The Study of New Energy Enterprise Evaluation Model Oriented by Green Economy
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Abstract. This paper constructs an evaluation model based on Analytic Hierarchy Process to study new energy enterprise evaluation. All different particularities for evaluate value were coming into view firstly in this paper. And then, oriented by “Green Economy”, through the path from value composition to value evaluation, a new evaluation model based on Analytic Hierarchy Process is proposed by deeply studying the value composition of new energy enterprise, so that it can be fully evaluated.

Introduction

As outstanding representatives of new energy industry, new energy companies are emerging popularly and becoming market newly favors because of technological innovation, policy support and attention from various social circles. The intrinsic value of new energy enterprise has been reflected so that the evaluation is becoming more important. Current methods including asset-based approach, market approach and income approach still have shortcomings. As a result, precise evaluation of the new energy enterprise has become focus of managers and investors.

The studies of new energy enterprise evaluation are quite few and thorough theory system has not been conducted yet. Previous studies are connected with new high-tech enterprise. Performance studies in the field of new energy companies are conducted in China from the perspective of profitability, debt paying ability, growth ability, asset management capability etc. The majority of scholars (Xiaoli Ren, 2009; Fengchun Geng, 2011) focused on financial indexes to make correlation studies with new energy enterprise value. Huaihong Diao (2011) proposed that government should take incentive measures to develop new energy companies, reflecting the critical connection between the companies and the government support. Zhongwen Peng studied the relationship between government subsidies and new energy firm performance. Some scholars (Yanting Zhu, 2011) analyzed investment risk of new energy industry, conducted a risk evaluation system using Analytic Hierarchy Process (AHP) and Fuzzy Comprehensive Evaluation (FCE) and considered the technical risk as one of the most important factors that regulate the industry development. It can be found that studies of new energy enterprise value in domestic academic world are usually correlation analysis of influencing factors, but few studies of evaluation methods. The development of new energy enterprise is mostly based on its national conditions in economic development and is affected lot by political factors. As a result, studies abroad can only provide reference in the aspect of evaluation methods, but many others have no help.

The situation of “contention of hundred schools of thought” in the correlation studies is rooted in the particularities of value composition in new energy enterprise. In this paper, oriented by “Green Economy”, through the path from value composition to value evaluation, a new evaluation model based on Analytic Hierarchy Process (AHP) is proposed by deeply studying the value composition of new energy enterprise so that it can be fully evaluated.

New Energy Enterprise Evaluation Oriented by Green Economy

“Green Economy” is a new form of economy which is oriented by the market, based on traditional
industrial economy and to achieve the purpose of harmonious development of economy and environment. For the domestic new energy enterprise, value composition and “Green Economy” are synchronous. At a macro level, our new energy industry development itself is entirely in the background of “Green Economy” and “Low Carbon Economy”, in which, new energy is essential guarantee of green economy development conversely providing support for our new energy industry and corporate development. At a micro level, the birthmark of new energy differing from traditional companies is main aspect of value composition in new energy enterprise.

The path from value composition to value evaluation is the most specific focus evaluators must explicit. From the perspective of enterprise management elements, value creation requires the investment of manpower, capital, information, technology, knowledge etc. And new energy enterprise value creation is without exception. Particular characteristics apart from the traditional enterprises should be connected with evaluation when new energy enterprise is evaluated. New energy enterprise possesses particular characteristics that distinguishes itself from traditional ones — diversity, high-growth and high-risk, policy dependence.

All above these particularities demand us to fully understand the value reflection corresponded to different particularities in value composition of new energy enterprise. The evaluation of new energy must be rooted in the new energy itself and then balance the economic value and social value. Only in this way can the result be objective and comprehensive. Economic value refers to the economic payment and future expectation from the new energy development in companies, while social value refers to the social beneficial influence brought by the utilization of new energy, that is, essential value in the future survival and development of human society and its conformance to requirements of ecological security and environment protection. As new energy enterprise is in the game state between economic value and social value, we should put the emphasis on how to achieve Nash equilibrium in the value composition. In this paper, as shown in Figure 1, both economic value and social value are taken into account. Accordingly, we set out relative specific measuring indexes from financial perspective and non-financial perspective, which can be used to amend the evaluation result by traditional enterprise evaluation method so that the new energy enterprise value can be comprehensively evaluated.

