal solution $\lambda^* = (\lambda^*_1, \lambda^*_2, \dots, \lambda^*_n)$, s^{+*} , s^{-*} , θ^* has the constraint of $s^{+*} = 0$, $s^{-*} = 0$.
2. For the solution of effective decision making units, system is not effective for the solution of effective decision making units, system is not effective.

2.3. Samples and Data Sources

With the concept of "Internet +", more scholars pay attention to the electronic commerce, and the impact value is becoming more and more prominent. Through the before research can be found, selecting too many evaluation units do not reflect the actual situation. So this article selects 5 indexes, including 3 input indexes and 2 output indexes. Usually the number of the index is twice of the number of decision making units, so this article select 24 listed companies as the research target in consideration of the electronic commerce enterprise mainly engaged in the business, data availability, comparability and other factors. The article financial data are derived from the Wind information database.

2.4. Input and Output Index Selection

For the data envelopment analysis (DEA) method, the selection of input and output indicators is the key to the use of DEA. Choosing the indicators obey to some principles:

1. Objectivity, which means the indicator could objectively reflect the efficiency of decision making units.
2. Comprehensive, which means through a single or a few indicators to comprehensively reflect the general characteristics of the decision making units.
3. Independence, which means each indicator is independent and the number of the indicators is not too much.

Input indicators: assets (X1), liabilities (X2), number of employees (X3).

Output indicators: net income (Y1), operating income (Y2).

Table1. *The e-commerce companies' input and output of 2015*

DMU	Y1	Y2	X1	X2	X3
LeTV	2.17	130.17	169.82	131.67	4885
China National Software	1.03	36.30	55.23	27.10	7113
INESA	2.21	29.97	45.82	10.03	2232
China Net Center	8.30	29.32	35.06	9.92	2286
East treasure	18.49	29.26	237.33	155.57	3485
Kingnet	6.53	23.39	13.55	5.87	985
People's network	3.92	16.05	36.04	4.88	2749
NavInfo Co.,Ltd	1.46	15.06	37.28	7.64	4145
2345	4.18	14.70	48.22	3.75	2466
Zhejiang Guangbo Group Co., Ltd	0.83	14.57	21.49	5.22	2563
Lansum	1.33	10.23	27.11	9.48	1314
Hangzhou Shunwang Technology Co.,Ltd	3.11	10.22	19.09	4.18	1170
Green unita	1.93	8.78	21.33	4.43	1765
Baofenggroup	1.58	6.52	13.49	6.83	774
Every Network	1.14	6.41	10.85	1.64	1823
New Web	1.14	5.92	15.76	4.23	464
Newcapec Electronics Co., Ltd.	0.61	5.10	13.45	5.21	1699
Focus Technology Co., Ltd.	1.55	4.95	24.54	4.32	1855
Shenzhen Zqgame Co., Ltd	0.63	3.43	12.56	2.21	817
Hubei Century Network Technology Co., Ltd	0.77	2.40	8.59	0.63	491
Searainbow Holding Corp.	0.10	1.94	14.82	1.02	1581
Zhejiang Netsun Co.,Ltd	0.18	1.76	5.92	0.84	948
Sichuan Xunyou Network Technology Co., Ltd	0.56	1.72	4.98	0.53	182
Gosun Holding Co., Ltd	0.03	1.57	17.80	1.51	298

3. ANALYSIS AND DISCUSSION

There are various kinds of software to deal with data envelopment, but considering the accuracy, reliability and maneuverability, we select DEAP 2.1 software for data processing. Input data in table 1 to DEAP software, it concludes the technical efficiency, pure technical efficiency, scale efficiency and scale reward of 24 companies, the results are as following:

1. From the overall situation the industry, the companies still exists a certain gap and the whole efficiency is not high. There is only 3 companies' comprehensive efficiency achieving effective, only accounted for 12.5% of the total number of decision making units. There are 7 companies' pure technical efficiency achieving effective and 3 companies' scale efficiency achieving effective. The data shows that the input-output efficiency of e-commerce enterprise listed companies in China is not very high.
2. It can be seen from the scale reward most of China's e-commerce enterprise in the stage of scale increasing returns, it is only 62.5% of the total number of decision making units. In this state China's e-commerce development needs to expand and the market still has larger development space. Companies should grasp the opportunity to occupy the market and grab market share.
3. For the three companies in efficiency effectively, the efficiency is still effective after expanding the relevant data, that shows they still be in the efficient frontier after expanding their own scales.

Table2. *E-commerce companines' input-output efficiency analysis*

DMU	crste	vrste	scale	return to scale
LeTV	1.000	1.000	1.000	-
China National Software	0.381	0.717	0.531	drs
INESA	0.750	1.000	0.750	drs
China Net Center	0.745	1.000	0.745	drs

The Effectiveness Analysis of the E-commerce Listed Companies under the Background of “Internet +”

East treasure	0.800	1.000	0.800	drs
Kingnet	1.000	1.000	1.000	-
People's network	0.825	0.827	0.998	irs
NavInfo Co.,Ltd	0.495	0.496	0.997	irs
2345	0.989	0.995	0.994	drs
Zhejiang Guangbo Group Co., Ltd	0.700	0.703	0.997	irs
Lansum	0.325	0.378	0.861	irs
Hangzhou Shunwang Technology Co.,Ltd	0.657	0.660	0.995	drs
Green unita	0.497	0.502	0.991	irs
Baofenggroup	0.349	0.510	0.685	irs
Every Network	0.981	0.995	0.986	irs
New Web	0.528	0.726	0.727	irs
Newcapec Electronics Co., Ltd.	0.246	0.470	0.523	irs
Focus Technology Co., Ltd.	0.313	0.319	0.982	irs
Shenzhen Zqgame Co., Ltd	0.390	0.450	0.865	irs
Hubei Century Network Technology Co., Ltd	1.000	1.000	1.000	-
Searainbow Holding Corp.	0.477	0.551	0.866	irs
Zhejiang Netsun Co.,Ltd	0.526	0.844	0.623	irs
Sichuan Xunyou Network Technology Co., Ltd	0.924	1.000	0.924	irs
Gosun Holding Co., Ltd	0.261	0.611	0.427	irs

4. CONCLUSION

This paper puts forward the evaluation index based on electronic commerce system, evaluates performance of electronic commerce for 24 enterprises and puts forward some suggestions by using DEA model. Through the result of software operation we can see that the overall efficiency of electronic commerce enterprise is not high, industry competition is fierce and most of the enterprises need to improve their efficiency by expanding the scale of production.

Under the background of the further development of "Internet +", e-commerce enterprises not only face the competition in the industry, but also bear the new challenges of the traditional industry combined with the Internet. In the premise of strengthening innovation, it should strengthen their own e-commerce advantage; strengthen team construction and the combination of the real economy.

REFERENCES

- [1] A. Charnes, W.W. Cooper and E. Rhodes, (1978) Measuring the efficiency of decision making units, *European Journal of Operational Research*, 2: 429–44
- [2] Barnes S.J,Vidgen R.T. An Integrative Approach to the Assessment of E-Commerce Quality [J] . *J. Electron. Commerce Res*, 2002, 3(3):114-127.
- [3] XING Ying. The third-party B2B e-commerce efficiency evaluation in our country [D]. *Capital University of Economics and Business*, 2009.
- [4] GAN Ping. Electronic business enterprise of the DEA technical efficiency evaluation [J]. *Research productivity*, 2012, 06:232-234.
- [5] LI Xiao-Yu, TIAN Xin-Ming. E-commerce business efficiency research [J]. *Commercial age*, 2013, 13:34-35.