

INTANGIBLE ASSETS INDEX: AN EMPIRICAL STUDY BASED ON A SHARES INFORMATION TECHNOLOGY COMPANY

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Abstract:

As our country's economic development mode changes from relying on the input of capital and material elements-extensive economic growth mode to rely on scientific and technological progress and human capital-intensive economic growth mode, the intellectual property rights and human capital as a typical representative of the intangible assets are more and more activities in the enterprise value creation. This paper is based on the theory of technology innovation, the theory of core competence and the theory of sustainable competitive advantage, combining with questionnaire investigation, using AHP and entropy method, constructing intangible assets evaluation index, in order to reveal the technological innovation ability, the core competitiveness and sustainable development capacity of enterprises, then making empirical test by information technology industry listing Corporation 2010-2012 data, and analyzing the results.

Keywords: intangible assets index; AHP; entropy method; innovation

1. INTRODUCTION

As the economy and technology develops rapidly, the percentage of tangible assets in the total assets has reduced gradually, but that of the intangible assets has increased. The report did by the Ocean Tomo Company on the value of Standard & Poor's 500 index sample stocks in America draws the following conclusions. In 1975, in the 500 Standard & Poor quoted companies, the tangible assets occupied 83%, but the intangible assets 17%; in 1995, the tangible assets occupied 32%, but the intangible assets 68%; in 2010, the percentage of the tangible assets reduced to 20%, but the intangible assets increase to 80%. Nowadays, the intangible assets represent the comprehensive advantages of the enterprises in the market competition, such as, the patent right, the non-patent right, the trademark right, the copyright, the land use right and so on. The intangible assets have become the strategic resource in the developments of enterprises. They play a significant role in production, operation, management and so on.

Recently, the domestic and international researches on intangible assets show the interdisciplinary development trend, including the intangible assets counting, intangible assets evaluation, intangible assets management, intangible assets trade, the legal protection of intangible assets and so on. However, the researches on index are mainly on price index, stock index, Corporate Governance Index, IP index, but the researches on intangible assets index are still in infancy. In 2010 Tianjin Intangible Asset Research Association and Tianjin Modern Research Institute of Intangible Assets began to study the problem. Yu (2012) believes that the Intangible Assets Index is a numerical comparison between the number of the intangible assets in a certain period and the one in the relatively standard period². Yuan (2012) suggests that "Intangible Assets Index is a sign which reflects the changes and trends in the innovation ability, competitive ability and development potentials of an enterprise."³

Based on the Technological Innovation Theory, the Core-competence Theory, the Sustainable Competitive Advantage Theory, combined with experts' advice, this paper proposes the Intangible Assets Index Evaluation System and tries to build up the Intangible Assets Evaluation Index by using AHP and Entropy Method. The purpose is to reveal and reflect the technological innovative capability, core competitive ability and sustainable development ability, to assist enterprises to understand the overall situation and development potential of its intangible assets, and set up the suitable development strategies. In addition, the evaluation results of the index have a certain reference value for investors to make right investment decisions.

2. THEORIES ON THE INTANGIBLE ASSETS EVALUATION INDEX DESIGN

2.1. The technological innovation theory

In 1912, Joseph A. Schumpeter first put forward technological innovation theory systematically in "The Theory of Economic Development", and identified "innovation" as the establishment of new productive function, which means that enterprises will bring the recombination of productive factors and conditions into the productive system, and then produce shock effects⁴ to the original system. Subsequently, The Theory of Endogenous Growth developed on the basis of innovation theory shows that in order to generate sustainable economic growth, it is necessary for a system to overcome the diminishing returns of marginal factor and achieve the increasing returns⁵. The essence is that sustainable economic growth will not rely on the external drive, and the key is to seek for a sustainable endogenous power, that is, to ensure the sustainability of its growth through technological advances. Based on Arrow's (1962) learn-by-doing theory, Paul M. Romer (1986) and Robert E. Lucas (1988) proposed the excessive outside knowledge model and human capital model, that is, in the course of labor factor inputs, human capital is included which is made of formal education, job training and so on. On the basis of existing knowledge, human capital is combined with the physical capital and produces new knowledge through innovative activities. And then human capital, technology and other factors are internalized to achieve the increasing returns of marginal factors and sustainable economic growth.

