Risk investigation of logistics management and logistics method in the Chinese non-metallic mineral industry

--A Case Study of

The Shenzhen Rocky Mountain

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Examiner: Robin von Haartman

Bachelor’s Thesis, 15 Credits
Logistics Management and Logistics Outsourcing
Industrial Management & Logistics
Abstract

The purpose of this thesis is to investigate the risks in logistics management and logistics methods for the non-metallic mineral companies. The authors review the current situation of logistics management and logistics method from the non-metallic mineral companies and find out the problems or risks from these companies. The authors reviewed a few articles that evaluate the risks and problems in the non-metallic mineral companies. The authors also had several interviews through the Internet with the interviewee, who works as a regional manager in the case company. This thesis is a qualitative single case study, the authors search for usable information from the Internet, interviews and the authors also review many literatures and write about the current situation of the logistics methods, logistics management and logistics outsourcing in the non-metallic mineral companies. In the conclusion part, the authors give out the answers about the common risks in the literature for logistics management and logistics outsourcing, the characteristics of logistics in non-metallic mineral companies and the risks and problems of logistics management and logistics outsourcing in the non-metallic mineral companies during practice. This part also includes limitation in this thesis and it shows the further study, which the authors want to study in the future.

Key words: risk investigation, logistics management, logistics outsourcing
Acknowledgement

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Zhao Jiangye and Zhu Zhu
2012-10-05
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Notion

1PL: The First Party Logistics

3PL: The Third Party Logistics

ICT: Information and communication technology

Shenzhen Rocky Mountain: Shenzhen City Rocky Mountains Industry Development Company Limited

SCRM: Supply chain risk management

SME: Small and medium-sized enterprises

The Case Company: Shenzhen City Rocky Mountains Industry Development Company Limited

Xi’an CGS: Xi’an Center of Geological and Mineral Resources
1. Introduction

1.1 Background

In the current society, with the accelerated process of global economic integration and the use and development of IT in the logistics field, logistics outsourcing expands quickly and has a fast growth of demand in integrated multi-channel market; in this situation, the ability of logistics service providers should be promoted too. In this way, logistics outsourcing services can be learned, realized, recognized and employed by people in the future. As a method to improve the speed of material flow, reduce logistics cost and reduce the backlog of capital in transit, logistics outsourcing could bring more profits to supply and demand parties. According to the current situation in many non-metallic mineral companies in China, the output in these companies is very large and a few companies have their customers outside the country, so logistics management is very significant at this time. These companies rely on the output to gain more profits; logistics management could help them to achieve this accomplishment. Because different areas have different transportation conditions, the non-metallic mineral companies administrate logistics management by themselves and based on different conditions they have different choices.

But there are a few risks in logistics management and logistics methods for the non-metallic mineral companies, for example, these companies do not have a specific logistics department, they always use owner drivers, this way has more costs on logistics, these companies also have latent information asymmetry and poor communication. When the authors search on the useful literature from journals or Internet, there is no literatures on the mining industry of logistics management, especially in the non-metallic mineral industry. Some literatures were using mining industry as an example in their paper. The logistics management and logistics methods for the non-metallic mineral industry in China are incomplete because of the broad land. So the authors choose the risks investigation of logistics management and logistics methods of this industry in China.

1.2 Purpose

The purpose of this thesis is to investigate the risks in logistics management and logistics methods for the non-metallic mineral companies. As we cannot find out more researches in
this field, we want to have more studies in this industry. The authors will review the current situation of logistics management and logistics method from the non-metallic mineral companies, and find out the problems or risks from those companies. The purpose could be broken down into the following three parts:

- What are the common risks in the literature for logistics management and logistics outsourcing?
- What are the characteristics of logistics in non-metallic mineral companies?
- What are the risks and problems of logistics management and logistics outsourcing in the non-metallic mineral companies in practice?

