

An Investigation of Internet Enterprise Value Assessment Based on Comprehensive Evaluation Method

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Abstract

According to the overall asset status, the profitability and the economic environment, enterprise value evaluation is a comprehensive assessment of the overall fair market of the enterprise. Different enterprises have different nature and assessment targets, a suitable method should be chosen for assessment of different enterprise characteristics. The traditional methods of enterprise value evaluation can be summarized as three basic types: the cost methods, the marketing method and the revenue method. Different from traditional enterprise, internet enterprise is defined as the knowledge-intensive enterprise, whose enterprise value has a very typical light asset structure. A new enterprise value evaluation method should be raised for internet enterprises. In this paper, a complete and comprehensive assessment system based on fuzzy mathematics and analytic hierarchy process (AHP) has been raised for internet listed enterprise value. The assessment system put forward five general indicators to assess the overall value of target enterprise, including the own value of enterprise, strategic core, product design and service, financial status and potential value. All indicators are divided into two classes: quantitative group and qualitative group. The weight coefficients of quantitative group are determined by data collection and the qualitative group weight coefficients are determined by expert scoring method. Considering all the indicators having different units, extreme method has been used for non-dimension and the indicators can be compared between each other. Every enterprise has a score which can represent one's own status in the whole internet industry which depends on the whole value of the five different indicators. The stock value of every internet enterprise can be estimated by the comprehensive score and the otherness between the different results from different value methods can be compared.

Keywords

Internet Enterprise Value, Comprehensive Evaluation Method, Analytic

1. Introduction

In recent years, many enterprises based on internet have reached a high-speed economic development period and obtain a pivotal position in the entire capital market. As the main representatives of the new economy, internet enterprises have acquired the strong momentum of development especially in the NASDAQ market in the United States and the Shanghai and Shenzhen domestic market. On one hand, differ from the traditional enterprises, the internet enterprises have the unique profit model, the different development regularity. On the other hand, the internet enterprises are better than the traditional enterprises about the innovation and the market strain capacity. Last but not the least, a reasonable prediction on the economic value is the premise condition for a healthy enterprise. Therefore, in this economic environment, the research about how to evaluate Internet companies and avoid the second internet bubble economy has a high practical value.

2. Sample Selection and Data Acquisition

In this paper, the study samples are consist of twenty three Chinese internet enterprises from the NASDAQ stock market. The indictors like continuous innovation, corporate culture are analyzed by Delphi quantitative method, which means that a review group consist of ten authoritative experts should learn more about the target enterprise and give it a score [1]. The other indictors like customer retention time, the customer flow and the total site visits can be found on the websites. Standardized treatment and analytic hierarchy process should be used for all the indictors to obtain each index and the subsystem weight. All the indictors can only be compared with each other to obtain the weight after non-dimensional process [2].

2.1. Indicator Establishment of Comprehensive Evaluation for Internet Enterprises

In the process during the internet enterprise evaluation, financial data shouldn't be the only reference standard for the enterprise value, the indictors can't overly dependent on the stable indicator system and the weight can't excessively rely on the subjective ideas of experts [3]. Considering the particularity of the internet enterprises and the applicability of the model, all the indictors should be determined on the point of generality. As shown in **Table 1**. To evaluate the value of internet enterprise, five indictors like the self-value, the strategic core, the product design and service, the financial status and the potential value have been established as the second hierarchy. Every indicator has been divided into several secondary indictors which are regarded as the third hierarchy [4].

Table 1. Analytic hierarchy process of target enterprises.

Indictors	Secondary indictors
Self-value (A)	Company culture (a1)
	Brand influence (a2)
Strategic core (B)	Staff education (a3)
	Monthly page views (b1)
	Market share (b2)
	Customer flow (c1)
	retention time (c2)
Value of internet enterprise	Product design and service (c)
	User stickiness (c3)
	Page views (c4)
	Continuous innovation (c5)
	Income (d1)
Financial status (D)	Net cash flow (d2)
	Wool yield (d3)
	Gross margin (e1)
Potential value (E)	Total revenue growth rate (e2)
	Stock returns (e3)

2.2. Index Processing

In this paper, all the indictors have been divided into two groups: the quantitative indictors and the qualitative indictors. The quantitative indictors in this paper means the evaluation indictors can be characterized and calculated directly and the data can be collected from the enterprise financial statements. The qualitative indictors represent that the data can't be found from related financial accounts of the target enterprises. The weight of quantitative indictors can be calculated by specific data process, however, the qualitative indictors should be treated quantitatively before comparing the differences.

