Analysis on the Country Differences of CSR of Multinational Corporations Based on Fuzzy C-Means Clustering

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Abstract. At present, the fulfillment of corporate social responsibility has become an important responsibility of Chinese enterprises. 10 manufacturing enterprises of China top 100 enterprises to be the study of corporate social responsibility. This article applies the method of fuzzy c-means clustering. It directly and scientifically reflects the development status of sample CSR. Conclusion shows that the uneven development of China's corporate social responsibility of manufacturing, the level of corporate social responsibility to improve, enterprises need to actively fulfill market responsibility, social responsibility, environmental responsibility, and should strengthen the responsibility management.

Keywords: Corporate social responsibility, Fuzzy c-means clustering, Comprehensive coordination, Sustainable development

1. Introduction

As a new corporate value, corporate social responsibility (CSR) requires enterprises to take responsibility for consumers, employees, communities and the environment while creating profits and being responsible for the interests of shareholders, so as to achieve sustainable development[1]. Since the concept of corporate social responsibility was put forward, it has gradually developed from the initiation of the concept to the actual implementation.

In 2007, the relevant documents pointed out that: fulfilling social responsibility is closely related to realizing the sustainable, coordinated and sustainable development of enterprises, society and environment[2]. Only those who respond quickly and actively can win the competitive priority, so as to survive and develop better. In order to help Chinese enterprises to better cope with new challenges of corporate social responsibility movement both at home and abroad, scientifically analyzes the present situation of our country enterprise society responsibility and is particularly important[3]. The analysis results can be used as a business, government, consumers’ decision-making reference.
2. Overview of corporate social responsibility

About the definition of corporate social responsibility and content, not yet formed a more unified understanding[4]. The current mainstream academic views are stakeholder theory, sustainable development theory, corporate citizenship theory, triple bottom line theory, the pyramid model, etc.

The theory of stakeholder holds that enterprises must deal with specific organizations and individuals in the process of operation, such as consumers, shareholders, employees, suppliers, creditors, debtors, communities, governments, non-governmental organizations and other stakeholders, and corporate social responsibility is embodied as the responsibility to stakeholders[5]. Sustainable development theory emphasizes that enterprises must fulfill corporate social responsibility if they want to achieve sustainable development, and it is not sustainable to seek development at the expense of the interests of stakeholders[6]. This theory mainly focuses on environmental protection, poverty and equity issues, and enterprises should be committed to solving the above problems and assume corresponding responsibilities.

Corporate citizenship theory is that in a country for an official registration, according to the law of the country's corporate rights and corporate responsibility and obligation of legal person, is the enterprise citizen, corporate citizen's obligation is to the enterprise bear the social responsibility[7].

In 2009, the CSR research center constructed a new CSR theoretical model based on the classic social responsibility theories such as the "triple bottom line" and the stakeholder theory, which emphasizes three aspects: market responsibility, social responsibility and environmental responsibility. Market liability including customers, shareholders, liability and partners such as closely related to the enterprise business activities and market responsibility of responsibility; Social responsibility includes the government responsibility, responsibility and community participation; Environmental liability including management, saving energy resources, reduce pollution emission reduction, etc.

3. The research methods

3.1. Data source

All the data are from the CSR development index of China's top 100 enterprises (2009). This index system is a comprehensive, consistent and comparable CSR development index constructed by the CSR research center of the department of economics of the Chinese academy of social sciences based on the classic CSR theory and foreign typical evaluation system and in combination with the reality of China. It evaluates the CSR performance status of China's top 100 enterprises. From which extract 10 manufacturing enterprises, this paper use the 10 enterprises data for research. Is this article selects the enterprise data in table 1.

Table 1. 10 of China's top 100 enterprises manufacturing index of corporate social responsibility

| Enterprise name          | Market responsibility | Social responsibility | Environmental responsibility |
|--------------------------|-----------------------|-----------------------|------------------------------|
| China Iron               | 34                    | 32                    | 47.1                         |
| Taiyuan iron & steel     | 62                    | 40                    | 35.6                         |
| Laiwu steel              | 25                    | 47                    | 60                           |
| Jiangxi copper           | 10                    | 14                    | 38.5                         |
| Tangshan iron & steel    | 50                    | 28                    | 0                            |
| Wuhan iron & steel       | 80                    | 42                    | 81.4                         |
3.2. Research method -- fuzzy c-means clustering.

