A Study of Benchmarking and Corporate Strategic Behavior Adjustment from the Perspective of Individual Advantage Manifestation

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Abstract

The corporate strategic behavior adjustment is an indispensable work to the strategic management, which can be performed by benchmarking. With a new value ideology of strategic management the core contents of which are learning, innovation and collaboration, this paper dealt with the benchmarking and the strategic behavior adjustment from the perspective of individual advantage manifestation, and proposed an adjustment method including the selection of benchmark, the learning towards benchmark and the design of adjustment plan. Finally, the application research has been performed. The research results can provide a directional assistance and technical support for the successful implementation of corporate strategy.

Keywords: benchmarking; individual advantage manifestation; learning; new value ideology; strategic behavior adjustment.

1. Introduction

Benchmarking, as one of the effective corporate management tools used widely in the 1990s, has still been regarded as to a way to improve their strategic management practices by a number of firms. It refers to a good cyclic process in which a firm investigates the best business practices of leading firms in the same industry or other industries that can be given as the standards of comparison, analysis and judgment of itself and leading firms, and then takes some reasonable measures and management methods to improve itself continuously and further to stand beyond the leading firms (Lassila et al, 2004). A firm can adopt the benchmarking in its strategic management practice when facing the following cases: (1) to make or implement new strategy; (2) to change a strategic direction or goal chosen in the past; (3) to improve its behavioral mechanism on the basis of chosen strategy. In the second and third cases, the result of benchmarking appears to be either an adjustment effect of strategy or that of strategic behavior. Generally, the firm should pay more attention to the adjustment of strategic behavior to achieve a strategic goal correctly, efficiently and as soon as possible rather than the strategic adjustment except that there are great changes in its organizational values or strategic environment, because it is an important decision-making process concerning the firm's survival and future development. The strategic adjustment will bring about the strategic behavior adjustment, while the strategic behavior adjustment may be performed at any time by benchmarking even before a strategic adjustment happens.

The competition or the cooperation based on competition had been regarded as to a basic motive force for value creation of corporate strategic management until 1990s. However, entering the *21*th century, there have been great changes in value creation mechanisms of firms with the arrival of new scientific and technological revolution, the global economic integration, and the rapid development of information technology. Everyone has recognized that if a firm wanted to develop, whether to enhance its ability or to expand new markets, it should create new value together with other firms, that is, it should build up a development-oriented collaborative economic group with other

firms. Moore (1996) initiated the concept of "*commercial ecosystem*" after he investigated the firms' activities in modern markets from a perspective of ecosystem, by which it could be possible to break the limitation of strategic management theory based on competition and to seek "*co-evolution*". In fact, the competition can promote the growth of firm, but may also bring about some negative effects. For example, the competition makes it difficult to use the limited resources effectively to get the best benefit, while may cause the disharmony or trouble between firms or industries, especially, the vicious competition may result in a serious depletion of resource and a destruction of industrial ecosystem, and further influence a sustainable development of economy and society. As the competition has been likely to lose its universal significance as a powerful driving force of economic growth, the learning, innovation and collaboration have become a new value ideology of strategic management.

Because the strategic management is a reasonable and effective arrangement, guidance, control and adjustment of corporate strategic behaviors happening in the strategic period, its value ideology must be reflected in all strategic behaviors. The strategic behavior adjustment is an important part which can't be disregarded in strategic management, the results of which affect the successful implementation of corporate strategy directly, therefore, it should impersonate the value ideology of strategic management in order to contribute to the achievement of strategic goal. Today, with the great changes in global economic, social and industrial development environment, it is very important to explore a reasonable, effective and dynamic strategic behavior adjustment method based on new value ideology of strategic management, which can ensure the satisfactory implementation of corporate strategy and then promote the firm's sustainable development. The purpose of this paper is to establish a new adjustment method of corporate strategic behavior on the basis of dealing with benchmarking and strategic behavior adjustment from the perspective of the individual advantage manifestation (IAM) theory in line with new value ideology of strategic management as one of modern organizational behavior theories.

2. Literature Review

Recently, as the benchmarking research has been deeper and more expanded, a lot of its results have been produced in all aspects of corporate strategic management. An integrated model of so-called "*Learning Organization Pyramid*" was introduced for facilitating a good understanding of learning organization and education system, which could be applied to a benchmarking in knowledge-intensive industry (Shuhsien et al., 2010). Gregory (2012) illustrated such topics in the practice of benchmarking as the business improvement by benchmarking, the use of benchmarking results for the maximization of utility, the application of benchmarking into strategic planning. The researches were carried out on the benchmarking as a policy-making tool, the effect of benchmarking in the improvement of organizational performance from the perspective of quality management, the benchmarking in strategic planing of higher education sector, and the benchmarking of investment trust firms respectively (Endrit, 2012; Mahour and Stephani, 2012; Luciana and Alvaro, 2015; Wen et al., 2015). Jacek (2015; 2016) analyzed the competitive position of each city through the application research of analytic hierarchy process (AHP) and benchmarking to the urban strategic management practice. Gandhi and Shankar (2016) conducted an application of benchmarking to the improvement of performance based on strategic resource management model (SRM) and data envelopment analysis (DEA). Katharina et al. (2016) described the research status of benchmarking in IT firms, and proposed some effective ways to solve difficult problems encountered in the benchmarking. Tugce and Almula (2016) suggested a benchmarking model for the competitive strategy of multinational construction firm. There were researches on the benchmarking in strategic resources and business performance based on an open system, and the internal benchmarking and index model in improving the production efficiency of firm (Battagello et al., 2016; Di et al., 2017). Katharina et al. (2019) found the relationship between the traditional project-level factors and the success of benchmarking of IT firms; they were necessary but not sufficient. A DEA-based benchmarking and its applications were studied for the evaluation of performance of public universities (Wade et al., 2019; Jose and Inmaculada, 2019). Ayşenur and Hikmet (2019) emphasized the importance of benchmarking in corporate management by analyzing the relationship between quality management and benchmarking. Lucia et al. (2020) analyzed the measurement and monitoring practices of 21 urban sustainability rankings, benchmarks and indices, when they paid special attention to methodological issues. Qingxian et al. (2020) studied the subordinates' strategic behavior to realize DMUs' actual "best practice" through a benchmarking

based on DEA from the perspective of agency theory. Ioannis et al. (2020) proposed a two-stage hybrid model by combining the artificial neural network (ANN) with DEA for supporting better practice benchmarking.

A lot of researches have been conducted on the corporate strategic adjustment since earlier.Avi and Howard (1995) build up a partial adjustment model of strategic mobility for formulating competitive strategy, which incorporated the idea of a strategic group. Steven and Arjen (1996) argued that the strategic adjustment was a major source of sustainable competitive advantage. Joseph (1996) dealt with the corporate strategic reorientation and adjustment by using the panel data analysis techniques. Simonovic and Damnjanovic (2011) argued that the continuant strategic adjustment in modern economy could create new values for customers, otherwise there would be not any stimulation for buying product and service. Xavier (2012) analyzed the strategic complementarity, fragility, and adjustment in corporate strategic management, and emphasized that the strategic adjustment should set disclosure and prudential policy together. Daniel et al. (2017) illustrated how the strategic adjustment influenced the rise of China and how East Asian states adjusted their strategy in the light of rise of China, including how China managed its own emerging role as a regional great power. Patricia (2018) pointed out the future directions that researchers studying the strategic adjustment might wish to pursue in the years to come. In contrast to strategic adjustment, there have been few researches of strategic behavior adjustment, which shows that the researchers have only dealt with the behavior adjustment in the context of strategic adjustment. Although some researchers tried to associate the corporate behavior adjustment with the strategy, they explained only its necessity and direction (Qingfang, 2001).