2.3. Quantitative Treatment of Qualitative Indicators

All the indictors should be quantified first before fuzzy comprehensive assessment. To feedback the weight, Delphi method has been used to quantify the qualitative indictors. All the evaluation grades are range from level 1 to level 5 and value of each grade are represented by V1, V2, V3, V4 and V5. All the indictors should be scored by ten authoritative experts who learn more about internet enterprise evaluation and the vote number of every level are record by N1, N2, N3, N4, and N5 [5]. Then the index can be calculated by the formula:

$$\text{Index} = (V1N1 + V2N2 + \dots + V5N5) / 10$$

For example, during the judge of one qualitative indictor, there are two experts score it level 1, three experts score it level 2, four experts score it level 3, and only one expert score it level 4. Then the membership degree can be deter-

mined: $U = \{0.2, 0.3, 0.4, 0.1, 0\}$. To obtain the qualified results and each grade has been represented by specific value: $V = \{V1, V2, V3, V4, V5\} = \{1, 0.8, 0.6, 0.4, 0.2\}$. The result can be expressed by the index: $\text{Index} = U1V1 + U2V2 + \dots + U5V5 = 0.72$. It means that value 0.72 can be equal to the importance of the qualitative indicator after consistency test.

3. Indicator Comparison and Weight Analysis

In this paper, all the indicator weight are determined by analytic hierarchy process (AHP) and all the quantitative treatments are on the basic of Delphi method [6]. As shown in Table 2. The indicators on the same level should be compared with each other to get the relative importance and the scale score. Then the judgment matrix can be established to obtain the weight.

3.1. The Comparison of Enterprise Culture between Different Internet Enterprises

The principle of the selection of target enterprises includes many aspects like the research samples must cover different types of internet enterprises, the valuation error result from the exchange rate and the time difference must be avoid and the samples must be provided with the reliability and the universality. The samples in this paper have obtained electricity, news, video, instant messaging tools, dating social and so on. Secondly, the samples are all have a certain market position and business history and the financial data are credible. In conclusion, twenty-three Chinese internet enterprises listed in the United States have been

Table 2. Weights of different indicators.

Indictors		Weight	Secondary indictors	Weight
Self-value (A)		Aw = 0.15	Company culture (a1)	aw1 = 0.64
			Brand influence (a2)	aw2 = 0.26
			Staff education (a3)	aw3 = 0.10
Strategic core (B)		Bw = 0.27	Monthly page views (b1)	bw1 = 0.25
			Market share (b2)	bw2 = 0.75
			Customer flow (c1)	cw1 = 0.10
Value of internet enterprise	Product design and service (c)	Cw = 0.37	retention time (c2)	cw2 = 0.04
			User stickiness (c3)	cw3 = 0.29
			Page views (c4)	cw4 = 0.06
			Continuous innovation (c5)	cw5 = 0.51
			Income (d1)	dw1 = 0.14
Financial status (D)		Dw = 0.13	Net cash flow (d2)	dw2 = 0.43
			Wool yield (d3)	dw3 = 0.43
			Gross margin (e1)	ew1 = 0.14
Potential value (E)		Ew = 0.08	Total revenue growth rate (e2)	ew2 = 0.72
			Stock returns (e3)	ew3 = 0.14

chosen as the research samples. According to the quantitative treatment that the qualitative indicators of all the research samples have been processed by Delphi method. The quantitative indicators like retention time, page views and customer flow can be queried on the websites. Every indicator has been processed and every research sample has been analyzed [7]. All the results have been standardized and the final scores are fall into (0, 1).

As shown in **Table 3** and **Figure 1**. The comparison of enterprise culture is a quantitative indicator that can't be compared directly. Delphi method and standardized scoring method have been used to express the difference of the enterprise culture among the research samples. There are 5 levels (A, B, C, D and E) to represent the culture degree which the sample enterprise attached. The weight of the five evaluation grades are respectively 100, 80, 60, 40 and 20. Every research sample can obtain a score according the result of Delphi method. On the point of the whole internet industry, all the scores have been standardized and

Table 3. The comparison of enterprise culture.