Based on technological innovation theory, we construct a Technological Innovative Ability index and select three indicators in the secondary level, that is, R&D Investment Rate, Intangible Assets Conversion Rate and Technical Personnel Density to reflect the technological innovative capabilities of the Intangible Assets Index.

2.2. The core-competence theory

In 1990, C. K. Prahalad and Gary Hamel first proposed the concept of "core competence", which marks the formation of the theory of core competitive ability of enterprises. The theory means that core competence is the integration of the accumulation of knowledge within an organization, especially to integrate a variety of production skills and multiple technological streams. The enterprises with high core competitive ability can integrate the work, provide its value and keep the leading competitive advantage existing long. Core competence can provide companies with a potential way into many markets, bring customers significant perceived value, and make it difficult for competitors to replicate. In 2004, Tang explained the relationship between intangible assets and core competence, and then she noted that core competence includes technology, skills and knowledge. In essence, it is the ability to get businesses through a variety of techniques, skills and knowledge, so core competence and intangible assets are consistent in nature, for both reflect the profitability of the enterprises, and make enterprises become a particular market leader in the field and reap excessive profits⁶. Hence, core competence is a unique endogenous resource which can bring special benefits to consumers and make the enterprises obtain a long-term competitive advantage and create stable sales revenue and super profits in a market field.

Based on the Core-competence Theory, we set up market competitive indicators, and select three indicators in the secondary level, that is, Brand Advantage , Market Share, Intangible Income-generating Capacity to reflect competitive ability in the market of the Intangible Assets Index.

2.3. The sustainable competitive advantage theory

Hofer and Schendel (1978) defined sustainable competitive advantage as the enterprises' leading ability to gain market competitive advantage through integrating their own resources⁷. The representatives of "Resource-Based View", Wernerfelt (1984) and Barney (1991) pointed out that an enterprise is an aggregation of resource bundles. The owned and controlled resources can affect the level of profits and competitive advantages, and the companies' sustainable competitive advantage comes from those valuable, particular and non-copied heterogeneous resources⁸. In 2001, Wang and Wan claimed that the special resources are the combination of employees' knowledge and abilities. Hence, organized learning can not only improve the individual's knowledge and ability, but also help transform the personal knowledge and the ability into the knowledge and ability of organizations, so that the knowledge and ability can be integrated into a greater force⁹. Therefore, for developments, the enterprises need to accumulate resources, and the key to keep sustainable competitive advantage status and the extra profits is to obtain and long-term possess those heterogeneous resources. The staff is the main creator of the heterogeneous resources, and intangible assets are the most important heterogeneous resource.

Based on the Sustainable Competitive Advantage Theory, we set up the sustainable development indicators and select four indicators in the secondary level , that is, Assets Increase Rate, Intangible Assets Occupancy, Staff Quality, Intangible Assets Per Share to reflect the sustainable competitive abilities of the intangible index.

3. INTANGIBLE ASSETS INDEX CONSTRUCTION PRINCIPLES AND HYPOTHESES

3.1. Intangible assets index construction principles

In order to make the Intangible Assets Index scientifically evaluate the overall state of the enterprises' intangible assets, this paper keeps the following principles during the study: Operational Principle. The value of index can be calculated from the company's raw data. The raw data can be gained and calculated to the greatest extent, and the information is accurate. Practical operability is the basis of constructing the index. All-round Principle. Index system should be able to comprehensively reflect the overall situation of intangible assets. Scientific Principle. The number of suitable indicators is never too tedious, nor too few. Comparable Principle. When the enterprises are evaluated by the intangible assets index, the intangible asset situation of different enterprises can be directly reflected, and the results are comparable. Highlighting Principle. Intangible Assets Index ought to reflect the state of enterprises' intangible assets, and avoid other enterprises' evaluation index converging.