The above researches provided a technical support and practical contribution to the improvement of corporate strategic management based on reasonable selection of benchmarks and effective learning process, the implementation of selected strategy, the enhancement of firm's competitiveness, etc. However, they have overemphasized the strategic behavior for obtaining the competitive advantages to achieve a final goal of development of firm on the basis of mutual competition between firms in industry, which was not consistent to new value ideology of strategic management. In addition, it is difficult to overcome such lacks as one-sidedness, subjectivity and unfairness because the analysis, evaluation and decision-making proposed in above researches mainly rely on the abilities and qualifications of decision-makers. For example, when selecting benchmarks, the researches can fully not ensure the objectivity, the fairness and the correctness, which makes it difficult to support the successful implementation of strategy, and even causes contradictions and conflicts in the law and corporate ethics between firms in industry, and further has a negative impact on the firm's growth as well as the sustainable development of industry, economy and society.

3. Individual Advantage Manifestation Theory

"BLINDED FOR PEER REVIEW" et al. (2006) argued that the people should strive to explore and use natural laws to exhibit their own advantages in improvement of environment and creation of benefits for mankind rather than competition, that was named "*individual advantage manifestation* (IAM)". The basis of IAM theory is an *'individual advantage characteristic*" initiated to characterize the individual behavior performed in a social group. The individual is an objective being with social attribute existed in a group, while the social group is an environmental base of its growth. The individual can't grow and develop without a group, so it should pursue a common development of itself and group, and realize its own values through the contribution to the group, which can be completed through the learning of development law of things, the innovation of development way of things, and the collaboration with group or other individuals in group. The individual advantage characteristic refers to a sort of essential structure that corresponds to index system that can best reflect the individual behavior under a common values of social group, which will be formed during the growth based on the understanding of law of things and the practice for benefit of group, therefore, it will necessarily imply the meaning of learning, innovation and collaboration in line with new value ideology of strategic management.

"BLINDED FOR PEER REVIEW" et al. (2012) proposed an identification method of individual advantage characteristics based on

expression of value content and multi-criterion decision theory, the results of which were all objective because it was depended on the actual performance of individual. The method makes it possible to understand the differences in advantage characteristics and value contents between the individuals in social group, which can provide some assistance and support for the management of individual behavior in social group. They also suggested individual and democratic agency evaluation methods based on identification of individual advantage characteristics, by which it was possible to obtain the utility values and ranking orders of individuals corresponding to an index system. The former is carried out from a standpoint of individual, therefore, its result will be the most beneficial to individual itself, but the latter is performed on the principle of treating the evaluations of all individuals in group fairly from a standpoint of group. Regardless of standpoint of individual or group, these methods have been proposed from the needs of analysis and management of individual advantage effect, so that they can be adopted in the management practice of individual or group's behavior. Moreover, these methods have objectivity, fairness, and easy acceptance because they are not only based on the actual performance of individual behaviors in a social group but also can produce the evaluation results beneficial to individual and group respectively. The above methods are important parts of IAM theory, which can play significant roles in the strategic management practice including benchmarking and strategic behavior adjustment.

4. Benchmarking From the Perspective of IAM

The purpose of benchmarking is to make better use of law of things to achieve better development based on the learning of behavior of selected benchmark. Because each individual has an ability to explore, understand and use the law of things to realize its own value, it needs to refine the best among them on the principle of considering the practices of each individual objectively and fairly, which is called a selection of benchmark. The selection of benchmark is a basis of benchmarking by which the direction of individual development may be determined. But, there will be differences between the individual behaviors in a group because of different recognition and understanding of law of things and it is difficult to find an absolute standard for evaluating accurately what is more preferable, the selection of benchmark is never a simple work to do easily. The evaluation methods given in IAM theory don't need any absolute standard for evaluating different individual behaviors in group because they are only depend upon firms' actual performance. Each individual can not only find the common benchmarks favorable to all members in group from the standpoint of group but also identify the most favorable ones to itself among them from its own standpoint. In a word, IAM theory can successfully treat the inevitable differences between individual behaviors, and use these differences to make the selection of benchmark more effective.

From the perspective of IAM, the selection of benchmark can be carried out depending on the individual and democratic agency evaluation method, in other words, the benchmark, as a "*pattern*" to learn by other firms, has to produce relatively high IAM effect from the standpoint of firm or industry. Firstly, it is possible to select some benchmarks recognized as fair, democratic and easy to accept by all the members in industry from the standpoint of industry, being called the "*learnable benchmark*" in this paper, which occupy the priorities in ranking of democratic agency evaluation of strategic behaviors in industry. Secondly, there will be a few members to reflect the highest level in all aspects of business activity among learnable benchmarks, which can play role as the "*common pattern*" of all strategic behaviors in industry regardless of the actual situation of each firm, being called the "*ideal benchmark*". Thirdly, the so-called "*target benchmark*"s are picked out among learnable benchmarks from the standpoint of a firm, which occupy the priorities in ranking result of individual agency evaluation of strategic behaviors in industry under the value parameter structure most favorable to the firm itself.

The learning towards the ideal benchmark can produce an ideal adjustment effect. However, there are a variety of firms in industry with the different strategies, the organizational structures, the behavioral modes, the capabilities and resources, which makes it difficult for firms to choose ideal benchmarks most favorable to themselves. Ignoring this objective reality and pursuing only ideal benchmarks may lead to the following negative results: (1) to decrease the learning effect; (2) to waste resource and time; (3) to bring deleterious reactions and effects to firm's development such as the blind development and the weakening of advantages. Every firm has not only the most favorable benchmarks to itself but the right to choose benchmarks according to its condition and ability in its objective environment. Target benchmark

is selected on the basis of the actual situation of a firm, which can produce a relatively high learning effect in strategic period. The firm must choose the most reasonable target benchmark according to its own personality, mission, social relations and external environment.

5. Corporate Strategic Behavior Adjustment From the Perspective of IAM

The corporate strategic behavior refers to an organizational behavior dominated by strategic decision-makers, that is, the reaction between the strategic consciousness of decision-makers and the ability of a firm, the adjustment factors of which are just strategic consciousness and ability (“BLINDED FOR PEER REVIEW” and “BLINDED FOR PEER REVIEW”, 2019). Under the today’s industrial development environment, the corporate strategic behavior adjustment should also reflect a new value ideology of strategic management the core of which are learning, innovation and collaboration, which is fully consistent with an ideological basis of IAM theory. Therefore, IAM theory can be adopted in the corporate strategic behavior adjustment based on new value ideology of strategic management, in other words, the adjustment of strategic behavior is just to increase its IAM effect through the improvement of strategic consciousness and ability.

The strategic behavior is a reflection of strategic consciousness as a subjective psychological reflection of decision-makers based on the analysis and prediction of internal ability and external environment of a firm. From the perspective of IAM, the strategic behavior is carried out under the strategic consciousness embodying an IAM will, namely, the IAM consciousness. Therefore, it is possible to evaluate the IAM consciousness by an analysis of value parameter structure of individual advantage characteristics of corporate strategic behavior in industry. If the value parameter structure of a firm is widely recognized by the other firms in industry, the IAM consciousness is relatively high, otherwise, the firm should explore the adjustment measures to improve its IAM consciousness, which can generally be realized by adjusting the value parameter structure. If a firm has high IAM consciousness but still lags behind in the ranking result of democratic agency evaluation, it may accept the adjustment measures to strengthen its behavioral ability. If a firm has high IAM consciousness and ranks in the front of democratic agency evaluation, its IAM effect is so high that its strategic behavior needs not to be necessarily adjusted. Otherwise, the firm must accept a method of adjusting value parameter structure and ability together. It should be noted that the adjustment of value parameter structure will bring about an adjustment of behavioral ability. Moreover, the firm may consider two modes, i.e., fast or slow adjustment according to adjustment goal and environment.

6. Method

The strategic behavior adjustment may be regarded as to a learning process towards benchmark, which includes the selection of benchmark, the comparative analysis with benchmark, the learning towards benchmark and the design of adjustment plan. From the IAM, these are all carried out on the basis of identification of individual advantage characteristics, the individual and democratic agency evaluation methods. Figure 1 shows the basic diagram of a method proposed in this paper.

