

# Engage Corporate Responsibility (CR) in Zijin Mining Group

-integration with real options approach and stakeholder theory

*Zhang Shanshan*



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Love all of you♥,

Serena

# Abstract

Nobody will disagree that companies should run business within the obedience of laws and regulations. However, there is always some requires which beyond those laws and regulations—for example the Corporate Responsibility (CR). Therefore, this thesis starts from this perspective and conducts a case study which based on lately happened accidents in one of China's biggest mining company: Zijin Mining Group (ZMG). Their attitudes and behaviours after the accidents appear to be quite anti-CR and as a result worth to be studied with the issues such as how ZMG will engage CR performance. Nevertheless, CR practicing is not just a fancy idea but need to be carefully cultivated. It is such a long-run programme while at the same time contains various risks. Thus, the aim of this thesis is to analyze the CR context within ZMG and discuss the integration of real options approach and stakeholder theory as some tools for CR engagement. Correspondingly, the theoretical framework will involve CR, real options and stakeholders' theory; penetrating into a case study from qualitative research method. As a result, the thesis will provide a holistic picture of CR context in ZMG, followed by discussion about the application of real options approach on the purpose of promoting a smooth and beneficial CR participating process.

Key words: Corporate Responsibility (CR), real options, Zijin Mining Group (ZMG)

# Abbreviations

<b>CASS</b>	Chinese Academy of Social Science
<b>CBCSD</b>	China Business Council for Sustainable Development
<b>CEC</b>	Commission of the European Communities
<b>CFCSR</b>	Chinese Federation for Corporate and Social Responsibility
<b>C(S)R</b>	Corporate (Social) Responsibility
<b>DCF</b>	Discounted Cash Flow
<b>GAPP</b>	General Administration of Press and Publication
<b>ISO</b>	International Standardization Organization
<b>NPV</b>	Net Present Value
<b>SASAC</b>	State-owned Assets Supervision and Administration Commission of the State Council
<b>SRI</b>	Social Responsible Investment
<b>TQM</b>	Total Quality Management
<b>WBSCD</b>	World Business Council for Sustainable Development
<b>WRI</b>	World Resource Institute
<b>WWF</b>	World Wild life Fund
<b>ZMG</b>	Zijin Mining Group

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# 1. Introduction

Since 1978, China's economy has been transitioning from a planned economy to market economy (see, e.g. Adelman and Sunding, 1987). In order to increase competitiveness with other countries and achieve an influential financial role in the world economy, the Chinese government published a series of economic policies which mostly concentrated on financial and monetary development (Hannan, 1995). For years, China has maintained a leading position in pace of economic growth and achieved nearly a 10% annual increase in GDP (Liu and Diamond, 2008: 1). However, environmental damage such as CO<sub>2</sub> emissions and over exploitation of natural resources is happening constantly and overwhelming environmental protection efforts. In one instance China invested billions for water pollution management in Taihu, the country's third largest lake; however hundreds of manufacturing companies continue to emit wastewater into the lake. Ironically, those companies are permitted to do so because they can make money and contribute to the fast growing GDP index in China (*ibid*). As a result of such practices, China ranked near the end of the world's environmental and sustainability index list (ESI, 2006); as well as kept a distance from the Corporate Responsibility (CR) which indicates "*corporations have a fiduciary duty to both meet the needs and wants of customers and stakeholders and protect the health and safety of humankind and the natural environment*" (Rainey, 2006: 219).

There are several reasons why China cannot balance its economic development and environmental/social performance; however, the most persuasive arguments are attributed to the focus on economic performance and neglected investment and regulations targeting environmental/social quality management (Hannan, 1995). Even though the government is trying its best to promote environmental policy and regulations (Liu and Diamond, 2008); all its efforts appear to become superficial since the profit maximizing rule is still considered as the ultimate aim for most corporations in China (Delios *et al.*, 2006). Perhaps the business logic in China is heavily affected by Milton Friedman's article which published on New York Times on September 13th, 1970. He proposed that "*There is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud*" (Friedman, 1970). Obviously, this neo-classical opinion highlighted the importance of profit maximization but that have to be established within certain ground rules: transparency, fairness and no deceptions. Nevertheless, no one can give out an absolute correct and clear explanation about "on what level a market can be tagged as transparency, fairness and no deceptions" (Dam, 2008). As a matter of fact, the rules of the market are always set up by the Chinese government itself which highlight the crucial role of "making profits" (Zhou *et al.*, 2004). The result is that corporations continue to chase economic profits while sacrificing environmental and even social responsibilities (*ibid*). In addition, the reason that putting profit chasing as the primary guidance is also generated by political reason: individuals who want to be *selected and promoted as government leader is considered heavily upon the person's ability to manage economic performance* (Liu and Diamond, 2008: 2).

The global mining industry has been substantially influenced by some new factors such as sustainable development issues from the 1950s (World Mining Congress, 2008). The original single economic based orientation is moving towards to a healthy and safety context, which sheds a light on environmental, social and legal responsibilities as well as keeping focuses on economic performance. The growing number of mine disasters that happened annually not only arouses the legislation challenges, but also increases concerns on social and environmental topics. From 1980s several local communities began to protest against mining companies that lack of environmental and social considerations. These protests reflected that the CR issues existing in mining business both in developed and developing countries, and arouse legal and political attentions from 1990s (*ibid*).

The tradeoff between profitability and social and environmental responsibilities has been very evident in China's mining industry (Jimena, 2010), which is one of the country's most important industries in China since the large mine resource reservation and huge increasingly demand all over the world (www, mbendi, 2011, 1). About 80,000 mining enterprises are state owned and a comprehensive mining industry system that includes geology, production, construction, scientific research, design, equipment manufacture, management, education and training has been established (*ibid*). However, the economic profit is still the primary target for most mining corporations in China although the government starts to pay attention on environmental and social issues (World Mining Congress, 2008). Some of the following figures may help to understand the lack of ethical and social responsible awareness in China's mining industry. In year 2000, 5,300 people died in coal mining accidents and the number increased to 7,200 in 2003 (www, Frankwarner, 2011). Even though it decreased to 2,631 people in 2009; the number is still tremendous compared with 18 deaths in US coal mining accidents (*ibid*). Stated in terms of deaths per volume of coal mined, 0.849 lives are sacrificed for every 1 million tons of coal in China while the figure is only 0.02 lives in the US (*ibid*).

Thereafter, the mining industry is always labeled as a “devil” industry which reflected on its business characters: *operating in areas without social legitimacy, causing major devastation, and then leaving when an area has been exhausted* (Jenkins, 2004: 24). Henceforth, the CR initiatives which contain both environmental and social responsibility activities appear to be inseparable for the mining industry. Step further, Wheeler *et al.* (2002) indicated that CR is a useful tool for evaluate the company's attitude to its stakeholders. Thus, one intention of the penetration of CR in mining industry is to identify the demands from various stakeholders and balance those diverse conflicts between stakeholders and company itself (Jenkins, 2004). Specifically, those conflicts normally stand as a huge divergence between economic benefits and social & environmental welfare (Dam, 2008). Unfortunately, since CR is not mandated by law and its benefits on monetary gains are hard to estimate in short run, many companies choose not to be the “first mover” for implementing CR (张维迎 (Zhang, W.) , 2007).

With increasing economic globalization, the “fairness of society and environment” has been promoted intensively (Dam, 2008). As a result, self-regulation is being practice by a growing

number of companies all over the world (Becchetti *et al.*, 2005; Beltratti, 2005). For instances, The Body Shop is doing a range of both environmentally and socially friendly activities through its daily business (www, TheBodyShop, 1, 2011); Shell, the Royal Dutch energy and petrochemical group “benchmarked” itself as the sustainable business leader of the world’s oil and gas industry (www, Shell, 1, 2011). It is easy for us to feel that more and more companies are voluntarily becoming environmentally and socially responsible; as well as engaging a wide range of their stakeholders in their business. According to Dam (2008), this kind of behavior can be tagged a popular title of “CR”.

Numbers of authorities analyzed and discussed the benefits of implementing CR that it could for example enhance a company’s reputation or increase the products’ market price (see, e.g. Weber, 2005; Lundgren, 2010). Further, CR involves behavior of the company that goes beyond the social and environmental laws and regulations (McWilliams and Siegel, 2001). In another word, it should be a spontaneous activity which considers the social and environmental responsibilities beyond its shareholders’ immediate economic benefits (*ibid*). And as a matter of fact, social and environmental responsibility of a company is now considered as important as or even more important than immediate economic profits (Baron, 2001). Steps further, there are some researches on CR’s effects from economic aspect in order to find the relationship between CR and financial performance. For instance, the Environmental Kuznets Curve (EKC) evaluates the relationship between economic and environmental performance (see, e.g. Gruver, 1976; John and Pecchenino, 1994). It implied that the EKC is an inverse U shape curve which indicates a first increasing then decreasing relationship between economic development and environmental deployment (Hettige *et al.*, 2000).

However, several studies had pointed out the challenges related to CR investment and the mixed results they have on financial performance (see, e.g., Margolis and Walsh, 2003). As Knox and Maklan (2004: 514) stated that “*the development of CR implementation will be inhibited by the lack of systematic framework linking investment in these responsibilities to social or business outcomes*”.

In reality, there are also differences in how CR is promoted and implemented in companies originating in developed and developing countries (Carron *et al.*, 2006). For instance, if a given financial investment is required for a CR program, companies from developing and developed countries may have different capacities for raising these funds and will therefore evaluate the investment decision differently. The dilemma between short-term and long-term benefits that generated by CR investment is also larger for companies from developing countries. In addition, the uncertainties and risks that accompany CR investments are further impediments to their adoption (*ibid*).

As a result, the existence of a framework or approach that could allow a company to assess its financial performance under the umbrella of CR could probably “facilitate the CR

implementation and support rational decision making” (Weber, 2008:247; Epstein and Roy, 2001: 601).

Then the intersection between CR and the real options approach starts a new page on the measurement of CR performance and seems to reduce the paradoxes effectively. Bowman and Hurry (1993) proposed that employing real options can help to promote a company’s investment in risk business as it reduces future uncertainties. This is because the logic of the real options approach implies considerations regarding flexibility before making investments (McGrath, 1997). In general, the real options approach enhances a company’s strategic management ability on CR performance when surrounded by risks and uncertainties (Husted, 2005). Hence, it is interesting to analyze how companies in developing countries like Zijin Mining Group (ZMG) could apply the real options approach and stakeholder theory to support investment decision targeting improved CR performance.

## 1.1 Problem background

In the summer of 2010, a water pollution disaster occurred in Shanghang County in China, with 9100 cubic meters of waste water spilling into the Ting River between 4:00 pm on July 3rd and 2:30 pm the following day. Thousands of fish were killed and people who live around the river were endangered by the polluted water (www, Sina, 1, 2010). However, ZMG failed to report this accident until nine days later. Even worse, just three days after the first reports, there occurred a second water pollution incident at the same plant though it was quickly controlled to avoid further damage (*ibid*). Following a recent investigation of results by the General Administration of Press and Publication (GAPP), it was reported that China’s largest gold producer ZMG and the local government tried to bribe several journalists to conceal the water pollution disaster (www, Chinadaily, 3, 2010). Although ZMG made an announcement and apologies for their misdeeds afterwards (*ibid*), its behavior appears to be quite in contrast to the existing “CR statements”: caring about environment and sustainable development, creating a harmony society (www, Zjky, 1, 2010). As a result, the scandal caused dissatisfactions and a lack of trust between ZMG and its wider stakeholders: victims, media, NGOs, stockholders, citizens (especially the ones who live nearby Ting River) and even employees (www, Chinadaily, 3, 2010).

ZMG’s actions are in distinct contrast to those in alignment with the concerns of CR. It might be the current situation in China that the profit-focused economic policy and the profitability survival rules lead companies to neglect the importance of CR and purely chase short-term economic benefits (Zhou *et al.*, 2004). Additionally the organization may use the excuse that companies can do whatever they want as long as they are making money; even worse, they can “control the business rules” if they are state owned companies (杨林 (Yang, L.), 2003). But this type of behavior does not support long-term sustainable development, in particular for Chinese companies that want to become globalized and join the international market.

Building on the thoughts of Rainey (2006: 215) who suggests that “*corporations exist to satisfy the needs of their customers, markets, shareholders, stakeholders and society*”, there is no doubt that making profit is not the only or most important goal within business. Concerning business effects in a broader range within stakeholders or even the whole society seems to be the new “trend” for companies.

At the same time, from the company or its manager’s perspective, the struggle of whether or not to implement CR often arises from the conflict between short-term and long-term profits (Burke and Logsdon, 1996). The risky future is normally caused by market uncertainties that could lead to either positive or negative pay offs on CR activities (Aupperle *et al.*, 1985). The tradeoff between large amounts of investments in the short-term and unpredictable pay back in the long run have scared many investors therefore generating defensive emotions on CR participation (Burke and Logsdon, 1996). Despite a significant amount of academic research that demonstrates a positive relationship between CR investment and financial performance, managers always consider CR projects as risky investments and are quick to give them up (Husted, 2005).

However, some researchers have connected risk management and CR together within the context of real options (see, e.g. Kanter, 1999). This kind of research provided a much deeper and more delicate understanding between CR investment and risk management (Trigeorgis, 1994; Bowman and Hurry, 1993). Hence, using the real options approach to estimate the benefits from CR performance could provide the direct financial results and proactive advices from an economic perspective; which should be more acceptable by businessmen.

Nevertheless, as a big state owned mining company, ZMG probably faces more difficulties in determining its own CR agenda. The challenges from strategy change or even culture change are not as easy to deal with as we might imagine. As Rainey (2006: 369) indicated “*the resistance to change has been a key concern of executives and strategic management for decades*”. Additionally, the “state owned” tag and the contribution of its products to economic activities might formulate a protective shell for ZMG which indicates that it (ZMG) can do whatever it wants unless it is breaking the law. However, the water pollution disaster, its attempt to limit the transparency of its misbehavior through bribes in exchange for hiding coverage of the accident, and lack of monitoring after the first accident are outside the boundary of what the “protective shell” could handle.

## 1.2 Aim

As the world’s hyper competitive economic conditions are creating “a heavy pressure on companies to examine their philanthropy and other social responsibility activities” (Burke and Logsdon, 1996: 495); CR and its related issues become increasingly important within daily business. Thus, according to the problem stated above, the main purpose of this paper is to *analyze ZMG’s CR performance and investigate the application of the real options approach and stakeholder theory in CR management decisions.*

## 1.3 Research Questions

For accomplishing the research aim, this study will investigate answers to the following main questions:

- 1) What are the benefits/difficulties of implementing CR in ZMG?
- 2) How could the real options approach and stakeholder theory work in the case of ZMG?
- 3) What kind of managerial strategies are most appropriate for ZMG to implement CR?

## 1.5 Outline

The following figure 1.2 provides the structure and outline of this thesis. Chapter 1 introduces the issues that will be discussed in this paper, including an explanation of the problem background, the aim and the research questions that arise from it, the research approach and delimitations. Chapter 2 states the methods that are used in this paper, followed by Chapter 3, which focuses on the establishment of the literature review in the field of CR and real options and the related topics.

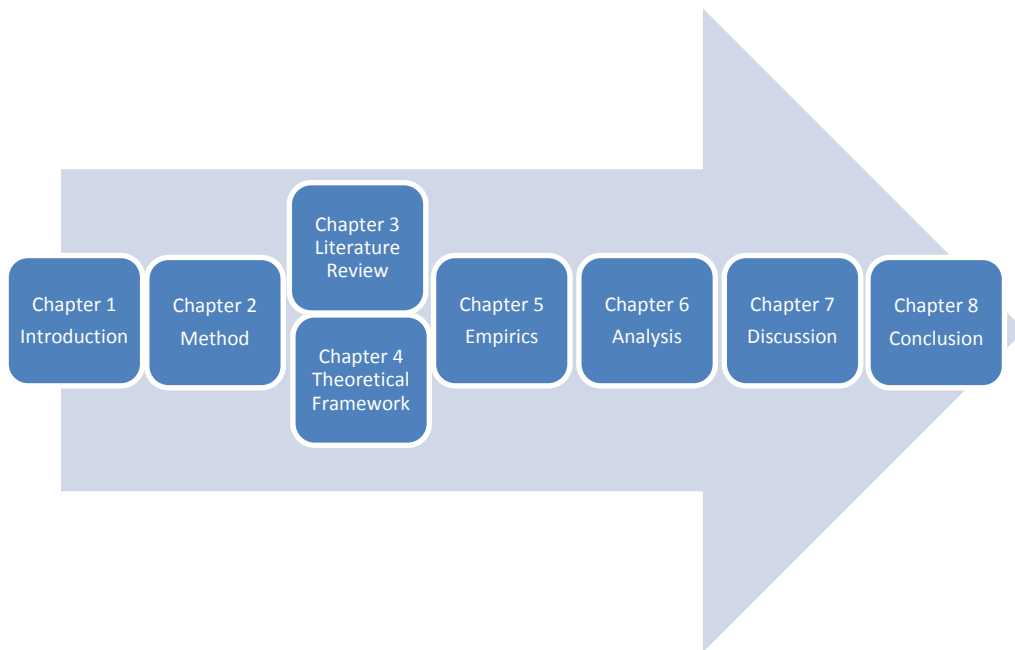


Figure 1.1 The outline framework of the thesis

The forth Chapter provides the theoretical framework to be applied in this study and, following that Chapter 5 introduces empirics of the ZMG case, providing more details for better understanding the background and making preparation for the following in-depth analysis and discussion. Chapter 6 includes analysis relating to the research questions that were introduced in Chapter 1 on the basis of theoretical framework and empirical findings. After that, Chapter 7 discusses the results from the analysis and tries to achieve the research aims. In the last section,

Chapter 8 provides conclusions drawn from the study process and proposes the possible suggestions for future research.

## 1.5 Delimitations

It is the truth that one thesis cannot cover everything although it tries to. Thus there is a need to establish boundaries and point out the limitations for what is feasible and realistic within the research. The purposes of this paper are to identify the context for CR in ZMG and investigate whether the integration of real options approach and stakeholder theory can be used to support CR management decisions. However, since CR and real options framework are both such large topics on their own, it is difficult to cover them entirely within this thesis. Therefore certain elements of each will be discussed in the context of a case study, with the focuses on stakeholder analysis within CR framework and application of real options approach into CR investment within real options framework. Meanwhile, the three elements that constitute CR framework will be studied correspondingly. The environmental effects are presented according to the empirics; while the economic effects are discussed with the integration of real options. However, the social effects are just mentioned as a side-impact from the empirics and will not be discussed overmuch on the risk of digressing from the subject.

Obviously, one important reason for the choice of ZMG as the case company subject is that it could appropriately connect CR and real options together; while another reason is on the consideration of geographic and culture factors. ZMG is a Chinese company and most literatures and documents about this company are in Chinese. Further, the character of Chinese companies, especially state owned companies are quite special in that their business behavior is influenced by Chinese culture (Redding, 1993:12). Hence, as a Chinese national and native speaker, it is easier to gather and digest information originating from my cultural background. But just like one coin has two sides, it has to be kept in mind that no matter how well I understand the Chinese literature and business environment; the translation and interpretation problems no doubt exist because of individual subjectivity and language barriers.

## 1.6 Limitations

Before the officially start of studies in this thesis, it is necessary to pull out the limitations. First of all, there is a need to declare that the subjectivity during writing is inevitable. This is because every individual could have his/her distinct viewpoint for one thing; and as a result there are various opinions on the same topic in research. As Leedy and Ormrod (2005: 133) proposed, “*in qualitative research there is not necessarily a single, ultimate truth to be discovered*”. Thus, it has to be kept in mind that this research is based on the author’s own epistemology which is influenced by her living surroundings and experiences; while the outcome of the research could be entirely different by another person.

Secondly, since there is barely any academic paper on the studies of ZMG's lately happened accidents; the empirical sources are limited and mainly gather from the China Daily news press. Although China Daily is such a transparency and reliable newspaper (Herbert, 2001) which maintains more than 200,000 circulation over 150 countries and regions everyday and is the only "national English language newspaper in China" (www, Chinadetail, 1, 2011); there is inevitably a limitation which accompany with the holistic research in this thesis.

Finally, the time limitation could affect the quality and depth of the research process but it's not the critical one.

The above is the introduction of the problem, background, outline, delimitation and limitations of the paper. In the following chapter 2, it will explain more details about the methods.

## 2. Method

*The method is making choices and being aware of the research conduct* (Mark-Herbert, 2002: 37). And obviously, the choice of “method” is quite important and taking a significant position in this thesis. Therefore, the main purpose of this section is to provide the information about how the studies will be conducted in this paper. It will outline the main approach used in the paper and present the research structure according to the chosen method.

### 2.1 Approach

As Cecilia Mark-Herbert (2002: 16) mentioned that “*the interplay between studied theory and empirical findings has guided the analytical process*”; the choosing of the theoretical framework and the collecting of the empirics generated the research questions and studying process for this thesis. In addition, Leedy and Ormrod (2005: 2) defined research as “*a systematic process of collecting, analyzing and interpreting information in order to increase our understanding of the phenomenon about which we are interested or concerned*”.

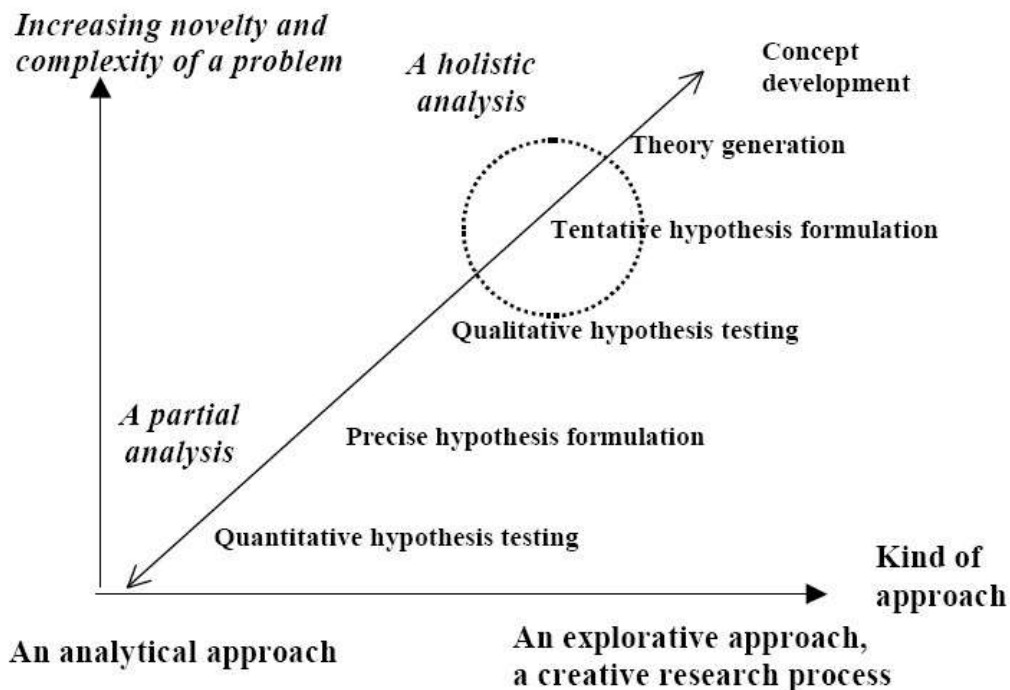


Figure 2.1 How increasing novelty and complexity of a problem affects the research approach and desired research contribution (Nyström, 1990 that be cited in Mark-Herbert, 2002: 17).

The figure 2.1 above shows the choice of approach depends on the novelty and complexity of a research problem. This thesis practices qualitative hypothesis testing and tentative hypothesis formulation. Specifically, the thesis is written from ZMG’s perspective and hold with neutrality and inductive traits. It will explore the context of CR in ZMG; analyze the benefits and

difficulties of implementation of CR; as well as seek for solutions to eradicate those difficulties with the concern of real options.

## 2.2 Choice of research method

Modern research methods on CR evaluation analysis are mostly in two main categories: qualitative studies such as empirical research or case studies and quantitative approaches including real options analysis, econometrics evaluation and microeconomics model. Examples of qualitative studies include, Burke and Logsdon (1996) which evaluated the payoffs from CR investments within the qualitative method and; Weber (2008) that made a company level measurement of CR through case studies. A number of papers have also employed a quantitative approach including Husted (2005) that applied a real options approach to evaluate the relationship between CR implementation and financial performance; Belu and Manescu (2009) conducted an econometrics method for analyzing impacts from CR on economic performance; and Lundgren (2010), which set up a microeconomics model to discuss the relationship between CR and several economic mechanisms.

In this paper, the research method will purely consist of a qualitative study. Indeed Bouchard (1976: 268) indicated that the mixed use of qualitative and quantitative method could “*enhance our belief that the results are valid but not a methodological artifact*”. However, because of lacking first hand data from ZMG for quantitative study, the real options approach will be analyzed and discussed from a qualitative perspective correspondingly.

Firestone (1987: 16) defined qualitative methods as “express the assumptions of a phenomenological paradigm that there are multiple realities that are socially defined”. And the purpose of qualitative methods is to provide in depth and detailed understanding, analysis and discussion of phenomenon (Jupp, 2006).

As a matter of fact, the case study approach is chosen as the primary qualitative research method in this paper. According to Robson (2002: 178), case study is defined as “*a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence*”. Gummerrsson (2000) also indicated that case study approach is a powerful tool when dealing with business and management research. And it can be used in fields such as corporate strategy, marketing, leadership decision making, etc. (*ibid*). In short, case study is a kind of approach that concentrates on analyzing the present situation through one or several cases (Eisenhardt, 1989; Yin, 1984).