3.2. The research hypotheses of intangible assets index

Consider the differences of accesses to gain the external resources between enterprises, imbalanced economic developments in different regions and the disability to get some external information, this paper put forward the following two assumptions:

1. Endogenous assumption. Companies owned and controlled resources, especially heterogeneous resources, determine the differences between enterprises, and heterogeneous resources can be classified into external heterogeneous resources and the internal heterogeneous resources. This article aims to examine the enterprises' innovative ability, the market competitiveness and the sustainable development capability which are reflected by the internal heterogeneous resources. Hence, in order to eliminate the influences of the external heterogeneous resources (such as government relations, incentives, etc.); it is assumed that the enterprises have the same ability to gain the external heterogeneous resources.
2. The balanced assumption. The level of economic development between different regions, the differences in the industrial structures, and the uneven distribution of natural resources are also important factors to affect enterprises' development. In order to eliminate the differences in districts, highlight the differences of technological innovative ability, the market competitiveness, and the sustainable development capacity between enterprises, we assume that there were no regional differences in all enterprises.

4. THE CONSTRUCTION OF INTANGIBLE ASSETS INDEX

4.1. Definition of the concept of evaluation index

Based on Technical Innovation Theory, Core Competence Theory and Sustainable Competitive Advantage Theory, the index system being perfected by expert investigation method, this paper constructed 3 level Indexes-- Technological Innovative Ability (CIAI1), Market Competitiveness (CIAI2), and Sustainable Development Ability (CIAI3)--and 10 secondary Indexes including R&D Investment Rate (X1), Intangible Assets Conversion Rate (X2), Technical Personnel Density (X3). Their specific meanings are as follows:

1. Technological Innovative Ability (CIAI1). The representative indexes are Research and Development Investment Rate (X1), Intangible Assets Conversion Rate (X2) and Technical Personnel Density (X3). R&D Investment Rate (X1) is the ratio of research and development expenses with operating revenue of an enterprise during a certain period of time. Research and development activity as a principal part of the innovation chain is the important source while the research and development investment rate represents the enterprise's input intensity and its emphasis degree, so R&D Investment Rate is a vital index for a company's technical innovation ability. It is an important Index which reflects an enterprise's technician innovation ability. Intangible Assets Conversion Rates (X2) is the ratio of an enterprise's excess profit in the total amount of intangible assets over a certain period of time. The essence of intangible assets is its ability to create excess profits. Intangible Assets Conversion Rate represents the efficient use of intangible assets, and it represents a company's ability to create excess profits. So it is an important index in evaluating an enterprise's technological innovative ability. Technical Personnel Density (X3) is the proportion of research and development technicians in all the staff in a certain period of time. Innovation especially technical innovation needs experts. Research and development technician, as the main part of in an enterprise's innovation activities, the important source of its intangible assets, plays a more and more important role in an enterprise's innovation. Technical Personnel Density represents the enterprise's technician innovation ability strength.
2. Market Competitiveness (CIAI2). The representative index is Brand Advantage(X4), Market Share (X5) and Intangible Income-generating Capacity (X6). Brand Advantage(X4) means the ratio of marketing expenses with operating revenue of an enterprise during a period of time. Brand is an important aspect of intangible assets. Customers recognize the brand through media such as advertisements, which will decide the market competitiveness of the enterprise's products as good brand resources can win greater market competency for the company. Hence Brand Advantage is an important index which reflects corporation's market competitive ability. Market Share (X5) means the ratio of an enterprise's sales revenue in the total amount of the industry over a certain period of time. It visually represents the enterprise's market competitive position and its operating performance. A greater Market Share is the strong basis for a company to sustain and expand its market share. Market Share also reflects

a company's comprehensive competitiveness of the market. Intangible Income-generating Capacity (X6) means the ratio of the amount of sales with the total intangible assets over a certain period of time. As a heterogeneous resource, it represents as the contribution rate of an enterprise's sales. The stronger as an Intangible Income-generating Capacity, the stronger is its competitive ability under the same market conditions. It represents the contribution rate of intangible assets in the market.