1.3 Outline

In this thesis, there are 9 parts. Part 1 tells the main purpose of this thesis and it provides the background of logistics outsourcing, logistics management in the non-metallic mineral companies in China, risks in logistics management and logistics methods of these companies and a short introduction of the case company. Part 2 is to introduce the scientific approaches that the authors choose to use, the literature that the authors used in order to review and the data, which are collected for this thesis, this part also includes the research quality and reasoning style in this thesis. Part 3 is to explain logistics and logistics management in reviewed literatures and it also consists logistics outsourcing and risks of logistics management and logistics outsourcing. Part 4 comes up with the result of findings, which is based on the data collection. Part 5 is written about analysis according to findings; the authors found out common risks of logistics management, analyzed the characteristics and the risks of the present logistics method and logistics management in the case company. Part 6 tells about the final conclusion of this thesis, the authors answered the questions that are consisted in purpose and this part also include contributions, limitations and further study. Part 7 is about the references the authors used and they are listed in line. In the last part, the appendix is listed; it is about the interview questions that the authors made for interviews.
2. Methodology

According to the research questions and the situation of the case company, the aim of the case study is to achieve the research purpose. The case company has been chosen because the representativeness among the non-metallic mineral industry. In this part, the authors described the quantitative and qualitative approaches, case selection, and literature review and data collection. On the basis of study, the authors chose the single qualitative case study. In order to satisfy the purpose of the thesis, firstly, the authors reviewed a number of the literature; secondly, the authors interviewed the manager in the case company.

2.1 Quantitative & Qualitative Approach

Thompson & Walker (1998) mentioned that the qualitative research approach is based on social phenomenon or things that have attributes and contradictory changes in the movement; and it is a method or view point use to study phenomenon or things from the inherent regularity. The differences between qualitative and quantitative research approach is described by them in figure 2.1.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Explores causes, makes predictions</td>
<td>Aims to describe phenomenon or generate theory</td>
</tr>
<tr>
<td>Perspective</td>
<td>Objectivity increased through use of precise measurement</td>
<td>Subjective view of participants</td>
</tr>
<tr>
<td>Sample</td>
<td>Large, representative samples</td>
<td>Small samples</td>
</tr>
<tr>
<td></td>
<td>Random selection of subjects or random assignment to group</td>
<td>Purpose selection of participants based on their experience</td>
</tr>
<tr>
<td>Data</td>
<td>Generated from responses to questionnaire or some objective measurement (e.g., temperature)</td>
<td>Consist of words (interviews, diaries, other written documents) or pictures or other artifacts in which the significance has been rendered into words</td>
</tr>
<tr>
<td>Analysis</td>
<td>Statistical</td>
<td>Interpretive</td>
</tr>
</tbody>
</table>

Figure 2.1 Contrasts between Quantitative and Qualitative Approaches

(Thompson & Walker, 1998)

Clissett (2008) also described the differences like below:
<table>
<thead>
<tr>
<th>Qualitative research</th>
<th>Quantitative research</th>
</tr>
</thead>
<tbody>
<tr>
<td>An umbrella term for strategies that seek to explain</td>
<td>Formal, objective and systematic process for obtaining quantifiable information about the world</td>
</tr>
<tr>
<td>human behaviour in terms of the reasons people have for behaving the way they do</td>
<td>Presented in numerical form and analysed through the use of statistics</td>
</tr>
<tr>
<td>Uses human speech or writing as data</td>
<td>Used to describe and test cause and effect relationships</td>
</tr>
<tr>
<td>Used to uncover the understandings and motives that lead to certain actions</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2.2 Some of the differences between qualitative and quantitative research**

*(Clisset, 2008)*

Based on the research purpose and the differences between qualitative and quantitative research approach, the single case study in qualitative research has been made to satisfy the research questions. Graziano & Raulin (2004) advised that because the researcher is easily to intervene or bring subjective feelings into the research processes, case-study research is higher constraint, such as asking questions of a participant, and case-study research is no limitations on research of psychopathology or psychotherapy. Blaxter et al., (2001) suggested that the case study could be done by the small-scale researcher, and satisfied demand and resources ideally. The research questions which have been listed in the purpose included what questions of risks and characteristics. In order to get academic answers from specific instances for the research questions, the case study has been chosen by the authors. The research theory is also helpful to satisfy the purpose, help to collect data and analyze.

### 2.2 Reasoning Style

In the light of Hyde (2000), generally there are two approaches to reasoning when doing qualitative research which may help to draw the acquisition of new knowledge, namely deductive reasoning and inductive reasoning. These two approaches have been called by a joint name as reasoning style. Deductive reasoning is a process that testing the theory from an established theory or generalization, and seeks to check if the theory applies to specific instances. Inductive reasoning is a process that building a new theory from observations of specific instances, and then establishes generalization about the phenomenon under investigation.

In this research paper, the authors used deductive reasoning to answer the research questions and to draw the conclusions. In order to answer the research questions, the authors review related literatures about the characteristics and risks of logistics management and logistics
outsourcing; then compared with the present situation of the case company; finally get the answers of research questions which will also fulfill the research purpose.