Evaluation Model Construction of New Energy Enterprise

It is extremely urgent to establish an emerging evaluation system to adapt to the development of new energy industry and market for traditional methods like cost method and income method cannot satisfying the needs of market development and industry upgrade. In the assessment, evaluators should not only consider general factors affecting enterprise’ economic value like debt paying ability, earning capacity, operation capacity and development ability, but also the specific factors affecting corporation value. Factors of industry, technology, environment and policy are essential ones that evaluators should consider when evaluating new energy enterprise.

Establishment of the Combined Model Based on AHP

As for evaluation of new energy enterprise, traditional methods only consider inherent economic value of company, but not social value in Green Economy. Discounted cash flow, one of income method, is an example that the result can only reflect economic value but not social value.
Modifying the result is a critical issue in the evaluation. Through the analysis of value composition, we can see that social value is one part that should not be ignored when evaluating.

In this paper, we have considered the value effect driving by financial and non-financial factors. The evaluation principle is shown in Figure 2. Firstly, discounted cash flow method is used to calculate the future cash flow discounted value of new energy enterprise. Secondly, analytic hierarchy process (AHP) is used to quantizing factors into financial index and non-financial index for modifying the above discounted value. Finally, the real value can be calculated.

![Figure 2. Evaluation designation of new energy enterprise.](image)

**Discounted Cash Flow Confirms Value of Assets.** Discounted cash flow model is a type of analysis based on discounting cash flows to the present by a proper discount rate. The fundamental formula is:

\[
V = \sum_{i=1}^{n} \frac{DCF_i}{(1 + R)^i} + \frac{P_n}{(1 + R)^n}
\]

In this formula: V—Enterprise discounted value; n—Planting duration in the early stage (generally in the next five years); Pn—Residual value (enterprise value after n years); R—Discounted rate reflecting the estimated cash flow risk; DCF—The expected cash flow at the stage of “i”.

**The Evaluation Design Based on AHP.** In the evaluation of new energy enterprise based on AHP, we should firstly choose proper evaluated index to establish comprehensive index system. After the analysis of our domestic new energy enterprise value composition and reveal of necessities to establish the combined model based on AHP, the index system can be built as follows: at the beginning establish first grade indexes, including financial index and non-financial index; then establish second grade indexes, that is, the criterion layer; finally establish the third grade indexes which is index layer.

Table 1. Financial Index System.

<table>
<thead>
<tr>
<th>Criterion layer</th>
<th>Index layer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X1</strong> Debt paying ability</td>
<td>X11 Asset liability ratio[%]; X12 Quick ratio[%]; X13 Cash liability ratio[%];</td>
</tr>
<tr>
<td></td>
<td>X14 Interest coverage ratio[times].</td>
</tr>
<tr>
<td><strong>X2</strong> Earning capacity</td>
<td>X21 Return on equity(ROE)[%]; X22 Return on total assets(ROA)[%]; X23 Profit ratio of sales[%; X24 Security surplus cash multiples(SSCM)[times].</td>
</tr>
<tr>
<td><strong>X3</strong> Operation capacity</td>
<td>X31 Receivable Turnover[times]; X32 Inventory turnover ratio[times]; X33 Current asset turnover[times]; X34 Total assets turnover[times].</td>
</tr>
<tr>
<td><strong>X4</strong> Developing ability</td>
<td>X41 The growth rate of net asset value per share[%]; X42 Sales growth rate[%];</td>
</tr>
<tr>
<td></td>
<td>X43 Sales profit growth[%]; X44 Total assets growth rate[%].</td>
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Social value is reflected in the activities that enterprises fulfil their social responsibility, so it is especially should not be ignored in the new energy enterprise. Through the above deep analysis of new energy enterprise value connotation and value composition, the non-financial index system can be established from five parts—industry development opportunity value, Product uniqueness, Human resource effectiveness, Effectiveness of corporate governance, Environmental factors effectiveness. As shown in Table 2 is non-financial index system.