In this paper, most objects do not have strict attributes, and they are intermediary in terms of sexual states and categories, which are suitable for soft partitioning, such as the CSR index here. The proposed fuzzy set theory provides a powerful analytical tool for this kind of soft division, USES the fuzzy method to deal with the clustering problem, expresses the intermediation of the sample category, that is, establishes the description of the uncertainty of the sample for the category, and can more objectively reflect the sample enterprises' performance of CSR. Since the discussion of this method is not the focus of this paper, this paper only briefly summarizes, specifically as follows:

Define the target function as: \[ J(U,V) = \sum k = 1^n \sum k = 1^n U_{ik} m D_{ik}^2 \] \hspace{1cm} (1)

Among them, \[ D_{ik} = \|X_k - V_i\| \] \hspace{1cm} (2)

Given data set: \( X=\{X_1, X_2, ..., X_n\} \), where each sample contains \( s \) attributes. Fuzzy clustering divides \( X \) into \( c \) class in time, \( 2 \leq c \leq n \), \( V=\{V_1, V_2, ..., V_n\} \) is \( c \) clustering centers. In the fuzzy classification, each sample cannot be divided into a certain class strictly, but belongs to a certain class with certain membership degree.

**Table 2.** the center of all kinds of clustering analysis

| Central point      | Market responsibility | Social responsibility | Environmental responsibility |
|--------------------|-----------------------|-----------------------|----------------------------|
| The first category | 55.572                | 53.557                | 61.762                     |
| The second category| 19.599                | 27.648                | 39.419                     |
| The third category | 38.526                | 17.328                | 6.7989                     |
| The fourth category| 1.7954                | 2.5583                | 1.9587                     |

In table 2, the fourth class enterprise has four, respectively is the north station, Jiangsu group, Tangshan iron and steel, MaAnshan steel holdings, can see from the picture such companies focused on the figure at the bottom of the dark blue area location, here we call it "frigid zone". It is an obvious fact that enterprises in the "cold zone" hardly disclose their social responsibility practices. Except that BeiTai steel has some marks for market responsibility and social responsibility, other enterprises all score zero.

3.3. Suggestions

Based on the above analysis, this paper gives the following Suggestions:

3.3.1. The performance of the corporate actively. As corporate social responsibility investment and new investment in China has also ground to take root, and shows strong vitality. Enterprises should comply with the trend of historical development, and actively fulfil responsibility "market", "social responsibility", "environmental responsibility" and so on corporate social responsibility.
3.3.2. Specification of corporate disclosure. Timely and standardized information disclosure is the premise of establishing "mutual trust" between enterprises and other economic entities, and is also the basic guarantee for enterprises to establish a reliable credibility system. However, many enterprises in China lack a standardized corporate social responsibility information disclosure system, which seriously restricts the development of CSR. Therefore, enterprises with low CSR index focus on effective corporate information disclosure, standardizing information disclosure, behaviour and improving the construction of their own information disclosure system.

3.3.3 To promote corporate social responsibility management. In order to enhance the level of performance of the corporate social responsibility, enterprises should introduce the CSR management system, and guide the CSR practice in a more scientific way.

4. Conclusion
From the above analysis, it can be seen that the CSR development of the selected enterprises presents a "stretching" feature, that is, the emphasis and practice degree of CSR vary greatly among enterprises. Enterprises represented by "tropical" and "subtropical" attach importance to CSR, while those represented by "temperate" and "cold zone" lag behind in CSR development. At the same time, we found that the enterprises that actively fulfill CSR are larger in scale and have higher visibility, such as boasted group and Wuhan iron and steel, while the enterprises with lower visibility and smaller scale are relatively poor. Of course, there is also a possibility that enterprises in the "temperate zone" and "cold zone" actively fulfill their CSR but fail to make any kind of disclosure, which also leads to the low index value.

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