2.3 Case Selection

Based on Seawright & Gerring (2008), in a case study research thesis, the adaptive cases are more important to get constructive conclusions. Case selection is the primordial task for the case study researcher; and in choosing cases, sets out the schedule for studying those cases is a important process. A single case has been chosen by the authors due to the following reasons: the purpose of this thesis, the theory which will be used in this thesis, the requirements of theoretical framework, the case company has problems with their logistics method and logistics management, and the manager of the case company decides to solve the problems. Voss (2009) considered that even though the single case study is limited on the generalizability of conclusions, for example, single case could not represent most events and easily overstate data or information, greater depth will be fulfilled during the research. During searching and selecting of the literature, there is no any literature about the non-metallic mineral industry in risks investigations of logistics management and logistics methods. China has a different situation in non-metallic mineral industry compared with other countries which will be described later; the authors choose to research the non-metallic mineral industry in China.

The case company (Shenzhen City Rocky Mountains Industry Development Company Limited) has been selected due to the following two main reasons:

This company has such kind of logistics problem during daily operation, for example, in lower controllability of logistics management by using vehicles. The manager wants to change their logistics method to improve the logistics management, finally reduces the logistics cost, which also means the reduction of products prices. Therefore, the information and data could be collected easily and reliable from the case company, which means the case company will cooperate with the authors highly since they wish to solve the problems.

The second reason is that the case company has more representativeness among the same kind enterprises, according to their ranking in Chinese non-metallic mineral companies. Due to the purpose, the authors not only want to evaluate the logistics management and logistics method
for the case company, but also for all companies in the non-metallic mineral industry in China. A company has more representativeness than other companies in the non-metallic mineral industry in China will helpful to draw the conclusion, because it got the 12th place in whole China of the barite (native sulfate of barium) exporting.

2.4 Literature review

Hart (1998) regarded that literature review helps to build the authority and legitimacy of the research, and it ensures the researchability of the chosen topic before the analysis begins. At the beginning, all authors can say that review of the literature is important because without it authors will not receive a clear understanding of the topic, of what has already been done before, methodology of researches, and the key points. In other words, it helps to clarify the possible contribution of the research and helps to constrain the research to a feasible scope. It is a common characteristic of many research thesis that they initially have a rather broad and ambitious intent. The literature review is the central part that helps to manage the research and control the scope of the research, make the research more manageable.

According to Croom (2009), in any research field, the researchers should understand the logic of the evidence before they use academic or empirical knowledge from the existing researches. The significances of literature review is testifying existence of literature, and building the reliable foundation for further study in the research field.

In the case study, the authors focused on making literature review clearly which helped to construct a theoretical framework. The authors associated their knowledge when they reviewed the literature.

In addition to using more academic knowledge, reviewing the literature in a specific field improved the consciousness of how to construct and build methods and data analysis of academic researches and in the case study these methods help to report traditional knowledge in such specific research field.

2.5 Data Collection

2.5.1 The Types of Data

In order to satisfy the case study research, the authors need to collect much information and data to fulfill the analysis of the case company and conclude the adaptive results for the
purpose. Those useful information and data could be divided into two types: primary data and secondary data.

Primary data: according to Hox & Boeije (2005), primary data are data that are collected for the specific research problems, and the data should fit the research problem best. The primary data inside this thesis include information and data for the case company from interviews are all collected by the authors themselves. These information and data have been collected only for this thesis. Therefore, these information and data are more useful and they are associated with the purpose.

Secondary data: according to Hox & Boeije (2005), secondary data originally collected from different authors already that can be used in the research. The secondary data inside this thesis include parts of the information for the case company which have been given by the Internet, the information about the non-metallic mineral industry, literature, reports of the non-metallic mineral industry and other information from the Internet, those information and data were all collected by others, which have been published before.

Information or data in those two types have been collected by the authors in two different ways: from the interviews and from the external sources. The interviews have been done through e-mails and telephone calls. E-mails have been sent to a manager of the case company with some appropriate questions, after a few days the manager will send his answers back; if it's possible, the interview has been done by telephone calls.

2.5.2 Techniques for Managing Data

The techniques for managing data could be divided into five phases by Blaxter et al., (2001) which shows below:

Coding--the process for choosing collected field of data and information.

Annotating--the process by which written material is changed because of the additive notes and comments.