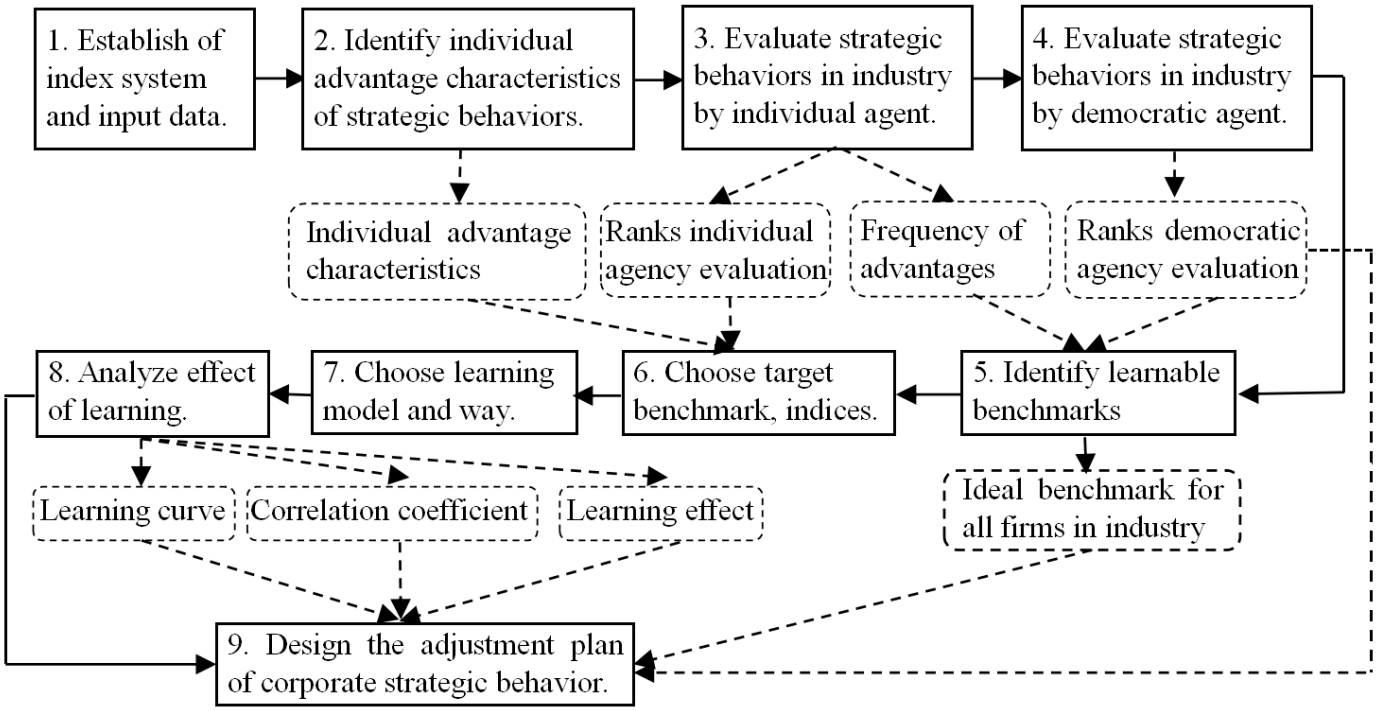

Figure 1. The basic diagram of a method proposed in this paper

6.1. Building up index system and inputting data

After building up an index system to identify the individual advantage characteristics of strategic behaviors in an industry on the principle of systematicness, comparability, feasibility and conciseness, it is possible to input the corresponding actual observation or evaluation data. For example, the performance data of firm may be one of the input data that can reflect its behavioral feature.

6.2. Identification of individual advantage characteristics

An ideal point utility model is used to identify individual advantage characteristics (“BLINDED FOR PEER REVIEW” et al., 2012), if m is the number of indices and n is the number of firms in an industry, the equation of identification is as follows:

$$\min_{w} d^2\left(f_i, \tilde{f}\right) = \sum_{j=1}^{m} w_{ij}^2\left(f_j\left(x_i\right) - \tilde{f}_j\right)^2 = \sum_{ij}^{m} w_{ij}^2\left(f_{ij} - \tilde{f}\right)^2 \quad (1)$$

$$\text{s.t.} \sum_{j=1}^{m} w_{ij} = 1$$

$$w_{ij} \geq 0, \quad j = 1, 2, \ldots, m, \quad i = 1, 2, \ldots, n$$

where f_{ij} is an observed value for index j of firm x_i, f_i is an index value vector of x_i, $w_i = \left(w_{i1}, w_{i2}, \ldots, w_{im}\right)^T$ is a value structure of individual advantage characteristics obtained for x_i, $\tilde{f} = \left(\tilde{f}_1, \tilde{f}_2, \ldots, \tilde{f}_m\right)$ is an ideal value vector, $d\left(f_i, \tilde{f}\right)$ is a distance between f_i and $\tilde{f}$ under the value structure w_i. The optimal solution of equation (1), w_i^* is a value parameter structure of individual advantage characteristics of corporate strategic behavior.

6.3. Individual agency evaluation

By substituting the result of equation (1) into the following equation (2), it is possible to obtain the individual agency evaluation values of firm x_i to firm x_k. The smaller the value, the better the evaluation result ("BLINDED FOR PEER REVIEW" et al., 2012).

$$d_{w_i}\left(f_k, \tilde{f}\right) = \sqrt{\sum_{j=1}^{m} w_{ij}^2 \left(\tilde{f}_j - f_{kj}\right)^2}, \quad i, k = 1, 2, \ldots, n \qquad (2)$$

The two results can be obtained from the equation (2): (1) the evaluation of all strategic behaviors under the value parameter structure most favorable to a firm itself. Being based on the Pareto's law, the strategic behaviors ranked in the top $0.2\times n$th in the evaluation are called the advantageous ones, where those ranked in the top $0.2\times 0.2\times n$th are the most advantageous, and the others have a few advantage. If the strategic behavior of a firm still ranks behind in the individual agency evaluation under the value parameter structure most favorable to itself, its value parameter structure will have some problems to be adjusted; (2) the frequency of advantage, that is, the frequency of occurrence of strategic behavior ranked in the top $0.2\times n$th in the individual agency evaluation. If the frequency of advantage of a firm is relatively high, its value parameter structure has widely been recognized by the other firms in industry, and can play a leading role in the development of industry by its powerful ability.

6.4. Democratic agency evaluation

It is possible to rank all strategic behaviors on the principle of treating fairly the individual agency evaluations in industry by a democratic agency evaluation reflecting the impacts of behaviors on the development of industry, which can be performed by using the equation (3). For example, the democratic agency evaluation result of a firm x_k is an arithmetic mean value of all individual agency evaluation values on it, the standard of which is the same as that of individual agent evaluation ("BLINDED FOR PEER REVIEW" et al., 2012).

$$H\left(x_k\right) = \frac{1}{n}\sum_{i=1}^{n} d_{w_{ij}}\left(f_k, \tilde{f}\right), \quad i, k = 1, 2, \ldots, n \qquad (3)$$

6.5. Identification of learnable benchmarks

The benchmarks selected from the standpoint of a firm will only meet its own wish, but the benchmarks selected from the standpoint of industry should be helpful to promote its sustainable development, that is, they have to be obviously advanced, the selection of which can be completed by democratic agency evaluation. From the standpoint of firm and industry, the learnable benchmark must satisfy the following two criteria at the same time: (1) its frequency of advantage has not to be less than 40%; (2) it has to be ranked in the $0.2\times n$th in democratic agency evaluation ("BLINDED FOR PEER REVIEW" et al., 2012). In addition, it is possible to find the ideal members among the learnable benchmarks which occupy the $0.2\times 0.2\times n$th in democratic agency evaluation.

6.6. Selection of target benchmarks and learning indices

It is possible to pick up the target benchmarks among the learnable benchmarks from the standpoint of a firm, which occupy the $0.2\times n$th in ranking result of individual agency evaluation under the value parameters structure most favorable to the firm, while the indices that look advantageous in the value parameter structure of individual advantage characteristics of target benchmark are taken as the learning indices.