Enterprise name	Enterprise culture					score	Standard score
	A	B	C	D	E		
SINA	0.9	0.1	0	0	0	98	0.975
NTES	0.9	0.1	0	0	0	98	0.975
SOHU	1		0	0	0	100	1
BIDU	1	0	0	0	0	100	1
GAME	0	0	0	0.1	0.9	22	0.025
Giant	0	0	0	0.1	0.9	22	0.025
NCTY	0	0	0	0	1	20	0
CYOU	0.3	0.6	0.1	0	0	84	0.8
PWRD	0	0.1	0.6	0.3	0	56	0.45
CTRP	0.1	0.7	0.2	0	0	78	0.725
JRJC	0	0	0	0	1	20	0
LONG	0	0.3	0.6	0.1	0	64	0.55
JOBS	1	0	0	0	0	100	1
KZ	0	0	0	0.8	0.2	36	0.2
KUTV	0	0	0	0	1	20	0
SFUN	0.3	0.6	0.1	0	0	84	0.8
YOKU	0	0.1	0.8	0.1	0	60	0.5
QIHU	0	0	0.2	0.6	0.2	40	0.25
RENN	0	0	0	0.3	0.7	26	0.075
DATE	0	0	0	0	1	20	0
FENG	0	0	0	0.7	0.3	34	0.175
TAOM	0	0	0	0.7	0.3	34	0.175
NQ	0	0	0	0	1	20	0

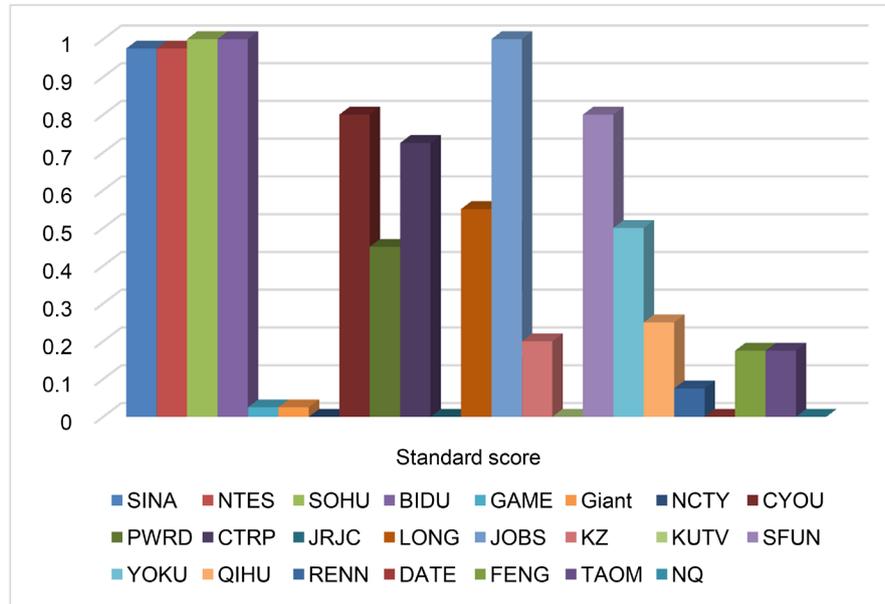


Figure 1. The comparison of enterprise culture.

the final scores are fall into (0, 1), and the difference of culture among all the research samples can be compared with each other. As shown in Figure 1, the enterprise culture are best in SOHO and BIDU, followed by SINA, NTES and JOBS. However, JRJC, KUTV, DATE and NQ have the lowest scores. These enterprises which have worse scores should strengthen improve the enterprise culture construction and move closer to the enterprises like BIDU, SOHO and so on.

3.2. Brand Influence Comparison

The brand influence can reflect the degree of recognition. Through the page level PR value from the side to respond to the object of the enterprise popularity. The PR value range from 0 to 10. The greater the PR value, the more popular the enterprise. Usually, if the PR value less than 2 then the enterprises are not popular, however, when the value greater than 7 then the enterprises are very popular. In addition, the PR value of research samples can be found on the internet.