Labeling--based on your analysis option, go through all useful materials with significant words.

Selection--choose the significant, typical, useful data or information among the materials.

Summary--decide the quantity of data set, and summary all chosen data before the analysis process.
When doing data collection, the authors first build a theoretical framework based on the thesis purpose; then note the requirements of data which should be linked with theoretical framework closely; select data in collected information, which come from the Internet and answers from interview; select the position of useful data and summary them before writing the thesis.

2.5.3 Interview

Yin (2009) suggested that one of the most important sources of case study information is interview. Such observation may be surprising because of the usual association between interviews and the survey method. However, interviews also are essential sources of case study information. The interviews will be guided conversation rather than structured queried. In other words, although you will pursue a consistent line of exploration, the actual questions in a case study interview are more fluid than rigid.

After the authors reading about the case company on the Internet and the books, according to the information that they collected the authors sorted out the questions and sent these questions for the first interview to the manager, who is working in the case company. Before doing this work, the authors selected in-depth interview.

Yin (2009) suggested that in in-depth interview, you can ask key respondents about the facts of a matter and their opinions about events. In some situations, you can even ask the interviewee to propose her or his own insights of certain events and use these propositions as the basis for further research. Therefore the "interview" may take place over an extended period of time, not only a single sitting. The interviewee also can suggest other persons for you to interview, as well as other sources of evidence. In Kvale (2007), Sennett also said that in-depth interview is a distinctive, often objective skill.

If more interviewees give more helps, they will be seen as one of the informants, who are providing information rather than treated as respondents. Important informant often plays a decisive role in the success of a case study. These informants help the case study researchers to have a better understanding of a matter and start to use positive or contrary sources of evidence. The authors may overly dependent on one important informant in some situation, especially because the informant has good interpersonal relationships and has a good knowledge basis in several particular aspects. The reasonable way to deal with this problem is
to depend on other sources of evidence that support the informants' insight and check adverse evidence as carefully as possible.

According to Yin (2011), the authors selected structured interviews. The definition about structured interviews is "all interviews involve an interaction between interviews carefully that script this interaction". And there are some measures about structured interviews; at first, the researchers will use a formal questionnaire that lists all questions; second, the researchers will transit to the interviewers, and try to arouse responses from the interviewees; third, the interviewers will try to keep the same consistent behavior when interviewing every participant.

In order to update the information and complete the findings of the case study, the authors as the interviewers had interviews and communicated with the interviewee three times by e-mail and telephone call. The interviewee is a regional manager of the case company who is mainly responsible for exploiting, purchasing, operating and transporting in Guizhou Province (except Tianzhu), Yunnan Province and Sichuan Province. The authors sent questions interviewee at 10th and 20th of April, 2nd of May in 2012.

2.5.4 External Source

The secondary data are all from this way, those wholesale information and data are from the sources outside the company. Because of the case company is belong to China and the minerals of the case company are all in China, the total information and data have been collected from the reports, documents, news and analysis on the Internet.

Yin (2009) considered that a very important principle of data collection is using multiple sources of evidence. In order to make more reliability of the thesis, the authors always use multiple sources to make sure the authenticity of parts information and data, for example, different websites which describe the same thing, articles which describe the same definition from different authors.

2.6 Research Quality

Research quality will affect the readability of the whole thesis in several ways. To establish the quality of this thesis, four tests have been made during research processes, they are:
**Validity**: extent of the things which can accurately measure by measuring tool or method. If the anastomotic extent between measurement result and exploratory content is higher, the validity is higher; conversely, the validity is lower. The validity of thesis can be divided into three parts. Based on Yin (2009):

- **Construct validity**: identifying correct operational measures for the studied concepts. For example, during data collection process, the multiple resources and interview of relevant manager have been made and the review of draft thesis for informants also has been made to increase the construct validity.
- **Internal validity**: pursuing to build a causal relationship. For example, this thesis uses a logic model to analyze the information and data and then inference out the conclusion step by step.
- **External validity**: delimiting the scale that findings from a research can be generalized. The authors have combined the case company's situation with the general situation of the non-metallic mineral industry by choosing a representative company as the case company to make the conclusion more useful for companies or organizations, which almost have the same situation with the case company and finally make it, be an example of the logistics method for industries.

**Reliability**: Graziano & Raulin (2004) regarded that really believable degree of a study is the reliability. Because of the changing situation and conditions of the non-metallic mineral industry, the findings for this kind of research will be different during different time-intervals. The multiple sources and interview by listing questions could fulfill the increase of reliability for this thesis.