6.7. Choosing of learning model and way

The following general form of learning curve model can be used:

$$y = ax^m, \qquad (4)$$

where x is a cumulative increase amount of performance of learning subject, y is a learning period (cost) required for each increase, a is a constant produced during the derivation of equation (4), and m is a learning coefficient ($m \leq 0$). c is a learning rate, by which the learning curve is usually represented (see Figure 2). For example, the learning curve with a learning rate of 80% is called the 80% learning curve.

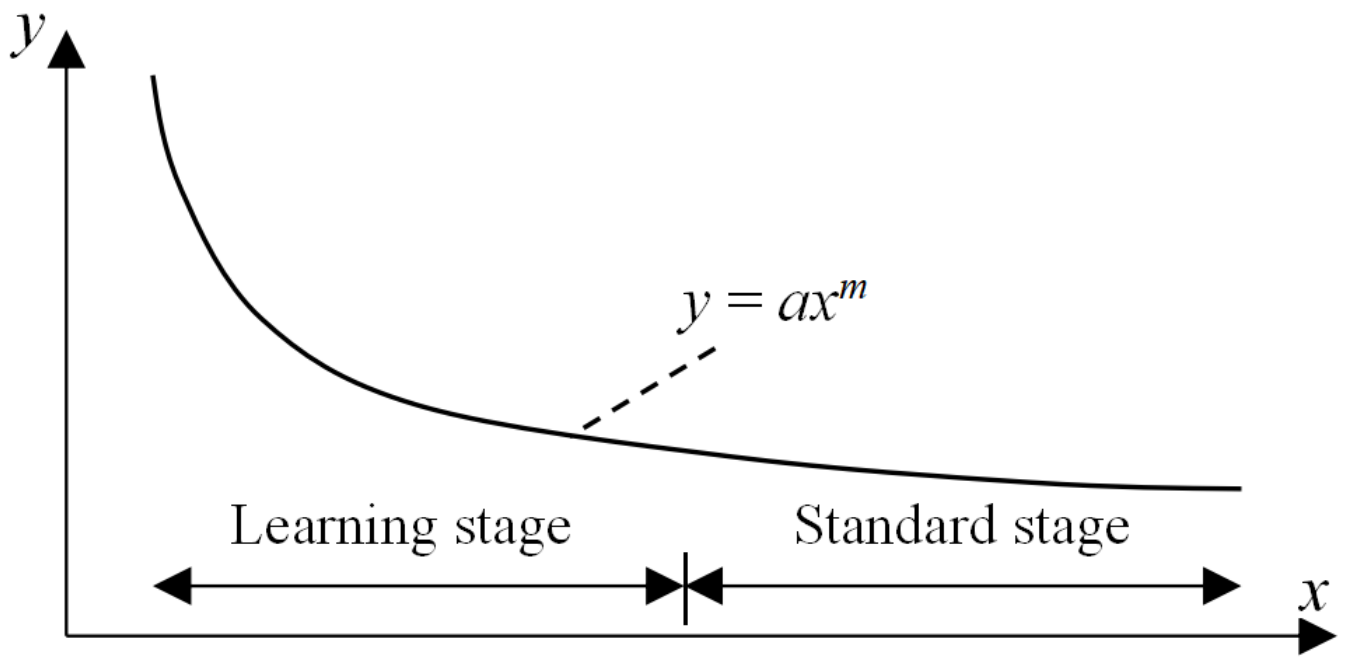

Figure 2. The general form of learning curve

The learning curve includes two stages: (1) the learning stage, in which the learning time gradually decreases with the increase of cumulative amount of performance; (2) the standard stage, in which the learning effect is negligible. It can be seen from equation (4) that the relationship between y and x is nonlinear. Therefore, the equation may be transformed into a linear model by the following variable substitution:

$$\lg y = \lg a + m \lg x, \qquad (5)$$

If $Y = \lg y$, $X = \lg x$, and $A = \lg a$, the following is obtained:

$$Y = A + mX, \qquad (6)$$

The equation (6) is a linear regression equation of learning curve. It is possible to obtain the learning coefficient and learning rate of learning subject by equations (5) and (6). But this regression analysis should pass a r-test. The greater the absolute value of r, the more obvious the linear correlation of equation (6).

The learning way refers to a increasing way of performance ability of a firm in a certain index, which may be a linear increase or a nonlinear increase (including the quadratic function, the exponential function, the algebraic function, etc.).

6.8. Analysis of learning effect

The learning rate and stage are important factors of evaluating learning effect. The learning rate determines whether a learning can converge to a target value and when it can converge to the target value. If the learning rate is low, the cost decreases rapidly with a increase of cumulative ability. But, if it is too low, the convergence process will become very slow, that is, the learning stage will become too long. If it is high, the learning can converge to a target value more quickly, namely, the learning stage is relatively short. But when it is too high, the learning may oscillate around the target value, and even can not converge. If the learning rate is appropriate and the learning stage is relatively short, the ideal learning effect can be obtained. Therefore, choosing an appropriate learning rate is very important for the learning process towards the target benchmark (see Figure 3).

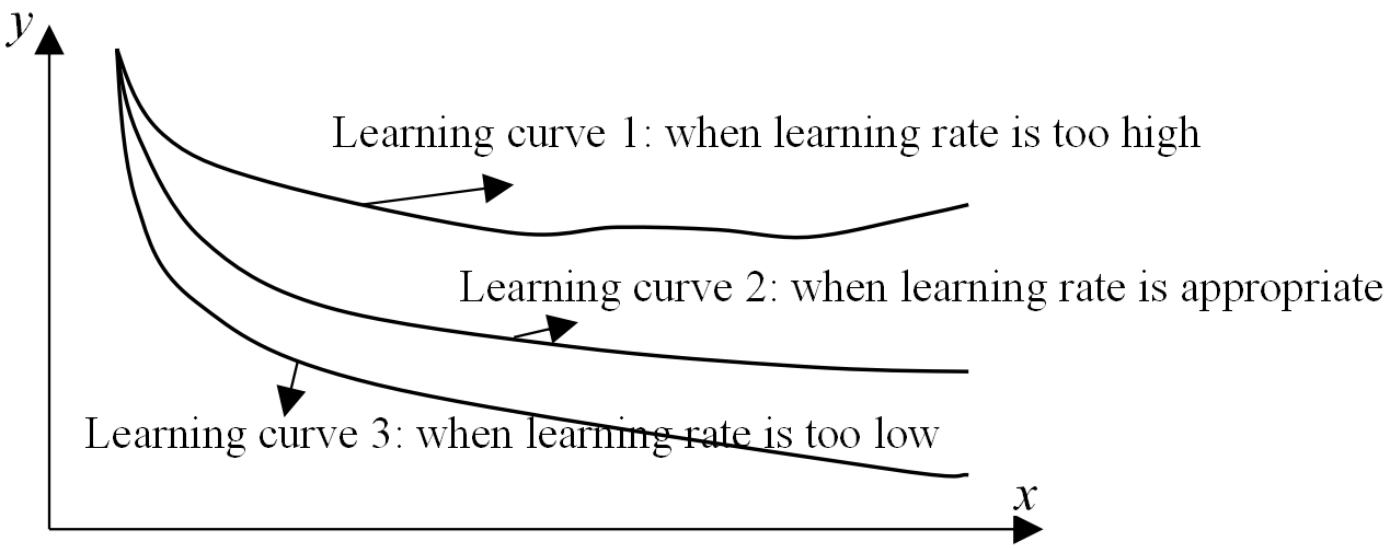

Figure 3. The convergence feature curve with learning rate

As seen from Figure 3, the learning curve 2 has not only appropriate learning rate but also relatively short learning stage, which shows that it has the best learning effect among three curves, and further may play a significant role in enhancing the performance of learning subject. The learning processes towards different benchmarks in different learning indices produce different learning effects. Therefore, it is possible to find the target benchmarks and learning indices most favorable to the enhancement of performance of learning subject by analyzing learning effects in learning period.

