Research on Internet Corporate Social Responsibility Evaluation Based on Analytic Hierarchy Process

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Abstract—At present, China's Internet industry has a low level of social responsibility performance, and the social responsibility evaluation index system for Internet corporates has not been established. From the perspective of stakeholders in the Internet industry, this paper uses analytic hierarchy process to construct an evaluation index system of social responsibility for the Internet industry, which contains nine dimensions and 25 sub-indexes. Based on the established evaluation index system, ten listed Internet companies such as Alibaba and Tencent were selected to evaluate their social responsibility performance and compared. The results show that there is a big gap in the performance of Internet corporate social responsibility, and the performance of Internet giants is better.

Keywords-Internet industry; corporate social responsibility; evaluation index; stakeholders

1 INTRODUCTION

In recent years, China's Internet enterprises have enjoyed strong development and growing economic strength, which has promoted economic development and social progress. At the same time, the implementation of social responsibility of Internet enterprises has attracted much attention. Compared with other industries, the overall level of social responsibility fulfillment in the Internet industry is relatively low. Few Internet enterprises have realized the importance of social responsibility for sustainable development of enterprises, and have incorporated social responsibility fulfillment into corporate development strategy planning and put it into practice. The enthusiasm of China's Internet enterprises to fulfill their social responsibility needs to be stimulated. In this process, it is an important link to build an evaluation index system of corporate social responsibility based on the characteristics of the Internet industry.

2 RESEARCH REVIEW

2.1 Connotation of Corporate Social Responsibility

Oliver Sheldon[1](1924) put forward the concept of corporate social responsibility (CSR) for the first time and proposed to integrate ethical principles into the operation and management

of enterprises. He holds that while carrying out production activities to create economic profits, enterprises should meet the demands of stakeholders in the internal and external environment to a certain extent. Bowen[2] (1953) believed that enterprises should not only create profits for shareholders, but also comprehensively consider the interests of employees, suppliers, consumers and other interest groups to create welfare for the society. Different scholars' understanding of "corporate social responsibility" mainly lies in why enterprises should undertake social responsibility and how much social responsibility they need to undertake. With the development and progress of the times, "corporate social responsibility" has been endowed with new connotation of the times, but its essence has always been that enterprises should break the traditional limitation of profit maximization or shareholder's interests first and take into account the interests of all stakeholders.

2.2 Corporate Social Responsibility Evaluation Index System

Most scholars at home and abroad establish corporate social responsibility evaluation framework and index system based on "pyramid model"[3] (1979), "stakeholder theory"[4] (1983), and other theories and models. For example, Wang Xiaodong and Deng Kangyi[3] (2019) explored the game among enterprises, employees, customers, society and government from the perspective of stakeholders，and established an evaluation system of corporate social responsibility in line with China's national conditions. Considering the differences among different industries, some scholars have established evaluation systems of corporate social responsibility that conform to the characteristics of specific industries, but there are only a few references on establishing an evaluation index system of social responsibility based on the characteristics of the Internet industry. For example, based on stakeholder theory, pyramid theory and sustainable development theory, and combined with the characteristics and development status of China's blockchain industry, Sun Jianguo[6] (2020) constructed the evaluation index system of blockchain corporate social responsibility.

3 SELECTION PRINCIPLES OF CORPORATE SOCIAL RESPONSIBILITY EVALUATION INDICATORS

3.1 Principle of Systematization

The setting of the evaluation index system should reflect the performance of Internet corporate social responsibility from different dimensions. The indicators of different dimensions and different indicators of the same dimension have a clear logical relationship. Each upper indicator has some matching lower indicators, which can reflect the relevant characteristics of the evaluation object from shallow to deep, so as to form an organic and unified evaluation system.

3.2 Principle of Independence

Different indicators of the index system should be relatively independent, and the overlap between indicators should be as small as possible, so that they can represent the performance of a certain aspect of social responsibility to a high degree.

