Study on Index System Model to Evaluating Company Core Competence under Intellectual Capital Theory *

YAO Li-gen¹  CHEN Juan
School of Economics and Management, Hebei University of Engineering, 056038
ligenyao@163.com

Abstract: The intellectual capital is the capital form of the core competence of the corporation and the core competence can be represented by it, which is composed of the human capital, the structure capital and the social capital. This article constructs the index system of core competence from the point of intellectual capital. Then, drawing on the method of analytic hierarchy process and fuzzy comprehensive evaluation, this article makes a comprehensive evaluation on the core competence of the firm.

Key words: core competence, intellectual capital, the analytic hierarchy process, fuzzy comprehensive evaluation, research

1 Introduction

With the arrival of economic globalization and knowledge economy, the knowledge has become the most important element of production. In addition, the intellectual capital has become the most important strategy capital of corporation, which has the decisive significance more and more in the core competence of corporation. Most scholars focus on the technological innovation of corporation’s core competence. They thought that going ahead in the technology must lead to competitive advantage in the market. However, they have neglected the function of the human capital and the organization knowledge. Under this background, this article makes the appraisal and research from the point of intellectual capital and constructs evaluating indicator system of core competence including the human capital, the structure capital and the social capital. Thus this research has made up the insufficiency of other study on core competence above.

2 The Review of the Core Competence

2.1 The proposing of core competence

C.K.Prahalad and Gary Hamel brought up the concept of core competence in The Core Competence of the Corporation, which was published in 1990 in Harvard Commercial Review. They thought the core competence of corporation is the knowledge accumulated. It is the collective knowledge and collective study in organization, which is manifested by the ability of coordinating different production technologies, and conforming various technology flows. Harvard and Hamel further pointed out in following research: The core competence is a group of techniques and skills, which enabled the corporation to provide special effectiveness to customers (Hamel and Prahalad, 1994). The theory of core competence of corporation believes that the enterprise is an ability system essentially. The ability of accumulating, maintaining and applying the capacity of developing the market of product and service decides the competitive advantages of the corporation in long-term. The reserve of ability governs the management scope of the corporation, especially the breadth and depth of multiple-angle management.

2.2 The definition of core competence

The core competence of corporation originates from all kinds of activities of the enterprise. However not all activities can form the core competence. According to the definition of core competence given by Prahalad and Hamel, the core competence is a group of specific technologies and skills. This article regards the core competence of corporation as a group of techniques and skills, which
are formed through the conformity management of the human capital, the social capital and the structure capital. This kind of techniques and skills are formed in the competition, which can enable the corporation to hold the superiority in the market. The concrete meaning is explained as following:

First, the core competence is formed in long-term team study and knowledge accumulation. Secondly, the core competence can enable the corporation to hold certain superiority in the competition. Thirdly, the core competence cannot be separated from the human capital, the structure capital and the social capital. Fourthly, valuable, unique, extendable and learning are the main characteristics of the core competence.

3 The Contents of the Intellectual Capital

3.1 The concept of intellectual capital

Stewart used the concept of intellectual capital for the first time in October 1994. Contrast to the traditional material capital, the intellectual capital is latent, invisible and dynamic, and can bring surplus merit. The intellectual capital is the synthesis of material capital and the non-material capital. In a word, it is the value difference between the company’s market value and the book value. The raise of intellectual capital theory have provided a new frame of theory to explain the innovation, transmission, utilization and the protection of knowledge, as well as the formation of corporation's core competitiveness of modern enterprise, particularly the knowledge enterprise. All of these have great impact on the business management theory.

3.2 The constitution of intellectual capital

Nowadays, complete unification about the meaning of intellectual capital has not been obtained. American scholar Anne Brooking thought that intellectual capital is a kind of intangible capital, which is composed of the market capital, the intellectual property rights capital, the human capital and the foundation structure capital. Stewart thought that the intellectual capital is composed of three parts: the human capital, the customer capital and the structure capital. Based on the viewpoints of them, the article considers that the intellectual capital includes the human capital, the structure capital and the social capital, as shows in fig.1:

![Fig.1 Composition of Intellectual Capital](image)

3.3 The intellectual capital and the core competence

There are intimate relations between the intellectual capital and the core competence. The basic way to improve the corporation’s core competence is to raise its intellectual capital and the intellectual capital is the capital form of the core competence of Modern Corporation. The promotion of core competence can provide powerful safeguard for the development of intellectual capital. The core
competence of corporation is the market performance of the intellectual capital.

Appropriate management to the intellectual capital helps to form core competence of corporation. The human capital, the social capital and the structure capital of intellectual capital, are the carrier through which the core competence of corporation to be realized. Fig. 2 shows the formation of the core competence of corporation.

![Fig. 2 Formation of the Core Competence](image)

### 4 The Construction of the Index System of the Core Competence

As intimate relations exist between the intellectual capital and the core competence, this article constructs the index system of core competence from the point of intellectual capital, listed in table 1.