### 2.7 Limitation

The limitation of this thesis is existed in two ways: firstly, the authors did not research and experience the logistics management and logistics method in the case company by themselves; all information came from interviews and Internet. Secondly, there is only one case company has been analyzed in the thesis. In addition, the authors have interviewed only one interviewee in the case company, there is a possibility of defective information for the case company.
3. Theoretical Framework

In this section, the authors will introduce the concepts and definitions that are helpful and could be used to get the scientific conclusions based on the purpose. In order to adapt the purpose, several literatures have been reviewed to satisfy the necessary knowledge for the research in four different parts: logistics management, outsourcing, logistics outsourcing, and risks of logistics management and logistics outsourcing. In these four parts, outsourcing is the foundation of logistics outsourcing; logistics management and logistics outsourcing is the basis for risks of logistics management and logistics outsourcing, because the logistics outsourcing has been considered as the logistics method of non-metallic mineral companies. According to the research questions, these four parts can build the theoretical framework of the analysis.

3.1 Logistics Management

Traditionally, logistics is a support function in the firms, which has been handled by firms themselves. Razzaque & Sheng (1998) considered that logistics activities have the lower priority that is based on the priority of other business functions, which include transportation, distribution, warehousing, inventory management, order processing, and material handling. According to Vasilianskas & Jakubauskas (2007), most small businesses buy and sell in the same location is referred as 1PL. Trappey et al., (2009) also suggested that 1PL (i.e., manufacturer) essentially owns and handles all self-logistics functions.

Logistics is responsible for the transport and storage of materials between suppliers and customers that defined by Waters (2003) as:

“Logistics is the function responsible for the flow of materials from suppliers into an organization, through operations within the organization, and then out to customers.”

Logistics is a global wide business type now and with the development of logistics, logistics management becomes a popular management system, which has been defined in Mears-Young & Jackson (1997) by the Council of Logistics Management (1986), is:

“The process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from
point-of-origin to point-of-consumption for the purpose of conforming to customer requirements.

3.2 Outsourcing

3.2.1 The Concept of Outsourcing

Corbett (2004) thought that the idea of outsourcing is certainly not new. Bhagat et al., (2010) also thought that outsourcing could bring more values of ownership, cost reduction, helps for customer operation and improve customer satisfaction; because of the outsourcing providers could act better than the company itself in outsourced activities. Hätönen & Eriksson (2009) summarized that outsourcing has become famous in the 1980s even it has appeared in the 1950s as a practice. Corbett (2004) also summarized that it was first used in the 1970s by manufacturing executives and has been gradually adopted since then by executives in just about every other business function. Explorers, traders, and mercenaries are all early examples of the concept of outsourcing. Even though the appearance of outsourcing is early, it is still a recent burgeoning industry, which can bring more new vitality to business. Figure 3.1 shows the evolution of outsourcing concept from Hätönen & Eriksson (2009).

<table>
<thead>
<tr>
<th>Time period</th>
<th>Big bang</th>
<th>Bandwagon</th>
<th>Barrierless organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1980s to early 1990s</td>
<td>Early 1990s to early 2000</td>
<td>From early 2000 onwards</td>
</tr>
<tr>
<td>Prime motives</td>
<td>Cut costs</td>
<td>Cut costs, capability enhancement, process improvement</td>
<td>Organizational transformation</td>
</tr>
<tr>
<td>Buzzword</td>
<td>Outsourcing</td>
<td>Strategic outsourcing</td>
<td>Transformational outsourcing</td>
</tr>
<tr>
<td>Out location</td>
<td>Domestic</td>
<td>International</td>
<td>Global</td>
</tr>
<tr>
<td>Management of the outsourcing relations</td>
<td>Arm's-length, transactions</td>
<td>Strategic alliances</td>
<td>Collaborative development</td>
</tr>
<tr>
<td>Organization</td>
<td>Efficient organization</td>
<td>Focused organization</td>
<td>Virtual organization</td>
</tr>
<tr>
<td>Core organizational competences</td>
<td>Management of key strategic business units (SBUs)</td>
<td>Key strategic competences (core competences)</td>
<td>Dynamic competences and network competences</td>
</tr>
<tr>
<td>Strategic rationalization</td>
<td>Profit maximizing</td>
<td>Strategic and competitive edge</td>
<td>Survival</td>
</tr>
<tr>
<td>Outsourcing objects</td>
<td>Structured and well defined turnkey manufacturing processes</td>
<td>Strategically important organizational process</td>
<td>Projects highly knowledge-intensive and creative in nature</td>
</tr>
<tr>
<td>Main theories*</td>
<td>Transaction cost theory</td>
<td>Resource/competence-based view</td>
<td>Organizational theories</td>
</tr>
</tbody>
</table>