3.3 Principle of Importance

Select indicators with high generality and leading role as far as possible. When selecting indicators to evaluate the performance of corporate social responsibility in the Internet industry, the setting of indicators should be concise and summarized, rather than more.

3.4 Principle of Accuracy

The specific contents reflected by the indicators must be clear and the meaning expressed must be accurate.

3.5 Principle of Availability

Indicators of social responsibility evaluation for the Internet industry should be easy to obtain. Qualitative indicators tend to cause subjective judgment errors, while quantitative indicators can be more intuitive and accurate to evaluate, and easier to compare. Therefore, quantifiable indicators should be selected as far as possible, and qualitative indicators should be quantified as far as possible.

3.6 Principle of Comparability

The setting of Internet corporate social responsibility evaluation indicators should realize horizontal comparability of social responsibility construction levels among different enterprises and vertical comparability of social responsibility construction levels of the same enterprise in different periods.

4 DIMENSIONS OF INTERNET CORPORATE SOCIAL RESPONSIBILITY EVALUATION

Stakeholder theory holds that all the individuals and groups affected by the production, operation and management activities of the enterprise are the stakeholders of the enterprise. Internet enterprise stakeholders include shareholders, employees, customers, creditors, collaborators, government, community and the natural environment and competitors[7](2014). Select all stakeholders as the evaluation dimensions of Internet corporate social responsibility evaluation system, and analyze the main contents of each dimension according to the characteristics of the Internet industry[8](2015).

4.1 Shareholders

Shareholders provide important support for enterprises in terms of capital and technology, and are owners of enterprise assets. The purpose of shareholder investment is to enjoy the economic profit created by the enterprise and realize the preservation and appreciation of capital. When making operation and management decisions, managers should first ensure that the legitimate rights and interests of shareholders are not infringed, disclose relevant information of the company to shareholders in a timely, true, accurate and complete manner, formulate perfect profit distribution methods and distribute dividends reasonably and fairly.

4.2 Employees

Employees are direct creators of the profits of Internet enterprises. The fate of Internet enterprises largely depends on the innovation ability and dedication of employees. Only by fully respecting and protecting the rights of employees, caring and motivating employees, can enterprises retain innovative talents. The social responsibility of an enterprise to its employees mainly includes the following aspects: providing a safe working environment for employees and ensuring their life safety and health; pay employees' wages on time, pay insurance and provident fund for employees according to the prescribed standards, and improve employees' welfare; organize staff to carry out necessary vocational training; establish fair reward and promotion mechanism to stimulate employees' work enthusiasm and innovation ability; the hiring and firing of employees comply with relevant laws and regulations.

4.3 Users

Users can bring economic profits to enterprises, and enterprises should put satisfying customer needs in the first place in their business activities. Internet enterprises should explore needs of users quickly, actively innovate and update products and services in time. At the same time, Internet enterprises need to ensure user information security, strengthen platform supervision and content review, rectify all kinds of online disorder, protect the healthy growth of minors, and create a clean and upright cyberspace for young people. There are essential differences in products and services provided by different Internet platforms for users, and the emphasis on the social responsibility content of users is also different. More targeted evaluation indicators can be flexibly selected according to the attributes of different types of Internet platforms.

4.4 Creditors

Creditors expect enterprises to repay principal and interest on time, and pay most attention to the solvency of enterprises, especially short-term solvency. Internet enterprises shall be honest and trustworthy, use the borrowed funds for agreed purposes, and repay principal and interest on time.

4.5 Collaborators

"Strong cooperation" between enterprises and partners is helpful to enhance competitive advantages in the fierce market competition. Internet enterprises should abide by business ethics and industry norms, protect the trade secrets of their partners, and fulfill their obligations within the time limit stipulated in their contracts.

4.6 Government

The government vigorously supports the operation and development of the Internet industry, providing policy and financial support for the Internet industry. The Internet industry should abide by the law, pay taxes in accordance with the law, eliminate bribery and other corrupt practices, actively respond to relevant policies, support government's public welfare and charity undertakings, promote government-enterprise cooperation, and make full use of the technology and platform advantages to contribute to rural revitalization.