6.9. Design of adjustment plan of strategic behavior

From the perspective of IAM, the adjustment plan of strategic behavior should be designed on the principle of providing a effective technical support for raising its IAM effect and improving its industrial environment, including the following: (1) the adjustment cause. It is possible to explain the adjustment causes by the analysis of industrial environment and IAM effect of strategic behavior, for example, the change in industrial environment, the lack of IAM consciousness and ability, the irrationality of value parameter structure, etc.; (2) the adjustment basis. Being based on the above analysis results, it is possible to find the advantage or disadvantage of strategic behavior, the environmental opportunities and threats; (3) the adjustment goal. The level of target benchmark such as a ranking order in democratic agency evaluation is just a standard for setting the adjustment goal, which should stand beyond the level of target benchmark because following only a benchmark dose never surpass it forever; (4) the adjustment direction. It is possible to determine a direction of adjustment depending upon the indices to produce the best learning effects which are called the key adjustment indices, i.e., the preferential enhancement of performance ability in key adjustment indices can be set as a direction of strategic behavior adjustment; (5) the adjustment

mode. The different adjustment modes can be considered according to the above goal and direction, for example, the rapid adjustment mode based on the behavioral ability can be accepted to raise firm's strategic position in industry as soon as possible; (6) the adjustment stage and content. According to the direction and the principle of "*one specialty and many abilities*", it is possible to design the most reasonable adjustment stage, for example, a firm can build up "*one specialty*" to raise its performance ability in key adjustment indices up to the level of target benchmark ranked in the forefront of individual agency evaluation under the value parameter structure most favorable to itself in the first stage, and then it can accept "*many abilities*" to strengthen its performance ability in many indices in order to reach or surpass the level of target benchmark in the ranking of democratic agency evaluation; (7) the adjustment effect analysis. The strategic behavior adjustment in key indices enables a firm to reach the level of target benchmark in individual agency evaluation under the value parameter structure most favorable to itself ("*one specialty*" stage). A more important adjustment will be performed in the "*many abilities*" stage, because there are many different combinations of adjustment indices in this stage in which the adjustments can produce different democratic agency evaluation results. Therefore, the reasonable selection of indices or index combinations is very important to ensure the effectiveness of strategic behavior adjustment, that is, how to compose the index combinations affects an adjustment effect in the "*many abilities*" stage directly. If a firm accepts the most reasonable indices or index combinations, it can use fewer indices to raise the adjustment effect in a short time. It is possible to choose the most reasonable index combinations and their combining ways by a simulation analysis of democratic agency evaluation in different indices or index combinations. Firstly, the democratic agency evaluation is conducted on a performance ability adjusted in a combination of key indices and another index, the evaluation result of which is a predictive value reflecting an adjustment effect. Secondly, an index combination with the greatest adjustment effect is selected. Thirdly, the democratic agency evaluation is again conducted on a performance ability adjusted in a combination of selected index combination and another index. As the number of simulations increases, the number of adjustment indices or index combinations increases. The simulation analysis can be carried out until the strategic behavior of a firm reaches or exceeds the level of democratic agency evaluation of target benchmark, by which it is possible to obtain the most reasonable index combinations and combining ways. Figure 4 illustrates the above simulation analysis.

Key index combination	$G_0=\{w_{k1},w_{k2},\ldots,w_{km}\}$	G_0 is an index combination in "*one specialty*" stage, m is the number of key indices, w_{k1}, w_{k2}, … , w_{km} are key adjustment indices.
*1*th	$G_1=\{w_{k1},w_{k2},\ldots,w_{km},w_i\}$	i =1, … , n-m, n is the number of indices.
It is possible to obtain an index combination, $G_{k1}=\{w_{k1},w_{k2},\ldots,w_{km},w_{km+1}\}$ that produces the greatest adjustment effect by democratic agency evaluation.		
*2*nd	$G_2=\{w_{k1},w_{k2},\ldots,w_{km+1},w_i\}$	i =1, … , n-m-1。
It is possible to obtain an index combination, $G_{k2}=\{w_{k1},w_{k2},\ldots,w_{km+1},w_{km+2}\}$ 。		
*3*rd	$G_3=\{w_{k1},w_{k2},\ldots,w_{km+2},w_i\}$	i =1, … , n-m-2。
It is possible to obtain an index combination, $G_{k3}=\{w_{k1},w_{k2},\ldots,w_{km+1},w_{km+3}\}$ 。		
	⋮	
*l*th	$G_l=\{w_{k1},w_{k2},\ldots,w_{km+l-1},w_i\}$	l is the number of simulation time when a strategic behavior reaches the level of target benchmark, i =1, … , n-m-l-1。
It is possible to obtain an index combination, $G_{kl}=\{w_{k1},w_{k2},\ldots,w_{km+l-1},w_{km+l}\}$ 。		

Figure 4. The simulation analysis in different index combinations

As seen in Figure 4, $G_{k1}=\{w_{k1},w_{k2},\ldots,w_{km}\}$, $G_{k2}=\{w_{k1},w_{k2},\ldots,w_{km+1}\}$, …, $G_{kl}=\{w_{k1},w_{k2},\ldots,w_{km+l}\}$ are all the index combinations with the greatest adjustment effects in the corresponding simulation stage, which can ensure the effectiveness of strategic behavior adjustment. It is possible to complete the selection and combination of indices, the division of adjustment stages, and the setting of starting point in each stage through a detailed analysis of resource, ability and management level of a firm,

7. Application

It has been carried out to apply the above method to the strategic behavior adjustment of a listed company (No.5) of China's iron and steel industry in 2016. The learning curves and learning effects of company 5 towards 4 benchmarks have been obtained in the indices selected by individual and democratic agency evaluation, and then an adjustment plan of strategic behavior of company 5 has been designed on the basis of analysis of learning effects of every learning curves.

7.1. Building up index system and inputting data

Table 1 describes the main financial indices of listed companies.

Table 1. The financial indices of listed companies

No	Index of Evaluation	No	Index of Evaluation
1	Earnings per share (RMB), w_1	5	Net assets per share (RMB), w_5
2	Net earnings per share (RMB), w_2	6	Rate of return on common stockholders' equity (%), w_6
3	Gross sales (Billion RMB), w_3	7	Cash flow from operations per share (RMB), w_7
4	Net profit (Billion RMB), w_4	8	Gross profit ratio (%), w_8

The performance data of listed companies in China's iron and steel industry could be derived from Eastern Fortune Net (*www.eastmoney.com*).

7.2. Identification of individual advantage characteristics

Table 2 shows the value parameter structure of individual advantage characteristics of 41 listed companies of China's iron and steel industry in 2016.