Figure 3.1 the Outsourcing Evolution (Hätönen & Eriksson, 2009)

In the study of outsourcing from Hätönen & Eriksson (2009), the evolution of outsourcing can be divided into three stages: big bang, bandwagon and barrierless organizations. These three words visual shown the process of outsourcing: appearances as a "big bang"; becoming famous as strategic outsourcing around the whole world; widely and barrierless used in organizations nowadays. In each stage, Hätönen & Eriksson (2009) described some characteristics of outsourcing to show the differences among each stage, and deepen the understanding of
outsourcing. These characteristics are: time period, prime motive buzzword, outsourcing location, etc.

The outsourcing defined by Ellram & Billington (2001) as:

“Our outsourcing is the transfer of activities and processes previously conducted internally to an external party.”

It also defined by Varadarajan (2008) more deeply as:

“Our outsourcing refers to the practice of a firm entrusting to an external entity the performance of an activity that was erstwhile performed in-house. The outsourced activity could either be the manufacturing of a good or the performance of a service.”

### 3.2.2 Classification of Outsourcing

The classification of outsourcing can be made in different ways such as: it is based on geographical position, job category, sources, different industrial fields, etc. In this part, the authors will describe two kinds of classification that could be divided into two patterns.

Hätönen & Eriksson (2009) thought that nowadays outsourcing is done both domestically and internationally. Outsourcing can be classified into two types that are based on the different geographical distribution of outsourcing services, domestic outsourcing and offshoring outsourcing. Based on the description from Tomiura (2006) and Nakatsu & Iacovou (2009), domestic outsourcing can be defined as the outsourcer and outsourcing providers are from the same country and the outsourced jobs will be done inside the country. Hätönen & Eriksson (2009) defined that offshoring implies that the outsourcer and outsourcing providers are not in the same country, the outsourced jobs will be completed elsewhere (i.e. outside the home country) and it involves the transfer of both the ownership and the location of the operations. Varadarajan (2008) defined that offshore means outsourcer outsourcing to a third party firm which is located in other countries; offshoring means outsourcer outsourcing to a third party firm which has subsidiaries in other countries. Verhoeft (2005) regarded that offshore outsourcing has its own overhead costs, and the travel expenses will be much higher than for local development. Jahns et al., (2006) suggested that while considering whether or not choose offshoring outsourcing, cost is the crucial factor. Turning to how offshoring is regarded in practice, this phenomenon has received the higher attention, which will continue to receive more attention.

3.3 Logistics Outsourcing

In this thesis, the authors stress on logistics outsourcing because of the research area. The so-called logistics outsourcing defined by Hong et al., (2004) as:

“Logistics outsourcing is an increasingly popular alternative to traditional services such as transportation, warehousing, inventory, and value-added services”.

Based on the definitions from Bagchi and Virum (1996), Berglund, Laarhoven, Sharman and Wandel (1999), Lieb (1992), Razzaque and Sheng (1998), the authors use the definition of 3PL from Lieb (1992) as below:

The third party logistics (logistics outsourcing) involves the use of external companies to perform logistics functions that have traditionally been performed within an organization. The functions performed by the third party can encompass the entire logistics process or selected activities within that process.

In recent year, 3PL can be defined by Aghazadeh (2003) as:

"Logistics management consists of three core functions: transportation management, inventory management, and value added services. Third party logistics is defined as when a third party is brought in to help manage these functions."

Hsiao et al., (2010) have presented a decision-making framework for outsourcing levels of logistics activities for food supply chain networks; they used literature review, case studies of three food manufacturers and exploratory survey to satisfy their research purpose. Hsiao et al., have decompose outsourced logistics activities into four levels.

1st level. Refer to the execution level of basic activities, such as transportation and warehousing.

2nd level. Refer to value-added activities.
3rd level. Indicates the planning and control level include inventory and transportation management. Activities can be outsourced in this level, which include sales forecasting, stock control and event control route planning and scheduling and event control.

