Matching Relationship among Corporate Lifecycles Theory, Stakeholder Theory and CSR

——From the Perspective of Fuzzy Characteristics of CSR

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Abstract—**In the view of fuzzy characteristics of corporate social responsibility (CSR), this paper put corporate lifecycles theory into CSR and stakeholder theory by fuzzy mathematics method. Based on above, this paper get four relation matrixes: cycle comprehensive ability, responsibility degree, cycle specific responsibilities, stakeholders' specific responsibilities, and eventually this paper construct the social responsibility model matching with corporate lifecycles theory and stakeholder theory based on the lifecycle: QS model and QR model. Finally, numerical examples are also considered and provide some guidance for corporations.**

Keywords-CSR, lifecycles, stakeholder theory, fuzzy characteristics, CSR Models

I. INTRODUCTION

Since the CSR was put forward, the connotation and denotation of CSR had got great development, and became a wide concerned topic in the theoretical circle and business circle. On theoretical aspect, researches mainly related connotation or extension of CSR, it is hardly to form a relatively uniform CSR definition because of objects and contents of responsibility have fuzzy characteristics, so it is hard to set up a CSR index system. On practical aspect, it is difficult to measure the preference of the enterprises' social responsibility because of the ambiguity definition of CSR. What' more, whether corporations fulfill their own social responsibility or not, what kind of social responsibilities they had performed, as well as the levels and influences of social responsibilities, so it is necessary to use fuzzy mathematics to study the social responsibility.

In terms of corporate social responsibility, we should examine the implementation of responsibility based on the different stages of the enterprise, which requires cyclical factors should be fully considered in the study and practice of social responsibility.

II. OVERVIEW OF THE THEORY

Since the father of corporate social responsibility Bowen (1953) put forward that what kind of responsibilities do we expect businessman to perform, in his book called the merchant's social responsibility, then the research of CSR became hotspot issue in academia and business community. In subsequent decades, many achievements in CSR research had been proposed; it can be summarized in the following two aspects: definition of corporate social responsibility and corporate social responsibility to fulfill.

A. Fuzzy characteristics of CSR definition

Davis (1960) proposed the "Davis Laws" said in 1973"CSR involved issues of economic, technical and legal requirements and reaction which beyond enterprises consideration, social responsibility come into working where the law ends its function."[1]

"Concentric Circle Model" which proposed by the American Economy Development Association (CED), the "Concentric Circle Model" is consists of inner-circle CSR, mid-circle CSR and outer-circle CSR. In the mid 1970s and '80s, the research of CSR and CSP (corporate social performance) came into the heyday. Carroll (1979) made the relationship of social economy enterprises, legal requirements and the expectations and concerns of more social oriented, and then put forward a more comprehensive definition of CSR. What's more, he also proposed the CSR pyramid model: charity responsibility and moral responsibility, legal responsibility, economic responsibility. Lately, he made some corrections about CSR pyramid model and brought forward the IC model of CSR [2].

The concept of CSR is based on the perspective of the stakeholders since the stakeholder theory was put forward in the 1980s. Isabelle (2002) CSR research by the United States and European countries, and had got five CSR stakeholders and 11 dimensions [3]. James (2003) pointed out that enterprises should bear what kinds of responsibility for various stakeholders, and then proposed that enterprises should assume the corresponding social responsibilities to customers, shareholders, employees, communities, suppliers, and competitors [4].

According above, the contents of responsibility have changed from independence to interrelated, which is results of study more in-depth, and also made the study more realistic. When we study the CSR from the perspective of stakeholders, we can easily find that responsible objects are ranging; it is difficult to determine which responsibility should be fulfilled to each object, let alone the extent of responsibility perform. Above all, the reasons to hard to unified concept of CSR are that CSR is a dynamic development process, which made the boundaries of CSR fuzzier and dimensions more uncertain. By analysis the

definition of CSR, objects, contents, we believe that the definition of CSR is blurring.

B. Fuzzy characteristics of CSR performance

The core issues in CSR performance is the relationship between CSR and CSP (corporate social performance), that is to say, whether CSR performance will have any effect on enterprises. Namely, the research turn into study the costs and benefits of bearing social responsibility, and the relationship between enterprise value relations, financial performance and accountability competitiveness.