The brand influence can affect the customer flow and the potential development value directly. As shown in Figure 2 and Figure 3. BIDU is the only enterprise that the brand influence can exceed 0.9, followed by SINA, NTES and SOHO. The other brand influence can float around 0.5 and keep normal status. All the internet enterprises should improve the brand influence to promote the whole internet brand development.

3.3. Employee Education Level

The employee education level can reflect the professional degree and knowledge accumulation level the whole internet enterprise. The employees can be divided into bachelor, master, doctorate and turtles. The weight are respectively 1, 3, 4 and 5.

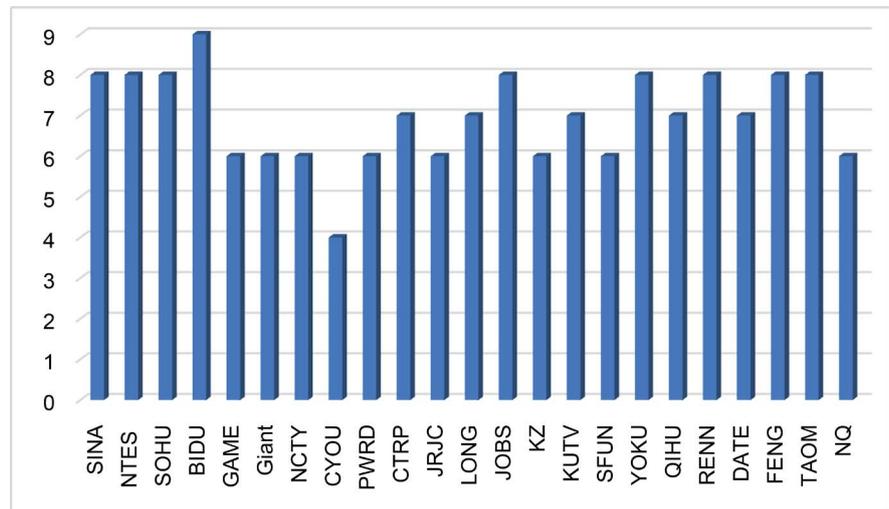


Figure 2. Comparison of brand influence (PR).

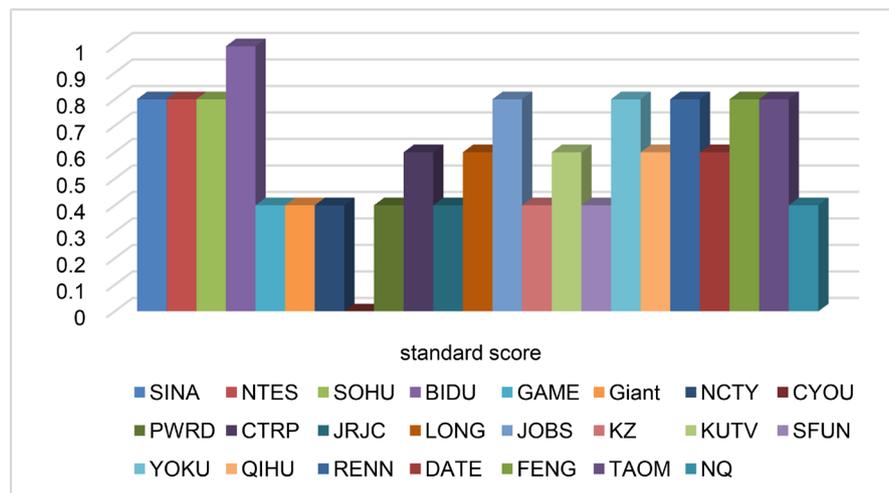


Figure 3. The standard scores of brand influence.

The employee education can reflect the ability of the enterprise to solve the difficulties and the technical content of one’s main products. As shown in **Figure 4** and **Figure 5**, the employee education level like NCTY, CYOU, YOKU and DATE are mainly bachelor. To improve the team ability, these enterprises may consider appropriate to introduce sophisticated talent in order to improve the enterprise’s own inner strength. The enterprises like SINA, CTRP, GAME, RENN and NQ are main consist of Doctoral and returnees and the intrinsic value are relatively higher. The employee education of other enterprises are relatively balanced and stable.