4th level. At the top level of logistics activities to be outsourced is the distribution network design. This is the strategic decision-making level in which decisions are made concerning, for instance, road carrier selection, location and site analysis and logistics network management.

3.3.1 Reasons for Logistics Outsourcing

The reasons for a company pursue logistics outsourcing can be seen differently and various kinds. Song et al., (2000) have done a study to trace the development of logistics management for a strategic alliance between the companies which involved often results. The trace was been done from a subordinate activity within a product-producing entity to its performance by a separate entity that specializes in logistics management. Song et al., also summarized some reasons for logistics outsourcing, those reasons can be described as: organization's own lack of logistics expertise; the desire to focus on organization's own core competence; the difficulty in maintaining communication and information technology that is up to date; the desire to improve system capabilities along the global supply chain; and the desire to build flexibility within available resources.

Berglund et al., (1999) provided a study on strategies of third-party logistics providers. In their study, the reasons of logistics outsourcing also have been supplied. The reasons can be described in two views, demand side and supply side. On the demand side: reduction of asset intensity; restructuring of the distribution structure, triggered by a restructuring of the production structure; and reduction of labor costs by switching to a non-unionized labor force.

On the supply side: deregulation of the transportation industry, which made it possible to provide logistics outsourcing services; declining profit margins in basic services (i.e. Freight transport); and availability of capital (e.g., Penske, GeoLogistics, Technologistica).

3.3.2 Characteristics of 3PL

In the study of Burnson (2000), many fortune 500 companies have now outsourced transportation, warehouse, and inventory management, functions that are not part of their core competencies. In the research from Aguezzoul (2007), in 1994 and 1999, the top three
determinants in selecting a 3PL were service quality, reliability and on-time performance; in 2003, the price became the most important selection criterion. Knemeyer & Murphy (2005) stated that, most of the firms outsourced only one logistics activity, and the most frequently outsourced activities are inbound and outbound of traffic control. Hong et al., (2004) did some survey which aimed at understanding the firm-specific determinants of logistics outsourcing in a transitional economy in China, and some hypotheses have been made by them to show the results by calculations. Their results shows that, in China, number of employees has a negative effect on probability of choosing outsourcing, while the variable of assets is significantly associated with increased outsourcing in manufacturing firms. Chinese logistics market is still in its infancy, and the outsourcing service is expensive. But the firms with JIT production are more likely to purchase logistics services from outside, and the firms that produce food, beverage, tobacco, chemical products, electrical, and electronic components have higher incidence of outsourcing. In addition, firms who make logistics decisions at medium management level have higher probability of outsourcing.

To carry out a comprehensive survey on 3PL practices in India, Sahay and Mohan (2006) did a study by statistical analysis through data collection, survey questionnaire on the input variables (i.e. the extent of usage of 3PL services, the reasons for outsourcing, the impact of the usage of 3PL services) and the output function (which has been influenced by the input variables through the future of usage of 3PL services). In addition, another purpose of this study is to establish the impact of usage of 3PL services on business results. The practices of 3PL in Indian industry shows that there are many most common outsourced activities, for instance, warehousing, inbound and outbound transportation, customs clearance and forwarding; a few activities gain more attention and grow diffusely, for example, packaging, fleet management and consolidation; more firms are planning to use 3PL services as a complete set of services in the future, not just for motion of matter; because of the benefits from reducing logistics cost, more abilities to focus on core operations and improving supply chain efficiency, the intention of 3PL appears.

Arroyo et al., (2006) did a survey of third party logistics in Mexico and a comparison with reports on Europe and USA. The purpose of their study is to find out the situation of 3PL in Mexico and compare with Europe and USA, and find out the possibility of global 3PL. The
survey and comparison have been made for food industry, fabrication of apparel, chemical industry and fabrication of mineral products in central Mexico. They mentioned that 3PL has a lower using percent in Mexico and stressed that 3PL is more like the practice now because firms in Mexico focus on customer service improvement on core activities. Firms in Mexico also try to seek for the multitude benefits when using 3PL and concentrate on routine activities. The authors choose the general characteristics of 3PL from their study to do the comparison with situations of the case company (i.e. Shenzhen Rocky Mountain) to draw the characteristics for the non-metallic mineral companies. These chosen characteristics include: (i) financial stability; (ii) capacity to fulfill the demand; (iii) demonstrated ability to attend to customer's requests; (iv) price charged for the service; (v) joint problem solving ability, creativity; (vi) general reputation; (vii) international scope; (viii) 3PL service provider has a continuous improvement policy; (ix) wish to develop a reciprocal gain-gain relationship; (x) 3PL service provider has a quality certification and offers service guarantees.