There are three main relationships between CSR and CSP. First of all, corporate which fulfill CSR will increase CSP. Yang Rong, Yang Yu take listed companies in China as example to explore the corporate relationship between social responsibility and core competitiveness of enterprises, and then put forward that there is a strong positive correlation of them, it can also help to improve their own access to business resources and the ability to be recognized by society [5]. Bian Jihong proposed that competitiveness of corporate responsibility contribute to the achievement of sustainable development of SME clusters [6]. Meng Xiaojun, Xiao Zuoping believe that CSR information disclosure helps reduce information asymmetry, thereby reducing the cost of capital, there is a interactive relationship between them [7]. Second, CSR performance will reduce CSP. Cornell, Shapiro thinks that CSR can't meet the demand of the interests of outside shareholders; it will produce market fears, improve the company's risk premium and ultimately lead to higher costs or loss of opportunities [8]. Finally, in between, LI Zheng analysis the relationship between CSR and corporate value by data of listed companies in 2003, and then come to conclusion that CSR performance will reduce the enterprise value in the current period, but in the long term will make benefit [9].

Above all, it is difficult to determine the relationship between CSR and CSP. The main reasons as following: First, only after a period of time corporate social responsibility produces an effect on business performance while immediate effect. Longer time span reduce the desire to fulfill the responsibility, so the impact of social responsibility is fuzzy to some extents. Second, under normal circumstances, it is difficult to quantify the expedition the impact of social responsibility, because it manifested through corporate reputation, corporate culture, and brand image instead of financial indicators. Finally, in term of theoretical research, existing studies are more about which kinds of CSR should be fulfilled, however, few research about whether the enterprise itself fulfill the social responsibility, CSR of each stage and the extent of the CSR perform. This paper argues that these issues with strong uncertainty of corporate social responsibility should be made clear before. In summary, this paper believes that corporate responsibility have fuzzy characteristics.

III. MODEL BUILDING PROCESS

This paper puts corporate lifecycles theory into CSR and stakeholder theory by fuzzy mathematics method, and then analyzes the relationship between enterprise lifecycles and CSR by qualitative and quantitative methods. The fuzzy mathematics method is a kind of comprehensive evaluation method based on the fuzzy mathematics, which membership functions, fuzzy operator are used. When the quality or quantity are affected by many kinds of factors or a variety of indexes and the levels of indexes completed are difficult to recognized, we can use the fuzzy membership functions to switch the qualitative evaluation into quantitative evaluation. That is to say, we can make an overall evaluations by using fuzzy mathematics to the objects which restricted by factors.

A. Comprehensive capacity of every lifecycle stage

The enterprise lifecycles theory is one of most important modern enterprise management theory. It regarded enterprise as a living individual modeled on biological development cycle, and divided enterprise lifecycles into different stages, and then managed the enterprises by the characteristics of each stage. Haire (1956) divided enterprise lifecycles into five stages: birth stage, growth stage, maturity stage, recession stage, death stage. Adize (1989) divided enterprise lifecycles into ten periods. Rui Mingjie (2004) divided enterprise lifecycles into incubation period: survival period, high-speed growth period, mature period, decline period, transformation period [10].

According to the development of the enterprise time sequence, this paper divided enterprise lifecycles into n stages, expressed as set $Q = \{ Q1, Q2, \cdots, Qn \}$. This study selected m characteristics as evaluation factors when analyze the characteristics of every stage, such as the scale of the enterprise, total assets, debts, management mechanism, market share and profitability, etc . All the evaluation factors can be quantified by expert scoring, and then we can get set $C = \{ C_1, C_2, \cdots, C_m \}$. Make sure every evaluation factor's ability of each stage is measured; we can get the following matrix:

$$\begin{pmatrix} P_{11} & \cdots & P_{1n} \\ \vdots & \ddots & \vdots \\ P_{m1} & \cdots & P_{mn} \end{pmatrix} \quad (1)$$

We should make non-dimensional processing because of different statistics can't be compared. Every statistic is divided by maximum in each column vector. After non-dimension data processing, we can get

$$p_{j1} = \frac{P_{j1}}{MAXP_{j1}}, (j = 1, 2, \cdots, n), 0 \le p_{j1} \le 1 \quad (2)$$

$T_{Q1} = \sum_{j=1}^{m} p_{j1}, (j = 1, 2, \cdots, n)$ It represents comprehensive capacity situation of each lifecycle of enterprises, referred as cycle comprehensive ability, Expressed as $T'_{Qn} = [t_{Q1}, t_{Q2}, \cdots, t_{Qn}]$, In order to make model easily, we shift T'_{Qn} into

$$T_{Qn} = \begin{pmatrix} t_{Q1} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & t_{Qn} \end{pmatrix} \quad (3)$$