In this thesis, qualitative research is based on the case study of ZMG. It will first provide an introduction of ZMG and descriptions of the disasters the company was responsible for in the empirics section. This will provide the information for future analysis and discussion. Then it will focus on the analysis of the CR context of ZMG; benefits and difficulties for the firm in practicing CR; penetration of real options approach and so on. The data that collected in the

empirics section is all from second hand literature, internet reports and local newspapers. It might be a limitation of this thesis since there is no primary data. However, because of the corporation's regulations and the government's protection for this largely state-owned company; it is hard to secure first hand data.

## 2.3 Literature Review

Literature review is crucial in this paper and represents the foundation for future analysis and discussion in the following sections. Academic journal articles and books comprise most of the literatures used in this paper. However, a small number of Internet articles have also been cited to support some viewpoints. In order to better managing the literature review, three stages were employed which are presented below.

First stage: literature review

The SLU's library academic article searching system was used to ensure the coverage of all issues related to this paper (see, <http://link.libris.kb.se/sfxslub/az/slub?lang=eng>). All the journals and articles were chose according to the topic of this paper. For example, key words as "CR" (or CSR), "Business Ethics", "Business Management", "Real Options" and "Risk Management" were used for targeting the range of journals. Then more specific words like "C(S)R in mining industry", "C(S)R and Real Options" etc. were used to find relative articles. The following graphs are examples of academic journal articles' searching steps:

The screenshot displays the SLU library academic article searching system interface. At the top, there are tabs for 'Title', 'Subject', 'Advanced', and 'ArticleFinder'. Below these, a search bar contains the text '0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Others'. A 'Go' button is located to the right of the search bar. Below the search bar, there is a 'Title' field with the text 'Corporate Social Responsibility' and two radio buttons labeled 'Starts with' and 'Contains'. Below this, a message states 'Total number of Journals: 1' and a link to 'Switch to Detail View'. A table lists the search results with columns for 'Journal title', 'ISSN', and 'Actions'. The first result is 'Corporate social-responsibility and environmental management' with ISSN 1535-3958 and a 'Get it' button. Below the table, the 'Search Results' section shows 'There are 67 results for: CSR and mining in Corporate Social Responsibility and Environmental Management'. At the bottom, there are buttons for 'Select All', 'Save to profile', and 'Export Citation'. A 'VIEW' section shows '1 - 20' selected, with links to '21 - 40', '41 - 60', and '61 - 67'. A list of search results is shown, including 'Mining and stakeholder engagement discourse in a Papua New Guinea mine' from the 'CORPORATE SOCIAL RESPONSIBILITY AND ENVIRONMENTAL MANAGEMENT' journal, Volume 18, Issue 2, March/April 2011, by Kevin P. Kepore and Benedict Y. Imbun. The article was first published online on 20 JUL 2010 with DOI: 10.1002/csr.243. Links for 'Abstract', 'PDF(339K)', and 'References' are provided.

Figure 2.2 An example of academic articles' searching steps

And the search terms in this example = C(S)R/Business Ethics × Mining industry (in China) × Real Options (in general).

#### Second stage: Selecting papers

After collecting the relative academic journal articles, it is very important to select the most relevant ones. From the first stage, more than 200 articles were selected and after more detailed selection, about 105 articles were kept and studied for literature review.

#### Third stage: making references and adding missing parts

After completing the literature review, references were carefully made to all sources. Further, some newly added articles recommended by my supervisors and peers were added to the final count.

## 2.4 Choice of the theoretical framework

The choice of the theoretical framework supports the analysis and discussion that answer the research questions from an academic perspective, and connect with the empirics, therefore achieving the research aims. Thus, the concept of CR, stakeholder theory and real options theory are selected as the theoretical frameworks for this paper.

The CR theoretical framework is chosen on the basic consideration of its connection with the empirics; also because of the holistic analysis is built in the context of CR. However, there is no specific theory on CR yet since it is still a fuzzy concept and in the process of developing (). As a result, this thesis uses the commonly accepted and applied framework of CR, with the coordination and endorsement of literature reviews.

The other theory that has been chosen for this thesis is the stakeholder theory. It will help to understand the CR context of ZMG. Meanwhile, the stakeholder theory could facilitate the analysis about the parties involved with ZMG's accidents and who needs to take responsibility.

Real options theory is also selected as a key part in the theory section. It is based on the combination of the classic theory lead by Lenos Trigeorgis and the new branch in the CR field, proposed by for instance Bryan W. Husted. The introduction of real options theory is intended to provide a general concept and how it is related with CR.

## 2.5 Choice of the country, sector and the company

China is located on the western shore of the Pacific Ocean, eastern Asia (www, China-window, 1, 2011). It has 9.6 million square kilometers of area and the world's no.1 population ca 1.3 billion (statistic till 2009) (*ibid*). However, its economic growth has increased rapidly and is remarkably global (www, Economywatch, 1, 2011). Even during the global economic crisis, the growing pace of China's economy did not slowdown. Additionally, it is predicted by some authorities that

China's economy will surpass America's in 2035 (*ibid*). At the same time, this dramatic growth has brought it with many challenges related to environmental and social issues (Elizabeth, 2004). Thus, it is a very interesting country to be selected as the research target; moreover, it is also the country where I come from therefore the economic culture could be easily understood and interpreted.

Jill Shankleman (2009) stated in her report "Going Global: Chinese Oil and Mining Companies and the Governance of Resource Wealth" that China has already become a crucial supplier of minerals in the international market. By 2007, China was the world's fourth largest copper producer and stored more iron ore than almost every country. However, under the pressure of becoming globalized, mining companies, especially the state-owned ones, have to operate within the policies published by State-owned Assets Supervision and Administration Commission of the State Council (SASAC). The policies aim to guide those state-owned mining companies on the way to becoming "international, competitive, listed on global stock markets and be included in the Global Fortune 500 status" (*ibid*). In short, mining industry is one of the key industries for economic development in China, and attracts a lot of attentions.

However, since CR began penetrating the global mining industry in recent years, China's mining industry has faced pressure from social and environmental considerations (Shankleman, 2009). The severe environmental pollution, poor working conditions and other social issues are the current characters of China's mining industry that impede the development and internationalization of China's mining business (Lindbeck, 2008).

ZMG, as one of China's largest state owned company, was selected as the unit of analysis. Because of its water pollution accident and mine dam collapse disaster that happened in 2010, ZMG fulfilled the research aims which were chosen as the first place. Its reactions and behaviors after these two accidents are all good materials for the empirical studies, although they are collected from second hand sources.

### 3. Literature Review

This chapter aims to introduce the literature reviews that on the basis of theories and relate with the research purposes and questions. The chapter begins with the general description of CR context, then provides the relationship between CR and mining industry; follows with the risks and uncertainties that corresponding with CR investments; then continues on the penetration of real options approach within CR projects; and advocates the engagement of stakeholders.

#### 3.1 Context of Corporate Responsibility (CR)

Before the occurrence of CR, the fulfillment with stakeholders who provide the investment capitals for business operation was the core issue among managers (Jensen and Meckling, 1976). Therefore, almost all concerns had been put on making profits in order to paying back those stakeholders and attracted more investments in future (*ibid*). Johnson *et al.* (2008: 146) defined C(S)R as “it is concerned with the ways in which an organization exceeds its minimum obligations to stakeholders specified through regulation”. Certainly this definition is still standing from the stakeholders’ perspective but highlights the importance of “responsibility” as well as broader the range of stakeholders. In the C(S)R context, those responsibilities are constituted from three main facets: economic, social and environmental. And the stakeholders include not only the “capital investors”; but also those who could affect the business performance (*ibid*). Meanwhile, “*the conception of C(S)R involves several matters related to a company’s behavior in its social environment beyond the exclusively economic realms with which companies are traditionally associated*” (Daza, 2009: 284). This statement indicates that the CR framework taking considerations on business performance not only from economic/financial perspective, but also from social and environmental aspects.

When talking about CR, sustainable development is always related and sometimes as a substitute from a stakeholder perspective (Ebner and Baumgartner, 2006). Chichilnisky *et al.* (1995) advocated that sustainable development is activities which concerning about the natural resource for temporary and future generations. Further, according to Jenkins and Yakovleva (2006), sustainable development implicates at the same context as CR: economic development, environmental protection and social cohesion. As a result, either CR or sustainable development has to achieve the social progress that benefits for everyone in temporary and future; reduce or avoid environmental pollutions and apply efficiently energy using systems; keep rapid and stable economic growth and provide safety & comfortable working conditions (Cowell *et al.*, 1999; Miller, 1999).

CR is generally considered as the intermediary between company and society (Snider *et al.*, 2003). Therefore, kinds of questions such as “*should companies take responsibility for social issues?*” (Kok *et al.*, 2001: 286) are discussed for years by academicians, governments, CEOs, media and consumers for years. However, at the beginning era of CR, there existing some queries like the doubt on the relationship between CR participation and company’s economic/financial

performance. As Pinkston and Carroll (1996) indicated that using company's assets on CR activities could be dangerous since the profit will be decreased or cost will be increased or both of them could happen.

Certainly there might be a tradeoff between CR investment and short-term profits since the cost adding and profit reducing at the very beginning phase of CR investment program (Burke and Logsdon, 1996). However, from a longer perspective, CR could pay off the company more than it spent at the first place. For instances, the customers will be more supportive of environmental friendly products; the employees are willing to receive lower wage but in a nice working condition; and even the government will supply kind of subsidy and rewards for participating in CR (*ibid*).

Additionally, Burke and Logsdon (1996: 495) proposed that "a fundamental belief among its business supporters and business-and-society scholars is that Corporate Social Responsibility 'pays off' for the firm as well as for the firm's stakeholders and society in general". Furthermore, Kok *et al.* (2001: 288) pointed out that CR should be on the status of "obligation of the firm to use its resources in ways to benefit society, through committed participation as a member of society, taking into account the society at large and improving welfare of society at large independent of direct gains of the company".

As a matter of fact, the biggest doubt is about the conflicts between profit earning and CR implementation (McAdam and Leonard, 2003). For solving this paradox, Wood (1991) and Moir (2001) indicated a total quality management (TQM) model for CR activities in order to incorporate in business through smooth processes and created benefits in the end. It combined the leadership power during the CR implementation and stakeholder participation management. Nevertheless, TQM neglected the quantitative estimation and evaluation of all CR behaviors and as Greening *et al.* (2000) mentioned that the achievements of CR could only be realized through effectively measurement of its impacts on economic and financial performances.

### 3.2 CR and the mining industry

The CR issues have been discussed around mining industry during these years (Jenkins, 2004; Cowell *et al.*, 1999). Because of the limited non-renewable mine resources, the environmental hazards from the extraction activities and bad working conditions, mining industry is on the embarrassment position among economic development, environmental protection and social impacts (Tilt and Symes, 1999). A mine company always operates in a target area without consideration of legitimate and ethical regulations, and moves to another target area after enormous extraction and damage of mine resources (Jenkins, 2004). Moreover, the mining industry always hires indigenous employers but provides poor working and living conditions. As a result, there appears to be a global tendency by communities and NGOs which doubt the development of mining industry from sustainable aspect and approve the emancipation of indigenous (Kapelus, 2002). Sometimes, CR is a conceptual framework which helps company to

explore its attitudes towards stakeholders (Wheeler, *et al.*, 2002). Hence, for the mining industry CR could be used to balance the various expectations from stakeholders and demonstrate the urgency for achieving sustainable development (Jenkins, 2004).

Therefore, there indeed contain several advantages for implementation of CR in the mining industry. Step further, according to Walker and Howard (2002) there are various reasons for implementing of CR. The most significant reason is that mining industry has been labeled as a destructive industry that focuses on extraction and profit gaining rather than environmental protection and sustainable development (Rae and Rouse, 2001). As a result, there exist constant growing pressures on mining companies from local or international organizations. Some of the pressures just stand on superficial layer which will not hamper the normal operation of mining industry; while some of them are based on legal foundation and challenging the development of mining business (*ibid*). For instance, a large number of NGOs, communities and environmental organizations opposite the development of uranium mine at Jabiluka which locates in the Kakadu National Park of Australia (www, mirrar, 1, 2011). Another example happened in the Newmont gold mining in Peru. Several local communities and organizations resisted the extraction activity of the gold mining since its anti-CR behaviors: environment pollution activities, poor working conditions for employees and their health welfare, lack of community engagement and bribery for unethical or even illegal performance (Bury, 2005).

In general, CR is a useful tool for balancing the various demands between shareholders and stakeholders such as the investors who need their profits back and the NGOs who want to protect the environment and other people's social welfare (Wheeler *et al.*, 2002). As Hamann (2003) proposed that CR could promote a company to be responsible for its investors and stockholders as well as its employees, suppliers, customers and even the general public. Because of the environmental sensitivity characteristics of mining industry: the over extraction of natural resources; the easily happened environmental pollution disasters; poor working conditions and bad social impacts (Tilt and Symes, 1999); CR is on the agenda for enhancing mining companies' awareness on environmental and social responsibilities, promoting companies' disclosures of its behaviors to its stakeholders, and further generating protection for the natural resources and environment (Peck and Sinding, 2003). Nevertheless there is a delightful phenomenon that a growing number of large-scale mining companies began to behave sustainable and voluntarily communicate their CR activities through annual reports, website and some other channels with their stakeholders (Jenkins and Yakoleva, 2006).

### 3.3 Risks and uncertainties in CR participation

The dynamic and uncertainty factors that affect the CR implementation are always aroused by economic uncertainty, technical uncertainty and managerial flexibility (Lazo, *et al.*, 2009). Economic uncertainty always related with external stochastic factors such as product prices and costs; while technical uncertainty refers to internal factors like fast growing technical development or uncertainty about production size. The managerial flexibility belongs to the

natural character of strategic management: managers are always free to make decisions according to their reasonable analysis about future situation and the scarce resources that could be allocated (*ibid*). The following table 3.1 listed out different types of uncertainties and risks that a company could face during investing:

Table 3.1 Different types of uncertainties and risks (Triantis, 2000: 3)

Technological	R&D outcome risk Implementing new tech Force majeure risks	Production breakdown Defective products
Economic	Material and labor costs Product demand uncertainty	Output price risk Market share risk
Financial	Interest rate risk Commodity price risk	Currency rate risk Security holdings risk
Performance	Subcontractor performance Credit risk of contract counterparties	Judicial risk
Legal/Regulatory	Tax law changes Political regime switches or insurrection Environmental regulation changes	Expropriation

Although the implementation of CR could create various monetary and non-monetary benefits for companies, it still contains risks and uncertainties as listed above that connecting CR participation with risk management (Husted, 2005). The CR participation which contains risks and uncertainties can be then classified into two categories: systematic risks and unsystematic risks (Husted, 2005; Weston and Brigham, 1981). Systematic risks refer to the market risks which relate with the return of the stock market (*ibid*). Unsystematic risks, also called business risks, are always influenced by company's private behaviors which "reflect the variation in a stock's return ascribable to firm-specific forces" (Amit and Wernerfelt, 1990: 521). The systematic risks in CR investment always refer to the flexibility and uncertainty of natural resource system. Chichilnisky and Heal (1998) pointed out that the ecosystem's dynamic and future availability of natural resource should all be considered as risks. Interestingly, these systematic risks induce the unsystematic ones. This is because those systematic risks are specific when compared with normal ones and need company to take it for granted within institutional change by itself (Lepoutre *et al.*, 2007; McDevitt *et al.*, 2007). According to Busch and Hoffmann (2009: 298), there are six areas of business risks which caused by unsystematic risks in CR activities especially from environmentally perspective: the constraints within natural environment and institutional action aimed at conserving natural environment belonged to the dynamic of business environment; the environmental state risks referred to extent & timing of ecological limitations and scale and scope of human responses to ecological issues; and the organizational effect risks tagged magnitude and direction of ecology-induced constraints for the firm and exposure to & relevance of ecology-induced institutional changes (*ibid*). Nevertheless, it is difficult to capture and realize either systematic or unsystematic risks from a CR managerial viewpoint because of the complexity by themselves (Wheatley, 1999; Busch and Hoffmann, 2009).

On the other hand, the risks and uncertainties around CR participation could also be divided as the following two groups: “perceived” and “objective” flexibilities (Busch and Hoffmann, 2009; Boyd *et al.*, 1993). This new view generated by the distinction between perceived and objective forecasting of risks and uncertainties within future business environment (Hambrick *et al.*, 2005; Smircich and Stubbart, 1985). Commonly, it is easier to predict the future situation of business environment by “perception” than by “objectivity” (*ibid*). More specifically, this statement can be explained by Milliken (1987) that the prediction of future risks and uncertainties is an individually behavior that hard to be objective and accurately. Therefore, the objective risks are always represented by the changing of business environment which caused by natural environment change or social environment change and hard to be affected through individually behaviors; while the perceived risks refer to the decision response flexibility which incurred by the subjective concerning for future development (Busch and Hoffmann, 2009).

### 3.4 CR and real options

Since CR is incrementally becoming crucial for companies, there is a tendency to “formulate and implement entrepreneurial and environmentally beneficial marketing activities with the goal of creating revenue by providing exchanges that satisfy a firm’s economic and social performance objectives” (Menon and Menon, 1997: 54). Therefore, CR can be considered as one kind of investment (McWilliams and Siegel, 2001). However, because of its difficulty on quantification and tough of evaluation, not every company performs proactively and therefore the investment is always considered as risky (Kytte and Ruggie, 2005; Clarkson, 1995). Merely, since the fluctuation, uncertainty and competitiveness are tagged as the characters of the reality market, “*real options are opportunities to delay and adjust investment and operating decisions over time in response to the resolution of uncertainty*” (Triantis, 2000: 64). As a result, the real options approach provides the chances for a company to reduce the risks on maximum degree while making investments (*ibid*). Therefore, the real options approach helps for analyzing and evaluating the value of CR investment and examine if it could “creates opportunities to expand and grow in future” (Kogut, 1991:21).

Compare with Net Present Value (NPV) rule or Discounted Cash Flow (DCF) method, real options is an advanced approach that helps company to manage the flexibilities and provides costless alternatives, such as defer or abandon the investment when the future is blending with risks (Triantis, 2000). From the mathematical viewpoint, real options can reduce the standard deviation of future cash flow; as well as enhance the expected value of the future cash flow (*ibid*). (Variance= $\sigma^2 = E[(X-\mu)]^2$ ,  $E(x)=\mu$ ) From the risk management viewpoint, real options are on the basis of strategic management but not purely financial or economic aspects, i.e., the combination of risk and financial/economic strategic management (Husted, 2005; Kogut, 1991). Step further, there exists a logically relationship between real options and strategic decision makings which include for example resource allocation or competitive position estimation (Bowman and Hurry, 1993; Trigeorgis, 1996). As a result, the various fields that real options could applied into are like

R&D (Paxson, 2001), technology investments (McGrath, 1997), global manufacturing (Kogut and Kulatilaka, 1994), joint ventures (Chi, 2000) and so on. Meanwhile, some literatures claimed that strategies formulation should be considered as a portfolio in real options (Luehrman, 1998; Bowman and Hurry, 1993; Sanchez, 1993).

Generally, CR real options can be divided into two categories according to their contributions: direct and indirect benefits (Burke and Logsdon, 1996). Direct benefits CR real options include development of new products or services that always creates captured rents; while indirect benefits ones refer to potentially value adding behaviors which require incrementally and long-lasting CR investments (*ibid*).

In the case of direct benefits, CR real options are easier to evaluate and can provide suggestions about whether to continue the CR investment or not. McGrath (1997) and Paxson (2001) demonstrated this kind of CR real options is similar to the one that generated by R&D investment. What's more, McGrath (1997) proposed an approach to evaluate CR real options which based on investments in pollution control technology.

On the other side, the CR investments which generate indirect benefits are hard to evaluate and estimate because of the intangible benefits (Husted, 2005). However, the CR real options here stand for strategic flexibility through for example the creating of goodwill among communities and consumers especially when encountered crisis or scandals (*ibid*). Nevertheless, in this case the CR real options are still not obligatory but might work as collecting stakeholders for resources of the formulation of a new venture (Fombrun and Shanley, 1990; Starr and MacMillan, 1990). As a matter of fact, both direct and indirect benefits are important for CR implementation companies; while direct benefits are much easier to be captured and admitted that could facilitate the pace of CR implementation process.

The value of CR real options are affected by the same five variables as real options: value of underlying project, the time to maturity, the exercise price, the risk free interest rate and the uncertainty of the returns making up the underlying project (Husted, 2005; Copeland, 2001; Luehrman, 1998). The exercise of the CR real options depends on both its value and price. The prices of the CR real options are "the costs for their development" (Husted, 2005:179) and relate with the capital, labor involvements etc. (McWilliams and Siegel, 2001). Therefore, from a strategic management viewpoint, when the value of the CR real options is higher than the price, the company can realize the option; or not if the opposite situation happened (Husted, 2005; Busch and Hoffmann, 2009).

The first variable that affects the CR real options' value is the value of the underlying project. It is the expected revenue from a CR investment project (Sanchez, 1993; McGrath, 1997). More specifically, the expected revenue is depended on the demand of CR (*ibid*). McWilliams and Siegel (2000) approved that the price of CR related products, advertising spending for promoting visibility of CR, level of customers' disposable income and price of substitute CR products are all

influencing the demand of CR. Nevertheless, the expected revenue might also be a negative number, for example, related CR costs added in the future because of avoidance on spending it at the very beginning (Husted, 2005).

Another variable is the timing of the exercise of CR real options. It is a key variable which heavily influences the expected value (Bowman and Hurry, 1993; Sanchez, 1993). For instance, the longer deferring the exercise of the real options, the more valuable it is. However, it is not absolutely correct when the asset itself decays fast along the time or there happens hyper competition from the substitute producers. Under this condition, the value of the real options will decrease unless exercise them as earlier as possible (*ibid*).

The third affected variable is the exercise price. It indicates the investment in CR in future by a company from which to get the expected value that generated by the previous investment behavior (Husted, 2005). It somehow closely depends on the risk free interest rate for the reason that it is a future payment activity.

Risk free rate is also a variable which could affect the value of CR real options. However, the risk free rate is not easily controlled by the holder of real options (Husted, 2005). It is normally evaluated as the return of short-maturity US treasury securities (Weston and Brightman, 1981). Even though, the risk free rate is still a crucial influence in the measurement of real options (Copeland, 2001; Luehrman, 1998). In most literatures, it is showing that the higher risk free rate, the larger value of real options (Copeland, 2001; Bookstaber, 1981). This point could relate with the exercise price variable. Since the exercise price is paid in future, when the risk free interest rate increase, the present value of the exercise price will decrease. As a matter of fact, the value of the real options increases for keeping the present value on the same level as before.

The last variable is the uncertainty of the project's return. According to Bowman and Hurry (1993) and Sanchez (1993), when the perceived environmental uncertainty increases, the CR real options' value also increases. The increase of uncertainty referred to either the increasing or the decreasing of expected return on the project (*ibid*). And this uncertainty here could be explained from the mathematical viewpoint as "the variance of the expected value of the net revenues minus the costs of extracting benefits from the project (exercise price)" (Husted, 2005: 180). Because of real options limit the probability of negative expected return, the holders will exercise once the benefits add from the increased variance in returns (*ibid*). According to this statement, the value of the CR real options increased when the variance of the return (uncertainty) increased.

### 3.5 Stakeholder engagement

Elkington (1997) proposed that sustainable business is a  $2+2>4$  equation. Henceforth CR has been promoted into a high position in business field (see, e.g. Charter and Polonsky, 1999). Nevertheless, the management of CR is always hard to be captured since it (CR) is more a

conceptual framework (Burke and Logsdon, 1996). While the importance of doing CR is not only for the company itself; but also for the visibility to its stakeholders (*ibid*).

Donaldson and Preston (1995: 87) indicated that the stakeholder theory refers to “*managerial and recommends the attitudes, structures and practices that, taken together, constitute a stakeholder management philosophy*”. And actually, this stakeholder theory goes beyond the neo-classical ones which purely described that there are stakeholders and who are they for corporations; but additionally formulated the managerial implications from stakeholders. Johnson *et al.* (2008: 153) supported this viewpoint through mentioning that “the decisions managers have to make about the purpose and strategy of their organization are influenced by the expectations of stakeholders”. As CR is always considers as one kind of managerial strategies inside a company; the managers need to pay carefully attention to the stakeholders. Additionally, a company’s being socially responsible activities could mitigate the risk on negative stakeholders’ responses as well as increase their loyalty and even encourage the employees (Johnson, *et al.*, 2008). Therefore, the involvement of stakeholders in the CR management appears to be quite influential.

Indeed, the stakeholders are represented as “acting either formally or informally, individually or collectively, are a key element in firm’s external environmental that can positively or negatively affect the organization” (Murray and Vogel, 1997: 142). Thus the engagement of stakeholder in CR is the process to identify who is responsible for whom and how “large” the responsible range could be (Riordan and Fairbrass, 2006). Therefore, engaging stakeholders and taking into account about their influences are crucial for CR activities and also a key element of strategic management (Johnson *et al.*, 2008).

Step further, there is a tendency to incorporate long term value creation viewpoint into stakeholder theory recently (Andriof *et al.*, 2002). This argument implied the concentration on long term holistic (economic, social and environmental) pay back rather than immediate financial returns within stakeholder theory (Morsing and Schultz, 2006). However, it doesn’t mean that “making profits” should not be concerned; instead, it proposed a win-win approach that realizing stakeholders’ benefits from longevity and interactive perspectives. Meanwhile, it also coincides with the essence of CR which focusing on long term benefits not only from economic aspect, but also from social and environmental ones (*ibid*).