3. Sustainable Development Ability (CIAI3). Its representative indexes are Asset Growth Rate (X7), Intangible Assets Occupancy (X8), Staff Quality (X9) and Intangible Assets Per Share (X10). Asset Growth Rate (X7) means the proportion of an enterprise's assets growth amount in the total assets of last period compared with the asset growth of last period. A company's assets are its resource foundation, so the growth of assets is the basis for a company's sustainable development. It is a fundamental index representing a company's sustainable development ability. It reflects a company's sustainable development ability basis. Intangible Assets Occupancy (X8) is the ratio of an enterprise's intangible assets in the total amount of assets over a certain period of time. The ratio of intangible assets with the total assets is the ratio of the heterogeneous resources in the enterprise's resources. The bigger the heterogeneous resource ratio is, the stronger is the enterprise's sustainable development ability. It reflects a company's strength of sustainable development ability. Staff Quality (X9) means the ration of a company's staff above undergraduate education level in the total staff. Since the staff is the creative subject of the heterogeneous resources of an enterprise, higher Staff Quality means the enterprise has a greater ability to obtain the heterogeneous resources. Staff Quality becomes an important factor for a company's sustainable development so it is also an important index to evaluate a company's sustainable development ability. Intangible Assets Per Share (X10) is the ratio of the total amount of intangible assets with current number of ordinary shares of an enterprise in a certain period of time. The applicable subject of intangible evaluation index system is the listed company. The more intangible assets per share is, the more heterogeneous resources an enterprise has which means the greater of the enterprise's sustainable development potential. As a result, through evaluating the number of the company's Intangible Assets Per Share, we can evaluate its sustainable development potential.

Table 1: Index of intangible assets evaluation system

Level Index	Secondary Index	Definition
Technological Innovative Ability (CIAI1)	R&D Investment Rate (X1)	Research and development expenses/Operating revenue
	Intangible Assets Conversion Rate (X2)	Excess profits created by the enterprise /Total amount of intangible assets
	Intangible Assets Conversion Rate (X3)	Number of R&D technicians /Total number of staff
Market Competitiveness (CIAI2)	Brand Advantage (X4)	Marketing expenses/Operating revenue
	Market Share (X5)	Sales revenue /Total sales revenue of the industry
	Intangible Income-generating Capacity (X6)	Sales /Total amount Intangible Assets
Sustainable Development Capacity (CIAI3)	Assets Increase Rate (X7)	(Total current assets -Total assets of last period) /Total assets of last Period
	Intangible Assets Occupancy (X8)	Total intangible assets/Total assets
	Staff Quality (X9)	Total number of people above undergraduate education /Total number of staff
	Intangible Assets Per Share (X10)	Total Intangible Assets/current number of ordinary shares

4.2. The determination of index weight-- based on the subjective and objective weight method

Combining AHP and the entropy method, this paper determines the index weight to construct index of intangible assets. The main reasons of choosing these two methods are : AHP is a subjective weight method which considers experts' experience and the determiner's preference and will. Since index of intangible assets synthesized numerous influencing factors among which certain factors' specific effect degree is unknown, it may contradict with real experience if only objective data is applied. Hence, subjective suggestions are necessary. However, as weight accounting is a process of quantization, figures entirely determined subjectively may lack accuracy and objectivity, making it necessary to combine with objective weight methods. The entropy method has been widely applied and developed

as a mature objective weight method, which can realize this effect very well. As a result, this paper makes weight accountings by a comprehensive weight method combining AHP and the entropy method.