B. Fuzzy relationship between CSR and stakeholder

Firstly, this paper divides CSR into x types, and it can be expressed as set $R = \{R_1,\ R_2,\ \cdots,\ R_x\}$. Secondly, this paper divides stakeholders into y types, and can be expressed as set $S = \{S_1,\ S_2, \cdots,\ S_y\}$. We should take stakeholders into consideration when exam the social responsibility of enterprises. Combining CSR and the stakeholder theory, the paper calculates the duty weight of the enterprise for each stakeholder; we can draw the matrix A by using set R and set S:

$$A = \begin{pmatrix} a_{11} & \cdots & a_{1y} \\ \vdots & \ddots & \vdots \\ a_{x1} & \cdots & a_{xy} \end{pmatrix} \quad (4)$$

Taking $A_{1y} = (a_{11}, a_{12}, \cdots, a_{1y})$ as an example, each element in row vector represent that how much responsibility enterprise performed in the first CSR for different stakeholders. Matrix A can be expressed as responsibility degree. The range of each element is $0 \le a_{xy} \le 1$.

C. Specific CSR of each lifecycle stage

This paper divides specific responsibilities into z types, namely indicators of CSR are $F = \{F_1,\ F_2, \cdots, F_z\}$. In the practice, the study selects some specific indicators according to "China Corporate Social Responsibility Report 2010 Edition". Combining set Q with set F, we get the relation matrix V. Matrix V represents the fulfillment of specific responsibilities at different stages, and it is referred to specific responsibilities of lifecycles. The data of specific responsibilities of lifecycles can be got from related departments. Before enter data into a matrix V, we should make non-dimensional processing, because different evaluation factors of data can't comparable. Finally, we can get matrix:

$$U = \begin{pmatrix} u_{11} & \cdots & u_{1n} \\ \vdots & \ddots & \vdots \\ u_{z1} & \cdots & u_{zn} \end{pmatrix} \quad (5)$$

D. Fuzzy relationship of stakeholders' specific CSR

In this step, we will build the relationship between the indicators of CSR and the stakeholders. The degree of the relationship was described by fuzzy membership; it can be referred to as the specific responsibilities of stakeholders, and get the corresponding fuzzy matrix E. In the matrix E, each row vector present $S = \{S_1,\ S_2, \cdots,\ S_y\}$, while each column vector present $F = \{F_1,\ F_2, \cdots, F_z\}$. Finally, we can get matrix E as following:

$$E = \begin{pmatrix} e_{11} & \cdots & e_{1z} \\ \vdots & \ddots & \vdots \\ e_{y1} & \cdots & e_{yz} \end{pmatrix} \quad (6)$$

E. QS Model and QR Model

Multiplying set E set U and set T, we get the QS model; the expression as follows:

$$QS\ Model = \begin{pmatrix} e_{11} & \cdots & e_{1z} \\ \vdots & \ddots & \vdots \\ e_{y1} & \cdots & e_{yz} \end{pmatrix} \begin{pmatrix} u_{11} & \cdots & u_{1n} \\ \vdots & \ddots & \vdots \\ u_{z1} & \cdots & u_{zn} \end{pmatrix} \begin{pmatrix} t_{Q1} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & t_{Qn} \end{pmatrix} = (EUT)_{y \times n} \quad (7)$$

The QS model represents that corporate should take cycle comprehensive ability, stakeholders' specific responsibilities and cycle specific responsibilities into consideration when performing their CSR.

On the basis of the QS model and responsibility degree, we can get performance of diffident responsibilities at every lifecycles stage. The expression of QS model is as follows:

$$QR\ Model = A \times QS\ Model = A_{x \times y} \times (EUT)_{y \times n} = (AEUT)_{x \times n} \quad (8)$$

IV. CASE STUDY

The paper select Sanlu Group as Social Responsibility body, and assume that Sanlu Group's interests species, life cycle can be clearly divided, data sources are real and reliable. Due to space constraints, the specific calculation process involved is no longer given, only lists the calculation results of each step.