## 4. Theoretical Framework

This chapter is on the purpose of providing theoretical framework that could connect with empirics and support the analysis and discussion in the following. It firstly introduces the conception of CR; then continues on to the stakeholder theory; and in the end, it presents the real options theory.

### 4.1 Corporate Responsibility (CR)

The concept of Corporate Responsibility (CR) had been discussed in the business field for decades even though there is still not a unified definition. Compared with Friedman's (1970) belief that "the only social responsibility for corporations is to make money", today's range of concepts surrounding "responsibility" have been expanded to include financial, social and environmental areas (Carroll, 1999). Therefore, besides pursuing excellent economic performance, corporations need to make efforts on social and environmental performances in order to achieve the expectations of various stakeholders (*ibid*). As a result, the CR agenda appears to be such a big umbrella, covering issues from environmental concerns, public relations, corporate philanthropy to human resource management and community relations (Shahin and Zairi, 2007).

After Howard Bowen pushed CR into a more popular territory in 1953 with his book "Social Responsibilities of the Businessman", more and more ingredients kept contributing to the concept. Nevertheless, one of the most cited definitions of CR which was put forth by the World Business Council for Sustainable Development (WBCSD) (1999) addressed CR as "*the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large*" (*ibid*). However, this definition did not address environmental issues since WBCSD did not foster any environmental topic in either the concepts of "corporate social responsibility" or "corporate environmental responsibility" (Dahlsrud, 2008). Hence, the definition from the Commission of the European Communities (CEC) (2001) appears to be more comprehensive and popular as it defined CR as "**the integration of social and environmental concerns in companies' business operations and in their interaction with their stakeholders on a voluntary basis**". This definition offered perspective on social, environmental and economic dimensions and shed light on the voluntary and need to consider stakeholders in companies' business operation (*ibid*).

As shown below in figure 4.1, there are three parts that constitute the general context of CR. The crossover areas between economic and social, economic and environmental, social and environmental are fair, livable and viable; while the area, which is covered by all these three facets, is "sustainable". Rainey (2007: 219) also mentioned that "*C(S)R implies that corporations have a fiduciary duty to both meet the needs and wants of customers and stakeholders and protect the health and safety of humankind and the natural environment*". Meanwhile,

considering the solidarity link between economic and social demands, corporations should not limit their behaviors on financial performance when considering social benefits (*ibid*).

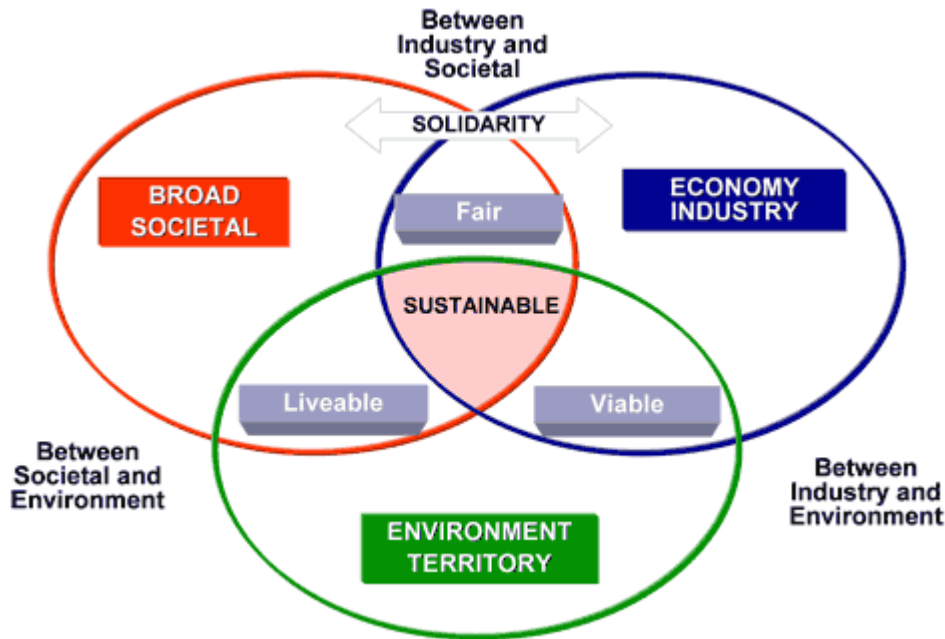


Figure 4.1 CR constitute (source: [www, necbalumni](http://www.necbalumni.com), 2011, 1)

Nevertheless, the definition of CR only provides the phenomena but offers management no guide of how to formulate strategies for addressing all dimensions within CR. Moir (2001) implied that the complexity of the definition on CR is mainly caused by the complicated, mixed context of it (CR): a normative or ethical consideration as socially responsive activities; or empirical management for building corporate image and achieving business goals. Therefore, the acknowledgement of under what context could CR be structured appears to be reasonable and necessary (Dahlsrud, 2008). The four components of CR and the pyramid relationship connecting them were proposed by Carroll (1991). He separated economic, legal, ethical and philanthropic as four different facets that constitute CR and then showed how they were positioned in the structure of the pyramid. As it is illustrated in the figure 4.2, the economic component is the basis of doing business: making profit and sustaining the business to survive in the competitive market; and the legal factor is the system which could regulate or oblige the behavior of companies; while the ethical component refers to more spontaneously responses on sustainable performance by companies and finally the philanthropic layer stands for some philanthropic involvements which reach more broader community range. In one word, the economic facet is considered as the foundation of the pyramid and plays the key role, while the philanthropic part stands on the top according to a company's voluntary behaviors. These four parts represent four different responsibilities and help companies to set up correct strategies in different responsible context on the way of participating CR (*ibid*).



Figure 4.2 Pyramid of Corporate (Social) Responsibility (Carroll, 1991) in Visser (2006: 34)

## 4.2 Corporate (Social) Responsibility Stances

As Johnson *et al.* (2008: 146) stated that “*Different organizations take very different stances on social responsibility; these different stances will also be reflected in how they manage such responsibilities*”. Indeed, each company takes distinct environmental and social responsibilities during its business operation; and therefore leads different stand point as the following table 4.3 shows.

Table 4.3 Corporate (social) responsibility stances (source: Johnson *et al.*, 2008:146)

	Laissez-faire	Enlightened self-interest	Forum for stakeholder interaction	Shaper of society
Rationale	Legal compliance: make a profit, pay taxes and provide jobs	Sound business sense	Sustainability or triple bottom line	Social and market change
Leadership	Peripheral	Supportive	Champion	Visionary
Management	Middle management responsibility	Systems to ensure good practice	Board-level issue; organisation-wide monitoring	Individual responsibility throughout the organisation
Mode	Defensive to outside pressures	Reactive to outside pressures	Proactive	Defining
Stakeholder relationships	Unilateral	Interactive	Partnership	Multi-organisation alliances

The table above illustrated a C(S)R stance on the considerations of various C(S)R related issues. The titles of the columns are listed from the classification of the least responsible to the most responsible companies; while the titles for the rows refer to several C(S)R related facets such as rationale, leadership, management, mode, stakeholder relationships and so on (Johnson *et al.*, 2008). The intersection by each column and row presents a special C(S)R characteristic for each distinct company (*ibid*). For example, the first column named “Laissez-faire” crosses with the first row titled “Rationale” indicating an intersection of “Legal compliance: make a profit, pay taxes and provide jobs”. This means that when a company is not that caring about C(S)R performance, the rational goal it needs is just to comply with laws and regulations. Step further; this stance table could also be interpreted by the intersections of each column and all the rows (Johnson *et al.*, 2008). As a result, the five parts that crossed by one column and five rows will paint a more detailed picture about how a company look like with the concern of C(S)R (*ibid*).

Practically, this C(S)R stances table might be taken by “executives who are persuaded of it ideologically or by smaller businesses that do not have the resources to do other than minimally comply with regulations” (Johnson *et al.*, 2008: 147). Therefore, different type of companies or different level of managers in each company could spot their own position in this functional table. The essence of the realization of correspondingly C(S)R stance is for pursuing optimal “responsibilities” as well as improving profits (Johnson *et al.*, 2008). Nevertheless, the wrong locating by self confirmation might happen as well as it is hard to realize the actual responses from stakeholders; therefore an increasingly risk within CR participation could occur (*ibid*).

### 4.3 Real options

Due to the increasing flexibility of economic and financial markets, more and more corporate decision makers felt dissatisfied with old methods for guiding investment decisions and resource allocation (Donaldson and Lorsch, 1983; Trigeorgis, 1996). For instance, the standard NPV approach and DCF method cannot work efficiently under conditions of uncertainty and direct the investment decisions appropriately. In the NPV approach, a future value of a project is estimated without the realistic considerations (Husted, 2005). It will reject a project with a negative NPV estimate at the time of calculation, even though changing characteristics of dynamic markets may later produce a positive NPV situation (Copeland, 2001; Luehrman, 1998). Since the phenomenon of the present economic and financial market is flexible and changeable, it’s more rational to execute investment decisions while continuously adding information (*ibid*). Further, the NPV or DCF criteria always incorrectly estimate the investment opportunities and competitive abilities for the reason that they are not giving proper consideration to strategic management capabilities (see, e.g. Trigeorgis, 1996; Hayes and Abernathy, 1980; Hayes and Garvin, 1982). Therefore, the real options approach is a wise strategic choice for decision makers dealing with real asset investments, which are surrounded by uncertainties and risks (Sick, 1995).

However, before touching the field of real options; it is necessary to provide a general concept of “options”. Brach (2003) explained that making an option is not an obligatory activity but rather a

free choice. Actually, the word “option” comes from French, which stands for “the power of choice” (*ibid*). In the context of business, the option can be defined as “the freedom of choice after revelation of additional information that increases or decreases the value of the asset on which the option owner holds the option” (Brach, 2003: 1). There are generally two categories of financial options: call options and put options. A financial call option is the right for the owner to purchase the stock in future at present fixed price; while a financial put option is the right for the owner to sell the stock in future at the present fixed price (Huchzermeier and Loch, 2001). Therefore, when the future price goes up, it is beneficial to hold financial call options and on the contrary, if the future price goes down, it is beneficial to possess financial put options (*ibid*). While on the basis of exercise time, the financial options can also be classified as European options and American options (Lazo, *et al.*, 2009). The European style has a fixed date for exercising the option; while the American style is more flexible and the option could be exercised at any time according to its maturity time (*ibid*).

As a matter of fact, real options theory is built on the principles of financial options (Frayer and Uludere, 2001). If the financial options can be compared to a big farm; then the real options are the corn fields on that farm. Here the word “real” means the “*fixed, permanent, or immovable things, as opposed to illusory things*” (Brach, 2003: 1). This explains that the real options deal with all tangible assets such as the real estate, technology investment and so on. According to Trigeorgis (1993: 203), the occurrence of real options is “*aroused in part as response to the dissatisfaction of corporate practitioners, strategists, and some academics with traditional capital budgeting techniques*”. And the “real options” approach is important for corporate decision makers because of its flexibility regarding strategic management of tangible assets. This point was demonstrated by Trigeorgis (1993: 203) as “*the resource allocation and the evaluation of investment opportunities* are key factors which affect heavily on corporate value creation and competitive ability”.

Since the real options approach built a bridge between risk and strategic management, it has to be functional within various risky situations. Trigeorgis (1993: 203) mentioned that the value of real options is demonstrated in “*a collection of real options (call or put) that embedded in capital investment opportunities, having as an underlying asset the gross project value of expected operating cash flows*”. Therefore, as Baldwin and Trigeorgis (1993) advocated, there are several types of real options which fit in different investment opportunities. The following table 4.4 exhibits the types and their appropriate applied fields:

Table 4.4 Different types and application of real options (Trigeorgis, 1993: 204)

Category	Description	Applied field
<b>Option to defer</b>	Management holds a lease on (or an option to buy) valuable land or resources. It can wait (x years) to see if output prices justify constructing a building or plant, or developing a field	All natural resource extraction industries; real estate development; farming; paper products.

<b>Time to build option (staged investment)</b>	Staging investment as a series of outlays creates the option to abandon the enterprise in midstream if new information is unfavorable. Each stage can be viewed as an option on the value of subsequent stages, and valued as a compound option.	All R&D intensive industries, especially pharmaceuticals; long development capital intensive projects; e.g., large scale construction or energy generating plants; start-up ventures.
<b>Option to alter operating scale (e.g., to expand; to contract, to shut down and restart)</b>	If market conditions are more favorable and expected, the firm can expand the scale of production or accelerate resource utilization. Conversely, if conditions are less favorable than expected, it can reduce scale of operations. In extreme cases, production may temporarily halt and start up again.	Natural resource industries such as mine operations; facilities planning and construction in cyclical industries; fashion apparel; consumer goods; commercial real estate.
<b>Option to abandon</b>	If markets conditions decline severely, management can abandon current operations permanently and realize the resale value of capital equipment and other assets in secondhand markets.	Capital intensive industries, such as airline and railroads; financial services; new product introductions in uncertain markets.
<b>Option to switch (e.g., outputs or inputs)</b>	If prices or demand change, management can change the output mix of the facility ("product" flexibility). Alternatively, the same outputs can be produced types of inputs ("process" flexibility).	Output shifts: any good sought in small batches or subject to volatile demand, e.g., consumer electronics; toys; specialty paper; machine parts; autos. Input shifts: all feedstock-dependent facilities, e.g., oil; electric power; chemicals; crop switching; sourcing.
<b>Growth options</b>	An early investment (e.g., R&D, lease on undeveloped land or oil reserves, strategic acquisition, information network/infrastructure) is a prerequisite or link in a chain of interrelated projects, opening up future growth opportunities (e.g., new generation product or process, oil reserves, access to new market, strengthening of core capabilities). Like interproject compound options.	All infrastructure-based or strategic industries, especially high-tech, R&D, or industries with multiple product generations or applications (e.g., computers, pharmaceuticals);

		multinational operations; strategic acquisitions.
<b>Multiple interacting options</b>	Real-life projects often involve a “collection” of various options, both upwards-potential enhancing calls and downward-protection put options present in combination. Their combined option value may differ from the sum of separate option values, i.e., they interact. They may also interact with financial flexibility options.	Real-life projects in most industries discussed above.

## 4.4 Stakeholder theory

Donaldson and Preston (1995: 65) state that “the idea that corporations have stakeholders has now become commonplace in the management literature, both academic and professional”. Indeed, the stakeholder theory had been positioned at a new stage after the publication of Freeman’s 1984 famous book. More and more academic articles and books which focusing on the topic of stakeholder theory sprang up like bamboo shoots after spring rain (*ibid*). In the context of business management, the occurrence of stakeholder theory was trying to build a bridge between managers and the outside unpredictable business environment (Freeman and McVea, 2001). It (stakeholder theory) aims to separate various groups and relationships that managers will face; and presents a more detailed map for managers to create different strategies on one specific “group” or “relationship” (*ibid*).

The modern popular stakeholder theory proposed by Freeman (1984: 46), defines stakeholders as “*any group or individual who can affect or is affected by the achievement of the organization’s objective*”. While Johnson *et al.* (2008: 132) described stakeholders as “those individuals or groups who depend on an organization to fulfill their own goals and on whom, in turn, the organization depends”. More specific, Rainey (2006: 711) stated a stakeholder is “any individual or group that is directly or indirectly affected by the products, process, and/or systems, but does not directly benefit as an economic participant such as a customer or supplier”.

Donaldson and Preston (1995) summarized four interpretations of stakeholder theory: descriptive, instrumental, normative and managerial. The “descriptive” stakeholder theory refers to the “corporation as a constellation of cooperative and competitive interests possessing intrinsic value” (Donald and Preston, 1995: 66). This indicated the approach to recognize “what does the company/firm look like” from stakeholders aspects. The stakeholder theory could also be considered as instrumental. It presented one framework “for examining the connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals” (Donaldson and Preston, 1995: 67). However, there is an assumption for attaining instrumental context that “the stakeholder management should be relatively successful

in conventional performance terms like profitability, stability and growth” (*ibid*). The normative stakeholder theory is the basis one and relative with the following two areas: 1) stakeholders are persons or groups with legitimate interest in procedural and/or substantive aspects of corporate activity; and 2) The interest of all stakeholders are of intrinsic value (Donaldson and Preston, 1995: 67). While the managerial interpretation of stakeholder theory illustrated “not only existing situations or predict cause-effect relationships; but also recommends attitudes, structures, and practices that taken together to constitute stakeholder management” (*ibid*).

The figure 4.5 below presents the stakeholder network of a large organization. It is easier to get the message from the figure that there are various stakeholders for a large organization and there are interaction powers among the large organization and its stakeholders. In order to better understand the impacts of distinct stakeholders, they are divided into two categories commonly: external stakeholders and internal stakeholders (Johnson *et al.*, 2008). The external stakeholders are categorized into three main branches: economic, social/political and technological stakeholders, while the internal stakeholders refer to inside departments, geographical locations, different levels of hierarchy etc. (*ibid*). The reason for the classification of different types for external and internal stakeholders is to set up appropriate strategies according to these distinct stakeholder schools.



Figure 4.5 Stakeholders of a large organization (Source: Freeman, 1984 in Johnson *et al.*, 2007: 154)

According to Mitchell *et al.* (1997) the stakeholders could be categorized as primary/key stakeholders and secondary stakeholders. Here the primary/key stakeholders refer to the main effective stakeholders such as customers, suppliers and shareholders etc. The secondary stakeholders are represented as NGOs, communities, media and so on (*ibid*). Going a step further, Johnson *et al.* (2008) provided a more detailed stakeholder map which divided stakeholders into four groups according to the level of power and level of interest. The level of interest refers to the stakeholders' expectations on organization's strategic management; while the level of power illustrates the impacts and influences that the stakeholders could perform (*ibid*).

As figure 4.6 shows below, the matrix "indicates the type of relationship that such an organization might typically establish with stakeholder groups in the different quadrants" (Johnson *et al.*, 2008: 157). And there are four groups of stakeholders within the matrix: minimal efforts, keep informed, keep satisfied and key players. In reality, each group in the matrix will be represented by different kinds of stakeholders when the organization changes (Johnson *et al.*, 2008). As a matter of fact, the "keep satisfied" stakeholders are the most difficult to handle with. This group contains high level of power and could easily alter to "key players"; which will create heavy effects on organization's strategic choices (*ibid*).

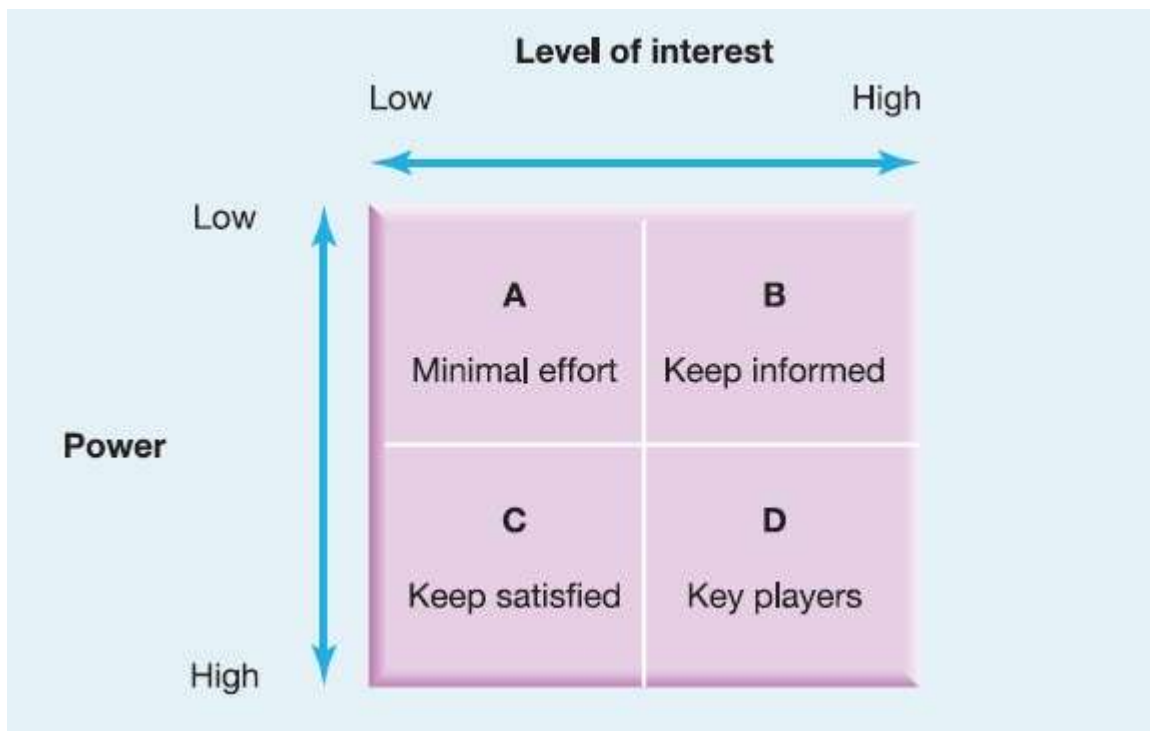


Figure 4.6 Stakeholder mapping: the power/interest matrix (Source: Mendelow, 1991 from Johnson *et al.*, 2007: 156)

## 5. Empirics

This chapter is the qualitative section covering empirical studies. It firstly introduces general information about ZMG; and followed by the description of two accidents as the main empirics. Then continues with a flow chart that organizes ZMG's accidents according to time. Finally, some factors of current CR situation in China are providing.

### 5.1 General information about ZMG

ZMG is a large international mining group with high technology and benefit oriented strategic goals (www, Zjky, 4, 2011). The main business is concentrated on exploration and development of gold and other metals. It started its first business with mining operations on Zijin Mountain in 1992, and successfully developed into a limited liability and joint stock company from 1998. In December 2003, ZMG was listed in Hong Kong Stock Exchange with the name "Zijin Mining" and code "2899". In March 2008, one core subsidiary company of ZMG, the Zijinshan Gold-Copper Mine was appraised as China's largest gold mine by the China Gold Association. It received this recognition for having the "largest usable reserves, largest mining and dressing scale, largest output, lowest grade of crude ore, lowest unit processing cost and the best economic benefit" according to its website (*ibid*). To date, it produces more than 10 kinds of metal products such as standard gold bullion, standard silver ingot, highly pure cathode copper, copper concentrate, etc. (www, Zjky, 5, 2011); and has 11 patented technologies such as a method for extracting copper from mixed copper deposits, a method for continuous preparation of pure gold sol, a closed type electrolytic cell and so on (www, Zjky, 6, 2011). Furthermore, in 2006 ZMG developed their business into the field of hotel, real-estate and tourism (www, Zjky, 1, 2011). It operates several grand hotels in different cities around China and has its own travel service company (*ibid*).

During year 1993 to 2000, ZMG was the leading producer in domestic gold industry (www, Zjky, 2, 2011). The phase IV technology improved project was accomplished in 2000 for Zijinshan gold-copper mine, which solved various difficult problems in extracting process. Step further, it made the gold-copper mine attained the highest level of utilization and ensured the reservation of monomer mines. The lowest unit of ore producing and the maximization of economic profits are also benefits from the technology improved project. From year 2001, the ZMG became as the largest mining group in China. At the same year, it established Xiamen Zijin Science and Technology Co., Ltd which focus on technology research and development for mine extraction. Till the end of 2006, ZMG had developed 80 subsidiaries among 20 provinces in China (*ibid*).

From year 2005, ZMG dedicated for the development of its international business (www, Zjky, 2, 2011). It participated in the project of Mwetaung Nickel Ore Exploration of Burma in 2005; and became the biggest shareholder of Pinnacle Mines Ltd of Canada with 21% shares. In 2006, the ZMG bought "20% shares and 9.9% stock warrants" from Ridge Mining Company and became its largest shareholder. In the same year, the group expanded its business to Vietnam. At the same

time, the ZMG constitute Heilongjiang Zijin Mining Investment Company with the joint venture of Kudonet Gold Mine and Lantarskaya Copper & Nickel Mine of Russia. In year 2007, through purchasing the main assets of Monterrico in North Peru, the ZMG's subsidiary Xiamen Zijin Tongguan Investment & Development limited company made successfully acquisition of Monterrico of the United Kingdom (*ibid*).

## 5.2 ZMG's water pollution disaster & dam collapse accident in 2010

On July 12th, the environmental authorities admitted that there happened a severe sewage leakage accident from a copper mine of Zijin Mining Group (ZMG) in Shanghang county, Fujian province, China (www, Chinadaily, 2010, 1). This water pollution disaster poisoned at least 1,980 tons of fish; and contaminated Tingjiang River which is one of the largest waterways in Fujian Province (*ibid*).

The leakage accident was discovered by an employee of ZMG on July 3rd (www, Chinadaily, 2010, 2). He founded the water level dropped in the sewage lagoon and the membrane which used to line the sewage pool had been broken over time. According to the reports, the leakage water contained several chemical toxins such as copper iron which could be very harmful. Ironically, the Century Weekly coverage that the local education bureau had already got the secretly notification about the problematic toxic water drainage system of ZMG and warned high school students to "stop eating fish" before the National College Entrance Examination that started on June 7th (*ibid*).

On August 28th, the General Administration of Press and Publication (GAPP) announced that ZMG and the local government tried to bribe the press and journalists with a huge amount of money for hiding the sewage leakage accident (www, Chinadaily, 3, 2010). However, the biggest media such as China Daily, 21st Century Business, People's Daily all refused the bribe and insisted to cover this accident even after 9 days (*ibid*).