1. Analytic Hierarchy Process (also AHP). The specific steps to decide all the index weight of intangible assets by AHP are as follows:
 - a. Construct the Hierarchy Structure Model. The index of intangible assets constructed in the paper mainly includes such three dimensions as Technician Innovation Ability, Market Competitiveness and Sustainable Development Ability, each of which contains secondary level indexes. Details are in Table 1.
 - b. Determine Judgment Matrix. On the basis of the hierarchy structure model in the first step, send questionnaire to experts. According to the Nine Proportional Scaling Method raised by Professor Satyr, give scores to the importance of each index. Finally by considering the scoring suggestions by every expert get the judgment matrix of each hierarchy.
 - c. Calculate the characteristic value and characteristic vector of each judgment matrix. In this paper, in the actual operation it is calculated by the square root method .
 - d. Calculate the biggest characteristic value of each matrix and take the consistency test. When the result of the consistency test is <0.1 , it means that OK ; If the data is above 0.1, it needs to recode and take the test again until it is passed. The purpose of taking consistency test is mainly because it ensures the index weight setting will not be contradictory.
 - e. Determine the index weight of each hierarchy. Calculate from above to below and take the consistency test of the calculated combined weight vector. When the test is passed, determine the overall weight vector ordering.
2. Objective weighted entropy method. The major steps are as below:
 - a. Calculate the proportion of the i index in the j scheme: $P_{ij}=X_{ij}/$
 - b. Calculate the entropy of the i index: $E_i=-k \sum_{j=1}^m P_{ij} \ln P_{ij}$, in it, $k=1/\ln m$, m is the sample
 - c. Calculate variation coefficient: $G_i=1-E_i$
 - d. Determine the index weight of item i : $W_i=G_i / \sum_{i=1}^m G_i$
 - e. Determine each Index weight: Obtained by the above formula:

$$\varpi = (A_1, A_2, A_3 \dots A_9, A_{10})$$

4.3. The construction of combined weight method and the index model

When combining Analytic Hierarchy Process with the entropy method, this paper chooses multiplicative integration method to reduce the weight inaccuracy resulted by subjective factors. W_c represents Weight obtained through AHP, W_s represents Weight obtained through the entropy method, the final combined weight calculation formula is:

$$W = (W_c * W_s) / (\sum W_c * W_s) ;$$

index of intangible assets model can be finally represented as:

$$CIAI = W_1 * CIAI_1 + W_2 * CIAI_2 + W_3 * CIAI_3$$

5. EMPIRICAL ANALYSIS AND DISCUSSION

5.1. Data source, sample selection and data processing

The object is A Shares Information Technology Listed Companies of SSE and SZSE in 2010-2012. The information technology industry reveals its research expenditure relatively perfect (in 2011, Liu found that listing Corporation revealed that R & D spent more than 80% manufacturing and information technology industries). Except for the listing corporations which cannot reveal their complete ST and intangible assets, there are 38 satisfied listing corporations. The original data is taken from CSMAR Database and RESSET Database.

In order to truly reflect the intangible assets structure of and its functions, this paper classifies the intangible assets into the technical intangible assets and non-technical intangible assets. The technical intangible assets include intellectual property patents, non-patented technology, trademark right, copyright and so on. The non-technical intangible assets include land use rights, franchise right business reputation and so on. According to Yu's (2012) processing method of intangible assets, this

paper gives the technical intangible assets and non-technical intangible assets the equal value, and then gets the weighted value of intangible assets.

The indexes selected in this paper are all positive ones (i.e. the bigger the number, the better the overall situation of the intangible assets), so there is no need to change the directions. But the grades of indicators' values are not the same, so it is necessary to do data standardization processing. This paper chooses Z-score method, i.e.:

The new data = (initial data – mean) / standard deviation.

The entropy weight method used for weight calculation requires the logarithmic data should not be negative, so the standardized data need to be transferred, in order to ensure that the results are of practical significance.