3.4. Enterprise Core Competence

With the development of the internet, the internet enterprises have a great breakthrough development in time and space and a more complex and larger customer volume. The market share of internet enterprise can be expressed by the characteristics of customs [7]. The visitor amount per million, the independent

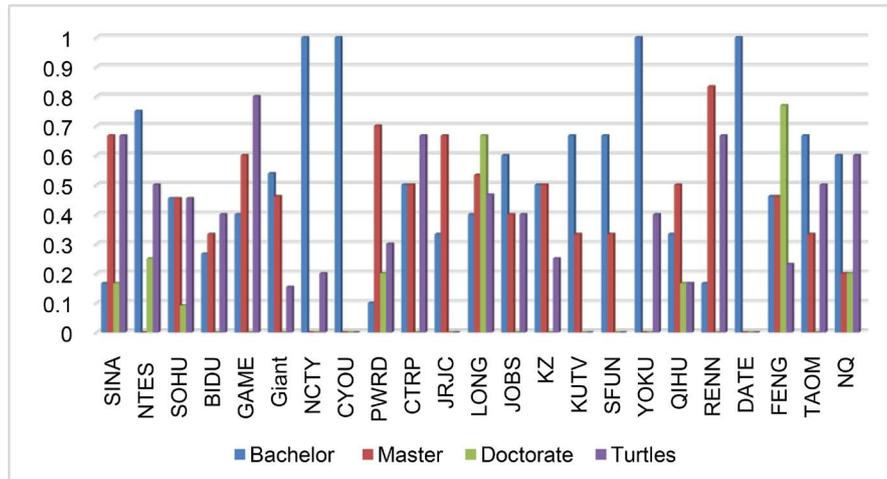


Figure 4. Employee education level of internet enterprises.

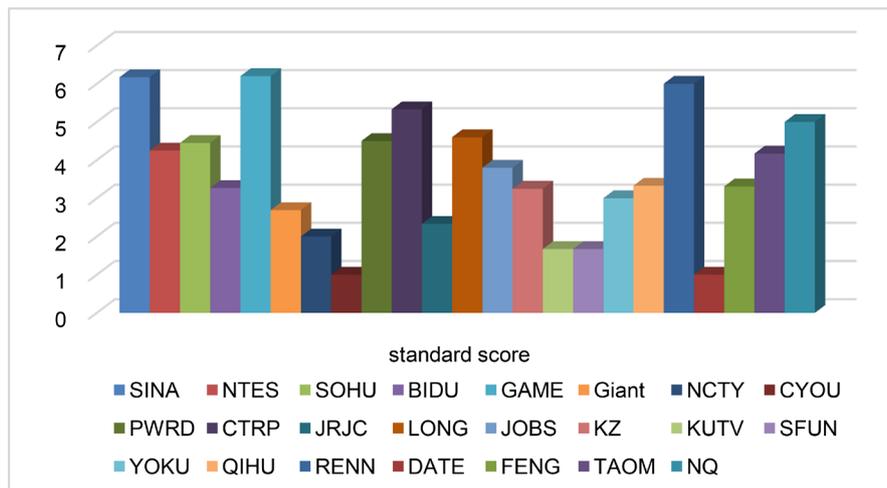


Figure 5. The standard scores of employee in internet enterprises.

user amount, the residence time and the loyalty of users have been chosen to reflect the characteristics of custom and all the data can be obtained from the Alexa website. As shown in Figure 6, the enterprises like SINA, NTES and BIDU have a high amount of independent and a higher market share. The other enterprises have a certain number of visitors, however, the independent user number is very few and the market share is not as much as BIDU, SINA and so on. These internet enterprises not only to increase the ability to attract customs but also to raise the construction of websites and their own characteristics to improve the depth of experience. The residence time and the loyalty can represent the custom sticky, custom demand and attention focus [8]. All the enterprises should dig the large data and improve the popularity among the customs.