ZMG disclosed after mass reports from July 12th that the sewage leakage actually happened on July 3rd from 16.00 till July 4th 14.30 (www, Chinadaily, 3, 2010). 9,100 cubic meters of waste water was spewed into the Tingjiang River from the sewage pool and killed 1.98 million kg of fish. Moreover, the poisoned water which contained a lot of copper toxic chemicals reached into Guangdong province through the river and formed a giant threat to the local fishing and farming industry. Even worse, a second sewage leak occurred at the same sewage plant only two weeks later. ZMG reported that it was quickly controlled in case of further water pollution. Nevertheless, 500 cubic meters of waste water was still discharged. However, the company blamed both accidents to the heavy rain and tried to escape from taking responsibilities (*ibid*).

Till October 8th, ZMG admitted it had been fined with 9.6 million Yuan ( $\approx$  \$1.4 million) because of the sewage leakage accident (www, Chinadaily, 4, 2010). It made severe pollution in Tingjiang River and caused a direct economic loss of 31.9 million Yuan ( $\approx$  \$4.65 million). The

company also announced that it “decided not to make an application for an administrative reconsideration and not to initiate administrative litigation as well as comply with the punishment imposed” (*ibid*). At the same time, ZMG’s vice president Chen Jiahong and three other high level executives were detained because of the severe environmental pollution accident (www, Chinadaily, 5, 2010). The company explained that those high-level executives have to take the responsibilities for the sewage leakage accident and ZMG will follow the restrictions and regulations according to the local authorities’ directions (*ibid*).

As a result, not only the high level executives of ZMG were detained; but also three government officers got dismissed because of the scandal (www, Chinadaily, 3, 2010). Two of them were officers from the local Environmental Protection Bureau. The head Governor of Shanghang County Qiu Heqing had been suspended for an investigation (*ibid*). As a matter of fact, the Ministry of Environmental Protection (MEP) warned ZMG in May, 2010 that the company is the top on the list of enterprises failing in controlling and managing of environmental pollution (www, Chinadaily, 2, 2010). Furthermore, the MEP also asked ZMG to restrict its six subsidiary companies and make necessary modification because of bad behaviors on environmental pollution during years. The Zijinshan copper mine is among those six subsidiary companies and is the one that caused the severe accident in Shanghang County on July 3rd, 2010. The company announced on its website on May 28th, 2010 that it had already finished the modifications required by the MEP; while the sewage leakage accident happened about 1 month after (*ibid*).

Right after the accident, the local authorities required ZMG to reduce its production by one ton in year 2010 for producing less environmental pollution (www, Chinadaily, 6, 2010). In year 2009, ZMG produced 75.37 tons of gold, which increased 31.05% compared with year 2008 (*ibid*). However, Zhou Shengxian, the head of the MEP pointed out that there had already happened 12 accidents which related to heavy metal pollution in 2009 (www, Chinadaily, 2, 2010). Moreover, one fourth (1/4) of 9123 metal processing companies in China are illegally emitted toxic heavy metal exceeding the range that allowed (*ibid*).

However, this is not the end of the story. On September 21th, another mine dam collapse took place in Xinyi City, Guangdong province in China (www, Chinadaily, 7, 2010). This dam was operated by two subsidiary companies of ZMG: Xinyi Zijin Mining and Xinyi Baoyuan Mining (*ibid*). The collapse caused 22 deaths and 523 residences to be destroyed, prompting a lawsuit for 170 million Yuan (≈\$25.8 million) in compensation (www, Reuters, 1, 2011). And a government investigation stated the dam collapse happened because the breaching of dam construction regulations. The local court in Xinyi City announced that there are over 800 lawsuits which approved by local residents and the compensation fee could be added over 300 million Yuan (≈\$45.6 million) (*ibid*).

### 5.3 The flow chart of ZMG's accidents

For better following the process of ZMG's accidents, it will be exhibited in a flow chart as graph 5.1 shows:

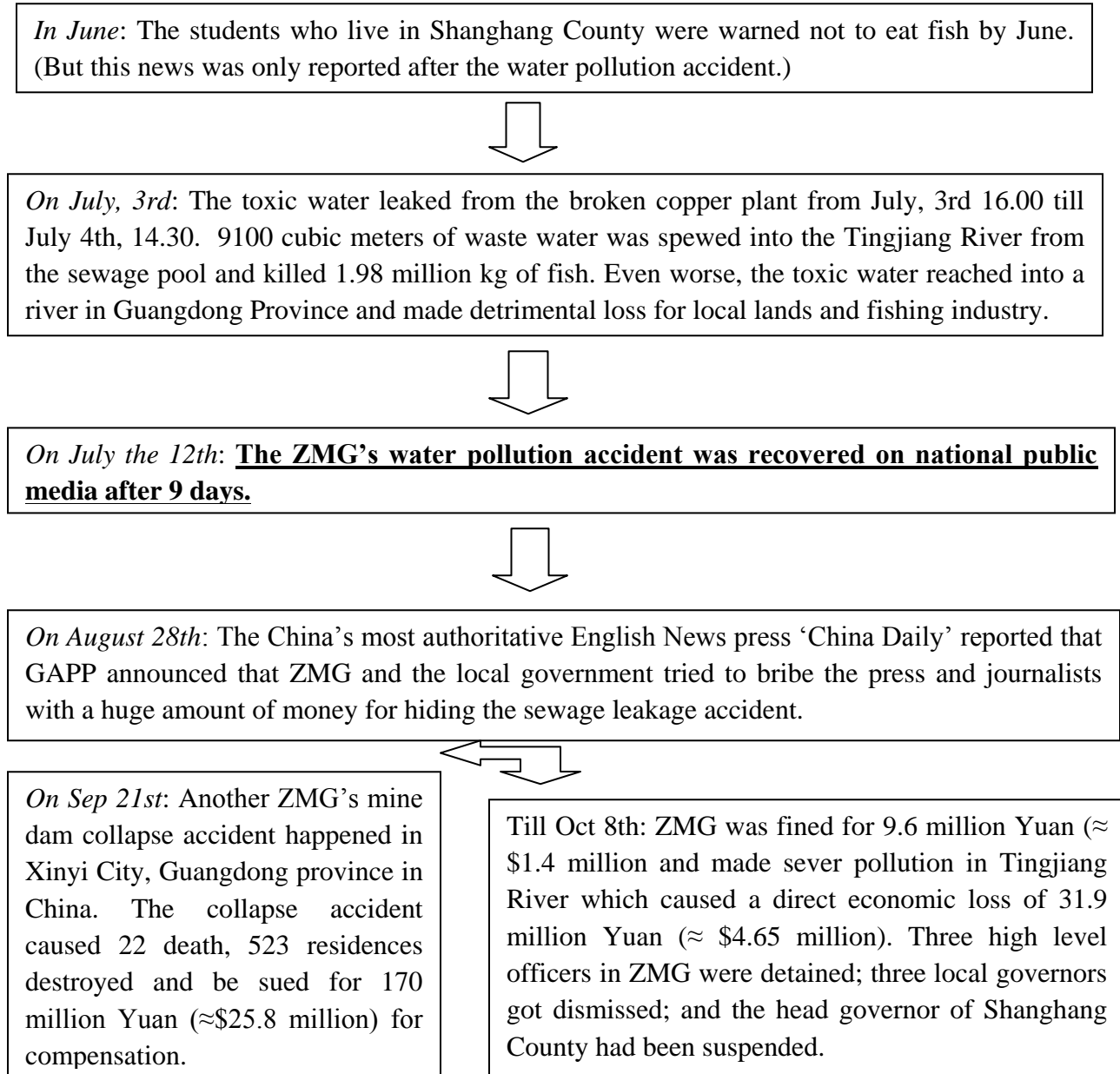


Figure 5.1 The process of ZMG's accidents

## 5.4 General condition of CR in China and ZMG

### 5.4.1 CR in China

Since the 1950s', CR has become a popular topic of discussion among companies, business schools, research institutions etc. in the western world (www, Chinalabour, 1, 2011). The European Parliament affirmed the crucial position of CR; and entrepreneurs realized that profit maximization is not the only goal of business, but have to concern also social and environmental impacts as their responsibilities. However, the shaping of CR in China was only started recently and still needs improvement (www, Chinalabour, 2011, 1). There are two main kinds of implementation of CR in China: one category is the normally inactive school, those companies could be local ones that act passively in terms of CR behavior or joint venture companies that just apply the regulations in order to continue the international cooperation. Another category includes those companies that are really proactive in CR activities, although they are in the minority (Li, 2010). Therefore in light of the current business situation, the Chinese Federation for Corporate and Social Responsibility (CFCSR) was established in 2006 to promote CR among corporations and help them implement CR practices. The Chinese government has continuously established several policies and initiatives for the development of CR; and set up a core CR research institution by the Chinese Academy of Social Sciences (CASS) (*ibid*).

Tateisi (2006) indicated the presence of a growing trend in Chinese corporations for CR to become part of real business strategies and not only a superficial agenda. The increased attention government is paying to “caring for people first, promoting scientific development and keeping a harmonious society”, has further supported the adoption of CR. For instance, the China Enterprise Confederation and the China Business Council for Sustainable Development (CBCSD) established the Recommended CR Standards for Chinese Corporations. However, there are still many challenges that companies have to face (*ibid*). The involvement of top executives and creating appropriate CR commitments are two of the major challenges (www, Uchina, 1, 2011). On one hand, in most Chinese corporations, the top executives are always “out of the consciousness of CR activities” while at the same time they are often the persons who make final managerial strategies. Their involvement in CR activities could let them better understand the importance of CR within their business and push them to make strategies with concern for CR. On the other hand, since the CR issue is becoming crucial these days, more and more Chinese companies are including it as part of their core strategic missions. However, they always make exaggerated commitments regarding their CR activities and hardly achieve those (Li, 2010). Other challenges include inactivity in cooperating with international NGOs, lack of education and involvements of employees, limited supervision power of the media and so on (*ibid*).

### 5.4.2 CR in ZMG

ZMG has its safety and environmental protection principles according to its announcement on the homepage. It mentioned that the whole group is following the laws and regulations that

established by the central government on safe production, environmental protection, and social security etc. (www, Zjky, 7, 2011). All its subsidy companies have to operate the business with the caring of their employees and social welfare. And for achieving this, the ZMG proposed its own operational system which refers to “basically stable security, comparatively safe production, sound environmental protection measures and sustainable growth of economy”. The pursuing of efficient extraction of mine and protection for clean water and green mountains are its strategic mission (*ibid*). ZMG promised on its website that it will never “development enterprises at the cost of environmental deterioration” and it must “protect the environment during the extracting activities” (www, Zjky, 8, 2011). Since it brought the business into international market and wish to build a good image, it will obey national laws and regulations about environmental protection and try to build up an environmental protection management system (*ibid*).

ZMG also announced on the website about its CR strategies and behaviors it had done or is doing. However, the water pollution accident and its controversy CR performance afterwards made ZMG as the Pinocchio. The company has been suffered serious “retaliations” from all kinds of stakeholders: governments, media, suppliers, cooperators, etc. For instance, ZMG’s stock price decreased 3.1% to 7.63 Yuan on March 17th (www, Bloomberg, 1, 2011). It is because of its tax rate rises from 15% to 25% since the government of Fujian province cancelled its status as a high technology company after the water pollution accident (*ibid*).

The empirics covering the accidents that took place in ZMG, the introduction to ZMG and the current situation of CR in China are stated above in this chapter.

## 6. Analysis

This chapter will analyze the empirics based on the theories that illustrated in chapter 3. It first analyzes the CR issues within ZMG from environmental and social aspects. After that, it looks at the benefits and difficulties of implementing CR in ZMG. Continuously, it mentions the stakeholder related analysis correspondingly. In the end, it advocates the penetration of real options approach within CR implementation for ZMG.

### 6.1 CR context within ZMG

Before the in-depth study on the benefits and obstacles of CR implementation in ZMG, it is necessary to analyze the CR context in ZMG. The following sector will analyze the CR context within ZMG from environmental and social perspectives not only on the reference of the accidents but also on the consideration of its daily operations; and then provides a general introduction about CR performance in ZMG.

#### 6.1.1 Environmental issues within ZMG

Hilson and Murck (2000: 228) described that “every industry faces industry specific challenges that require careful planning, tactical investment, and strategic management to overcome”. And actually, mining is in the category of “paradox” industry that on one hand it is crucial for economic development in a country; while on the other hand its environmental pollutions are detrimental. The following table 5.1 illustrates the relative environmental issues in mining industry.

From the below table 6.1 we can get the information that normally the environmental problems within mining industry attribute to water discharge, dewatering, smelting, transporting and mineral extraction. Obviously, the reason that caused ZMG’s water pollution disaster belongs to the first category: water discharge; while the reason caused mine dam collapse accident was part of mineral extraction. Nevertheless, other environmental problems such as air pollution, noise pollution etc. must exist in ZMG since they are the characteristics of mining industry.

Table 6.1 Common environmental impacts from mining operations (Source: Hilson and Murck: 2000: 229)

Activity	Common environmental impacts
Water discharge	Acid Mine Drainage Heavy metals overloading
Dewatering	Ecological impacts Sediment runoff Effluent contamination Impacts upon water resources
Smelting	Air pollution Acidic deposition Heavy metals contamination
Transportation	Noise pollution Dust and sediment Gaseous emissions Oil and fuel spills Soil contamination
Mineral extraction	Erosion Landform changes Alteration of water tables Dust Vegetation and habitat destruction Aesthetics

In China, there are series of environmental legislations on mining industries which define the range of pollutions that the mining companies will not be punished if they don't over the boundary. Such as ZMG, it hadn't been punished until the sewage accident happened which polluted the Ting River seriously and caused severe damages. However, the essence of CR is proactive and voluntarily, but not legislative or regulated. Therefore, the performances that "in line with legislation should not be necessarily translated into nice environmental practice" (Hilson and Murck, 2000: 229). While in almost all developing countries such as China or India, "it's normally to use poorly managed mines therefore tends to employ a number of rudimentary, low-tech methods in mineral extraction and refining process" (*ibid*).

### 6.1.2 Social issues within ZMG

Another key element in CR is "social". It is very hard to provide the definition of "social" but Epps (1997)'s viewpoint advocated a general idea of "social": the chasing for healthy and productive life in the context of society harmony. It is for sure that the mining industry could provide the "productive life" from the economic perspective since a mine company will employ workers and make contribution to the regional construction or other development projects (Dorian and Humphreys, 1994). However, the environment pollutions, natural resource deployment and cultural hazards are on the opposite side of "healthy life". As a matter of fact, DesJardins (1998) advocated that companies have the responsibility to behave sustainable while doing business.

In the case study company ZMG, there is a lack of “social responsibility” during and after the accidents. The company didn’t take responsibility for the water pollution disaster and even bribed the journalists for uncovering the reportage; while during the mine dam collapse accident, it refused to accept the claim of compensation from local victims. All these behaviors are out of the range of “social responsibility” therefore established a distance from CR context. Cragg (1998) proposed that for a mining company, it needs to behave fair and honest, which will further influence the company’s business operations. At the same time, the company’s benefits should not only take account the shareholders’; but also the stakeholders’ (*ibid*). In general, the mining industry and mine company such as ZMG has the responsibility to take the social concerns for its employees and the whole society. In short, although ZMG is a state-owned company and could be protected by government for a short while; it could not survive in the long run if it continuously ignores on taking social responsibilities.

## 6.2 CR benefits for ZMG from monetary and non-monetary aspects

Although CR had been proposed from 1950s in the western world, it is still a brand new concept for Chinese companies. The profit maximization is the only business goal and considered as the only social responsibility among Chinese firms (Zhou *et al.*, 2004) which partly learned from what Friedman announced in 1970. Nevertheless, since the increasing global attention and pressure on promoting and practicing CR framework into Chinese’s companies; most authorities and some companies started to be aware of the relationship between economic, social and environmental. As Burke and Logsdon (1996) mentioned that C(S)R could enhance the competition ability of a company from a business perspective. The short-term only profit chasing strategy will be challenged or even substitute by the long-term sustainable management operations (*ibid*). Additionally, C(S)R was demonstrated to have a positive relationship with financial performance by lots of academicians such as Margolis and Walsh (2003) who made research through both theoretical and empirical studies.

Therefore, CR appears to be an inevitable and beneficial investment for companies; especially for those environmental sensitive ones. Briefly speaking, there are two groups of environmental sensitive companies: the first group refers to the companies that easier to devastate the nature resources, make environmental pollutions or generate social issues, such as ZMG; the second group, on the contrary, indicates those ones that sensitive about environmental and social impacts therefore perform proactively on CR and sustainable development, such as the Shell Group. For the first group, CR is the approach which could decrease the negative impacts to the environment and society therefore enhancing their competitiveness; while for the second group, investment in CR is more like a voluntarily managerial strategy which could lead companies to a better position on the market and gain higher reputation among stakeholders. Obviously, this thesis focuses mainly on the first group and develops related analysis and discussion.

Generally, the benefits from CR are various, and can be categorized according to the formation of its contributions: monetary and non-monetary contributions. Monetary contributions could be

represented as the CR investments which directly create economic and financial benefits. Furthermore, as Weber (2008: 250) mentioned that the monetary CR benefits include “direct financial effects as well as benefits that do not directly lead to cash flows but can nevertheless be measured in monetary terms”. She categorized the measurable “indirectly cash flow effect” into brand value and therefore involves within monetary benefits. On the opposite, the non-monetary contributions indicate the indirectly economic and financial benefits from CR investments; which cannot be quantitatively measured. However, these non-monetary benefits could enhance the competitiveness, consumer loyalty and reputation for a company. The following part lists out and analyzes CR monetary and non-monetary contributions to ZMG separately.

### 6.2.1 Monetary contributions

1) *CR investment could have a positive relationship with the output (market) price.* This means CR investment will reflect an increase result of output price. It could happen because of customers are voluntarily willing to pay a higher price for CR products. Such demonstration had been made by Blend and Ravenswaay (1999). They conducted the empirical study on eco-labeled apples in America market and got the result that consumers are willing to pay more for those apples. From lots of empirical findings, there showed a result that investment in CR will lead a premium price from customers. Siegel and Vitaliano (2007) made empirical research on amount of companies and got the conclusion that strategic CR behaviors could maximize profit. As well as Kriström and Lundgren (2003) made quantitative research on the relationship between changes in green good will and pulp plant output price in Sweden, which demonstrated a positive connection between these two variables. Step further, Loken *et al.* (2010) also implied that the social responsibility behaviors such as CR could increase the value of brand; therefore increase the revenue and attain profit optimization.

Step further, Lundgren (2010) used a microeconomics model to research CR investment's impacts on different economic mechanisms. He demonstrated the goodwill stock has the positive relationship with output price, which refers to a result that once CR investment increases, the output price will also increase. This conclusion demonstrates again that the CR investment could positively affect the output price.

2) *CR behaviors can enhance the working passion of employees and reduce the cost of wage at the same time.* It is showing that employees will feel more comfortable and prefer to work in a better working condition after company participated in CR activities (COM, 2001). Weber (2008) attributed this to the increasing value of company's reputation. Actually the CR behaviors could let employees feel proud of their own company from ethical perspective. And human beings would prefer to “good activities” which could bring benefits to themselves and even others. Indeed, CR behaviors are those good activities that build trustworthy and motivation among employees. Step further, from a quantitative aspect, Lundgren (2010) proposed that there is a negative relationship between cost for wage and CR investment.

However, the qualitative studies on the relationship between cost of wage and CR investment are scarce. One of the existence empirical studies on this issue was conducted by Bolvig (2005). It is based on case studies in 2,000 American companies and got the conclusion that the wage tends to decrease when the investment in CR increased.

3) *CR investment can reduce the cost.* Here the cost could be the capital cost, wage, advertisement cost and so on. For instance, ZMG probably could eliminate the fine that caused by the accidents if it participated in CR activities before. But what we know exactly is their stock price was fallen rapidly on the stock market and suffered huge economic loss because of the accidents (www, Bloomberg, 1, 2011). Meanwhile, ZMG has to pay a much higher tax because of the central government cancelled its status as a high-technology company. Ironically, their anti-CR bribe behavior for uncovering the water pollution disaster is such a huge amount of expenditure which could actually be avoided.

There are also some empirical researches that support this viewpoint. Epstein and Roy (2001) implied that sustainable strategy could keep closer connection with regulators, suppliers; or could increase the viability of capital utility. In a word, it could enhance the efficiency gains (*ibid*). Lundgren (2010) also demonstrate the negative relationship between capital cost and CR investment from the microeconomic perspective.

### 6.2.2 Non monetary benefits

Non-monetary benefits from CR investments always refer to the indirectly impacts on company's economic and social performance. Weber (2008) implied that the non-monetary benefits are those ones that could increase the income of company indirectly such as non-measurable monetary term of "cash flows". Therefore, the non-monetary benefits from CR investment should include the indirectly value adding behaviors like 1) increasing of customers' loyalty, trustiness; 2) maintaining sustainable and stable relationship with suppliers; 3) improving motivation and loyalty from employees; 4) enhancing reputation among stakeholders.

The first non-monetary benefit stands from the customers' perspective. A company's ultimate business goal is to gain profit; and the primary way to gain profit is to sell its products to consumers over the market. Many empirical researches stated that a sustainable or environmental tagged product is always more preferred by customers therefore they are willing to pay a higher price and establish a loyalty for the product (Charter and Polonsky, 1999). The Body Shop could be a positive example since all its products are labeled as environmental friendly and announce that there is no animal test on any of its product (www, thebodyshop, 1, 2011). This kind of CR activity builds The Body Shop a very good reputation among its stakeholders and invites a wide range of customers. As a result, the increasing customer loyalty enhances company's reputation firstly; then adds value to the brand and even increase the stock price. Furthermore, according to Weber (2008) the brand value contribution was categorized as monetary benefits; which indicates that the non monetary benefits could be interpreted into monetary ones eventually.

When a company gained its good reputation, it could always easily establish a sustainable and stable relationship with its suppliers. Here the suppliers mean the first layer of direct suppliers. These suppliers always have their own rights to choose between the coordinators. There are several research showed that a good reputation of a company is always considered quite crucial by suppliers. For example, Bendixen and Abratt (2007) mentioned that corporate reputation intensely affects corporate value, where the corporate value is a key indicator for suppliers. Therefore, a good image that exhibited by CR behaviors will enhance a good impression and loyalty from suppliers (*ibid*).

Another important non-monetary benefit from CR participation is reflected on employees' reactions. As Lundgren (2010) demonstrated from microeconomics perspective that there is a negative relationship between CR participation and cost of wage. The higher level of CR participation that a company performs; the lower wage the employees are willing to ask for (*ibid*). Furthermore, there are some literatures showed that employees will pay more motivations or be more passionate if they know they are working in a responsible company such like a CR oriented company (Burke and Logsdon, 1996; Weber, 2008). This reaction from employees could be explained from psychological aspect that they feel safety and proud when their company performed as responsible and trustworthy during business activities (see, e.g., Raymond, 2010). Where such safety and proud are two basic emotions in the pyramid of human emotions which proposed by Freud and always considered as two key elements in the field of management.

The last CR non-monetary benefit reflected on the increasing reputation among stakeholders. Here the stakeholders include employees, customers, suppliers, media, governments, local communities, etc. Wheeler *et al.* (2002) advocated that CR is a useful tool to explore the attitudes from companies to their stakeholders. Specifically in mining industry, it (CR) is the device for balancing the various demands between stakeholders such as government and local communities who have the initiatives on environmental protection and companies who focusing on the pursuit of profit (Jenkins, 2004). For example, the disclosure documents about social and environmental performances on one of the CR agendas is facing increasingly demanded from stakeholders recently in mining industry (Jenkins and Yakovleva, 2006). As a matter of fact, CR activities could enhance the reputation among stakeholders through letting them understand the ongoing sustainable performances of a company. Unfortunately, ZMG hasn't got a clue about the importance of CR even after the water pollution accident. It tried to bribe the media for uncovering the accident and neglected the bad consequences afterwards (www, Chinadaily, 6, 2011). As a result, this anti-CR behavior let them got punished by the local government for 9.6 million Yuan (≈\$1.4 million) and lost the high technology enterprise status that cancelled by the government (www, Bloomberg, 1, 2011). As the end of the story, the reputation of ZMG is damaged and its stock price falls down all the time which leads to a huge economic loss.

## 6.3 Challenges of CR implementation

Although there existing various benefits in the operation of CR in ZMG as listed above; the difficulties that hamper the implementation process are always popping up. If we consider all CR benefits as those amazing ingredients for a fancy muffin recipe, the difficulties will then be the lack of equipments: no matter how wonderful the ingredients could be, the muffin is just on the recipe which cannot be ate in reality.

Therefore, according to the facts of ZMG and the current Chinese economic status, the main difficulties might occur as below:

### 1) The uncertainty about future market

If we consider CR implementation as a kind of investment, the first thing investors urgently care about is the return on investment (ROI). As one rational economic person, only the positive ROI will incur the execution of the investment, otherwise it will be abandoned. However, it is hard to estimate the ROI of CR especially when it is always filled up with various uncertainties and risks. Milliken (1987) indicated that uncertainties and risks are factors that disabled individuals predicting a future situation specifically; as well as Miller and Shamsie (1999) proposed that uncertainties and risks have the similar effects on companies as they are on individuals— influencing companies' strategic investment decisions. While according to Michael Porter's hypothesis (see, Porter and Linde, 1995), there will create a "first mover advantage" for the companies that participate CR earlier than other competitors. However, this hypothesis has been "rejected" by some empirical studies (see, e.g., Simpson and Bradford, 1996) that companies appear to be more conservative as being the "first mover" since there could be too many risks and uncertainties that disturb and hamper the CR execution process.