Table 2. The value parameter structure of individual advantage characteristics

LC	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
1	0.1042	0.1042	0.1092	0.1251	0.1042	0.1042	0.2446	0.1042
2	0.0377	0.0337	0.0049	0.0130	0.0398	0.7878	0.0288	0.0542
3	0.0327	0.0348	0.0095	0.0187	0.0614	0.7159	0.0175	0.1096
4	0.0000	0.0000	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000
5	**0.0237**	**0.0232**	**0.0060**	**0.0136**	**0.0071**	**0.8327**	**0.0212**	**0.0725**
6	0.0216	0.0110	0.0050	0.0126	0.0103	0.8481	0.0204	0.0711
7	0.0272	0.0298	0.0066	0.0162	0.0100	0.8262	0.0171	0.0668
8	0.0252	0.0287	0.0074	0.0152	0.0084	0.8186	0.0158	0.0806
9	0.0227	0.0250	0.0180	0.0215	0.0170	0.4858	0.3043	0.1057
10	0.0110	0.0257	0.0083	0.0074	0.0083	0.8335	0.0181	0.0876
11	0.0285	0.0303	0.0094	0.0185	0.0096	0.7978	0.0187	0.0873
12	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0268	0.0292	0.0071	0.0159	0.0096	0.8095	0.0213	0.0806
14	0.0239	0.0215	0.0007	0.0018	0.7832	0.1465	0.0087	0.0137
15	0.0258	0.0283	0.0069	0.0147	0.0082	0.8477	0.0200	0.0484
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
17	0.0224	0.0240	0.0076	0.0143	0.0074	0.6478	0.0212	0.2552
18	0.0276	0.0298	0.0090	0.0165	0.0259	0.7360	0.0517	0.1035
19	0.0283	0.0298	0.0085	0.0151	0.0144	0.7472	0.0331	0.1236
20	0.0150	0.0158	0.0030	0.0082	0.0043	0.5427	0.0067	0.4042
21	0.0231	0.0099	0.0048	0.0124	0.0097	0.8184	0.0044	0.1173
22	0.0006	0.0005	0.0002	0.0004	0.0001	0.9967	0.0004	0.0012
23	0.0286	0.0159	0.0058	0.0159	0.0128	0.8353	0.0292	0.0565
24	0.0240	0.0246	0.0045	0.0126	0.0093	0.7231	0.0131	0.1888
25	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
26	0.0298	0.0340	0.0170	0.0456	0.0331	0.6172	0.0528	0.1704
27	0.0297	0.0321	0.0141	0.0368	0.0237	0.5590	0.0266	0.2780
28	0.0297	0.0202	0.0037	0.0103	0.2535	0.5727	0.0117	0.0982
29	0.0267	0.0292	0.0082	0.0214	0.0147	0.6404	0.0236	0.2357
30	0.0169	0.0312	0.0134	0.0318	0.0264	0.4024	0.0414	0.4366
31	0.0287	0.0191	0.0065	0.0181	0.0199	0.7982	0.0142	0.0952
32	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
33	0.0315	0.0252	0.0108	0.0172	0.0292	0.8143	0.0173	0.0546
34	0.0283	0.0276	0.0052	0.0142	0.0167	0.7675	0.0131	0.1276
35	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
36	0.0170	0.0196	0.0152	0.0373	0.0649	0.6458	0.0343	0.1658
37	0.0289	0.0306	0.0133	0.0195	0.0189	0.7504	0.0129	0.1255
38	0.0285	0.0284	0.0063	0.0137	0.0109	0.8510	0.0147	0.0466
39	0.0123	0.0126	0.0018	0.0052	0.0045	0.3675	0.0058	0.5902
40	0.0186	0.0200	0.0038	0.0101	0.0048	0.8658	0.0095	0.0674
41	0.0311	0.0339	0.0155	0.0202	0.0138	0.7833	0.0286	0.0735

Note: LC refers to the listed company.

7.3. Individual agency evaluation

Table 3 and 4 show the individual agency evaluation results of 41 listed companies including the ranking orders and the frequency of advantage.

Table 3. The individual agency evaluation results

RI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
1	4	12	12	★	**35**	35	35	35	16	35	35	★	35	25	35	★	35	35	35	35	35	35	35	35	★	35	35	25	35	39	35	★	12	35	★	12	35	35	32	35	35
2	16	35	35	37	**12**	12	12	12	14	12	12	25	12	★	12	9	39	12	12	39	12	★	12	12	14	12	39	14	39	32	12	39	35	12	22	4	12	12	★	12	12
3	14	22	25	3	**22**	22	22	22	▲	22	22	14	22	28	22	14	20	14	22	32	22	12	22	39	28	4	32	▲	12	35	22	20	22	22	12	35	22	22	20	22	22
4	19	14	14	19	**25**	25	25	25	18	25	25	4	25	4	25	18	12	22	14	▲	25	40	14	20	4	14	20	4	20	20	25	35	25	25	40	14	4	25	35	25	4
5	18	25	4	8	**14**	14	14	14	19	14	4	35	14	3	14	19	32	4	4	17	39	25	25	14	3	16	12	3	32	17	14	17	14	14	25	25	25	14	17	14	14
6	2	4	2	33	**4**	4	4	4	2	4	14	2	4	2	4	2	24	25	25	24	14	14	4	25	2	39	4	2	4	24	4	24	4	39	14	28	14	4	24	▲	25
7	3	▲	28	18	**40**	40	40	40	35	40	40	16	40	12	40	35	19	16	39	19	4	4	40	4	12	25	19	12	14	19	39	30	2	4	4	3	39	40	19	4	40
8	12	16	▲	41	**39**	39	39	39	4	39	39	3	39	33	39	4	4	39	16	12	40	39	16	32	33	19	24	33	19	28	40	19	40	40	39	39	40	39	28	39	16

Note: *RI refers to the ranking order of individual agency evaluation. "★" and "▲" represent its ranking orders under the value parameter structure most beneficial to a company, where "★" shows that it ranks in the forefront (0.2×0.2×nth), while "▲" shows that it ranks in the front (0.2×nth). The listed companies, taking 8th or higher orders are showed in this table.*

Table 4. The frequency of occurrence of individual advantage

LC	FA	LC	FA	LC	FA	LC	FA	LC	FA
4	37	14	34	22	22	2	9	28	7
35	36	25	30	40	19	32	8		
12	35	39	28	16	10	3	8		

Note: *FA refers to the frequency of occurrence of individual advantage.*

7.4. Democratic agency evaluation

Table 5 shows the democratic agency evaluation results of 41 listed companies.

Table 5. The democratic agency evaluation results

RD	Value	LC	RD	Value	LC	RD	Value	LC
1	0.1094	4	15	0.1997	34	29	0.2318	41
2	0.1232	14	16	0.1998	8	30	0.2321	29
3	0.1428	25	17	0.2039	38	31	0.2323	20
4	0.1486	3	18	0.2067	6	32	0.2362	40
5	0.1504	12	19	0.2071	32	33	0.2368	11
6	0.1517	2	20	0.2121	23	34	0.2427	36
7	0.1559	16	21	0.2128	24	35	0.2531	30
8	0.1582	28	22	0.2162	31	36	0.2544	21
9	0.1632	18	23	0.2193	**5**	37	0.2552	26
10	0.1636	19	24	0.2200	13	38	0.2582	22
11	0.1796	37	25	0.2223	17	39	0.2614	27
12	0.1850	33	26	0.2254	9	40	0.2775	10
13	0.1963	39	27	0.2254	15	41	0.7761	1
14	0.1964	35	28	0.2266	7			

Note: *RD refers to the ranking order of democratic agency evaluation.*

As seen from Tables 3-5, the company 5 ranks behind in democratic agency evaluation, while its advantage frequency does not appear at all. Moreover, it occupies the *15*th order even in the ranking of individual agency evaluation under the value parameter structure most favorable to itself. Therefore, it should accept an adjustment mode based on the combination of value parameter structure and ability.

7.5. Identification of learnable benchmarks

The learnable benchmarks of China's iron and steel industry in 2016 can be identified by the results of Tables 4 and 5, which are satisfying the following two criteria at the same time: (1) their frequencies of advantage are more than 40%; (2) they are ranked in the *8*th in democratic agency evaluation (see Table 6). Although the advantage frequencies of companies 35, 39, 22, and 40 are not less than 40%, they can not be considered as the learnable benchmarks, because they all rank behind in democratic agency evaluation. Among the identified learnable benchmarks, the companies 4 and 14 have absolute advantages in terms of impact on the development of industry so that they can be considered as the ideal benchmarks for all companies in industry.

Table 6. The learnable benchmarks

LC	RD	FA
4	1	37
14	2	34
25	3	30
12	5	35

7.6. Selection of target benchmarks and learning indices

The company 5 can choose the target benchmarks under the value parameter structure most beneficial to itself. As seen in Tables 3 and 6, the companies 4, 14, 25 and 12 can be considered as the target benchmarks of company 5 because they are learnable benchmarks and rank in the front of individual agency evaluation under the value parameter structure most favorable to company 5. In other words, the company 5 can actively go on with the learning towards the companies 4, 14, 25 and 12, which enables it to increase its performance ability continuously. Although the impact of companies 3, 2, 16, and 28 on the development of industry can not be ignored, these companies are not considered as the benchmarks because they have no any advantage under the value parameter structure most beneficial to company 5. In addition, the indices that have distinct advantage in value parameter structure of companies 4, 14, 25 and 12 can be taken as the learning indices.