3.5. The Comparison of the Innovation Ability

As shown in Figure 7, the research samples have different levels of innovation ability. BIDU, SINA, NTES, SOHO and JOBS are relatively higher and the enterprise innovation ability like JRJC, KUTV and FENG are lower. The innovation

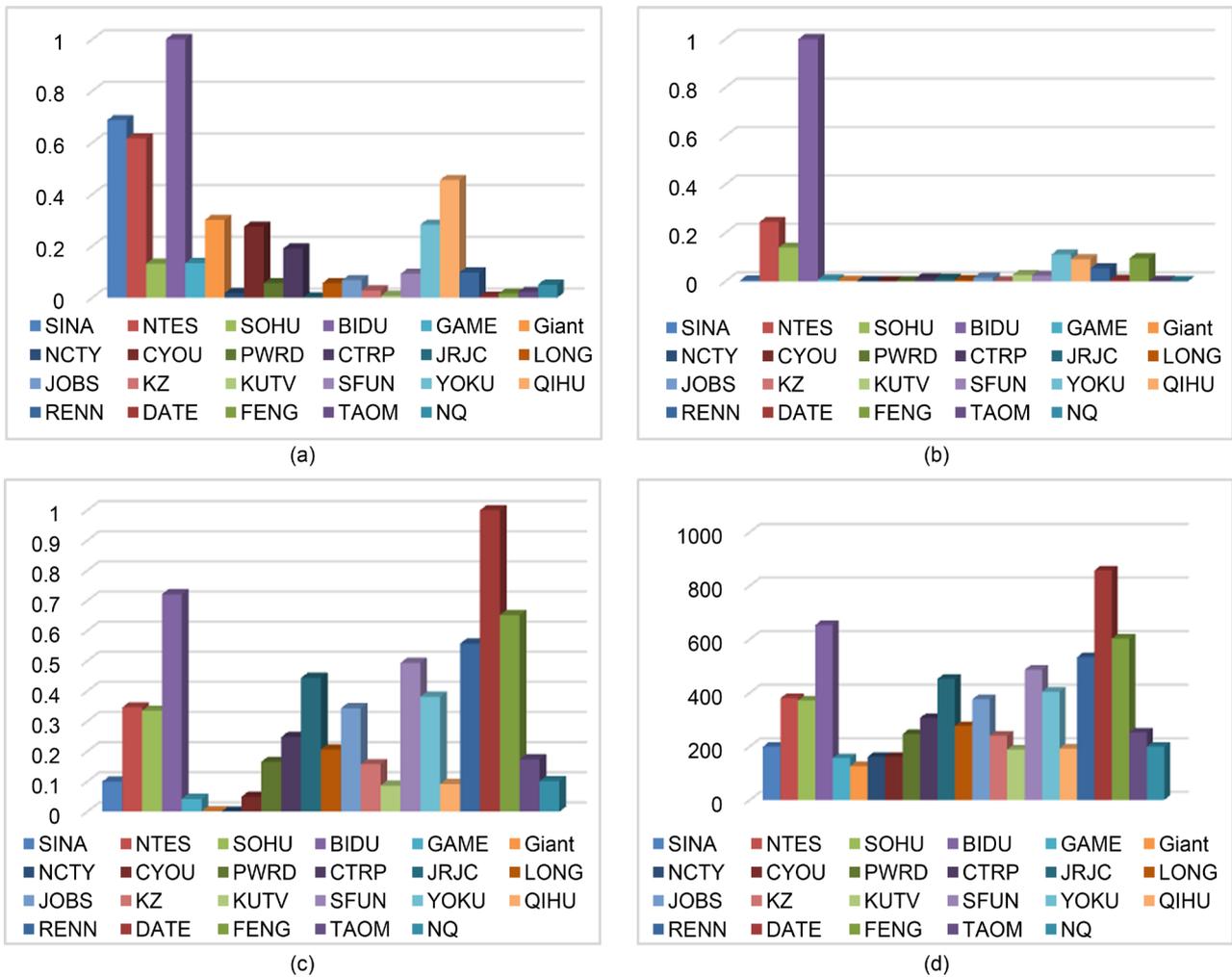


Figure 6. The comparison of enterprise core competence. (a) Internet enterprise visitor amount per million; (b) Independent user views; (c) Residence time of internet enterprises; (d) The loyalty of users.