For ZMG, this problem seems to be more apparently. Since it is stated before that gaining economic profit is the primary target that chasing by business men in China, there is no motivation to invest in such a risky project like CR unless all the benefits that analyzed above could be externalized in a very short-term.

Literally, the reasons about why CR investment is risky are various. First of all, the financial market is full of uncertainties and risks where no body could guarantee the CR investment will definitely become beneficial eventually. Secondly, the pay offs from CR activities are always lagged. From an economic perspective, the longer the waiting time of payoff, the less the present value it will be. Thus, the investors will hesitate or give up the investment decision for CR. As a result, the high risk of unforeseeable future plus the lagged pay offs generate such a pessimistic consideration on CR investment.

The below figure 6.2 illustrates a holistic picture of impacts from various uncertainties and risks in CR investment of ZMG. Those uncertainties and risks are from five facets: economic, financial, technological, legal and performance. Actually these five factors always have distinct effects on a

company's CR investment, where in ZMG their influential powers are demonstrated as the blue lines for a radar region.

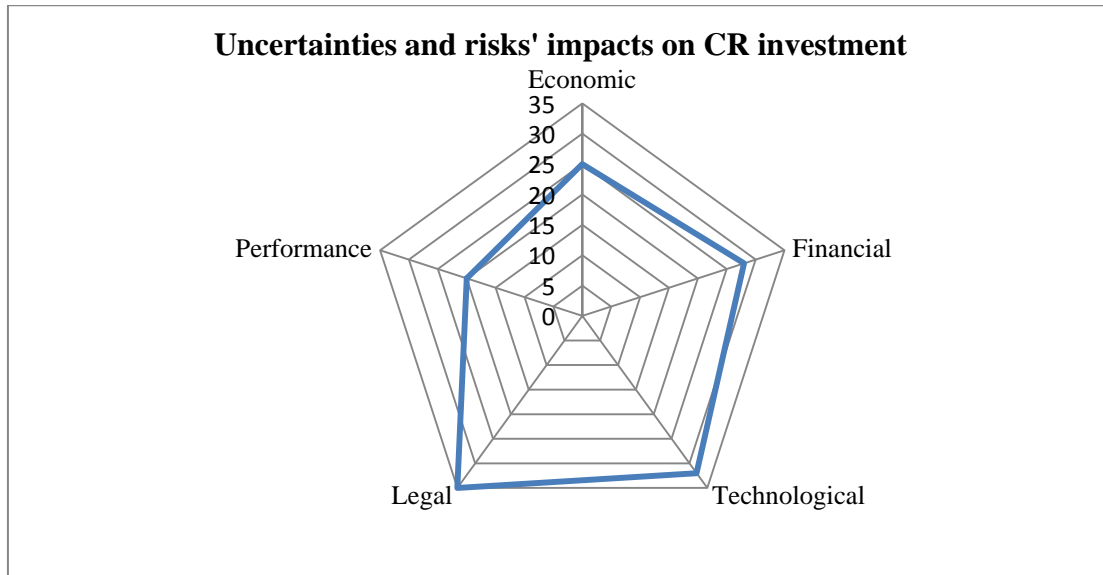


Figure 6.2 Uncertainties and risks' impacts on CR investment ZMG

The most influential element is the “Legal” one. The legal uncertainties could be represented as environmental (tax) law changes, the political regime switches and so on. For example, now there is no environmental tax law in China; therefore the CR investment on green technology is currently ignored and could be easily deferred. However, things could be different if the new political regime that replaced the old one changes the management ideas and starts to carry out certain laws such as environmental tax law. Under this circumstance, environmental sensitivity companies like ZMG have to think about their environmental performance and are on the demand of practicing CR. As a result, the ZMG could be charged an amount of tax and face profit decrease because it didn't invest in green technology under the old political regime. Nevertheless, if the old regime is not replaced or the new regime continues with the original political system; there will be no different whether ZMG invest in green technology or not. In short, the legal uncertainty could be quite influential but also very hard to be estimated.

The next influential factor is technological. The uncertainties and risks in the technical context for ZMG are reflected in R&D and its outcome risks, the implementation of new technology risks, the defective products risks, etc. For instance, there is a big chance that the green technology demands higher quality of raw material, otherwise it will make the “defective products” which might be the same as the previous ones but not qualified as the green products. As a result, if ZMG want to use the green technology to improve its product quality, it need to invest more in several related areas such as the improvement of raw materials, trained employees to operate the new green technology and upgrade the technology at certain times. While at the same time, no one could guarantee that the green technology induced CR investment will absolutely be accepted by the market and profitable.

The following influential factors are economic and financial uncertainties. These two factors are putting together because of they always make impacts on CR investment simultaneously; as well they can interact with each other mutually. The economic risks include labor cost uncertainties, output price risks, market share risks; while the financial risks refer to the interest rate uncertainties, currency rate uncertainties and commodity risks. Most of the economic and financial risks are belong to the systematic risks which cannot be controlled by ZMG group itself, for instances, the interest rate and currency rate; the output prices, the labor costs etc. are all controlled by the “invisible hand” which generated by the free market. However, these risks will still have powerful impacts on CR investment since they could affect the volatility of the underlying security.

The last element is “performance” risks. The performance risks relate to the judicial risks, credit risks of contract counterparties and so on. It might generate strong impacts on other cases of CR investment, but for ZMG, the performance uncertainties appear to be not that influential.

## 2) The excessive costs for implementation of CR.

During the implementing process, there always happened various obstacles which showed that implementing CR is not an easy task (www, Championingcsr, 1, 2011). And one of the most significant problems appears to be the excessive costs. For instances, the resource and time consuming activities when practicing CR in a company, especially a company like ZMG which has not so much previous experiences on CR implementation. Another excessive cost refers to the extra assets that need to be invested in CR activities such as the innovative environmental friendly green technology. Sometimes, the expensive promotion fees such as advertisement cost could also be a tremendous expenditure.

### ① Resource, time and human capital consuming

For most Chinese companies, CR is totally a new conception even it is growing popular and becomes a key indicator in daily business (www, Worldwatch, 1, 2011). However, the biggest trouble that faced by companies which intended to implement CR appears to be the costly investment in capitals (*ibid*). For ZMG, the expenditures in capital include bunch of time to insert the CR atmosphere during its daily operation; huge amount of money to educate their employees about CR; tremendous tangible and intangible capital investments to create and install its own codes of conduct. Technically these are just the main costly matters that could directly reflect on the CR agenda; at the same time, it could also generate various indirectly or even intangible cost elements. For example, the conflicts might arise at the very beginning stage of CR implementation between investors and CR executors since the CR investment cannot make ideally benefits or even cause economic loss in a short term. Then how to persuade investors to accept the concept of long-term benefits and keep funding CR program is also a time and resource consuming thing. The CR executors need to set up some meetings or workshops to communicate with the investors. Sometimes even need to invite CR experts to explain and deliver

the correct and effective information to investors. These kinds of activities definitely demand the supports of money, human resource and time.

## ② The extra assets investments

The character of extraction industry contains the detriments for environments such as the deployment of natural resources; destroy of forest and farmland, toxic emission and so on. ZMG obviously involves into this “environmental destroyable” category. However, the mine products such as gold and copper are quite necessary for the daily economic activities that cannot be stopped (Humphreys, 2002). As a result, the environmentally friendly green technology investments which could keep the extraction rolling on and decrease the environmental pollutions at the same time are always considered as the social responsible investment (SRI) and are classified as CR behaviors (Videen, 2010). It is easily to learn that ZMG’s accidents were mainly caused by the poor toxic water sewage system and the shabby dam (www, Nationalgeographic, 1, 2011). The damage could be decreased if they use the advanced sewage system or the better build mine dam; or if they purchase environmental friendly equipment which will cause less toxic water emission. However all of these technologies demand a huge amount of money and might need extra time and resources to train the employees about how to work with the new equipments and technology. As a result, the costly technical investment will scare investors in ZMG especially its business could still operate without those green technologies.

## ③ First mover expense and other promotion fees

Even though CR issue has become increasingly important for Chinese companies; it is still innovative and not so many companies are really implementing it so far (www, Worldwatch, 1, 2011). Therefore, it could generate the “first mover dangerous” for company that decides to apply CR activities during its business in China from now on. The first mover dangerous might include the huge amount of investments in tangible and intangible assets, the brand new market for new products, the unfamiliar new supply chain, the uncertainty of returns on investment and so on. Furthermore, for promoting CR spirit inside or even outside the company, there demand money and resources consumptions. For instances, the CR education program within the company; or the external promotion strategies as commercials or sustainable reports for outside stakeholders.

## 3) Coping with the CR standards

Even though CR is a fuzzy concept and has its own framework in different companies, there still exist some CR standards or indicators for the evaluation of the level of participation. For instance, the International Organization for Standardization (ISO) is the organization that estimate whether a “standardized interpretation of CR is desirable or feasible” (www, Iisd, 2, 2011). So ISO is such a global standard or guideline for CR performance. However, China has its special economic policy and some of the ISO requirements might not be fulfilled at once. Additionally, ISO is not a compulsory standard that every company has to install. As a result, it might create disharmonies

or even conflicts between China's economic policy and CR international standards; which need time and energy to be settled down therefore bring difficulties in CR implementation.

#### 4) Lack of self-incentives and external drivers to implement CR

Since CR participation is considered as the one that should be voluntary done without the supervision of regulations or laws (see, e.g., Jenkins and Yakovleva, 2006), it is hard to push a company like ZMG to implement CR especially when benefits will not be paid off immediately. Further, the key stakeholders such as public media or consumers might not generate powerful impacts for boosting the implementation of CR. Firstly; the ZMG is a state-owned mining company and contributes enormous benefits to the government. It involves complicated network of relationships that cannot be easily punished unless there happened accidents which broke the laws. Secondly, according to a report by International Institute for Sustainable Development (IISD), there are just 8% consumers in China will punish the company if it is not doing CR behaviors; while the figure in North America and Europe are 42% and 25% (www, Iisd, 1, 2011). In short, there is no obvious self incentive or external driver that could stimulate the implementation of CR in ZMG.

As analyzed above, there exist various difficulties for ZMG to implement CR. Some of them are internally obstacles from money and time consumption aspects; others are externally hampers which could not be controlled by ZMG but quite influential. However, they are just the main difficulties that could be forecasted; there must have some other unforeseeable obstacles which will also have impacts on CR implementation. However, it (they) will pop up once ZMG execute CR participation in reality.

## 6.4 Stakeholder Analysis

Since the stakeholders are considered as the key factor that could influence the CR behaviors for a firm (Johnson, *et al.*, 2008), then it is necessary to analyze the stakeholder circumstances for ZMG. As such, the following section will carefully peel the onion of stakeholders in ZMG layer by layer. And on the considerations of which the stakeholders are as well as what impacts they could create, the onion will be cut into two parts that 1) internal and external stakeholders; and 2) effect-induced stakeholders.

### 6.4.1 Internal/External Stakeholder Analysis

According to the explanation by Johnson *et al.* (2008), internal stakeholders are the ones who work within an organization; and external stakeholders are the ones who work out of the organization. Thus, the internal stakeholders for ZMG appear to be its middle and high level managers; employees, shareholders (who hold the state's assets); and stockholders (who hold stocks of ZMG). While the external stakeholders for ZMG refers to suppliers, local customers; international customers; local government; central government; NGOs; media; and the victims from ZMG's accidents.

The below figure 6.3 illustrates the internal and external stakeholder map of ZMG. However, the stakeholders contain distinct influences on ZMG's accidents with the concerns of CR. From the horizontal perspective, internal stakeholders have more power than external ones henceforth generate different impacts on ZMG's reaction to the accidents; while from the vertical perspective, the influences from each internal stakeholder or external stakeholder are unequally.

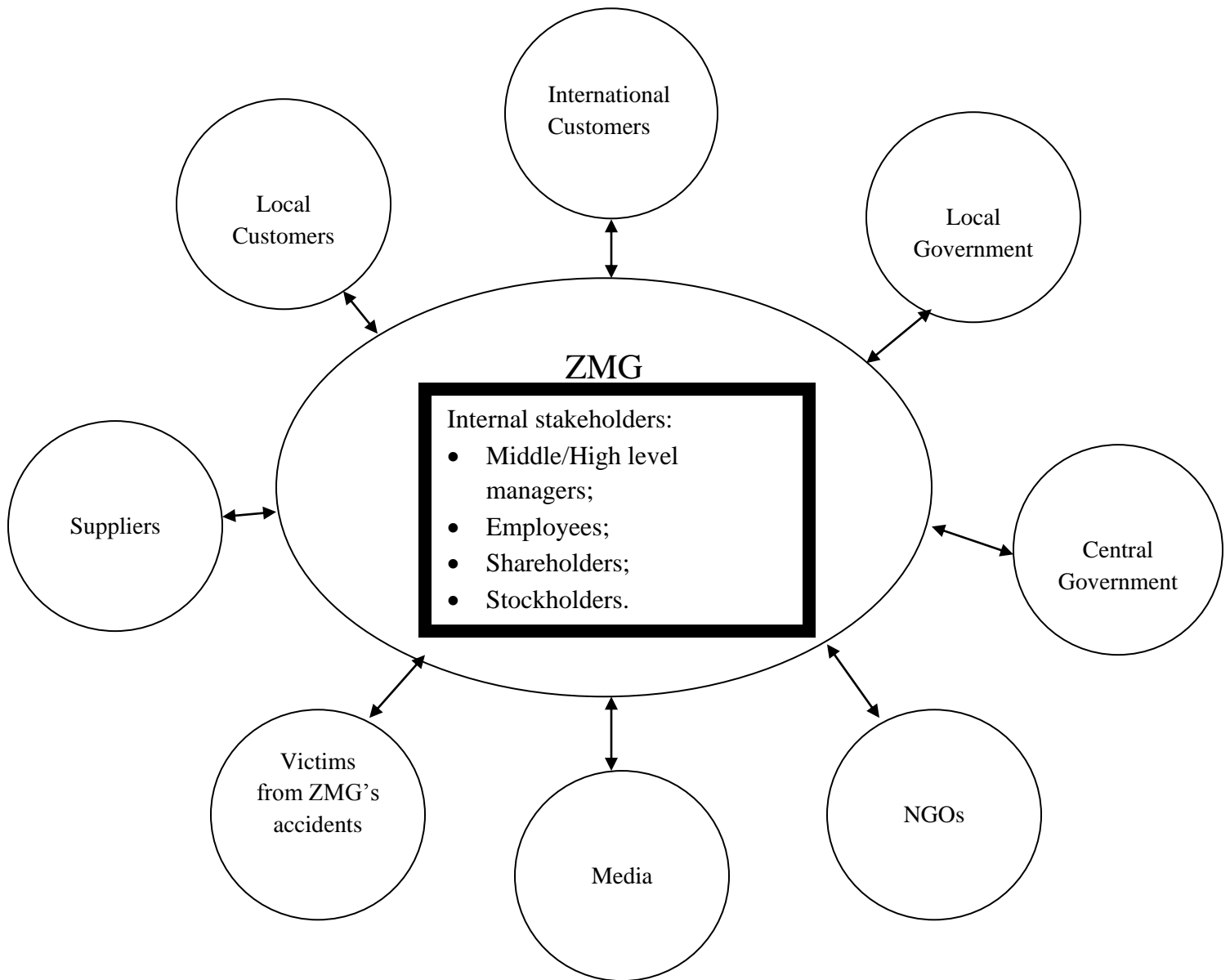


Figure 6.3 Internal/External Stakeholder map of ZMG's accidents

Horizontally, the internal stakeholders of ZMG are more powerful than the external ones. This happens because of Chinese-style business operating method and the culture circumstances. The state-owned companies always stand on a higher level than private companies; at the same time contain various "benefits" that private-owned ones cannot have. For instance, the state-owned

companies are always protected by the local or even central government unless they broke the laws; therefore the ultimate and only goal is to generate profits. As for ZMG, the local government was trying to help it bribe to journalists after the water pollution disaster. Fortunately, those journalists were not tempted by the money and insisted to coverage the truth. However, the media industry in China is still bounded by various regulations that cannot be a very powerful external stakeholder to execute supervision forces. As for the increasingly concerns on CR in mining industry all over the world, the NGOs such as Green PACE entered China and promoted the importance of behaving CR. However, they are still the “freshmen” and far away from the government; which as a result still cannot have supervision forces on CR performance for companies, especially state-owned ones in China. As a matter of fact, the NGOs and some other environmental protection organizations in China are always being neglected and not as influential as they were expected to be.

Vertically, the unequal power exists both internally and externally. When talking about the internal stakeholders, for instance, the middle/high level managers have obviously higher power than other internal stakeholders such as employees within ZMG. This is because most of those managers are also the shareholders. They could manipulate the behaviors of ZMG without considering employees’ or stockholders’ voices after the accidents. As a result, those managers’ manipulations such as bribing the journalist for covering the reportage of water pollution or blame the dam collapse to the pouring rain directly demonstrated the lack of environmental/social concerns and responsibilities; as well as indirectly indicated the lack of CR in ZMG. When the topic changes to the external stakeholders, local and central government have more priorities than other external ones. This is not only because ZMG is a state-owned company, but also because in China, government can control almost everything for example the media and NGOs. Ironically, the victims suffered from ZMG’s accidents should be the key stakeholders theoretically; but they were totally ignored because of their non-connection with the “government”.

#### 6.4.2 Effect-induced Stakeholder Analysis

Unlike the classification of external and internal stakeholders, the categorization of effect-induced stakeholders could be various under different conditions.

As the figure 6.4 showed below, the stakeholders of ZMG can be categorized into four types according to the level of interests and power. Type A that named “minimal effort” is constituted by the stakeholders who have low level of interest and low level of power, such as consumers. Since the products of ZMG are not the ultimate products that will be sold in the market directly, the consumers will not pay too much attention on its effort of performing CR. It is not like the organic food producer or the environmental friendly clothes producer that what they make will be presented to the ultimate consumers on the market directly. For instance, the gold that produced by the ZMG could be distributed to some manufactures like Tiffany or Cartier at the very end. It is a very long distribution chain and therefore the consumers have much less interest and power to track where the gold comes from or how it was made. Perhaps Tiffany and Cartier could gain

a price premium if they highlight the gold supplier is such a CR/sustainable company; but there will not be a significant price reduction if they don't mention what type the supplier is. As a result, the ZMG will not be heavily influenced by consumers and therefore the stakeholders belong to the type A will not be considered as a powerful driver of implementing CR.

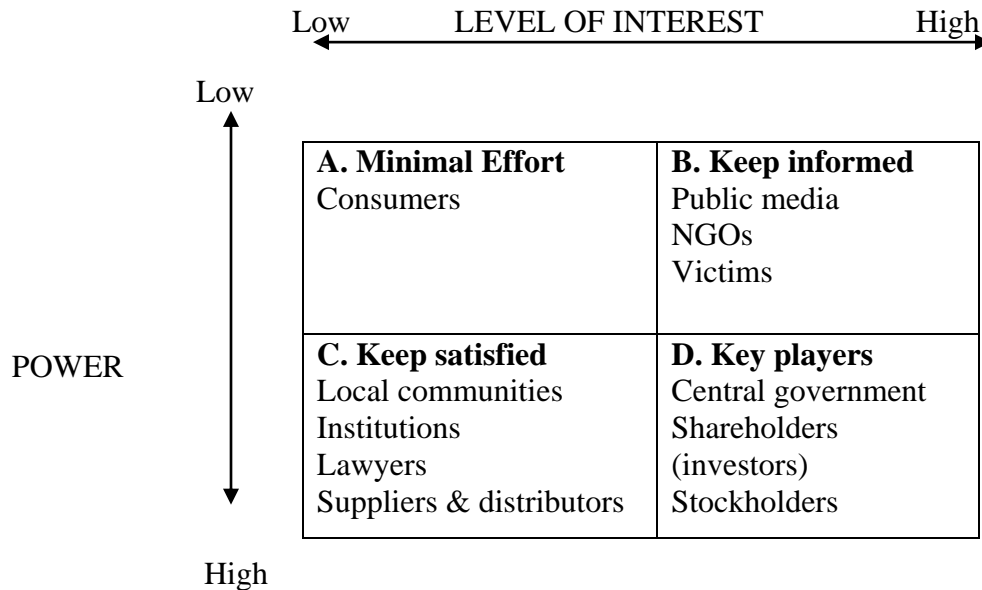


Figure 6.4 A stakeholder interesting/power map for CR implementation in ZMG (Source: Mendelow, 1991 in Johnson *et al.*, 2007: 156)

The second category is composed by the higher level of interest but low level of power stakeholders, such as public media, NGOs and the victims. The public media is trying its best to report correct ideas to Chinese civics; however, it doesn't have so much power to coverage sensitive news such as the accidents of ZMG. The government is always on a higher class than public media therefore the public media has to remain silent if the government asked it to. Nevertheless, the public media is still on the purpose of chasing and reporting the truth. Since CR issues are becoming increasingly popular among Chinese entrepreneurships, the public media aims to formulate a fair and honesty "atmosphere" for healthy, responsible and sustainable economic environment. Even though the media doesn't have the power to directly sue companies when they are doing bad things, it could monitor companies' behaviors and coverage the truth that implicitly arouse the public attention. The coverage of ZMG's accidents therefore appears to be a good paradigm. NGOs are the newly emerged "concepts" in China and most of them come from western worlds, for instances, Green Pace, WRI (World Resources Institute), WWF (World Wildlife Fund International) and some original Chinese ones like Green River, GSEAN and so on. However, they are all organizations and have no legislative power to punish an environment polluter such as ZMG. What they are doing now in China is similar as the public media: delivering the correct and positive information to the public as well as generating increasingly concerns on environmental and social concerns. Furthermore, these NGOs are prompting some education and training program in China for spreading out the CR atmosphere among the public

and promoting the CR framework into Chinese companies. In short, media and NGOs are quite important for Chinese companies especially the environmental sensitivity ones such as ZMG. They are aiming to educate and promote the correct philosophy of CR; and therefore they should be treated as what they called-- “keep informed”.

Literally, the victims from ZMG’s accidents should be the “key player” stakeholder. However, they are quite silent after the accidents and the media just reported that the ZMG refused to compensate the economic loss it made. It must be very interesting to study why those victims are keeping quite, however this thesis will stop further exploration on this topic since it involves several political sensitive issues.

The third type is named as “keep satisfied”, which constitutes by the low level of interest but high level of power stakeholders. This kind of stakeholders includes local communities, institutions, lawyers, suppliers and distributors. They all have power to “kill” a company if they purposely do so, however, they are all involved in a complicated profit network of ZMG. As a result, they will just let companies such as ZMG to be “Laissez-faire” and take no action unless they broke the laws. From one hand, these stakeholders could monitor and punish the companies who did illegal behaviors. While from another hand, the voluntariness and spontaneous characteristics of CR performance indicate that when a company such as ZMG is operating within the boundary of laws and regulations, these stakeholders do not have to oblige the implementation of CR if they cannot see profitability from doing that. Comparably, this kind of stakeholders appears to have fewer influences on CR implementation than type B stakeholders since they are more caring about “money” as well as un-CR behaviors will not easily cause illegal accidents in China.

The last type, and it is called the “key players”, is composed by higher level interest and high level power stakeholders such as central government, shareholders (investors) and stockholders. The reasons about why central government is the key stakeholder are because of its highest political and economic status and its inevitable responsibility to promote an honest and fair business environment for the sustainable development of China. Therefore, it should have powerful impacts on company’s CR behaviors as well as prompt company to be on the right track of CR participation. Although ZMG is the state-owned mining company; it still composed by shareholders and stockholders since it is a listed company. According to the economic laws in China, all listed company will be investigated of their environmental activities and will be punished once they cannot fulfill the environmental performance standards or broke the environmental laws (www, Cnbusinessnews, 1, 2011). Additionally, the stock market itself could also be a mirror for bad behaviors companies. Such as the empirics listed above illustrated the points that the central government cancelled the status of high-tech company for ZMG, which caused a tremendous increase of tax rate and dramatically decrease for its stock price. Therefore, the key players are the most important stakeholders that could accelerate the pace of CR participation within ZMG; and ZMG has to treat them carefully in reflection since they are quite interested in what CR activities have been done or even rectify wrong behaviors.

## 6.5 Real options approach penetrating in CR implementation

CR participation is considered as a kind of strategic management by Burke and Logsdon (2006). This is mainly because CR project initiated with goals and missions; contained plan and process; and aimed to achieve the value adding result. Nevertheless, Thompson (1967) stated that the essence of a company's strategic management is to accomplish future development goals with the combination of positive cash flows. In reality, the risks and uncertainties in business environment are always disturbing economic consequences and therefore destroying the launch of strategic management (Amram and Kulatilaka, 1999). In the previous section, it mentioned the challenges of CR implementation for ZMG. Therefore, it is necessary to find an approach which could systematically analyze the risks/uncertainties during CR implementation as well as ensure its successful launch.