<table>
<thead>
<tr>
<th>Target level</th>
<th>The criterion level</th>
<th>The index level</th>
<th>The sub index level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human capital</td>
<td>Human capital of entrepreneur</td>
<td>The leadership of entrepreneur</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The individual quality of entrepreneur</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ratio of correct decisions made by the entrepreneur</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human capital of administrative</td>
<td>The experience of administers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ratio of high school record in the administrative</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The coordination ability of administers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administers’ ability of deal with emergency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human capital of technician</td>
<td>Vocational skill</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning skill</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average level of being educated</td>
<td></td>
</tr>
<tr>
<td>General human capital</td>
<td>Professional dedication</td>
<td>Vocational skill</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Working efficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structure capital</td>
<td>Innovation capital</td>
<td>The R&amp;D expense</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The realization of innovation achievement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The innovation of strategy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The degree of technical advantage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cultural capital</td>
<td>Management philosophy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cohesive of corporation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interior culture conformity of corporation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process capital</td>
<td>Cooperation pattern</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information technology system</td>
<td></td>
</tr>
</tbody>
</table>
5 Study on the Evaluation Model of Core Competence of the Corporation

5.1 The hierarchy model of core competence

Based on the index system of the core competence, the hierarchy model can be constructed as fig.3.

Fig.3 Hierarchy frame chart of index system

5.2 The determination of the weights of the indexes with the analytic hierarchy process

(1) The construction of appraisal matrix

Under the target level, separately construct the 22-comparison judgment matrix of the human capital, the social capital and the structure capital of the criterion level based on 1-9 scale law. Then, separately construct 22-comparison judgment matrix of the index level under the criterion level.

(2) Get the relative weight of every element under the criterion level

Compute the characteristic value of the judgment matrix $\lambda_{\text{max}}$ and the feature
vector \( w = (w_1, w_2, \cdots, w_n) \). After the “Normalization”, get the ordering vector, namely the relative weight of the element that is compared.

(3) Calculate the combination weight of each element \( W = (W_1, W_2, \cdots, W_n) \) and carry consistency verify on it.

The indicator of deviation uniform is introduced:

\[
CI = \frac{\lambda_{\text{max}} - n}{n - 1}
\]  

When \( CR = \frac{CI}{RI} < 0.10 \) the judgment matrix has the character of satisfaction uniformity, the value gained is reasonable. Otherwise, adjustment to the judgment matrix must be carried, until satisfaction uniformity is gained.

We can get the weight of the criterion level after computation.

5.3 Fuzzy comprehensive evaluation

(1) The establishment of the evaluation set

Suppose the core competence of the corporation is divided into the high-level core competence, the core competence, third level core competence, the deficient core competencies. Then the appraisal set \( V = (v_1, v_2, \cdots, v_p) \) is established. All levels of evaluations from high to low are expressed by \( v_j (j = 1, 2, \cdots, m) \).

(2) The determining of the fuzzy evaluation matrix

\[
R_k = \begin{bmatrix}
    r_{k11} & r_{k12} & \cdots & r_{k1m} \\
    r_{k21} & r_{k22} & \cdots & r_{k2m} \\
    \vdots & \vdots & \ddots & \vdots \\
    r_{kp1} & r_{kp2} & \cdots & r_{kpm}
\end{bmatrix}
\]

Here let \( r_{ij} (i = 1, 2, \cdots, p; j = 1, 2, \cdots, m; k = 1, 2, \cdots, n) \) indicate the subordinate degree of indicator \( X_{uk} \) (the \( i \) th sub-factor of the \( k \) th main factor) which means the ratio that evaluation \( v_j \) is obtained by indicator \( X_{uk} \) of the index level. It appears in the form of single factor appraisal.

(3) Comprehensive evaluation

The weight vector of criterion level is \( W = (W_1, W_2, \cdots, W_n) \). Carry operations on the fuzzy matrix according to the fuzzy mathematics evaluation model, subordination vector \( B \) (the indicator of target level \( X \) regarding the evaluation set \( V \)) is obtained:

\[
B = W \cdot \tilde{R} = (b_1, b_2, \cdots, b_n)
\]

If \( \sum_{j=1}^{m} b_j \neq 1 \), normalized processing is made. Let

\[
\tilde{b}_j = b_j / \sum_{j=1}^{m} b_j
\]

Then \( \tilde{B} = (\tilde{b}_1, \tilde{b}_2, \cdots, \tilde{b}_n) \) is obtained, which is the subordination vector of the core competence of the corporation to the appraisal set \( V \).
(4) The arrangement of results

According to the biggest degree of subordination law, evaluation may be made: 
\[ b_{jo}^* = \max \{ \hat{b}_1, \hat{b}_2, \cdots, \hat{b}_n \} \]. Then the appraisal is obtained: \( v_{jo}^* \). Therefore, the evaluation of the core competence of corporation can be carried and which level it belongs is obviously.

6 Conclusion

The intellectual capital is the capital form of the core competence of corporation, and the core competence is the market representative of the intellectual capital. The formation of the core competence depends on the intellectual capital’s cultivation. The index system of core competence can be established from the point of the intellectual capital. Drawing on the method of analytic hierarchy process and fuzzy comprehensive evaluation, we can make a comprehensive evaluation on the core competence of the firm.

References