5.2. Calculate the index weight

1. The results calculated by hierarchical analytic method:
 - a. The first level indicator, weight vector (Technological Innovative Ability, Market Competitiveness and Sustainable Development Capacity) = (0.70.18 0.12); $CR=CI/RI=0.02/0.58=0.034<0.1$, the consistent test is get through.
 - b. The secondary level indicator: technological innovative capacity: $G1=0.44$; $G2=0.44$; $G3=0.12$; $\lambda=3.001$; $CI=0.0005$; $CR=0.0008<0.1$; market competitive ability: $G1=0.71$; $G2=0.2$; $G3=0.09$; $\lambda=3.08$; $CI=0.04$; $CR=0.069<0.1$; sustainable development capacity: $G1=0.11$; $G2=0.26$; $G3=0.45$; $G4=0.18$; $CI=0.0063$; $CR=0.007<0.1$; $\lambda=4.019$; All the consistent tests are got through. The results are shown as W_c in Table 2.
2. The results calculated by the entropy weight method: The calculation process is not discussed here in detail, and the results are shown as W_s in table 2.
3. The results calculated by the combination weighting method. According to the formula $W=(W_c*W_s) / (\sum W_c*W_s)$, the index combination weight is shown in Table 2.

Table 2: The combination weight of the intangible assets index evaluation indicators

Indicators	W_c	2010 W_s	2011 W_s	2012 W_s	2010 combination weight	2011 combination weight	2012 combination weight
R&D Investment Rate	0.308	0.095	0.087	0.096	0.305	0.251	0.308
Intangible Assets Conversion Rate	0.308	0.085	0.138	0.088	0.273	0.442	0.282
Technical Personnel Density	0.084	0.114	0.106	0.111	0.100	0.093	0.097
Brand Advantage	0.128	0.101	0.094	0.098	0.135	0.125	0.131
Market Share	0.036	0.098	0.091	0.096	0.037	0.034	0.036
Intangible Income-generating Capacity	0.016	0.085	0.081	0.096	0.014	0.013	0.016
Assets Increase Rate	0.013	0.103	0.098	0.105	0.014	0.013	0.014
Intangible Assets Occupancy	0.031	0.104	0.098	0.103	0.034	0.032	0.033
Staff Quality	0.054	0.119	0.110	0.112	0.067	0.062	0.063
Intangible Assets Per Share	0.022	0.097	0.097	0.093	0.022	0.022	0.021

5.3. The analysis of ranks and empirical results

This paper calculated the intangible assets index of each listing corporation in the sample by combining the weights. The front rank shows the higher index of the intangible assets, the stronger innovative ability, comprehensive competitive ability and sustainable development ability.

Through the analysis of the overall scores and ranks, and the single index scores and ranks, the following conclusions can be drawn:

1. From the intangible assets evaluation index weights, it can be seen that the independent innovative ability occupies high proportion in the intangible assets. The R&D Investment Rate

and the Intangible Assets Conversion Rate are most important. These two indicators weighted minimum in 2010 (57.8%); and the highest is 69.3% in 2011. All of these facts show that the comprehensive evaluation index pointing to the independent innovative ability is an important factor in intangible assets evaluation, and also verify that the innovation and its transformation achievements realize the maximization of enterprises' value.