A. Steps of case study

First Step: Cycle Comprehensive Ability of Sanlu Group. The corporate lifecycle is divided into five stages: entrepreneurial period, growth period, maturity period, decline period, Transformation Period, it can be described as vector $Q = \{Q1, Q2, Q3, Q4, Q5\}$. Then study the characteristics of the entire lifecycles, and summarize the main seven characteristics as follow: firm size, profitability, capital strength, operational risk, companies' image, management system, market share, we use $C_1 \sim C_7$ to reflect the comprehensive abilities of corporate: $C = \{C_1,\ C_2, \cdots,\ C_7\}$ and get cycle comprehensive ability.

Second step: Responsibility Degree of Sanlu Group. According to the needs of study, stakeholders are eight kinds: shareholders/creditors, consumers, employees, natural environment, communities, competitors, business partners, Government, and it can be expressed as set $S = \{S_1,\ S_2, \cdots,\ S_8\}$. In addition, this paper divide CSR into $R_1 \sim R_4$ as set $R = \{R_1,\ R_2,\ R_3,\ R_4\}$.

Third step: Cycle Specific Responsibilities of Sanlu Group. The paper selects six kinds' specific responsibilities: quality management, labor laws, after-sales service, and safety, responsibility purchasing and charitable donation. At last, we can get matrix U.

Fourth step: Stakeholders' Specific Responsibilities of Sanlu Group. Matrix E can be got as follows thought the same methods.

Last step: Social Responsibility Model. Combining with four steps above, we can establish the QS model and the QR model.

$$QS\ Model = (EUT)_{y \times n} = \begin{pmatrix} 0.07 & 0.07 & 0.07 & 0.08 & 0.07 \\ 0.28 & 0.27 & 0.25 & 0.24 & 0.28 \\ 0.35 & 0.33 & 0.27 & 0.33 & 0.27 \\ 0.01 & 0.01 & 0.01 & 0.01 & 0.01 \\ 0.08 & 0.09 & 0.15 & 0.10 & 0.12 \\ 0.01 & 0.01 & 0.01 & 0.01 & 0.01 \\ 0.11 & 0.14 & 0.18 & 0.16 & 0.18 \\ 0.09 & 0.08 & 0.06 & 0.07 & 0.06 \end{pmatrix}$$

$$QR\ Model = (AEUT)_{x \times n} = \begin{pmatrix} 0.05 & 0.06 & 0.09 & 0.06 & 0.07 \\ 0.14 & 0.15 & 0.17 & 0.15 & 0.16 \\ 0.43 & 0.42 & 0.39 & 0.42 & 0.40 \\ 0.38 & 0.35 & 0.35 & 0.47 & 0.36 \end{pmatrix}$$

QR Model represents the fulfillment of enterprise cycle for charitable responsibility, a moral responsibility, legal responsibility, economic responsibility, adding the results which come from the sum of each element in vector row, $R = \{R_1, R_2, R_3, R_4\} = \{0.07, 0.15, 0.41, 0.37\}$

B. Conclusions of case study

In this case, we can get three conclusions as following:

Firstly, the QS model line chart shows that enterprises in the entire life cycle pay more attention to the responsibility of consumers and employees; however, the extent is different at different stage. At the maturity and decline stages focus on community, business partners' responsibility, environmental responsibility is concerned in all lifetime. Compare to the same shareholder, the extent of fulfill the responsibility fluctuate depending on different cycles; it's associated with the enterprise's strategic objectives and the overall strength of enterprises theoretical analysis.

Secondly, the QR model line chart reflects implementation of the four type of responsibility at different stages of the life cycle. We can find the companies pay more attention to the implementation of economic responsibility and legal liability, which is determined by the nature of the enterprise. Concern about moral responsibility and charity responsibility is weak while obviously increase in maturity.

Thirdly, the outcome verifying the pyramid model of CSR, economic responsibility and legal obligation can be fulfill well, however moral responsibility and charitable responsibility are poor, this result is exactly consistent with Carroll's pyramid model.

V. CONCLUSIONS

This paper provide a new way for social responsibility research, and then construct matching model of social responsibility: the QS model QR model by putting corporate lifecycles theory into CSR and the stakeholder theory by fuzzy mathematic method. However, there are two shortcomings in this paper: First, the assumption is that fuzzy characteristics only exist in performs of social responsibility, beyond the types of responsibility, division of stakeholders and other aspects. Second, the paper only select partial CSR indicators and enterprises characteristics indicators, but it doesn't affect the model construction.

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