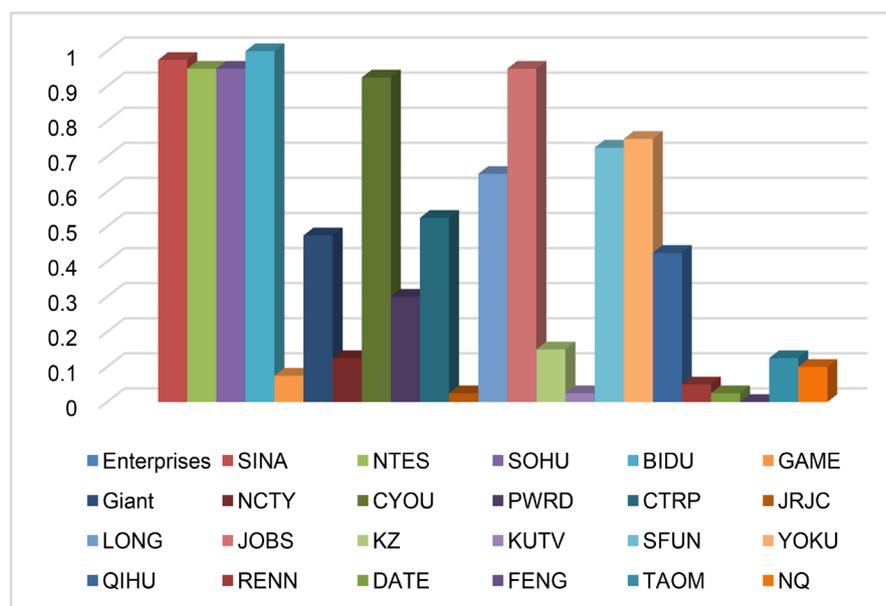


Figure 7. The comparison of the innovation ability.

can be divided into research capabilities, management capabilities and organizational capabilities. The research capabilities can increase the value and the performance of internet enterprises. Besides, the management capabilities and organizational capabilities can also affect the resource allocation and the enterprise value. All the internet enterprises should pay more attention to the innovation enhance and diffusion.

Standardization score summary of the internet enterprise evaluation index.

4. Conclusions

The weight of self-value, strategic core, product design and service, financial status and potential value is respectively 0.15, 0.27, 0.37, 0.13 and 0.08. In this paper, the customer characteristic, the financial status, the sustained competitiveness and the potential value have been analyzed and compared. As a kind of knowledge intensive enterprises, the Internet enterprises should pay more attention to the adjustment of light assets. Each research sample has been studied and the comprehensive score has been calculated. According to the scores, all the stock prices can be evaluated by the composite method [9] [10].

The comprehensive method for enterprise value assessment is very similar to the market method. Besides, PB method and PE method are the most popular in marketing methods [11]. As shown in **Table 4**, the result calculated from the

Table 4. The comparison of the comprehensive results.

SAMPLES	self-value	strategic core	product design and service	financial status	potential value	Comprehensive scores
SINA	0.975	0.1741	0.5069	0.092	0.1679	0.4069
NTES	0.8932	0.3377	0.5760	0.6179	0.3432	0.5461
SOHO	0.9132	0.1373	0.5771	0.2318	0.1529	0.4304
BIDU	0.9409	1	0.8988	0.9575	0.5233	0.9121
GAME	0.2239	0.0394	0.0587	0.2984	0.0987	0.1119
Giant	0.1533	0.0768	0.2487	0.5087	0.2597	0.2216
NCTY	0.1235	0.0049	0.0634	0.0008	0.4195	0.032
CYOU	0.5096	0.0686	0.4842	0.4823	0.442	0.3707
PWRD	0.4604	0.0147	0.2011	0.1795	0.2534	0.1901
CTRP	0.7041	0.0562	0.3555	0.3529	0.2466	0.3172
JRJC	0.1302	0.0079	0.0563	0.0007	0.1004	0.0503
LONG	0.5778	0.0174	0.3801	0.01	0.1845	0.2479
JOBS	0.9	0.0284	0.6368	0.4366	0.2462	0.4542
KZ	0.276	0.0074	0.1189	0.117	0.0616	0.1073
KUTV	0.1684	0.0214	0.0441	0	0	0.0284
SFUM	0.6263	0.0404	0.5218	0.3585	0.3854	0.0722
YOKU	0.5654	0.1542	0.4639	0.015	0.6193	0.3482
QIHU	0.3612	0.1817	0.2603	0.1659	0.8687	0.2878
RENN	0.3551	0.0645	0.1076	0.0068	0.3568	0.1388
DATE	0.155	0.0051	0.3422	0.1204	0.4244	0.1994
FENG	0.3168	0.0748	0.1458	0.0854	0.2782	0.0873
TAOM	0.3819	0.0071	0.0897	0.3328	0.1635	0.0845
NQ	0.1839	0.0124	0.0698	0.0067	0.7356	0.0427