4.7 Community

As an important part of the community, enterprises should ensure that their production and operation activities do not disturb the order of the community. The development of enterprises is inseparable from the support of the community, and enterprises should give back to the community in appropriate ways, actively participate in community construction activities, support community public welfare and philanthropy, and provide jobs for community personnel.

4.8 Environment

The Internet industry should consciously fulfill its social responsibility for environmental protection, actively practice the concept of green management, green production and green operation, actively publicize environmental protection knowledge and innovate and promote green and energy-saving products by taking advantage of the platform.

4.9 Competitors

Internet enterprises are supposed to strictly abide by national laws and regulations, business ethics and industry self-discipline conventions, form a sound competition pattern through fair and benign competition, stimulate the innovation vitality of the industry as a whole and provide consumers with better products and services.

5 INTERNET CORPORATE SOCIAL RESPONSIBILITY EVALUATION INDEX SYSTEM

5.1 Index Selection

5.1.1 Internet corporate social responsibility evaluation index system

Following the selection principle of corporate social responsibility evaluation indicators and based on the nine dimensions and contents of the evaluation of corporate social responsibility in the Internet industry, indicators that can reflect the performance of corporate social responsibility in the Internet industry are selected, as shown in TABLE 1.

5.1.2 Description of indicators

The above quantitative indicators include positive indicators and negative indicators. Positive indicators are plus items for corporate social responsibility performance. The higher the positive indicator value is, the better the enterprise performs in the social responsibility content reflected by the index.

TABLE 1. INTERNET CORPORATE SOCIAL RESPONSIBILITY EVALUATION INDEX SYSTEM

Dimensions	Indicators	Indicator definition or meaning	Indicator properties
shareholders	earnings per share	(current net profit - preferred stock dividends)/year weighted average total equity	quantitative, positive
	return on equity	net profit/shareholders' equity ×100%	quantitative, positive

	net cash flow from operations per share	net cash flow from operating activities/total annual common stock	quantitative, positive
	value preservation and appreciation rate of capital	closing owner's equity/opening owner's equity × 100%	quantitative, positive
employees	basic rights and interests protection	get paid; rest and vacation; safety and health protection; skill training; social security	qualitative, positive
	welfare	subsidies; paid leave; group tourism; supplementary insurance and commercial insurance	qualitative, positive
	good office environment	good office conditions; good working atmosphere; good corporate culture	qualitative, positive
	democratic management	employee participation in democratic management	qualitative, positive
users	sales growth rate	(current year's sales - last year's sales)/last year's sales ×100%	quantitative, positive
	r&d investment ratio	r&d cost/total product sales revenue ×100%	quantitative, positive
	improving platform services	understanding users' needs; improving platform functions; improving service level	qualitative, positive
	cyberspace security	information security and privacy protection; purify cyberspace	qualitative, positive
creditors	asset-liability ratio	total liabilities/total assets×100%	quantitative, negative
	cash ratio	(monetary funds + marketable securities) /current liabilities ×100%	quantitative, positive
	interest coverage multiple	EBIT/interest expense	quantitative, positive
	operating cash flow ratio	net cash from operating operations/current liabilities ×100%	quantitative, positive
collaborators	accounts payable turnover	net main business cost/average accounts payable balance ×100%	quantitative, positive
	anti-commercial bribery	combating and punishing commercial bribery	qualitative, positive
government	tax rate on assets	total tax payment/asset size ×100%	quantitative, positive
	proportion of donated income	donation expenditure/total profit ×100%	quantitative, negative
	supporting rural revitalization	promoting rural revitalization	qualitative, positive
community	employment contribution	number of jobs provided	quantitative, positive
	promoting community development	participating in community building activities, public welfare and charity undertakings	quantitative, positive
environment	protecting the environment	low carbon operation; environmental protection publicity; environmental protection actions	qualitative, positive
competitors	unfair competition	monopoly and hostile competition	qualitative, negative

The negative indicators are the deduction items of corporate social responsibility performance. The higher the negative indicator value is, the worse the performance of social responsibility is.