7.7. Choosing of learning model and way

The learning of company 5 towards companies 4, 14, 25 and 12 is conducted by using the general form of learning curve model and the linear increasing way. Table 7 shows the increase of performance ability of company 5 based on a linear increasing way in each learning index during a certain learning period.

Table 7. The increase of performance ability of company 5 (yuan, billion yuan)

Strategic period	w_1	w_2	w_3	w_4	w_5
1st year	0.1783	0.1363	375	12.14	2.37
2nd year	0.2673	0.2353	540	20.74	3.03
3rd year	0.3563	0.3343	705	29.34	3.69
4th year	0.4453	0.4333	870	37.94	4.35
5th year	0.5343	0.5323	1035	46.54	5.01
6th year	0.6233	0.6313	1200	55.14	5.67
7th year	0.7123	0.7303	1365	63.74	6.33
8th year	0.8013	0.8293	1530	72.34	6.99
9th year	0.8903	0.9283	1695	80.94	7.65
10th year	0.9793	1.0273	1860	89.54	8.31

7.8. Analysis of learning effect

Table 8 and Figure 5 show the agency evaluation results, the learning results towards each target benchmark.

Table 8. The agency evaluation results, the learning indices and the learning results towards each target benchmark

	LC12	LC25	LC14	LC4	LC5
Democratic agency evaluation (Order, Value)	5, 0.1504	3, 0.1428	2, 0.1232	1, 0.1094	23, 0.2193
Frequency of advantage	35	30	34	37	0
Individual agency evaluation most favorable to company 5 (Order)	1	2	3	4	15
Advantageous index	w_1, w_2	w_5	w_5	w_3, w_4	w_6
Value amount of advantageous index	0.5, 0.5	1	0.7832	0.5, 0.5	0.8327
Actual performance in advantageous index (yuan, billion yuan)	0.98, 1.03	8.53	8.285	1857.1, 89.66	5.44
Actual performance of company 5 in advantageous index (yuan, billion yuan)	0.0893 0.0373	1.71	1.71	241.74 3.54	5.44
Learning period	10 years	10 years	10 years	10 years	
Learning rate, % (linear increase)	82.51 77.92	90.35	90	84.12 78.21	
Correlation coefficient	0.9665 0.9914	0.8273	0.8291	0.9509 0.9904	
Learning curve	$y = 3x^{-0.2775}$, $y = 3.41x^{-0.3599}$	$y = 3.58x^{-0.1463}$	$y = 3.59x^{-0.1516}$	$y = 97.9x^{-0.2494}$, $y = 18.9x^{-0.3545}$	

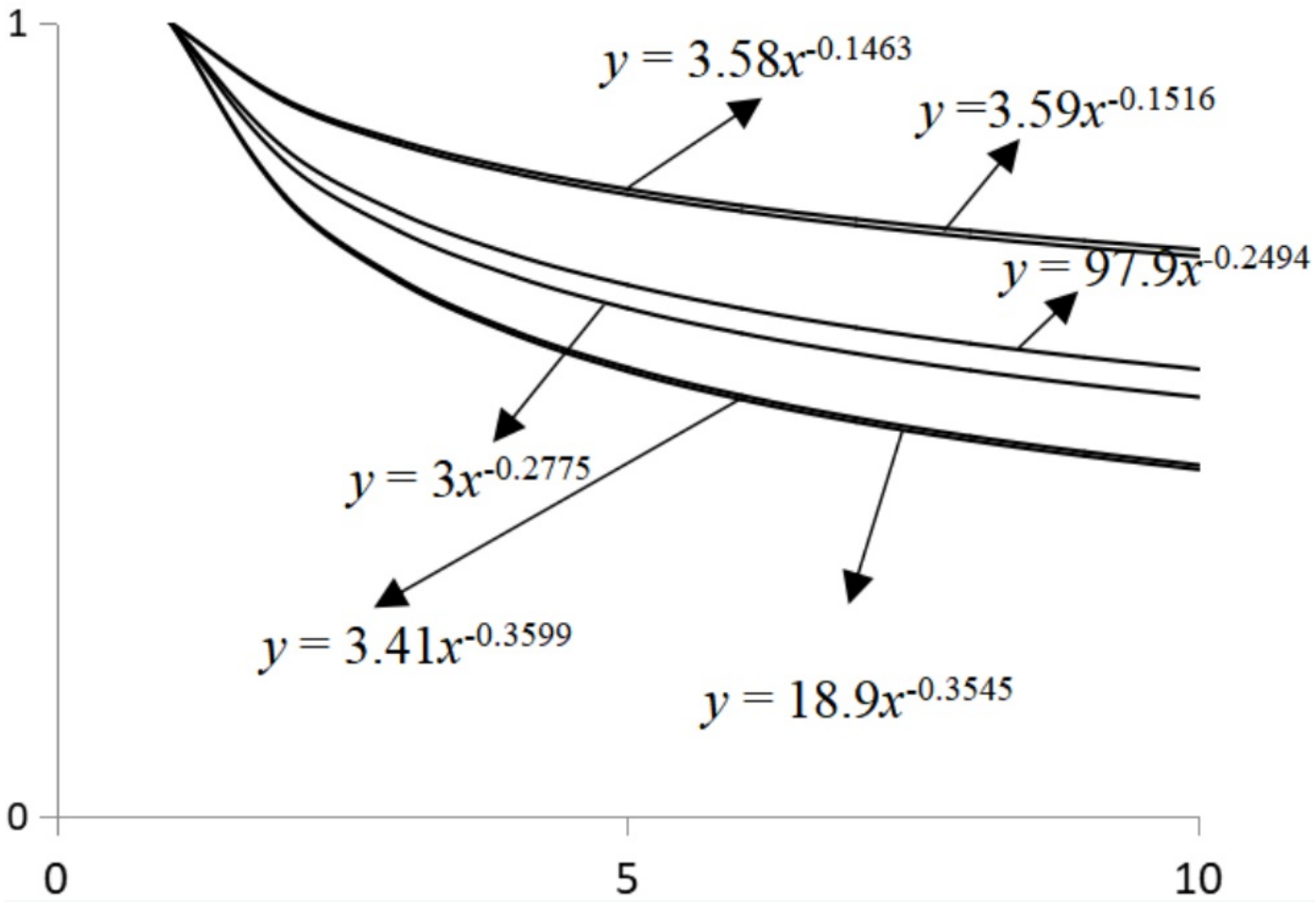

Figure 5. The learning curves of company 5 towards each benchmark

As seen from Table 8 and Figure 5, the linear correlation between y and x is highly obvious during the learning. The learning rates towards companies 12 and 4 in w_2 and w_4 are low, but the convergence features of these learning curves are very slow and the learning period is too long. The learning curves towards companies 12 and 4 in w_1 and w_3 are similar to those in w_2 and w_4. The learning rates towards companies 25 and 14 in w_5 are relatively high, but the learning stages of these two learning curves are shorter than the other learning curves, that is, they can converge to target values more quickly. Moreover, when undertaking the learning towards companies 25 and 14 in w_5, their convergence are relatively stable and look almost no any oscillation. From the above analysis, it can be said that the learning rates towards companies 25 and 14 in w_5 are appropriate, and the learning effects are the best. Therefore, when adjusting the strategic behavior of company 5, the key adjustment index is w_5, i.e., the net assets per share, while the target benchmarks are companies 25 and 14.

7.9. Design of adjustment plan of strategic behavior

1) The adjustment cause, basis and goal

As seen from Tables 3-5, the company 5 is so poor in the IAM consciousness and impact on the development of industry that should adjust its strategic behavior. Although it has an obvious advantage in the rate of return on common stockholders' equity, w_6, this advantage does not play any important role in improving its IAM effect. Its target benchmarks in the net assets per share, w_5 are companies 25 and 14, however, because the company 25 ranks behind company 14 in democratic agency evaluation, the company 5 can take a level beyond the democratic agency evaluation of company 14 as its adjustment goal.