comprehensive method have been compared with the results calculated by the PB and the PE methods. By comparing the error rates between the estimates and the real stock prices, the method raised in this paper is more appropriate for the assessment of internet enterprise value has been proved. Relative error rate can be calculated by the ratio between the difference of the actual value and the estimated value and the real stock price.

In the process of the value assessment by the comprehensive method, all the internet enterprises should be considered. This paper only chose 23 Chinese internet enterprises from the NASDAQ market as the research samples and the error rate relatively larger. However, the error rates form different methods be compared and the result can be proved that the comprehensive method is more appropriate to the value assessment of internet enterprises.

As shown in **Table 5**, to evaluate the internet enterprise value, the comprehensive method based on fuzzy mathematics and analytic hierarchy process has

Table 5. The difference result of different value methods.

Indictor	Stock price	Score	Comprehensive method	Error rate	PB	Error rate	PE	Error rate
SINA	69.16	0.4069	32.36	0.53	70.07	0.013	29.08	0.58
NTES	51.01	0.5461	43.14	0.15	58.96	0.156	161.5	2.17
SOHO	41.55	0.4304	34	0.18	78.38	0.89	74.14	0.78
BIDU	173.1	0.9121	72.06	0.58	69.96	0.6	318.3	0.84
GAME	6.98	0.1119	2.41	0.69	15.65	1.24	6.193	0.113
Giant	11.92	0.2216	17.51	1.68	12.15	0.02	5.567	0.53
NCTY	1.02	0.032	2.53	1.48	7.63	6.48		
CYOU	30.55	0.3707	29.29	0.04	36.34	1.19	19.85	0.35
PWRD	30.96	0.1901	15.09	0.51	107.6	2.46	24.41	0.21
CTRP	47.81	0.3172	25.06	0.48	49.28	0.03	75.8	0.59
JRJC	3.05	0.0503	3.95	0.3	24.3	6.96		
LONG	18	0.2479	19.58	0.09	32.14	0.79	2.56	0.86
JOBS	35.64	0.4542	35.88	0.01	27.43	0.23	17.61	0.51
KZ	7.25	0.1073	8.48	0.17	23.64	2.26	27.77	2.83
KUTV	1.02	0.0284	2.24	1.2	2.01	0.97		
SFUM	3.05	0.0722	5.7	0.87	3.89	0.28	7.05	1.31
YOKU	27.54	0.3482	27.51	0	38.9	0.41		
QIHU	31.54	0.2878	22.74	0.28	11.73	0.63	16.02	0.49
RENN	7.96	0.1388	10.97	0.37	24.09	2.03		
DATE	7.46	0.1994	15.75	0.97	10.86	0.46	9.96	0.34
FENG	3.62	0.0873	6.9	0.91	8.16	1.25	8.08	1.23
TAOM	3.7	0.0845	6.68	0.8	8.32	1.25	9.75	1.64
NQ	3.8	0.0427	3.37	0.11	6.99	0.84	3.35	0.12
Average value				0.539		1.366		0.861

been raised to compare with the market methods. The internet enterprise value has been divided and classified into five indicators. The data of quantify indicators can be found from the websites. The qualitative indicator can be quantified by Delphi method of expert scoring method. All the data of indicators have been standardized and the difference can be compared. Every research sample has obtained a comprehensive score based on the five indicators. The stock price can be calculated by the standard score according to the whole internet industry. The error rate of the comprehensive method, the PB method and the PE method are respectively 0.539, 1.366 and 0.861.

Chinese internet enterprises comparing to the western countries are in the developing stage and the value assessment is the most important in economic activities. More and more researchers from different courses should participate in the research. Only from various disciplines of statistical methods to analyze, the value assessment of internet enterprises can be improved.

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