2. In the 38 companies of the research sample, the majority of the companies have no big difference in ranking, indicating that most of the companies' intangible assets are stable; but there are some companies showing large difference, such as the rank of "YGSOFT changes from tenth in 2010 to the first in 2012; the rank of " Ultrapower "retreats from second in 2010 to the nineteenth in 2012. In 2010, in "YGSOFT", the Technological Innovative Ability ranked eighth, the Market Competitiveness ranking 18th, the Sustainable Development Capacity ranking 32nd, and the overall ranking is 10th; in 2011, the company's Intangible Assets Conversion Rate jumped to first, the rank of the overall Technical Innovative Ability surging to 3rd, its Market Competitiveness ranking 12th, with a total ranking improved to 3rd; in 2012, the indicators of the company's Technical Innovative Ability were at a high level, and the Intangible Assets Conversion Rate ranked first with the other companies being much far behind. Moreover, its comprehensive Technological Innovative Ability also climbed to the top; their Intangible Income-generating Capacity reached the first place, so that the Market Competitiveness was also improved (No. 10). In general, the overall ranking reached No. 1 position in 2012 with other indicators having no significant decline. " Ultrapower " had sharp setback in three years. In 2010, the Intangible Assets Conversion Rate and Intangible Income-generating Capacity ranked in the first place, having large gap with other enterprises; its Technical Innovative Ability ranks first, the Market Competitiveness 14th, and the overall rank is second. By 2011, the Intangible Assets Conversion Rate and the Intangible Income-generating Capacity are reduced to the level of the upstream, and the overall rank declined to 12th when other indicators did not change; in 2012, the company's Intangible Assets Conversion Rate declined further, and other indicators also had deterioration in various degrees with Technical Innovative Capability ranking 11th, the Market Competitiveness ranking 24th and Sustainable Development Capacity ranking 19th; what's worse, the overall rank fell to 19. Studies have shown that companies with much focus on the R&D Investment and Intangible Assets Conversion Rate have strong innovative ability.
3. Most highly ranking companies have the following common characteristics: (1) R&D Investment Rate is high. With high rank in the preceding two years, " Middle treasure "'s R&D Investment Rate ranked No. 1 in the three years, indicating that the rate of R&D Investment Rate has a strong correlation with overall ranking. (2) The income scale is small for most are in the growing period. This article defines the Market Share as the proportion of the operating income in the total industry revenue. The analysis of the corporations with higher comprehensive scores found that the overall revenue of the most companies is small, most in the developmental stage. However, these enterprises have a higher proportion expenditure on researches, indicating that the company's emphasizes innovative activities, which is testified and coincides with the intangible assets theory. (3) The net profit is high. In the top-ranking companies, the absolute value of the net profit is not high, but the revenue margins are high and surpass the average level. It indicates that these companies have good profitability, and the excess earnings theory of intangible assets has been tested. (4) The technical intangible assets occupy a large proportion. In the listing companies with higher composite scores, non-technical intangible assets based on land use right are very few, and the technical intangible assets have the majority share in the total intangible assets. This result is also consistent with the expectation that the intangible assets reflect the companies' independent innovative ability.
4. The low Ranking companies have the following characteristics: (1) The independent innovative ability is poor. In the 38 companies, every year, for each company which ranked last, the independent innovative ability also ranked the worst. In addition, for most companies that ranked lower, the ranks of their independent innovative ability are also very low. (2) The research expenditure is small and the net profit level is not high. Compared with the top-ranking companies, the low ranking companies have small proportion investment on researches, poor product profitability, and low net profit level. (3) The non-technical intangible assets based on land use right occupy a high proportion in the intangible assets.

6. CONCLUSION AND THE FURTHER RESEARCH DIRECTIONS

In this paper, the constructed Intangible Assets Evaluation Index and the empirical results on A Shares Information Technology Industry Listed Companies achieve the purpose to comprehensively evaluate the independent innovation ability, market competitiveness and sustainable development capacity of the listing Corporation. Through the analysis of the evaluation results, it can be observed that there is difference between different enterprises in the independent innovation ability, market competitiveness ability and sustainable development capacity, and the independent innovation ability is the most important factor. The empirical study finds that the data of Intangible Assets Evaluation Index can be collected, the result of evaluation can be compared, and the intangible asset theory is operable, comparable and scientific. Hence, the intangible assets have good theoretical explanatory power and practical applicable value.

During the process of study, the information technology industry is chosen as the representative for in this industry the intangible assets account for a large proportion which assists to reflect the characteristics and the leading advantages of intangible assets. Whether it is effective or not when the Intangible Assets Evaluation Index is used for all other listing corporations, and whether it is stable or not, are the main directions for the further researches.

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