1. The adjustment direction, stage and mode

It is possible to determine the adjustment direction and stages as follow: first, the company 5 should raise a behavioral ability in net assets per share up to the level of company 14 in "*one specialty*" stage to rank in the forefront of individual agency evaluation under the value parameter structure most beneficial to itself; second, it should strengthen its impact on the development of industry in combinations of net assets per share and the other indices depending upon the value parameter structure of company 14 in "*many abilities*" stage so that can reach or stand beyond the strategic position of company 14. Being based on the simulation analysis of democratic agency evaluation in different index combinations, it is possible to find the most reasonable index combinations and combining ways. In addition, the company 5 can accept a rapid adjustment mode of behavioral ability in net assets per share in the first stage, and may use a rapid or slow adjustment mode of value parameter structure and ability in combinations of net assets per share and other indices in the second stage.

1. The adjustment effect analysis

Table 9 shows a simulation analysis of democratic agency evaluation of strategic behavior of company 5 in combinations of net assets per share and other indices in the second stage.

Table 9. The simulation analysis of democratic agency evaluation of strategic behavior of company 5 in different index combinations

*1*st		*2*nd		*3*rd		*4*th		*5*th	
IC	RD	IC	RD	IC	RD	IC	RD	IC	RD
w_5,w_1	4	w_5,w_7,w_1	3	w_5,w_7,w_1,w_2	3	w_5,w_7,w_1,w_2,w_6	3	w_5,w_7,w_1,w_2,w_6,w_8	2
w_5,w_2	4	w_5,w_7,w_2	3	w_5,w_7,w_1,w_6	3	w_5,w_7,w_1,w_2,w_8	3	w_5,w_7,w_1,w_2,w_8,w_6	2
w_5,w_6	4	w_5,w_7,w_6	3	w_5,w_7,w_1,w_8	3	w_5,w_7,w_1,w_8,w_6	3	w_5,w_7,w_1,w_8,w_6,w_2	2
w_5,w_7	3	w_5,w_7,w_8	3	w_5,w_7,w_2,w_6	3	w_5,w_7,w_2,w_6,w_8	5	w_5,w_7,w_2,w_6,w_8,w_1	2
w_5,w_8	4			w_5,w_7,w_2,w_8	3				
				w_5,w_7,w_6,w_8	3				

Note: *IC refers to the index combination.*

It is possible to get the most reasonable index combinations and combining ways for company 5 on the basis of simulation results in Table 9 (see Table 10).

Table 10. The most reasonable index combinations for company 5 and adjustment effects

IC	RI	RD	Adjustment stage
No adjustment	15	23	
w_1 (key adjustment index)	3	4	First stage (*one specialty*)
w_5, w_7	3	3	
w_5, w_7, w_1 w_5, w_7, w_2 w_5, w_7, w_6 w_5, w_7, w_8	3	3	
w_5, w_7, w_1, w_2 w_5, w_7, w_1, w_6 w_5, w_7, w_1, w_8 w_5, w_7, w_2, w_6 w_5, w_7, w_2, w_8 w_5, w_7, w_6, w_8	3	3	Second stage (*many abilities*)
w_5, w_7, w_1, w_2, w_6 w_5, w_7, w_1, w_2, w_8 w_5, w_7, w_1, w_8, w_6 w_5, w_7, w_2, w_6, w_8	2	2	
w_5, w_7, w_1, w_2, w_6, w_8	1	2	

As seen from Table 10, the adjustment in net assets per share not only makes company 5 occupy the *3*rd order in the ranking of individual agency evaluation under the value parameter structure most beneficial to itself but also cause a very good adjustment effect, which means that the learning in net assets per share plays the most important role in strategic behavior adjustment of company 5. For example, if the performance ability of company 5 in net assets per share is increased to 1.4 times of current level, the ranking order of democratic agency evaluation can be raised from *23*th to *20*th. In the second stage, the company 5 ranks *3*rd order in democratic agency evaluation in a combination of net assets per share and operating cash flow per share. After that, as increasing the number of indices, the adjustment effect is no longer improved, which shows that the adjustments in such indices as earnings per share, net earnings per share, rate of return on common stockholders' equity and gross profit ratio have little contribution to the enhancement of performance ability of strategic behavior. However, these indices can also contribute to the achievement of adjustment goal by the combination with other indices at a certain time of strategic period. Actually, as seen from Table 10, the democratic agency evaluation of company 5 reached that of company 14 in combination of net assets per share and other indices.

In fact, the ideal target benchmark of company 5 is just a company 4. However, it is very difficult for the company 5 to reach the level of company 4 in a short time, because there are much large gaps between the two companies in such important financial indices as gross sales and net profit. The company 4 is one of the largest listed companies that plays a leading role in the development of China's iron and steel industry. Therefore, the company 5 should first establish a sound growth foundation by adjusting its strategic behavior towards company 14, and then carry out the second adjustment close to or reaching the level of company 4 on the basis of the improved value parameter structure and the increased ability. Figure 6 shows the stage, mode and effect of strategic behavior adjustment of company 5.

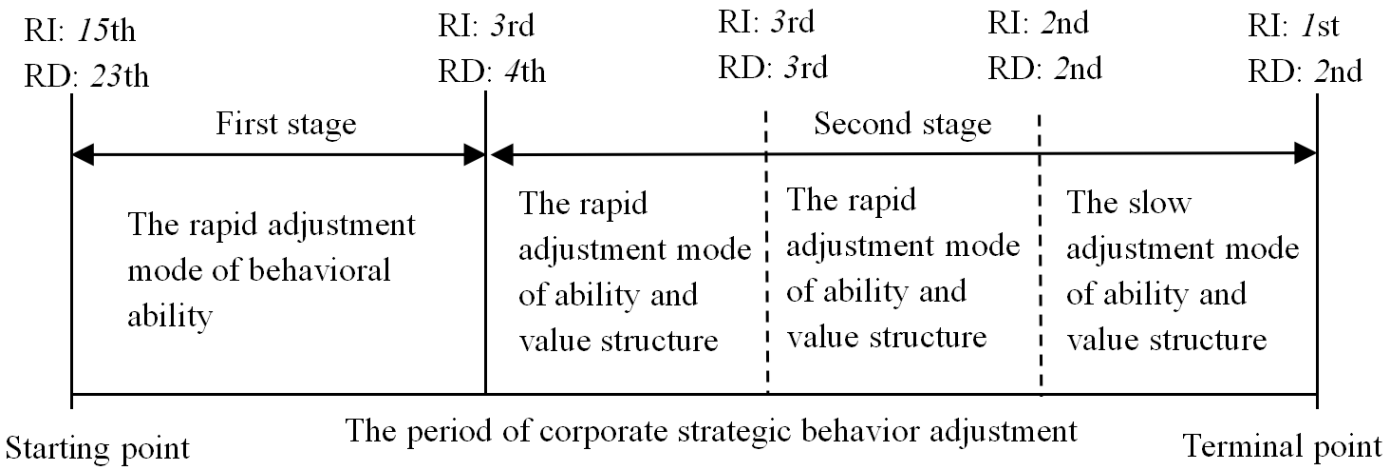

Figure 6. The stage, mode and effect of strategic behavior adjustment of company 5

8. Conclusion

The achievements in this paper are as follows: (1) new concepts such as learnable, ideal and target benchmark and theoretical mechanisms in terms of benchmarking and strategic behavior adjustment have been suggested from the perspective of IAM; (2) new methods including the selection of benchmark, the analysis of learning effect and the design of adjustment plan have been established on the basis of individual and democratic agency evaluation. The concepts, theories and methods in proposed in this paper can not only contribute to the development of strategic management theory and the application of new organizational behavior theories including IAM theory to strategic management practice but also provide a directional assistance and technical support to overcome the negative effects caused by vicious competition and ensure the satisfactory implementation of corporate strategy.

There have still existed some lacks in this paper as follows: (1) the dynamic change features of other strategic behaviors in industry along with the learning process have not been considered in benchmarking; (2) this paper has not dealt with the benchmarking from the perspective of national economy but limited to an industry. Because the benchmarking is never limited to an industry, the firm should have an open learning attitude and look for the most appropriate benchmarks beyond an industry to achieve the best learning effect.

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