The content reflected by "qualitative, positive" is positive, and the enterprise's fulfillment of the social responsibility content is "icing on the cake", but the enterprise's failure to fulfill the social responsibility content do not cause adverse effects. Assigning method can be used to quantify the indicators, that is, to score the performance of social responsibility content reflected by the qualitative indicators of Internet enterprises. If the performance is better or higher than the industry average, the qualitative index is assigned as 1; if the performance is not good enough or reaches the industry average level and needs to be improved, the score is 0.5; if the enterprise fails to fulfill the social responsibility or is lower than the industry average, the value is 0.

The content of "qualitative, negative" is negative. If the enterprise implements this behavior, it indicates that it damages the interests of stakeholders, and even may causes serious negative effects. For such indicators, the "one vote veto" system is adopted, that is, once the enterprise implements this kind of behavior, the social responsibility of this dimension not only does not add points, but also deducts certain points on the basis of comprehensive scores of social responsibility of other dimensions.

5.2 Analytic Hierarchy Process

There are many stakeholders in an enterprise, and the importance of each stakeholder to the survival and development of the enterprise is different, and the priority of the enterprise to fulfill its social responsibility to different stakeholders is also different. Analytic hierarchy process is used to determine the weight of corporate social responsibility in different dimensions in the Internet industry[7](2014).

5.2.1 Building judgment matrix

Assuming that there are n elements involved in the comparison, the n-step judgment matrix A can be constructed according to the nine-step scale method, $A = (a_{ij})_{n \times n}$. a_{ij} represents the relative importance of element i to element j, and the relative importance of element j to element i is expressed as a_{jr}, and $a_{jr} = 1/a_{ij}$. $a_{ij} = 1$ means that they are equally important, $a_{ij} = 3$ means that i is slightly more important than j, $a_{ij} = 5$ means that i is significantly more important than j, $a_{ij} = 7$ means that i is strongly more important than j, $a_{ij} = 9$ means that i is extremely important than j. Intermediate value 2,4,6,8 means that the relative importance is between two adjacent importance levels. For example, 2 is between 1 and 3, and means that the importance of i to j is between equally important and slightly important.

Relevant experts were invited to pairwise compare and score the nine dimensions of corporate social responsibility in the Internet industry, and then took the integer approximation value of the average value to construct a judgment matrix. In order to show the relative importance of each factor more intuitively, the judgment matrix A is expressed in table form, as shown in TABLE 2.

TABLE 2. JUDGMENT MATRIX

Dimensions	Shareholders	Employees	Users	Creditors	Collaborators	Government	Community	Environment	Competitors
Shareholders	1	2	2	3	3	4	5	5	7
Employees	1/2	1	1	2	2	2	3	4	6
Users	1/2	1	1	2	2	2	3	5	6
Creditors	1/3	1/2	1/2	1	2	3	3	4	5
Collaborators	1/3	1/2	1/2	1/2	1	2	3	3	4
Government	1/4	1/2	1/2	1/3	1/2	1	2	2	4
Community	1/5	1/3	1/3	1/3	1/3	1/2	1	2	3
Environment	1/5	1/4	1/5	1/4	1/3	1/2	1/2	1	3
Competitors	1/7	1/6	1/6	1/5	1/4	1/4	1/3	1/3	1

5.2.2 Normalization of judgment matrix

The judgment matrix A is normalized by the normal-column averaging method. Firstly, the sum of the elements of each column vector of judgment matrix A is calculated, then the ratio b_{ij} of each element to the sum of the corresponding column vector elements is calculated, and the matrix $B = (b_{ij})_{9 \times 9}$ is obtained, $b_{ij} = \frac{a_{ij}}{\Sigma_{j=1}^{9} a_{ij}}$.