The traditional method for evaluating the value of a project is the NPV. Nevertheless, the NPV assessment demands the business environment under such a stable circumstance (Busch and Hoffmann, 2009). As a result, the main approaches that are available to estimate the future value of a project under risks and uncertainties are: dynamic programming (see, e.g., Bellman and Dreyfus, 1962); Monte Carlo simulation (see, e.g., Hammersley and Handscomb, 1964); and real options theory (see, e.g., Black and Scholes, 1973). Due to the strategic analysis on the basis of flexibilities in CR implementation, this thesis will install the real options approach.

Literally, real options approach is explained as a management method which helps to make decisions for the development of an investment: grow, defer, extend, switch, or abandon (Busch and Hoffmann, 2009; Adner and Levinthal, 2004). More specifically, real options approach assists "decision makers assess the profitability of new projects and understand whether and when to proceed with the later phases of projects that have already been initiated under high level of uncertainty" (Copeland and Keenan, 1998: 129-130). As a result, the real options approach could be considered as an appropriately tool for analyzing the CR-driven investment in ZMG.

As it stated in the previous literature reviews part, there are five factors that need to be counted when utilizing real options: present value of the underlying project; exercise price (cost for realizing the underlying project); maturity time; risk free interest rate; and the volatility of the returns. Certainly these elements also have to be taken into account for the CR real options of ZMG. Dixit and Pindyck (1994) advocated three determinants to assess the value of real options with the combination of business risks and uncertainties. In the following, it will also create three main stages for proceeding real options approach in ZMG's CR project with the adoption of their ideas.

First, *identify the condition of ZMG's CR investment(s)*. In this stage, it is important to analyze the current business condition for the underlying investment(s). For instances, what is(are) the main CR investment(s)? Dose the economic situation allow CR investment(s) for ZMG? What

is(are) the value for the CR investment(s)? What are the factors that affect the CR investment(s)? Is(are) there any external influence(s) (e.g., government subsidy) for CR implementation?

Second, *predict the underlying risks and uncertainties for ZMG's CR investment(s)*. During this stage, it should mainly focus on the prediction of every possibility that might happen in future. All those possibilities are closely related with the underlying project and will definitely generate positive or negative effects. The returns on investment, the volatility of current and future market, the estimation on competitors' trends and lots of other "unstable" factors need to be taken into account and analyzed carefully within this stage.

Third, *determine the most appropriate time to execute the chosen real options*. After making analysis in the previous two stages, it's time to decide when and which real options to be realized. The five types of real options will then be chose accordingly: defer the option when the investment(s) is(are) not profitable currently but might be profitable within a long run; extend the option if the initial investment(s) was(were) profitable and can be applied into broader fields therefore generate more benefits; grow the option once the initial investment(s) was(were) profitable and can generate more returns if expand the investment(s) in future; switch the option when there are several scenarios for the investment(s), i.e., follow the most profitable one or track back if losing money; abandon the option once the underlying investment appears to be unprofitable and the situation cannot be reversed in future.

As shows below in figure 6.5, it illustrates the strategic processes for implementing CR in ZMG. With the final mission of value creation among all economic, social and environmental facets, the first strategic step is to identify the motivations and challenges of CR participation in ZMG. It was analyzed before that the motivations will accelerate the implementation of CR while the challenges could hamper the launch of CR projects. The barrier line represents the negative effects from CR challenges that the implementation process could be stopped there. However, the real options approach advocates the opportunities to continue with CR implementation since it could provide alternative strategic choices under flexible conditions.

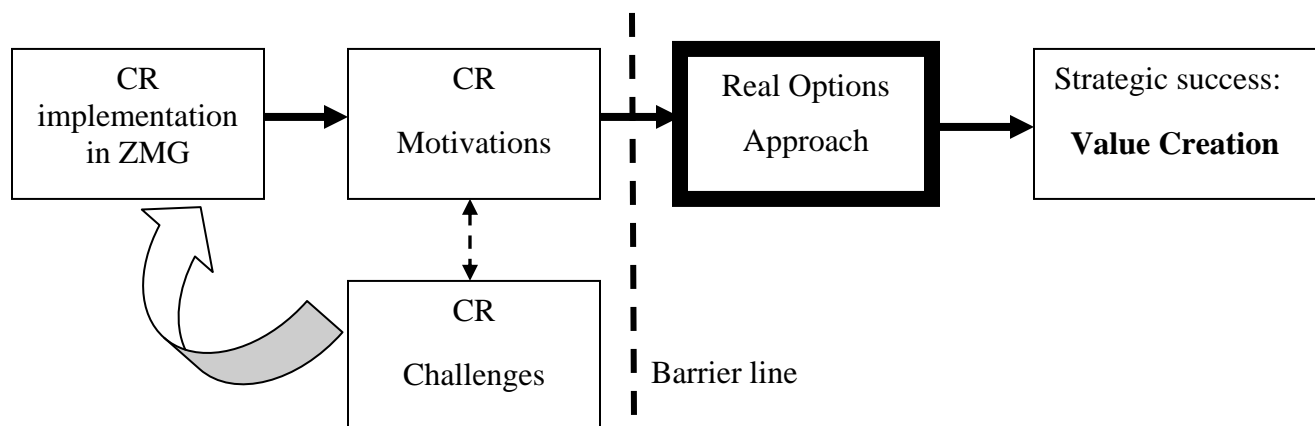


Figure 6.5 Strategic processes for implementing CR in ZMG

## 7. Discussion

Following the previous analysis, this chapter intends to make some in-depth discussions about CR and real options approach in ZMG. It firstly provides a general picture of CR circumstance in China's mining industry, and continues with discussions of the motivation and driver for CR implementation. Then followed by the explanations on four steps about how to apply real options approach into CR management in ZMG; meanwhile, some other possible strategies that could facilitate the successful launch and operation of CR implementation are also be advocated correspondingly. All the discussions in this chapter aims to answer the research questions that listed at the very beginning of this thesis therefore accomplishes the research aim.

### 7.1 General statement

The China's mining industry always plays a crucial role in economic and social activities because of its providing of raw materials and energy resources for daily production (Vintro and Comajuncosa, 2010). A holistic statement that illustrated the role of mining industry for China's economic development was described in Chief Economist David Humphreys (2002: 1)'s paper which presented to the Canadian Institute of Mining and Metallurgy:

*“China has risen to become the world's largest producer and consumer of steel and its second largest consumer of non-ferrous metals such as copper and aluminum. It is currently the world's largest buyer of copper on international markets, the second largest buyer of iron ore, and the third largest buyer of alumina. At the same time, it is the world's largest or second largest producer and exporter of tine, lead, zinc, magnesium and host of minor metals and industrial minerals, as well as a fast growing exporter of coal”.*

Although the outstanding contributions that China's mining industry made to the world; there are more and more concerns and research focusing on the relationship between CR and mining industry recently. Most of them are about the issues of why CR is important in mining industry or how CR is important in mining industry from the stakeholder or communication (sustainable reports) perspectives (see, e.g., Walker and Howard, 2002; Jenkins, 2004). Some even discussed the sustainable development of mining business within the context of CR (see, e.g., Warhurst, 2001).

Nevertheless, the real meaning of CR is always misinterpreted by individual companies such as ZMG. It announced on the webpage that ZMG had done several charity works during years which demonstrate the company's seriously concerning on environmental and social responsibilities (www, zkky, 5, 2011). Of course there is nothing wrong of doing charity works; but the money for doing so matters. From the previous theory chapter we got that within the framework of CR, all correspondingly behaviors are on the basis of transparency, fairness and voluntarily (Carroll, 1999); as well as maximizing “good” outputs while minimizing “bad” ones. Well, it is true that the line between “good” and “bad” outputs is unclear and hard to be settled.

However, once the money for donation earns from business that sacrifices environmental and social welfare; those charity works cannot be included into CR framework any more (Burke and Logsdon, 1996). As a result, ZMG could not just do kinds of charity or donation “shows” to pull itself into the framework of CR; but has to generate self-awareness on ethical and sustainable issues therefore performs environmental and social responsible (see, e.g., Bruntland, 1987). In short, ZMG has to make sure its economic activities are based on social and environmental orientations which satisfying the sustainable development of society in general (Wheeler *et al.*, 2002).

Practically, it is very hard to let a profit chasing company such as ZMG to make choices between short-term quick money on the sacrificing of environmental and social welfare and long-term benefits which increase incrementally as well as contain risks. Fortunately, the real options approach could provide alternative options under risks and optimize profits at the possible level. At the same time, stakeholders’ demands on company’s CR performances are growing rapidly (Labonne, 1999). As for the increasingly concerns of CR among consumers, suppliers, media, etc., ZMG needs to take carefully treatment with those stakeholders for keeping its production utility not decrease. Moreover, increasingly numbers of institutions like the International Council on Mining and Metals (ICMM) promoted their commitments or even regulations on CR agenda for mining companies and considered the “sustainable development” as one of the competitive advantages (www, Icomm, 1, 2011). Perhaps using regulation does not fulfill with the “voluntariness” of CR characteristic; but sometimes we just need a “dictator” to force the process going properly.

## 7.2 Implementing CR

This section discusses the motivation and driver for implementing CR in ZMG from different perspectives. Firstly it talks about the internally motivation of CR implementation: real options approach; then elaborates statement on stakeholder effects as the externally driver. At the end, the real options motivation and stakeholder driver are putting together for a briefly summary.

### 7.2.1 Sugar coat tablet (Real options approach motivation)

From the statements before it is obviously showed that ZMG got sick—irresponsibility with environmental and social behaviors. The doctor CR tries hard to cure but could do nothing by the surrounded challenges and difficulties. As mentioned above, the most significant challenges are high-risks and large amount of expenditures. Fortunately, there is a smart tool called real options. Of course we have to keep in mind that it is not an elixir; but hopefully it could assist the doctor to develop some easier way for healing the sick ZMG.

Perhaps the Chinese business men are special: they are profits chaser; they care short-term payoffs rather than long term payoffs; they believe money can solve any problem and they trust no one but themselves (www, Linkshop, 1, 2011). However, in pace with the economic

globalization, business men cannot do whatever they want unless they obey the rules of the “global business game”. CR had already become one of those game rules even though it is not compulsory. If those two accidents didn’t happen, ZMG might still operate its international business well even without CR participation. But the situation changed afterwards. CR has to be put one a priory position on the company’s business agenda for its long-term survival. However, the uncertainties and large costs that accompany with CR investment scared the managers in ZMG a lot.

Indeed, the fear from risks and costs for ZMG is similar as the fear for kid who has to take medicine. The process is tough and suffering. No company would be willing to launch a project with tremendous investments and high-risks, not even mentioned ZMG. However, as the reports showed that because of ZMG’s irresponsible performances after the accidents, it is facing 15%~25% rise on tax rate since the government canceled its “high-tech” status; followed such a dramatically fell down of the stock price (www, China, 1, 2011). Even worse, 850 peasants sued ZMG for its dam collapse’s damage of farmland and living residents in Xinyi City (www, Reuters, 1, 2011). As a result, the company’s reputation is decreasing and faces threats by the losing of domestic or even international market. Therefore, ZMG needs not only the CR therapist; but also a sugar coated tablet: real options approach.

The real options approach is not just a vanity title, the reason why it could be the sugar coat tablet for CR practicing in ZMG is because of its availableness on alternative options and capabilities for profit maximization. This means with the application of real options approach, the reduction on risks and optimization of profits could happen at the same time. Step further, there is no obligation when adopting real options approach, the decision makers could choose the most appropriate way according to the underlying situations. For instances, if ZMG felt too risky and unsatisfied with the estimated profits about one CR project; it could defer it or switch for another.

Meanwhile, such doubt could be generated as “how could real options approach facilitate CR implementation if itself allows defer or even abandon of an investment”. Of course, real option is not an omnipotent tool that could guarantee the successfulness of CR implementation; however, it provides opportunities for decision makers to think twice before they easily give up one project. Furthermore, as it stated previously, the real options approach is such a “dynamic” estimation method that NPV and DCF are hard to compete with. And the most important thing is, the final decision belongs to ZMG. If ZMG has no intention at all for CR participation; no matter whether the result that estimated by real options approach is positive or not, or there comes out some other better estimation tool, the end of the story is the same—no CR implementation forever.

### 7.2.2 Stakeholder drivers

Since the globally tendency to behave environmentally and socially responsible increasing rapidly, there are more and more companies begin to internalize CR program recently. For instance, the Shell Group set its strategic mission as “contribute sustainable development by

helping to meet the world's growing energy needs in economically, environmentally and socially responsible ways" (www, shell, 1, 2011). Or as the sustainable clothing retailer H&M promoted its "Conscious Collection" from the spring of 2011 for the environmental protection activity within clothing industry (www, Hm, 1, 2011). Even ZMG has its own sustainable slogan which can be interpreted as "chasing for a sustainable and harmony society" (www, Zjky, 6, 2011), nevertheless it never been achieved. Although not every company will promise to accomplish what it had stated on CR; the truth is that CR behaviors promote on building well image among the various stakeholders. Morsing and Schultz (2006: 323) supported this viewpoint through advocating that *"messages about corporate ethical and socially responsible initiatives are likely to evoke strong and often positive reactions among stakeholders"*.

Correspondingly, the stakeholders could always generate influences on monitoring or even accelerating CR performance. For instance, ZMG had been tailed by several stakeholders such as government, media and some lawyers because of its anti-CR behaviors. As Freeman (1984) stated that stakeholders could always generate effects on one company's strategic objectives; therefore they should be considered as "one member" within the company who prefer to interact with company's CR behaviors (Andriof and Waddock, 2002). As a result, the communication and satisfaction with stakeholders on the issues of CR by one company appear to be quite crucial (Johnson-Cramer *et al.*, 2002).

Practically, the stakeholders could be considered as a kind of driver that leads the implementation of CR into ZMG. Even though ZMG is a state-owned mining company and is under the protection of local and central government; it can not escape the responsibilities unscrupulously. Like the water pollution disaster and dam collapse accident, ZMG got punished both "physically" and "mentally" since it broke the ethical bottom line among several stakeholders. Although these stakeholders are not "key players" for ZMG, they can still generate pressures to the "key players" therefore make impacts on ZMG's CR performances.

### 7.2.3 Multiple Effects

As stated above, the implementing of CR in ZMG could be motivated by real options approach or drove by stakeholders' power. And there is no doubt that either way could facilitate the launch of CR project purposely. However, they are still different and could lead distinct results correspondingly.

Firstly, it is necessary to make it clear that "real options motivation" and "stakeholder drivers" are two different concepts. Real options motivation is like the engine of a car, it is self-behavior which is easily to be estimated and controlled by ZMG. While the stakeholders drivers are like the warm heart individuals that help to push the car when it is out of gasoline. Practically, the power from the engine should be much larger and effective than individuals; especially when the "powerful individual" (key stakeholders) are lack and cannot be that influential.

Indeed, the real options approach could provide alternative choices for decision makers that reduce the uncertainties and enhance the profit for CR projects at maximum level. Compare with the compulsory power from stakeholders, smart profit-chasing businessmen should choose the real options approach since it provides opportunities to play in freestyle. Nevertheless, the ending could be much better such as the “multiple effect” when “real options motivation” works together with “stakeholder drivers”. This is because the integration of internal motivation and external driver could always create much larger power than each one works individually. As a result, ZMG’s CR implementation could be in a better situation if decision makers utilize CR real options approach with the combination of stakeholder drivers.

### 7.3 Strategic opinions for CR implementation

After the discussion of different methods that could promote the implementation process of CR in ZMG, it will discuss the strategic opinions in the following section. Firstly, it talks about the strategic practice of CR real options in ZMG; then followed with the discussion about the stakeholder’s related issues for the CR participation. In the end the strategic actions from ZMG itself are mentioned and discussed at some extend.

#### 7.3.1 Strategic practice of CR real options in ZMG

As it analyzed above, there are various uncertainties and risks mixing with CR investments for ZMG, and one solution is to install real options approach. The following discussion will stand from a management viewpoint to identify and discuss how penetrate real options approach into CR investment.

Busch and Hoffman (2009) proposed an investment framework for ecology driven real options as illustrated in figure 7.1 below. In their paper, the ecology driven was explained as the environmental driven like reduction on carbon dioxide emission. However, it could be expanded into the field of CR driven real options framework correspondingly. According to them, the framework is constituted by four steps and on the purpose to determine final investment decision under uncertainties and risks. Therefore, the following discussion will adopt this framework to realize how to insert real options spirits into CR projects for ZMG.

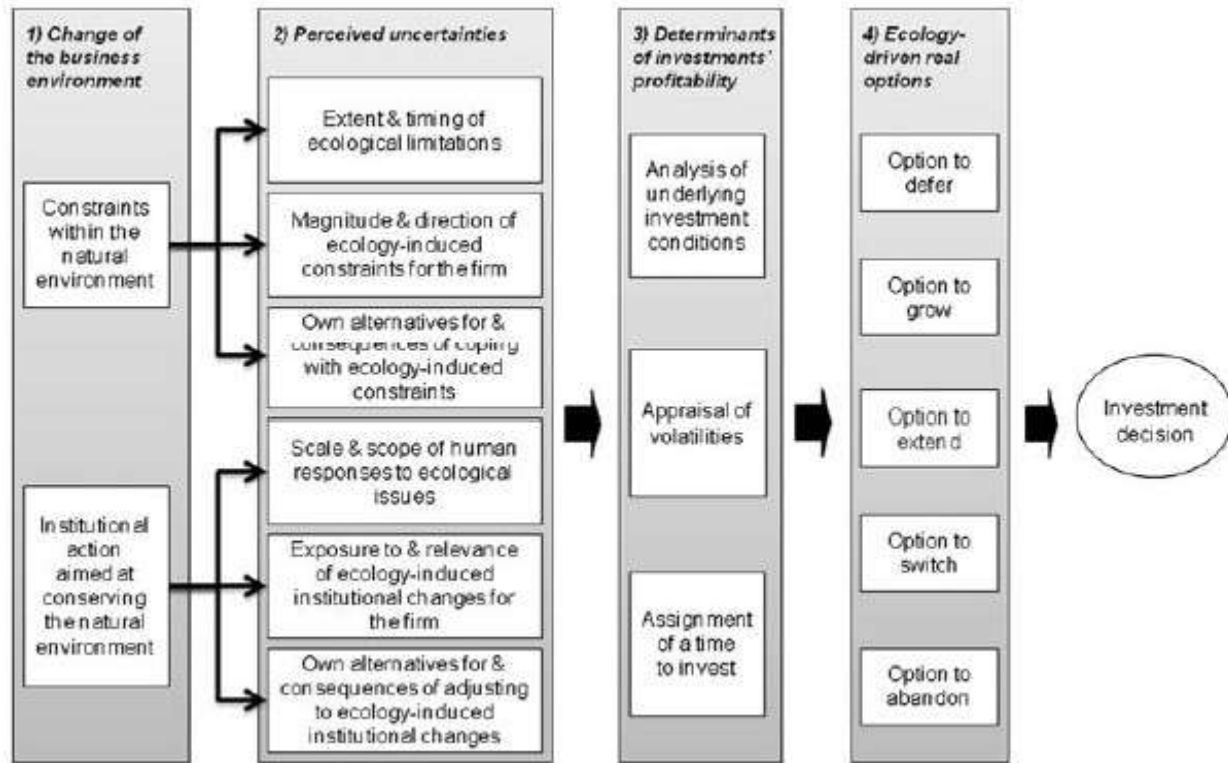


Figure 7.1 Integrative investment framework for ecology-driven real options. (Source: Busch and Hoffman, 2009: 302)

#### Step one: Seeking the change of the business environment

As it is showed in the figure 7.1, seeking the change of the business environment is the first step. It contains two concerns in this stage: the constraints within the natural environment and the institutional action aimed at conserving the natural environment. Kuik (2003) stated that the *constraint within the natural environmental* will generate effects on macroeconomic therefore influence on business environment. And Hourcade *et al.* (2007) indicated that the *institutional actions which composed by changes on environment regulations and laws* always incur business environment change. As a result, ZMG needs to figure out its business environment change since different changes refer to different relative risks and uncertainties in the following step.

Thus ZMG has to consider both the “constraint with natural environment” and the “institutional action aimed at conserving the natural environment”. On one hand, the whole world is caring more and more about the natural environment, so does China. There will be an increasing of constraint within the natural environment when doing business in future although it might reduce economic profits at a short run (Stern, 2007). Otherwise the destroyed natural environment will also cause detrimental disturbances to business activities in the end (Schwartz, 2007). On the other hand, because ZMG occurred such water pollution accident which caused enormous detrimental to the Ting river and local fish industry, there will definitely generate some

institutional actions that aimed to protect the environment as well as punish the pollution making companies. As a result, ZMG's business environment will confront with changes from both sides.

Step two: Identifying the potentially perceived uncertainties.

Once ZMG faces change of business environment by constraints within the natural environmental, the perceived uncertainties could refer to the first three that listed in the second category: extent & timing of environmental limitations, magnitude direction of environment induced constraints for the firm, and own alternatives for & consequences of coping with environment induced constraints. All these uncertainties are connected with the alternative natural environment and related with the environment side of CR. For instance, the extent & timing environmental limitations could be the exhausting of mine resources. Therefore, even if ZMG had already invested in green technology, it might not be beneficial since the lack of raw materials for production process. However, the mine resources scarcity is hard to estimate and the risks could be then reflected on 1) whether to continue extraction; or 2) invest in green technology for efficient and sustainable extraction; or even 3) invest in innovative technology for finding other alternatives which coping with the mine resources constraints. In addition, the last option is the most risky one since it is difficult to anticipate when and to what extent the customers could accept the alternative products of mine products such as gold and copper.

When ZMG confronts with changes of business environment by institutional action which aims on protecting the natural environment, the uncertainties will be interpreted as 1) various scale & scope responses from stakeholders; 2) distinct treatments with the institutional induced changes among companies and; 3) different level of environmentally relevance with the institutional induced changes for different companies.

All those three uncertainties are crucial for ZMG and could be classified into two main categories. The 1) and 2) are in the group of unsystematic risk, which can be controlled and alternated by company itself; while 3) belongs to the systematic risk that will be heavily influenced by the macro environment or the characteristic of the industry itself. For instance, the influential stakeholders of the state owned ZMG at present are its "relatives" such as central government, shareholders and stockholders. Therefore, the ZMG could keep those stakeholders be quiet on the sake of generating profits even there is a globally tendency to become environmental and social responsible within mining industry. Meanwhile, the company's treatment on CR is then on the formation of laissez-faire. As a result, ZMG appears to be able to minimize the first two risks. As a result, ZMG could choose to abandon the CR investment option if it is not profitable from the company's perspective; but its business behaviors have to be cautious because of the increasingly systematic risks. This is because the nature of a mining company is always tagged as negatively impact on environment and social performance (Jenkins, 2004), and ZMG is inevitably facing the challenges and pressures under the globally tendency of becoming CR; such as the media cracked its "protection shell" after the accidents as well as generated the attention from the central

government who punished ZMG consequently. Therefore, risks within ZMG's business are growing rapidly once it ignores environmental and social responsibilities.

On the other hand, once ZMG decided to invest in CR and coping with the institutional environmental constraints, there might also have some other kinds of uncertainties and risks. For instance, at what level should ZMG invest in CR is unclear since there is no standard. Further, although several empirical studies demonstrated CR and its related behaviors could have positive effects for a company's economic performance (see, e.g. Sijm *et al.*, 2005); whether it could be true in ZMG is still unknown.

Step three: Assessing and determining the profitability of underlying CR investment.

After identifying the uncertainties of the CR investment, the next step is to assess and determine the profitability of it. Some uncertainties will generate small impacts on the future value of the CR investment real options; while others might cause severe consequences in future. Therefore, the company needs to assess and determine the profitability on the consideration of various parameters. For instance, uncertainty on the customers' responses on whether they are willing to pay higher price for green technology products is crucial for ZMG's CR investment decision. Thus, as it is illustrated in the figure 7.1 above, there are three key elements when assessing and determining the profitability of the underlying CR investment. Firstly, analyze the underlying investment conditions. Collecting information and analyzing underlying circumstances are quite important during this process since it is the first movement in a big picture. Secondly, assess the risks and uncertainties. This is the step to set up various scenarios and make comparisons of profitability under different assumptions. Finally, after well preparation of the previous two steps, it is the time to assign the time for the CR investment.

Step four: Various types of real options.

Finally, it comes to the phase of choosing which kind of real options the company will apply. There are five types of options: option to defer, option to grow, option to extend, option to switch, and option to abandon. Choices among these five types of options are determined by the previous three steps that mentioned above.

Option to defer refers to the situation that once the company feels too many uncertainties about the future and cannot see enough benefits, it could defer and hold the option until the uncertainties decrease or the benefits become clearer. For example, if ZMG uses the previous real options model and estimates that its green technology investment cannot be profitable within 3~5 years because of numerous uncertainties and risks on the market; then it could defer the option until the situation becomes better. An empirical case is from a bio-gas firm Choren. It invested in a Carbo-V® technology for the production of synthesis gas from biogenic and non-biogenic in 1995 (www, Choren, 1, 2011). However, because of several uncertainties on the market, Choren deferred the development of the project after several years. However, during the waiting years

Choren patented the Carbo-V<sup>®</sup> technology as well as launched some programs such as CarboCompact<sup>®</sup> Plant to support the successful application of Carbo-V<sup>®</sup> finally (*ibid*).

The option to grow indicates the increase of investment for the underlying project. For example, if ZMG realizes the bright future of the green technology investment through the real option model, it could expand the investment, i.e., promote the green technology among all its subsidiary companies. A case study could be learned from the Shell Company. Since the growing market of bio-fuels around the world, Shell started to invest in bio-fuels technology from 2006 (www, Shell, 2, 2011). After years, Shell increases its investment along the way and now becomes the world's biggest distributor of bio-fuels. According to its current sustainable strategy, it will expand the bio-fuels technology investment in the following 20 years with the estimation that 9% of the world's road transport fuel will be taken up by bio-fuels (*ibid*).