<table>
<thead>
<tr>
<th>Criterion layer</th>
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<tbody>
<tr>
<td>Y1 Industry development opportunity value</td>
<td>Y11 Industry average rate of return; Y12 Risk priority number; Y13 Market share</td>
</tr>
<tr>
<td>Y2 Product uniqueness</td>
<td>Y21 Net book value of new energy product; Y22 New energy technology R&amp;D investment intensity; Y23 Revenue proportion from new energy product and technology</td>
</tr>
<tr>
<td>Y3 Human resource effectiveness</td>
<td>Y31 Technical personnel proportion; Y32 High-degree employee proportion; Y33 Intellectual capital ratio</td>
</tr>
<tr>
<td>Y4 Effectiveness of corporate governance</td>
<td>Y41 Share ratio of the largest shareholder; Y42 Senior management shareholding ratio; Y43 Whether it is multiple listing or not; Y44 Ratio of independent directors</td>
</tr>
<tr>
<td>Y5 Environmental factors effectiveness</td>
<td>Y51 Macroeconomic policy; Y52 Consumer preference to green product; Y53 Enterprise resource utilization; Y54 Participation level of green activities; Y55 Environmental information disclosure degree</td>
</tr>
</tbody>
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After finishing the hierarchical structure, the importance of every index to the objective function should be ranked. Then we can obtain the weight compared between every two indexes.

Through expert estimation, a set of scale values can be received according to the expert advice. Choose scale value of certain index forming judgment matrix, starting from which, we can calculate the relative importance of every factor using square root method and get normalized weight coefficient. Calculate the largest eigenvalue \( \lambda_{\text{max}} \) of judgment matrix and coincidence indicator CI testing consistency. Each component of eigenvector of judgment matrix meeting the consistency examination is the weight each index to the superior one.

Through the consistency examination, the financial evaluated index \( X \) and the non-financial evaluated index \( Y \) based on AHP are used to modify the enterprise value by discounted cash flow method.

Establish Combined Model. To sum up, integrating AHP with discounted cash flow method, the combined model is established in this paper. The specific model is as follows:

\[
V^* = V + V \cdot (a \cdot X + b \cdot Y)
\]

In this model: \( V^* \)—Enterprise value; \( V \)—Enterprise discounted value; \( X \)—Financial evaluating index; \( Y \)—Non-financial evaluating index; \( a \)—Financial index weight; \( b \)—Non-financial index weight. The weight of financial index “a” and non-financial index “b” should be concretely analyzed for they are different when the enterprises evaluated are different.

Conclusions

“Green Economy”, an important carrier of new energy development, requires evaluators to make comprehensively reasonably evaluation of new energy enterprise through combining industrial characteristics and enterprise particularities, based on intensively analyzing value composition. The combined model proposed in this paper, firstly integrating AHP with traditional income method, then adopting expert estimation to quantize the enterprise present development and future development potential, finally using linear weighting confirms value of new energy enterprise. This model not only makes full use of the superiority of AHP over the traditional evaluation methods, but also overcome the inauthenticity of history data, uncertainty of future development and subjectivity of parameter determination. Relatively speaking, the model based on AHP is more reasonable, more accurate and more effective.
However, when using the model evaluators should also pay attention to the key points of traditional income methods for example the future operating estimation. Meanwhile, to confirm the weight of different kinds of factors such as environmental and political factors under the AHP index system is also a focal and difficult point. These factors take root in the value composition of new energy enterprise and eventually influence the evaluating result. In practice, on one hand, it is difficult for evaluators to objectively analyze the influences on the firm value; on the other hand, for enterprises are always dynamically developing, different factors may have different effects on the enterprise at different stages. As a result, evaluators must make fully investigation of how these factors impact on the company before evaluation, forming the important judgment.

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References