$$B = \begin{bmatrix} 0.29 & 0.32 & 0.32 & 0.31 & 0.26 & 0.26 & 0.24 & 0.19 & 0.18 \\ 0.14 & 0.16 & 0.16 & 0.21 & 0.18 & 0.13 & 0.14 & 0.15 & 0.15 \\ 0.14 & 0.16 & 0.16 & 0.21 & 0.18 & 0.13 & 0.14 & 0.19 & 0.15 \\ 0.10 & 0.08 & 0.08 & 0.10 & 0.18 & 0.20 & 0.14 & 0.15 & 0.13 \\ 0.10 & 0.08 & 0.08 & 0.05 & 0.09 & 0.13 & 0.14 & 0.11 & 0.10 \\ 0.07 & 0.08 & 0.08 & 0.03 & 0.04 & 0.07 & 0.10 & 0.08 & 0.10 \\ 0.06 & 0.05 & 0.05 & 0.03 & 0.03 & 0.03 & 0.05 & 0.08 & 0.08 \\ 0.06 & 0.04 & 0.03 & 0.03 & 0.03 & 0.03 & 0.02 & 0.04 & 0.08 \\ 0.04 & 0.03 & 0.03 & 0.02 & 0.02 & 0.02 & 0.02 & 0.01 & 0.03 \end{bmatrix}$$

5.2.3 Calculating weights and weight vectors

Calculate the average value ω_i of each row vector element of matrix B, which represents the weight of each dimension of Internet corporate social responsibility, and ω_i is calculated according to formula (1):

$$\omega_i = \frac{1}{n} \sum_{j=1}^{n} b_{ij} . \tag{1}$$

For example, $\omega_1 = (0.29 + 0.32 + 0.32 + 0.31 + 0.26 + 0.26 + 0.24 + 0.19 + 0.18)/9 = 0.264$, ω_1 represents the weight of shareholders. Similarly, weight values of other dimensions can be calculated, and then weight vector ω can be obtained. $\omega = [\omega_1 \quad \omega_2 \quad \omega_3 \quad \omega_4 \quad \omega_5 \quad \omega_6 \quad \omega_7 \quad \omega_8 \quad \omega_9]^T = [0.26 \quad 0.16 \quad 0.16 \quad 0.13 \quad 0.10 \quad 0.07 \quad 0.05 \quad 0.04 \quad 0.02]^T$.

5.2.4 Calculating the maximum eigenvalue

$$B\omega = [2.50 \quad 1.50 \quad 1.54 \quad 1.22 \quad 0.92 \quad 0.67 \quad 0.47 \quad 0.36 \quad 0.21]^T$$

The maximum eigenvalue is calculated according to formula (2):

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^{n} \frac{(B\omega)_i}{\omega_i} . \tag{2}$$

The calculated maximum eigenvalue is 9.329.

5.2.5 Consistency test

Consistency index CI value is calculated according to formula (3):

$$CI = \frac{\lambda_{max} - n}{n - 1} . \tag{3}$$

The calculated CI value is 0.041. By referring to the RI value table of random consistency test, it can be seen that the RI value of the random consistency index of the ninth order judgment matrix is 1.46, and then the CR value is calculated according to formula (4) :

$$CR = \frac{CI}{RI} . \tag{4}$$

The CR value calculated is 0.028. When $CR<0.1$, the judgment matrix can be considered to pass the consistency test. Here, $CR=0.028<0.1$, so the weight determined by the weight vector ω is reliable.

5.3 Evaluation of Index System

The evaluation index system contains nine dimensions, which are relatively comprehensive. The selection of social responsibility evaluation indicators of each dimension can reflect the corresponding content of corporate social responsibility. The evaluation index system has made detailed provisions on the treatment of qualitative indicators, and has strong operability.

There is room for further improvement in the selection of indicators. The selection of indicators should take into account availability and accuracy. Due to the low quality of Internet corporate social responsibility information disclosure, the different degree of detail and proof of social responsibility performance disclosure in all dimensions, and the low comparability of social responsibility performance information disclosure among different enterprises, the selection of evaluation indicators is greatly limited. If enterprises improve the quality of social responsibility information disclosure, more suitable indicators can be selected.