Option to extend is always mixed with option to grow, while they are distinct. If we consider option to grow as a vertical expansion, then option to extend is a horizontal expansion. For instance, when ZMG are unsure about whether its stakeholders will be satisfied with its initial green technology investment, it could use option to extend—not only invest in green technology of sewage reduction, but also invest in other green technology like toxic chemical emission reduction technology. The chemical firm BASF could be a good example for the option to extend. At the very beginning, the company invested in an eco efficiency tool at a small range of its products for the assessment of CO<sub>2</sub> emission and fossil fuel consumption during its production process (Saling, 2002). However, because of the uncertainties about whether its stakeholders will satisfy with this, the company began to spread out this eco-efficiency technology into all of its products range and even launched some other types of green technology investment (*ibid*).

Option to switch can be explained as the option to adjust or exchange the original investment. For instance, according to the real option model, there is a chance that ZMG could gain benefits from green technology investment. However, ZMG appears to be such risk aversion and just want to try a small step at first. So it invested in a cheaper green technology for sewage emission reduction at the beginning, and according to the positive market responses, it could change the cheaper green technology into a more expensive one or invest in another more eco-efficiency green technology for producing higher quality environmentally friendly products. In short, the option to switch could reduce the operation and production costs (Busch and Hoffmann, 2009); as well as increase the flexibility of the CR management for ZMG appropriately.

The last type is option to abandon. From the name it is easy to understand the “abandon” means give up. After execution of the green technology investment, ZMG could monitor the development of the investment and abandon it once it doesn't perform well as expected before. The Volkswagen's retreated of Lupo car could be a paradigm. The Lupo car was supposed to be an innovative production that established by Volkswagen as the world's first energy saving car which will just account for 3L gasoline/100km (Healey, 1999). However, because of the extremely low demand from the market, Volkswagen decided to stop the production of Lupo in

2005. Nevertheless, they didn't entirely give up the idea of manufacturing energy saving automobiles and introduced the low fuel consumption Blue Motion Line technology to each of its product series (*ibid*).

### 7.3.2 Government training and guiding to the field of CR

Since ZMG is a state owned mining company, the government plays a key role in its business operations. From theoretical viewpoint, the government should promote CR into a company no matter whether it is profitable. Perhaps the situation in China is a little bit complicated and different because of its distinctive social structure and economic policy as mentioned before. However, once the CR investment presented as profitable; it should be considered as an indispensable element in doing business especially for environmental sensitivity companies like ZMG.

Therefore, the first step that the government could do is to educate and train the importance, necessities and benefits for developing CR within business operation to the high level managers of ZMG, such as CEOs, CFOs, department managers etc. Perhaps those managers had already known the general structure of CR, but this step is aiming to pave a delicate way for them to really learning and absorbing the essence of CR.

Then the second step is to guide ZMG on the right track of becoming CR. This is a very tough phase since all the difficulties in the CR implementation process that discussed above could happen. Even though the company can treat CR as a real option and be free to defer or even abandon it once the result appears to be unprofitable; it is still costly for initial investments and some other assets expenditure. Thus, the government's guidance seems to be quite important. It could appropriately enhance the confidence of a company or even execute the guidance as a "regulation" under some circumstances. There are several successful cases about how farmers accepted growing organic food under the guidance of government in China (see, e.g. [www.ifoam.org](http://www.ifoam.org), 1, 2011). Although we cannot equal growing organic food to CR implementation, but the similarity here is either farmers or the ZMG is worrying about the profitability that can gain from an "innovative" investment. As a result, the government could help to remove the obstacles on the way of becoming CR for the company or even accelerate the pace for CR implementation.

The last step but not the least, is that government could subsidize or reward the company for its CR participation. For instance, if ZMG decided to make CR investment such as purchasing green technical extraction machines and enhancing working conditions only when it has enough money; then the government could provide the company some subsidies to let them make the first move. Or for another example, if ZMG had already made investment in green technology and indeed reduced its sewage emissions at the end, the government could reward it as a kind of encouragement to keep it doing CR in a long run.

### 7.3.3 Other external stakeholders' monitors

As it was mentioned in the theory and literature reviews part, stakeholders are quite important for CR management and always generate significant influences on a company's CR performance. However, the stakeholders here are distinct from the stakeholders that discussed above in section 7.1.2. Those stakeholders are mainly the "key players" while the stakeholders here refer to other externalities such as "keep satisfied" and "keep informed". Since ZMG belongs to a more "Laissez-faire" company within the CR context, the stakeholders' influences appear to become the supervisions: facilitating CR implementation and supervising CR performance. If we still use the metaphor that real options approach is the sugar coated tablet, then the stakeholders' monitors are like the parents. They are responsible for the supervision of the illness child to take the tablet due to their care and love.


Thus the ZMG should take account its stakeholders' suggestions and advices through their supervision. This is because from ZMG's own perspective, it is difficult to query itself about what has it done in CR and how good it is because of the subjective judgments. On the opposite, the external stakeholders could provide more objective opinions and help to improve the CR performance.

### 7.3.4 ZMG's self awareness and CR strategies formulation

Although there are real options' motivations and stakeholders' drivers that leading and prompting ZMG to fit into such a CR framework, they cannot be guaranteed to work 100% effectively. Especially it is the truth that the "key player" stakeholders such as central/local government have quite complicated money and power network with ZMG. As a result, a compromise on giving up CR implementation but chasing profit could exist. Under this circumstance, ZMG's self awareness of practicing CR appears to be valuable and helpful. Once a company itself decided to achieve the layer of "ethical responsibilities" or even "philanthropic responsibilities" as showed in figure 4.2 (p. 25), it could realize the CR context even without any other motivations or drivers.

The following table 7.2 is adopted from table 4.2 in the previous theoretical framework section. It depicted the current CR stance of ZMG with the integration of its nowadays CR performance and related factors such as rationale, leadership, management mode and stakeholder relationship. The ZMG could be positioned at a spot between "Laissez-faire" and "Enlightened self-interest", but probably much nearer to the "Laissez-faire" as the pentagram shows. This is because what ZMG is presenting on its website appears to be more like the type of "Enlightened self-interest": has some awareness of being responsible; positively supports from leaders; company's guarantee on good practices by sustainable system; maintain such a well interactive relationship with its stakeholders. Nevertheless, from the responses after water pollution accident and dam collapse disaster, it is performing more like a profit chasing company as well as defensive on the outside pressures about its CR performances.

Table 7.2 Corporate Responsibility stances (source: Johnson *et al.*, 2007:146)

	<b>Laissez-faire</b> 	<b>Enlightened self-interest</b>
<b>Rationale</b>	Legal compliance: make a profit, pay taxes and provide jobs	Sound business sense
<b>Leadership</b>	Peripheral	Supportive
<b>Management</b>	Middle management responsibility	Systems to ensure good practice
<b>Mode</b>	Defensive to outside pressures	Reactive to outside pressures
<b>Stakeholder relationships</b>	Unilateral	Interactive

Indeed, the table 7.2 could be considered as the standards for different level of CR performance. The ZMG could then propose its own CR strategies according to its strengths and weaknesses. Of course it is very hard for ZMG to jump from “Laissez-faire” to “shaper of society”, but there is a possibility if the company itself indeed establishing and practicing its CR strategies. Furthermore, it could integrate real options approach with the development of CR to reduce the risk and optimize the outcomes. Meanwhile, there is still a group named “stakeholders” that could help to supervise the carry out of CR program when ZMG cannot self-realization.

## 8. Conclusion

As for the growing concerns on environmental and social issues among companies all over the world; CR is becoming increasingly crucial (Carroll, 1999). Since the mining industry contains much more negative environmental and social impacts, it is urged to apply CR spirit by various stakeholders (Jenkins, 2004). However, since CR is still a new concept in China (Wang *et al.*, 2010); it is facing challenges for its integration within every industry for instance the mining industry.

Therefore, this thesis has been focusing on a case study of ZMG's water pollution disaster and coal dam collapse from a CR perspective. It aims to analyze and discuss the CR issues within ZMG and; tries to investigate a real options approach and stakeholder aspect that could adopt and facilitate CR performances for ZMG. Thus, it started with the introduction of current situation of CR in China and China's mining industry; then followed by the description of empirics. After that, it analyzed and discussed the CR issues within ZMG on the basis of real options theory and stakeholder theory.

It is clear that CR could create several monetary and non-monetary benefits for ZMG as it analyzed before; however, it also contains challenges. As Nicholson (1994: 593) advocated that confronting with the growing CR concerns when doing business; "managers meet with dilemmas of increasing complexity in a climate of uncertainty and change". Specifically, the flexibility and unpredictable change are also the main obstacles of CR implementation in ZMG.

Perhaps key stakeholders are a group which could push the practicing of CR; however, they appear to be not that effective in the case of ZMG. As it discussed previously, the main key stakeholders of ZMG are its stockholders and shareholders. They can decide whatever the ZMG could do, for instance, keeps chasing "unethical" profits as well as not implementing CR. Even another key stakeholder, the government, will not be such a persuader since it holds a large part of ZMG's stock and be involved in a complicated beneficial network. Thus, because of CR investment is always considered as a risky behavior (Kytle and Ruggie, 2005); profit-induced rational economist will follow the safety way which could guarantee the profit gaining—last unit of CR performance contribute more benefits than harm (Hay *et al.*, 2005). As a result, the key stakeholders would not take no CR concerns into ZMG's daily operations unless illegal things like the accidents happened. However, CR is not within the context of legal but such a voluntarily action. Therefore, there is a demand of "self-pushing" power that could facilitate the implementation of CR in ZMG.

As a result, the real options approach comes to the stage and advocates a brand new management tool for ZMG's decision makers to overcome challenges from flexible market that embedded in CR investment. It provides alternative options on the consideration of various possibilities for future situations; as well as reduces the unsystematic risks' influences which lower the passion of CR implementation. The real options approach then will promote the development of CR

implementation process in ZMG since it creates such a win-win situation—gaining profits as well as taking environmental and social responsibilities.

Practically, CR issues in ZMG are far more than they are analyzed and discussed in this thesis. Such topics could be for instances the concentration on the political/cultural impacts and policy guidance of CR behaviors in ZMG. Further, if it is possible to gather some first hand data on CR performance from ZMG, then the analysis and discussion on real options approach could pay more attention from a quantitative perspective that applying models as well as providing empirical economic conclusions. Henceforth, the future research could focus on topics as mentioned above and prompt deeper and comprehensive studies.

# References

## Books and academic papers

- Adelman, I. and Sunding, D. (1987) Economic Policy and Income Distribution in China. *Journal of Comparative Economics*. 11: 444-461.
- Adner, R. and Levinthal, D. (2004) What is not a Real Option: Considering boundaries for the application of real options to business strategy. *Academy of Management Review*. 29(1): 74-85.
- Amit, R. and Wernerfelt, B. (1990) Why do firms reduce business risk? *Academy of Management Journal*. 33(3): 520-533.
- Amram, M. and Kulatilaka, N. (1999) *Real Options: Managing Strategic Investment in an Uncertain World*. Harvard Business School Press. Boston. US.
- Andriof, J. and Waddock, S. (2002) Unfolding stakeholder engagement. In Andriof, J., Waddock, S., Husted, B. and Rahman, S. (Eds.) *Unfolding stakeholder thinking: Theory, Responsibility and Engagement*. pp 19-42. Greenleaf. Sheffield. UK.
- Andriof, J., Waddock, S., Husted, B. And Rahman, S. (2002) (Eds.) *Unfolding Stakeholder Thinking: Theory, Responsibility and Engagement*. Greenleaf. Sheffield. UK.
- Auperle, K., Carroll, A. and Hatfield, J. (1985) An empirical examination of the relationship between corporate social responsibility and profitability. *Academy of Management Journal*. 28(2): 446-463.
- Baron, D. (2001) Private politics, Corporate Social Responsibility and integrated strategy. *Journal of Economics and Management Strategy*. 10: 7-45.
- Beccetti, L., Giacomo, S. and Pinnachio, D. (2005) Corporate Social Responsibility and Corporate Performance: Evidence from a panel of US listed companies. *CEIS research paper*. Series No. 26-78.
- Bellman, R. and Dreyfus, S. (1962) *Applied dynamic programming*. Princeton University Press. Princeton. NJ. US.
- Beltratti, A. (2005) The complementarities between corporate governance and corporate social responsibility. *Geneva Papers on Risk and Insurance: Issue and Practice*. 30: 373-386.
- Belu, C. and Manescu, C. (2009) Strategic Corporate Social Responsibility and Economic Performance. *Working papers in Economics, Department of Economics, University of Gothenburg*. No. 362. ISSN 1403-2465

- Bendixen, M. and Abratt, R. (2007) Corporate identity, ethics and reputation in supplier-buyer relationships. *Journal of Business Ethics*. 76: 69-82.
- Black, F. and Scholes, M. (1973) The Pricing of Options and Corporate Liabilities. *Journal of Political Economy*. 81(3): 637-654
- Blend, J. and Ravenswaay, E. (1999) Measuring consumer demand for eco-labeled apples. *American Journal of Agricultural Economics*. 81(5): 1072-1077
- Bolvig, I. (2005) Firm provided social concerns? Just another compensating wage differentials story? *International Journal of Manpower*. 26(7-8): 673-704
- Bookstaber, R. (1981) *Option Pricing and Strategies in Investing*. Addison-Wesley Publishing Company. Reading, MA. US.
- Bouchard, J. (1976) Unobtrusive Measures: An Inventory of Uses. *Sociological Method & Research*. 4(3): 267-300
- Bowman, E. and Hurry D. (1993) Strategy through the option lens: An integrated view of resource investments and the incremental-choice process. *Academy of Management Review*. 18(4): 760-782
- Boyd, B., Dess, G. and Rasheed, A. (1993) Divergence between archival and perceptual measures of the environment-- causes and consequences. *Academy of Management Review*. 18 (2): 204-226
- Brach, M. (2003) *Real Options in Practice*. John Wiley & Sons, Inc. Hoboken, New Jersey. US.
- Bruntland, G. (1987) (eds) *Our common future*. The World Commitment on Environment and Development. Oxford. UK.
- Burke, L. and Logsdon, J. (1996) How corporate social responsibility pay off. *Long Range Planning*. 29: 495-502
- Bury, J. (2005) Mining Mountains: neoliberalism, land tenure, livelihoods, and the new Peruvian mining industry in Cajamarca. *Environmental and Planning*. 37: 221-239.
- Busch, T. and Hoffmann, V. (2009) Ecology-Driven Real Options: An Investment Framework for Incorporating Uncertainties in the Context of the Natural Environment. *Journal of Business Ethics*. 90: 295-310
- Carroll, A. (1991) The pyramid of Corporate Social Responsibility: Toward the moral management of organizational stakeholders. *Business Horizons*. 34: 39-48.
- Carroll, A. (1999) Corporate Social Responsibility: Evolution of a Definitional Construct. *Business and Society*. 38(3): 268-295.

- Carron, M. Thomsen, P., Chan, A., Muro, A. and Bhushan, C. (2006) Critical perspectives on CSR and development: what we know, what we don't know, and what we need to know. *International Affairs*. 82(5): 977-987.
- Charter, M. and Polonsky, M. (1999) *Greener Marketing: A global perspective on Greening Marketing Practice*. Greenleaf Publishing Ltd. Sheffield, UK.
- Chi, T. (2000) Option to acquire or divest a joint venture. *Strategic Management*. 21: 665-687
- Chichilnisky, G., Beltratti, A. and Heal, M. (1995) Sustainable Growth and the Green Golden Rule, presented at conference on Sustainable Growth in 1993. *Economic Approaches to Sustainable Development*, OECD. p147-165
- Chichilnisky, G. and Heal, G. (1998) Global environmental risks, chapter in Chichilnisky, G., Heal, G. and Vercelli, A. (eds.) *Sustainability: Dynamics and Uncertainty*. Kluwer Academic Publisher, Dordrecht.
- Clarkson, M. (1995) A stakeholder framework for analyzing and evaluating Corporate Social Performance. *Academy of Management Review*. 20(1): 92-117
- COM (2001) (Eds) Green Paper: Promoting a European framework for Corporate Social Responsibility. *Commission of the European communities*.
- Commission of the European Communities. (2001) Green paper: Promoting a European framework for Corporate Social Responsibility. *Presented by the Commission at Brussels*.  
[Available from]: [http://eur-lex.europa.eu/LexUriServ/site/en/com/2001/com2001\\_0366en01.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/com/2001/com2001_0366en01.pdf)  
[Accessed at]: 2011-01-11
- Copeland, T. and Keenan, P. (1998) Making real options real. *The McKinsey Quarterly*. 3: 128-141.
- Copeland, T. (2001) The real options approach to capital allocation. *Strategic Finance*. 83(4): 33-37
- Cowell, S., Wehrmeyer, W., Argust, P., Graham, J., and Robertson, S. (1999) Sustainability and the primary extraction industries: theories and practice. *Resource Policy*. 25(4): 277-286
- Cragg, W. (1998) Sustainable development and mining: opportunity or threat to the industry. *CIM Bulletin*. 91(1023): 45-50.
- Dam, L. (2008) *Corporate Social Responsibility and Financial Markets*. Doctoral thesis in Economics and Business. University of Groningen. Netherland.
- Dahlsrud, A. (2008) How Corporate Social Responsibility is Defined: an Analysis of 37 Definitions. *Corporate Social Responsibility and Environmental Management*. 15: 1-13

- Delios, A., Wu, Z. and Zhou, N. (2006) A new perspective on ownership identities in China's listed companies. *Management and Organization Review*. 2(3): 319-343.
- DesJardins, J. (1998) Corporate Environmental Responsibility. *Journal of Business Ethics*. 17: 825-838.
- Dixit, A. and Pindyck, R. (1994) *Investment under uncertainty*. Princeton University Press. Princeton, NJ. US.
- Donald, G. and Lorsch, J. (1983) *Decision making at the top: The shaping of strategic direction*. Basic Books.
- Donaldson, T. and Preston, L. (1995) The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of Management Review*. 20(1): 65-91.
- Dorian, P. and Humphreys, B. (1994) Economic impacts of mining: a changing role in the transitional economies. *Natural Resources Forum*. 18: 17-29.
- Ebner, D. and Baumgartner, J. (2006) The relationship between sustainable development and Corporate Social Responsibility. *Corporate Responsibility Research Conference*. [Available from]: <http://www.crrconference.org/downloads/2006ebnerbaumgartner.pdf> [Accessed at]: 2011-05-15
- Eisenhardt, K. (1989) Building theories from case study research. *The Academy of Management Review*. 14(4): 532-550
- Elizabeth, C. (2004) *The River Runs Black: The Environmental Challenge to China's Future*. Cornell University Press. New York. US.
- Elkington, J. (1997) *Cannibals with forks: The Triple Bottom Line of 21st Century Business*. Capstone, Oxford.
- Epps, J.M. (1997) The social agenda in mine development. *Industry and Environment*. 20(4): 32-35.
- Epstein, M. and Roy, M. (2001) Sustainability in action: Identifying and measuring the key performance drivers. *Long Range Planning*. 34(5): 585-604
- ESI. (2006) Environmental Performance Measurement Project. *Yale Center for Environmental Law and Policy, Center for International Earth Science Information network, World Economic Forum*. <http://www.yale.edu/esi>
- Firestone, W. (1987) Meaning in Method: The Rhetoric of Quantitative and Qualitative Research. *Educational Researcher*. 16: 16-21

- Fombrun, C. and Shanley, M. (1990) What's in a name? Reputation building and Corporate strategy. *Academy of Management Review*. 33(2): 233-258
- Frayer, J. and Uludere, N. Z. (2001) What is it worth? Application of real options theory to the valuation of generation assets. *The Electricity Journal*. 14(8): 40-51
- Freeman, R. (1984) *Strategic Management: A stakeholder approach*. Pitman Publish. Boston. US.
- Freeman, R. and McVea, J. (2001) A stakeholder approach to strategic management, p189-228. In Hitt, M., Freeman, R. and Harrison, J. (2001) (eds.): *Handbook of Strategic Management*. Blackwell Publishers Ltd. UK.
- Friedman, M (1970) The Social Responsibility of Business is to Increase its Profits. *The New York Times Magazine*. [on line] Available at: <http://www.umich.edu/~thecore/doc/Friedman.pdf> [Accessed from]: 2010-12-17
- Greening, D., Turban, D. and Daniel, B. (2000) Corporate Social Responsibility as a competitive advantage in attracting a quality workforce. *Business and Society*. 39(3): 254-281
- Gruver, G. (1976) Optimal investment in pollution control capital in a neoclassical growth context. *Journal of Environmental Economics and Management*. 5: 165-177.
- Gummersson, E. (2000) *Qualitative methods in management research*. Sage Publications, Inc. CA, US.
- Hamann, R. (2003) Mining companies' role in sustainable development: the 'why' and 'how' of Corporate Social Responsibility from a business perspective. *Development South Africa*. 20(2): 237-254.
- Hambrick, D.C., Finkelstein, S. and Mooney, A.C. (2005) Executive job demands: New insights for explaining strategic decisions and leader behaviors. *Academy of Management Review*. 30(3): 472-491.
- Hammersley, J.M. and Handscomb, D.C. (1964) *Monte Carlo Method*. Fletcher & Son Ltd. Norwich. UK.
- Hannan, K. (1995) *China, modernization and the goal of prosperity: Government administration and economic policy in the late 1980s*. Cambridge University Press. Cambridge, UK.
- Hay, B., Stavins, R. and Vietor, R. (2005) (eds.) *Environmental Protection and the Social Responsibility of firms: perspectives from law, economics and business*. Published by Resource for the Future. Washington, DC. US.
- Hayes, R. and Abernathy, W. (1980) Managing our way to economic decline. *Harvard Business Review*. July-August: 66-77.

- Hayes, R. and Garvin, D. (1982) Managing as if tomorrow mattered. *Harvard Business Review*. May-June: 71-79.
- Healey, J. (1999) VW Lupo: Rough road to fuel economy. *USA Today*. August, 27th, 1999. [Available from]: <http://www.usatoday.com/money/consumer/autos/mareview/mauto497.html>
- Herbert, J. (2001) *Practicing Global Journalism: Exploring Reporting Issues Worldwide*. Focal Press.
- Hettige, H., Mani, M. and Wheeler, D. (2000) Industrial pollution in economic development: the environmental Kuznets curve revisited. *Journal of Development Economics*. 62(2): 445-476
- Hilson, G. and Murck, B. (2000) Sustainable development in the mining industry: clarifying the corporate perspective. *Resource Policy*. 26(4): 227-238.
- Hourcade, C., Demailly, D., Neuhoﬀ, K. and Sato, M. (2007) Differentiation and dynamics of EU ETS Industrial Competitiveness Impacts. *Climate Strategies Report*.
- Huchzermeier, A. and Loch, C. (2001) Project Management Under Risk: Using the Real Options Approach to Evaluate Flexibility in R&D. *Management Science*. 47(1): 85-101
- Humphreys, D. (2002) China Mining and Metals: The waking giant. [on line] *Paper that presented to the Canadian Institution of Mining and Metallurgy's AGM, Mineral Economics Society Session on "Metal Markets and Mirages", Vancouver, 30 April, 2002*. [Available from]: <http://www.riotinto.com/documents/Investors/CIMMChinaPaper.pdf>. [Accessed at]: 2011-03-21.
- Husted, B. (2005) Risk Management, Real Options, and Corporate Social Responsibility. *Journal of Business Ethics*. 60: 175-183
- Jenkins, H. (2004) Corporate Social Responsibility and the mining industry: Conflicts and constructs. *Corporate Social Responsibility and Environmental Management*. 11: 23-34.
- Jenkins, H. and Yakovleva, N. (2006) Corporate social responsibility in the mining industry: Exploring trends in social and environmental disclosure. *Journal of Cleaner Production*. 14: 271-284
- Jensen, M.C. and Meckling, W.H. (1976) The Theory of the Firm: Managerial Behavior, Agency Cost and Ownership Structure. *Journal of Financial Economics*. 3(4): 305-360.
- Jimena, J. (2010) What the really world needs now. *Canadian Mining Journal*. December, 2010: 8-11. [on line]: [http://www.onthegroundgroup.com/documents/CMJ\\_Dec\\_8-11a.pdf](http://www.onthegroundgroup.com/documents/CMJ_Dec_8-11a.pdf) [Accessed at]: 2011-03-02
- John, A. and Pecchenino, R. (1994) An overlapping generations model of growth and the environment. *Economic Journal*. 104: 1393-1410.

- Johnson, G. Scholes, K. and Whittington, R. (2008) *Exploring Corporate Strategy*. Pearson Education Limited, Essex, England.
- Johnson-Cramer, E., Berman, L. and Post, E. (2002) Re-examining the concept of “stakeholder management”. In Andriof, J., Waddock, S., Husted, B. and Rahman, S. (Eds.) *Unfolding stakeholder thinking: Relationships, Communication, Reporting and Performance*. pp 145-161. Greenleaf. Sheffield. UK.
- Jupp, V. (2006) *The SAGE dictionary of social research methods*. (Eds) Sage Publications Ltd. London. UK.
- Kanter, R. (1999) From spare change to real change: the social sector as Beta site for business innovation. *Harvard Business Review*. 77(3): 122-132
- Kapelus, P. (2002) Mining, corporate social responsibility and the ‘community’: the case of Rio Tinto, Richards Bay Minerals and the Mbonambi. *Journal of Business Ethics*. 39(3): 279-296
- Knox, S. and Maklan, S. (2004) Corporate Social Responsibility: Moving beyond investment towards measuring outcomes. *European Management Journal*. 22(5): 508-516.
- Kogut, B. (1991) Joint Ventures and the option to expand and acquire. *Management Science*. 37(1): 19-33
- Kogut, B. and Kulatilaka, N. (1994) Operating flexibility, Global manufacturing, and the Option value of a multinational network. *Management Science*. 40(1): 123-139
- Kok, P., Weile, T., McKenna, R. and Brown, A. (2001) A Corporate Social Responsibility Audit within a Quality Management Framework. *Journal of Business Ethics*. 31(4): 285-297.
- Kriström, B. and Lundgren, T. (2003) Abatement investment and green goodwill. *Applied Economics*. 35(18): 1915–1921.
- Kuik, O. (2003) Climate change policies, energy security and carbon dependency. *International Environmental Agreements: Politics, Law and Economics*. 3: 221-242.
- Kytle, B. and Ruggie, J. (2005) Corporate Social Responsibility as Risk Management: A Model for Multinationals. *Corporate Social Responsible Initiative Working Paper No.10*. Cambridge, MA: John F. Kennedy School of Government, Harvard University.
- Labonne, B. (1999) The mining industry and the community: Joining forces for sustainable social development. *Natural Resource Forum*. 23: 315-322.
- Lazo, J., Pacheco, M. and Vellasco, M. (2009) Eds. Intel system in oil field development. Chapter 2: Real Options Theory. *Springer-Verlag Berlin Heidelberg*. SCI(183): 7-22
- Leedy, O. and Ormrod, J. (2005) *Practical Research*. 8th eds. Person Education Inc., US.

- Lepoutre, J., Dentchev, N. and Heene, A. (2007) Dealing with uncertainties when governing CSR policies. *Journal of Business Ethics*. 73(4): 391-408
- Li, W. (2010) Corporate Social Responsibility in China: Window Dressing or Structural Change? *Berkeley Journal of International Law*. 28(1): 64-100.
- Lindbeck, A. (2008) Economic-Social interaction in China. *CESifo Working Paper No. 2183*. [Available from]: <http://www.ifo.de/portal/pls/portal/docs/1/1187220.PDF> [Accessed at]: 2010-10-05
- Liu, J. and Diamond, J. (2008) Revolutionizing China's Environmental Protection. AAAS *NECOMB CLEVELAND PRIZE*. [online] Available at: <http://www.aseanenvironment.info/Abstract/41016032.pdf> [Accessed at]: 2011-03-20
- Loken, B., Ahluwalia, R. and Houston, M. (2010) *Brands and brand management: Contemporary Research Perspective*. (Eds) Taylor and Francis Group, LLC. US.
- Luehrman, T. (1998) *Strategy as a portfolio of real options*. In "Managing in the New Economy", Magretta, J. (ed). Harvard Business School Press, Boston, MA. pp. 91-111
- Lundgren, T. (2010) A microeconomic model of Corporate Social Responsibility. *Metroeconomica*. 62: 69-95
- Margolis, J. and Walsh, J. (2003) Misery loves companies: Rethinking social initiatives by business. *Administrative Science Quarterly*. 48(2): 268-305
- Mark-Herbert, C. (2002) Functional food for added value: Developing and marketing a new product category. *Doctoral Dissertation*. ISBN: 91-576-5837-4.
- McAdam, R. and Leonard, D. (2003) Corporate Social Responsibility in a total quality management context: opportunities for sustainable growth. *Journal of Corporate Governance*. 3(4): 36-45
- McDevitt, R., Giapponi, C. and Tromley, C. (2007) A model of ethical decision making: The integration of process and content. *Journal of Business Ethics*. 73(2): 219-229
- McGrath, R. (1997) A real option logic for initiating technology positioning investments. *Academy of Management Review*. 22(4): 974-996
- McWilliams, A. and Siegel, D. (2001) Corporate Social Responsibility: A theory of the firm perspective. *Academy of Management Review*. 26: 117-127.
- Mendelow, A. (1991) *Proceedings of the Second International Conference on Information Systems*. Cambridge, MA.

- Menon, A and Menon, A. (1997) Enviropreneurial Marketing Strategy: The emergency of Corporate Environmentalism as Market Strategy. *Journal of Marketing*. 61(1): 51-67
- Miller, D. and Shamsie, J. (1999) Strategic responses to three kinds of uncertainty: Product line simplicity at the Hollywood Film Studios. *Journal of Management*. 25(1): 97-116.
- Miller, R. (1999) Mining, environmental protection and sustainable development in Indonesia, in Vig, N. and Axelrod, R. (eds.) *The global environment: institutions, law and policy*. Earth Scan Publications Ltd. London. pp: 317-332
- Milliken, J. (1987) Three types of perceived uncertainty about the environment-state, effect and response uncertainty. *Academy of Management review*. 12(1): 133-143.
- Mitchell, R.K., Agle, B. and Wood, D. (1997) Toward a theory of stakeholder indentification and salience: defining principle of who and what really counts. *Academy of Management Review*. 22(4): 853-886.
- Moir, L. (2001) What do we mean by Corporate Social Responsibility? *Corporate Governance*. 1(2): 16-22
- Morsing, M. and Schultz, M. (2006) Corporate Social Responsibility communication: stakeholder information, response and involvement strategies. *Business Ethics: A European Review*. 15(4): 323-338.
- Murray, B. and Vogel, M. (1997) Using a hierarchy of effects approach to gauge the effectiveness of corporate social responsibility to generate goodwill toward the firm: Financial versus non financial impacts. *Journal of Business Research*. 38: 141-159.
- Nicholson, N. (1994) Ethics in organizations: a framework for theory and research. *Journal of Business Ethics*. 13: 581-596.
- Nyström, H. (1990) *Technological and market innovation*. Strategies for product and company development. John Wiley & Sons, Chichester.
- Paxson, D. (2001) Introduction to real R&D options. *R&D Management*. 31(2): 109-113
- Peck, P. and Sinding, K. (2003) Environmental and social disclosure and data richness in the mining industry. *Business Strategy and the Environment*. 12(3): 131-146.
- Pinkston, T. and Carroll, A. (1996) A Retrospective Examination of CSR Orientations: Have they changed? *Journal of Business Ethics*. 15(2): 199-207.
- Porter, M. and Linde, C. (1995) Toward a New Conception of the Environment-Competitiveness Relationship. *Journal of Economic Perspectives*. 9(4): 97-118.

- Rae, M., and Rouse, A. (2001) *Mining Certification Evaluation Project—Independent certification of environmental and social performance in the mining sector*. A WWF-Australia discussion paper. Resource Conservation Program, Mineral Resource Unit of WWF Australia.
- Rainey, D. (2006) *Sustainable Business Development*. Cambridge University Press. Cambridge. UK.
- Raymond, O. (2010) Motivation for high performance. Case: Building and road research institute (BRRI), Ghana. [on line] *Degree Program in Business Management, Laurea University*. [Available from]: [https://publications.theseus.fi/bitstream/handle/10024/22187/Ocran\\_Raymond.pdf?sequence=1](https://publications.theseus.fi/bitstream/handle/10024/22187/Ocran_Raymond.pdf?sequence=1) [Accessed at]: 2011-03-02
- Redding, S.G. (1993) *The spirit of Chinese Capitalism*. Walter de Gruyter & Co., Berlin. Germany.
- Riordan, L. and Faribass, J. (2006) Corporate Social Responsibility: Models and Theories in Stakeholder Dialogue. [on line] Corporate Responsibility Research Conference. [Available at]: <http://www.crrconference.org/downloads/2006oriordanfairbrass.pdf> [Accessed from]: 2011-03-13.
- Robson, C. (2002) *Real World Research*. (2nd). Blackwell Publishing. UK.
- Saling, P. (2002) Life Cycle Management, Eco-Efficiency Analysis by BASF: the method. [on line] *Eco-efficiency Analysis by BASF*. [Available from]: [http://www.basf.com/group/corporate/en/function/conversions:/publish/content/sustainability/eco-efficiency-analysis/images/Eco-efficiency\\_Analysis\\_by\\_BASF.pdf](http://www.basf.com/group/corporate/en/function/conversions:/publish/content/sustainability/eco-efficiency-analysis/images/Eco-efficiency_Analysis_by_BASF.pdf). [Accessed at]: 2011-04-02.
- Sanchez, R. (1993) Strategic flexibility, firm organization, and managerial work in dynamic markets: A strategic options perspective. *Advances in Strategic Management*. Vol(9): 251-291
- Shankleman, J. (2009) Going Global: Chinese Oil and Mining Companies and the Governance of Resource Wealth. [on line] *Woodrow Wilson International Center for Scholars*. [Available from]: [http://www.wilsoncenter.org/topics/pubs/DUSS\\_09323Shnkl\\_rpt0626.pdf](http://www.wilsoncenter.org/topics/pubs/DUSS_09323Shnkl_rpt0626.pdf). [Accessed at]: 2011-04-03.
- Schwartz, P. (2007) Investing in Global Security. *Harvard Business*. 85(10): 26-27.
- Shahin, A. and Zairi, M. (2007) Corporate governance as a critical element for driving excellence in Corporate Social Responsibility. *International Journal of Quality & Reliability Management*. 24(7): 753-770.
- Sick, G. (1995) *Chapter 21: Real Options*. Jarrow, R. et al. (Eds) Handbooks in OR & MS. Elsevier Science. B.V.

Siegel, D. and Vitaliano, D. (2007) An empirical analysis of the strategic use of corporate social responsibility. *Journal of Economics and Management Strategy*. 17: 773-792

Sijm, M., Bakker, S., Chen, Y., Harmsen, H. and Lise, W. (2005) *CO<sub>2</sub> price dynamics: The implications of EU emissions trading for the price of electricity*. Energy Research Centre of the Netherlands. Petten. NL.

Simpson, D. and Bradford, L. (1996) Taxing Variable Cost: environmental regulation as industrial policy. *Journal of Environmental Economics and Management*. 30: 282-300.

Smircich, L. and Stubbart, C. (1985) Strategic management in an enacted world. *Academy of Management Review*. 10(4): 724-736.

Snider, J., Hill, R. and Martin, D. (2003) Corporate Social Responsibility in the 21st Century: A view from the World's Most Successful Firms. *Journal of Business Ethics*. 48: 175-187.

Starr, J. and MacMillan, I. (1990) Resource cooptation via social contracting: Resource acquisition strategies for new ventures. *Journal of Strategic Management*. 11: 79-92

Stern, M. (2007) *The Economics of Climate Change- The Stern Review*. Cambridge University Press. Cambridge. UK.

Tateisi, N. (2006) Current State of Corporate Social Responsibility in China and Challenges Faced by Japanese Corporations. Report for Council for Better Corporate Citizenship (CBCC). [on line] Available at: <http://www.keidanren.or.jp/CBCC/en/report/200612observations.pdf> [Accessed at]: 2011-02-13

Thompson, J.D. (1967) *Organizations in Action*. McGraw Hill. New York. US.

Tilt, C. and Symes, C. (1999) Environmental disclosure by Australian mining companies: environmental conscience or commercial reality? *Accounting Forum*. 23(2): 137-154

Triantis, A. (2000) Real options and corporate risk management. *Journal of Applied Corporate Finance*. Vol (13): 64-73

Trigeorgis, L. (1993) Real Options and Interactions with Financial Flexibility. *Financial Management*. Autumn: 202-224.

Trigeorgis, L. (1996) *Real options: Managerial flexibility and strategy in resource allocation*. Asco Trade Typesetting Ltd. Hong Kong.

Videen, G. (2010) Effects of Green Business on Firm Value. [on line]:The Michigan Journal of Business. [Available from]: <http://michiganjb.org/issues/41/text41d.pdf>. [Accessed at]: 2011-03-29.

- Vintro, C. and Comajuncosa, J. (2010) Corporate Social Responsibility in the mining industry: Criteria and indicators. *Dyna rev.fac.nac.minas.* 77(161): 31-41.
- Visser, W. (2006) Revisiting Carroll's CSR pyramid: An African perspective, p29-56. In Pedersen, R. and Huniche, M. (eds.) *Corporate Citizenship in Developing countries*. Copenhagen Business School Press. [Available from]: [http://www.waynevisser.com/chapter\\_wvisser\\_africa\\_csr\\_pyramid.pdf](http://www.waynevisser.com/chapter_wvisser_africa_csr_pyramid.pdf) [Accessed at]: 2011-01-13.
- Wang, J., Qin, S. and Cui, Y. (2010) Problems and Prospects of CSR Systems Development in China. *International Journal of Business and Management.* 5(12): 128-134.
- Warhurst, A. (2001) Corporate Citizenship and Corporate Social Investment: Drivers of Tri-Sector Partnerships. *The Journal of Corporate Citizenship.* 1: 57-72.
- Walkers, J. and Howard, S. (2002) Voluntary codes of conduct in the mining industry. Mining, Minerals and Sustainable Development Project (MMSD), IIED.
- Weber, M. (2008) The business case for corporate social responsibility: A company-level measurement approach for CSR. *European Management Journal.* 26: 247-261
- Weston, J. and Brigham, F. (1981) *Managerial Finance*. Dryden Press. Hinsdale, IL. US
- Wheeler, D., Fabig, H. and Boele, R. (2002) Paradoxes and dilemmas for stakeholder responsive firms in the extractive sector: lessons from the case of Shell and Ogoni. *Journal of Business Ethics.* 39(3): 297-318.
- Weston, J. and Brigham, E. (1981) *Managerial Finance*. Dryden Press. Hinsdale, IL. US.
- Wheatley, M. (1999) *Leadership and the New Science: Discovering Order in a Chaotic World, Vol. 2*. Berrett-Koehler Publishers. San Francisco. US.
- Wood, D. (1991) Corporate Social Responsiveness revisited. *Academy of Management Review.* 16: 691-718
- World Business Council for Sustainable Development (1999) *Corporate Social Responsibility*. Geneva.
- World Mining Congress. (2008) New Challenges and Visions for Mining. 21<sup>st</sup> world mining congress, Poland. [on line] Available at: [http://www.wmcexpo2008.org/files/ABSTRACTS\\_21WMC.pdf](http://www.wmcexpo2008.org/files/ABSTRACTS_21WMC.pdf) [Accessed from]: 2011-01-03
- 杨林 (Yang, L.) (2003) 中国企业管理水平现状分析及对策探究。《巢湖学院学报》. 58(5): 28-41.
- Yin, R. (1984) *Case study research*. Sage Publications. Beverly Hills. CA, US.

张维迎 (Zhang, W.) (2007) 正确解读利润与企业社会责任.[on line] 中国政策论坛.[Available from]: <http://www.chinareform.org.cn/cirdbbs/dispbbs.asp?boardid=10&id=139729>. [Accessed at]: 2011-02-12

Zhou, Z., Gao, Y., Yang, Z. and Zhou, N. (2004) Developing strategic orientation in China: antecedents and consequences of market and innovation orientations. *Journal of Business Research*. 58: 1049-1058

## Internet

Blooming Berg, [www.bloomberg.com](http://www.bloomberg.com)

1. ZMG's stock slid, 2011-03-17

<http://www.bloomberg.com/news/2011-03-16/sinopec-china-eastern-everbright-zijin-mining-chinese-equities-preview.html>

Championing CSR, [www.championingcsr.co.uk](http://www.championingcsr.co.uk)

1. Implementation of CSR. 2011-02-03

<http://www.championingcsr.co.uk/business.htm>

China Business News, [www.cnbusinessnews.com](http://www.cnbusinessnews.com)

1. Listed companies required to issue annual environmental report. 2011-03-16

<http://cnbusinessnews.com/listed-companies-required-to-issue-annual-environmental-report/>

China Detail, [www.chinadetail.com](http://www.chinadetail.com)

1. The largest English language newspaper of China. 2011-05-18

<http://www.chinadetail.com/Who/MediaPublicationChinaDaily.php>

China Daily, [www.chinadaily.com](http://www.chinadaily.com)

1. Zijin mining group fined \$1.4 million for water pollution disaster, 2010-10-08

[http://www.chinadaily.com.cn/bizchina/2010-10/08/content\\_11384072.htm](http://www.chinadaily.com.cn/bizchina/2010-10/08/content_11384072.htm)

2. Zijin's high level executive detained after toxic spill, 2011-07-29

[http://www.chinadaily.com.cn/china/2010-07/29/content\\_11063403.htm](http://www.chinadaily.com.cn/china/2010-07/29/content_11063403.htm)

3. Zijin group admits vain attempt to bribe, 2011-08-28

[http://www.chinadaily.com.cn/china/2010-08/28/content\\_11218119.htm](http://www.chinadaily.com.cn/china/2010-08/28/content_11218119.htm)

4. Zijin's copper mine sewage contaminates river, 2010-07-12

[http://www.chinadaily.com.cn/bizchina/2010-07/12/content\\_10094759.htm](http://www.chinadaily.com.cn/bizchina/2010-07/12/content_10094759.htm)

5. Sewage leakage kills slew of fish in East China, 2010-07-13

[http://www.chinadaily.com.cn/china/2010-07/13/content\\_10096687.htm](http://www.chinadaily.com.cn/china/2010-07/13/content_10096687.htm)

6. Zijin Mining offered bribe to reporters: GAPP, 2010-08-28

[http://www.chinadaily.com.cn/business/2010-08/28/content\\_11218360.htm](http://www.chinadaily.com.cn/business/2010-08/28/content_11218360.htm)

7. Zijin Mining fell after told to limit production, 2010-07-28

[http://www.chinadaily.com.cn/business/2010-07/28/content\\_11060678.htm](http://www.chinadaily.com.cn/business/2010-07/28/content_11060678.htm)

8. Zijin Mining sued for 19.5 million after in mine dam collapse, 2010-10-18

[http://www.chinadaily.com.cn/business/2010-10/18/content\\_11424246.htm](http://www.chinadaily.com.cn/business/2010-10/18/content_11424246.htm)

China Labor Organization, [www.chinalabour.org](http://www.chinalabour.org)

1. The growth and future development of CSR in China, 2011-02-26

<http://www.china-labour.org.hk/en/node/100288>

China Web, [www.china.org.cn](http://www.china.org.cn)

1. Zijin Mining's shares drop on tax hike report. 2011-02-03  
[http://www.china.org.cn/business/2011-03/18/content\\_22168110.htm](http://www.china.org.cn/business/2011-03/18/content_22168110.htm)

China Window, [www.china-window.com](http://www.china-window.com)

1. Brief Introduction of China. 2011-03-28  
[http://www.china-window.com/china\\_travel/china\\_tourism/brief-introduction-to-chi.shtml](http://www.china-window.com/china_travel/china_tourism/brief-introduction-to-chi.shtml)

Choren, [www.choren.com](http://www.choren.com)

1. History of Choren. 2011-04-15  
<http://www.choren.com/en/company/history/>

Economy Watch, [www.economywatch.com](http://www.economywatch.com)

1. China Economic Development. 2011-03-15  
<http://www.economywatch.com/economic-development/china.html>

Frank Warner, [www.frankwarner.com](http://www.frankwarner.com)

1. Statistics of death number in coal mining in US and China. 2011-01-19  
[http://frankwarner.typepad.com/free\\_frank\\_warner/2006/01/us\\_coal\\_mining\\_.html](http://frankwarner.typepad.com/free_frank_warner/2006/01/us_coal_mining_.html)

H&M, [www.hm.se](http://www.hm.se)

1. H&M Conscious. 2011-05-01  
[http://www.hm.com/se/fretagsansvar/hmconscious\\_about\\_conscious.nhtml](http://www.hm.com/se/fretagsansvar/hmconscious_about_conscious.nhtml)

International Council on Mining & Metals, [www.icmm.com](http://www.icmm.com)

1. 10 principles under sustainable development framework. 2011-02-11  
<http://www.icmm.com/our-work/sustainable-development-framework/10-principles>

International Federation of Organic Agriculture Movements, [www.ifoam.org](http://www.ifoam.org)

1. Organic Agriculture in China. 2011-04-09  
[http://www.ifoam.org/growing\\_organic/2\\_policy/case\\_studies/china\\_cases\\_studies.php](http://www.ifoam.org/growing_organic/2_policy/case_studies/china_cases_studies.php)

International Institute for Sustainable Development, [www.iisd.org](http://www.iisd.org)

1. Corporate Social Responsibility Monitor. 2011-04-03  
[http://www.iisd.org/business/issues/sr\\_csr.asp](http://www.iisd.org/business/issues/sr_csr.asp)
2. An international standard for CSR  
[http://www.iisd.org/business/issues/csr\\_standard.aspx](http://www.iisd.org/business/issues/csr_standard.aspx)

Mbendi Information Services, [www.mbendi.com](http://www.mbendi.com)

1. General information of mining industry in China, 2011-01-20  
<http://www.mbendi.com/indy/ming/as/cj/p0005.htm#sectors>

Mirrarr Site, [www.mirrarr.net](http://www.mirrarr.net)

1. The Gundjehmi Aboriginal Corporation. 2011-03-13

<http://www.mirrarr.net/jabiluka.html>

National Geographic, [www.nationalgeographic.com](http://www.nationalgeographic.com)

1. Predicting the world's next water pollution disaster. 2011-02-26

[http://news.nationalgeographic.com/news/2010/12/101221-next-water-pollution-disasters-/](http://news.nationalgeographic.com/news/2010/12/101221-next-water-pollution-disasters/)

NECB Alumni Association, [www.necbalumni.org](http://www.necbalumni.org)

1. Figure of CSR

<http://necbalumni.org/2010/09/07/csr-discussion/>

Reuters, [www.af.reuters.com](http://www.af.reuters.com)

1. Zijin Mining sued for \$26 million after dam breach, 2011-02-17

<http://af.reuters.com/article/metalsNews/idAFTOE71G05L20110217>

Reuters, [www.af.reuters.com](http://www.af.reuters.com)

1. Zijin Mining gets court notice on Xinyi dam case. 2011-03-22

<http://af.reuters.com/article/metalsNews/idAFTOE72D05H20110314>

Sina, [www.sina.com.cn](http://www.sina.com.cn)

1. Zijin mining group's water pollution disaster, 2010-07-25

<http://news.sina.com.cn/c/2010-07-12/152617793008s.shtml>

The Body Shop, [www.thebodyshop.com](http://www.thebodyshop.com)

1. Values and Campaigns. 2011-02-08

[http://www.thebodyshop.co.uk/\\_en/\\_gb/values-campaigns/index.aspx?](http://www.thebodyshop.co.uk/_en/_gb/values-campaigns/index.aspx?)

The Shell Group, [www.shell.com](http://www.shell.com)

1. Sustainable development in Shell. 2011-02-25

[http://www.shell.com/home/content/environment\\_society/s\\_development/sd\\_in\\_shell/](http://www.shell.com/home/content/environment_society/s_development/sd_in_shell/)

2. Bio-fuels in Shell. 2011-03-13

[http://www.shell.com/home/content/environment\\_society/alternative\\_energies\\_transport/biofuels/](http://www.shell.com/home/content/environment_society/alternative_energies_transport/biofuels/)

The US-China Business Council, [www.uschina.org](http://www.uschina.org)

1. Corporate Social Responsibility in China

<http://www.uschina.org/public/documents/2006/10/uscabc-csr-best-practices.pdf>

The World Watch, [www.worldwatch.org](http://www.worldwatch.org)

1. Lack of Corporate Social Responsibility behind recent China Accidents. 2011-01-19

<http://www.worldwatch.org/node/3859>

United Nations Environmental Programme, [www.unep.org](http://www.unep.org)

1. Water pollution prevention and control—China's policies and successful experiences. 2011-03-15

<http://www.unep.org/gc/gcss-viii/china%20iwrn.pdf>

WWF, [www.wwf.org](http://www.wwf.org)

1. Environmental Problems in China. 2011-03-28

[http://wwf.panda.org/who\\_we\\_are/wwf\\_offices/china/environmental\\_problems\\_china/](http://wwf.panda.org/who_we_are/wwf_offices/china/environmental_problems_china/)

ZMG, [www.zjky.cn](http://www.zjky.cn)

1. Brief introduction to Zijin, 2011-01-19

<http://www.zjky.cn/english/tabid/172/Default.aspx>

2. Products of ZMG, 2011-01-19

<http://www.zjky.cn/english/tabid/198/Default.aspx>

3. Technology patent of ZMG, 2011-01-19

<http://www.zjky.cn/english/tabid/199/Default.aspx>

4. Hotels and Tourism service, 2011-01-19

<http://www.zjky.cn/english/tabid/207/Default.aspx>

5. Development strategy of ZMG, 2011-01-19

<http://www.zjky.cn/english/tabid/175/Default.aspx>

6. Environmental protection and safety work, 2011-01-19

<http://www.zjky.cn/english/tabid/187/Default.aspx>

7. Environmental activities in ZMG, 2011-01-19

<http://www.zjky.cn/english/tabid/188/Default.aspx>

联商网, [www.linkshop.com.cn](http://www.linkshop.com.cn)

1. 中国商人性格特征调查报告。 2011-04-02

<http://www.linkshop.com.cn/CLUB/dispbbs.aspx?rootid=229979>

经济观察网, [www.eeo.com.cn](http://www.eeo.com.cn)

1. China considers environmental tax. Economic Observer. 2009-07-01

<http://www.eeo.com.cn/ens/Politics/2009/07/01/142354.shtml>