6 INTERNET ENTERPRISES SOCIAL RESPONSIBILITY ASSESSMENT

Select Alibaba, Tencent, JD.com and other top 10 listed Internet enterprises in China, and evaluate the CSR performance of each enterprise according to the established Internet evaluation index system.

6.1 Index Value Calculation or Assignment

According to the 2021 annual financial reports of each listed company, corporate social responsibility reports and relevant information reported by the media, calculate each index value or assign value to the index value. Quantitative indicators such as earnings per share and return on net assets were calculated according to balance sheets, income statements and cash flow statements. Qualitative indicators such as employee welfare, anti-commercial bribery were scored according to the social responsibility report of each enterprise and relevant media reports. Unfair competition was measured according to monopoly penalties announced by the State Administration for Market Regulation of China. When using the assignment method, in order to reduce the influence of subjective judgment, researchers carefully read and mined important information, and increased or decreased scores accordingly.

6.2 Dimensionless Processing

The normalized method is adopted to conduct dimensionless processing for each index value.

6.3 Calculating Social Responsibility Performance Score

Multiply the sum of the dimensionless index values of each dimension by the corresponding weight, and the result is the score of each dimension. The final score is obtained by adding the scores of each dimension. The performance of corporate social responsibility in all dimensions and the overall performance of social responsibility score are shown in TABLE 3.

6.4 Results

Tencent has the best CSR performance with 2.468 points, followed by Alibaba and JD.com with 2.450 and 2.057 points respectively. The social responsibility performance of Pinduoduo, Baidu, NetEase and DIDI is in the middle level, with 1.506, 1.497, 1.449 and 1.040 points respectively. Ctrip, Meituan and Bilibili lags behind in social responsibility performance, with 0.994, 0.936 and 0.808 points, respectively.

There is a large gap in the level of social responsibility fulfillment of Internet enterprises. The level of social responsibility construction and management of Internet industry giants such as Tencent and Alibaba is much higher than that of other enterprises.

Most Internet enterprises perform well in the three dimensions of shareholders, employees and users, while the performance of social responsibilities in other dimensions needs to be improved.

7 CONCLUSION

In view of the fact that the social responsibility construction level of the Internet industry lags far behind the development situation of the industry, the following suggestions are put forward to the Internet industry: the construction of Internet corporate social responsibility should combine the overall situation of national development, attach importance to cyberspace governance, and strengthen industry self-discipline. The following suggestions are put forward to further improve the social responsibility evaluation of the Internet industry: standardize the disclosure of social responsibility information, improve the professional quality of evaluators, and innovate and improve the evaluation methods.

TABLE 3. SOCIAL RESPONSIBILITY ASSESSMENT OF CHINA'S TOP 10 LISTED INTERNET COMPANIES

Dimensions	Alibaba	Tencent	JD.com	Baidu	Meituan	Netease	Pinduoduo	DIDI	Ctrip	Bilibili
shareholders	0.510	0.877	0.563	0.597	0.458	0.569	0.668	0.286	0.364	0.085
employees	0.795	0.540	0.652	0.231	0.023	0.303	0.297	0.062	0.080	0.158
users	0.374	0.477	0.302	0.279	0.279	0.144	0.195	0.202	0.367	0.259
creditors	0.356	0.257	0.119	0.295	0.061	0.298	0.216	0.310	0.107	0.265
collaborators	0.099	0.099	0.138	0.020	0.061	0.009	0.040	0.158	0.020	0.020
government	0.131	0.083	0.136	0.045	0.036	0.106	0.072	0.007	0.006	0.006
community	0.089	0.051	0.090	0.022	0.017	0.004	0.000	0.002	0.051	0.001
environment	0.120	0.088	0.062	0.014	0.012	0.015	0.018	0.017	0.000	0.018
competitors	-0.023	-0.005	-0.005	-0.007	-0.012	0.000	0.000	-0.002	0.000	-0.002
total score	2.450	2.468	2.057	1.497	0.936	1.449	1.506	1.040	0.994	0.808

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