3.4 Risks of Logistics Management and Logistics Outsourcing

According to Harland et al., (2003), any business organization is responsible for managing financial, production, and structural capacities. In every business area, firms can arise their opportunities during the measurement of risks. Risk can be broadly defined as a chance of danger, damage, loss, injury or any other undesired consequences. Olson & Wu (2010) suggested that most natural risks can be dealt through diversification and redundancy, or through insurance, and each of them has inherent costs.

3.4.1 Risks of Logistics Management

In the study of Cucchiella & Gastaldi (2006), the supply chain risks can be divided into internal and external risks. Internal risks include the issues such as capacity variations, regulations, information delays, and organizational factors; external risks include market prices, actions of competitors, manufacturing yield and costs, supplier quality, and political issues. Olson & Wu (2010) did some researches, in China, supply chain risks have always been in debates or discussions, which have been motivated by both rapid economic growth and events. Zsidisin et al., (2004) have made a research to explore, analyze and derive common themes on supply risk assessment techniques for purchasing organizations through case studies. They
find out that techniques aim at addressing supplier quality issues, improving supplier processes, and reducing the likelihood of supply disruptions can be used directly to assess supply risk by purchasing organizations. In their paper, there are 8 categories that are evaluated within the supply risk, which can also be seen as the supply chain risks in logistics management: (i) attached costs from lack of planning in transportation and cancellation; (ii) attached costs from outdated materials; (iii) unhoped material price increase according to distribution, output risks and change of standards; (iv) absent parts because of late delivery, quality defects of supplier and instability of supplier’s country; (v) attached costs from single material source during the acceleration phase; (vi) risks in contractual phase; (vii) investment of supplier improvement; (viii) current risks.

In order to increase the awareness and understanding of the nature in changes to markets and supply chain relationships, point out the potential opportunities and risks, supply guidelines for the developments in strategic management, relationship marketing and risk management, Ritchie & Brindley (2000) did a research for SMEs. The Figure 3.2 shows below is a supply chain risk model from their study, in this figure, the sources of risks in several areas have been shown. These activities or relationships can be seen as risks of supply chain management.

Figure 3.2 Supply chain risk model (Ritchie & Brindley, 2000)

An exploratory case study through nine companies has been made by Zsidisin et al., (2000), the purpose of their research was to understand how purchasing organizations deal with supply risk and which kind of activities purchasing organizations have made in response to
those risks. Their study indicates that purchasing organizations often use contingency plans, implement process-improvement and buffer strategies in response to supply risk. They have summarized supply risk in inbound supply namely: business risks, supplier capacity constraints, quality-related risk, production technological changes, product design changes and disasters. They have also summarized the organizational supply risk in design, quality, cost, availability, manufacturability, supplier, legal, environmental, health and safety.

In order to explore the phenomenon of risk management and risk management strategies in global supply chains, Manuj & Mentzer (2008) did a qualitative study through an extensive literature review, 14 in-depth interviews, and a focus group meeting with senior supply chain executives. They summarized the risk events and their definitions in global supply chain, they are:

<table>
<thead>
<tr>
<th>Risk Event</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency</td>
<td>Changes in exchange rates</td>
</tr>
<tr>
<td>Transit time</td>
<td>Mean and variability of time spent in transit including transportation time and port clearance</td>
</tr>
<tr>
<td>Forecast</td>
<td>Errors in predicting demand leading to stock-outs or excess stock</td>
</tr>
<tr>
<td>Quality</td>
<td>Defective, damaged, or wrong product, components or materials; differences across multiple sites</td>
</tr>
<tr>
<td>Safety</td>
<td>Products causing safety hazards</td>
</tr>
<tr>
<td>Business disruption</td>
<td>Inability to produce goods or sell to customers</td>
</tr>
<tr>
<td>Survival</td>
<td>Firm going out of business/bankrupt</td>
</tr>
<tr>
<td>Inventory and tools ownership</td>
<td>Confusion and/or dispute over inventory ownership; dispute over use and IP of tools provided by one partner</td>
</tr>
<tr>
<td>Culture</td>
<td>Inadequate knowledge about people, culture, and language</td>
</tr>
<tr>
<td>Dependency and opportunism</td>
<td>A supplier’s or a customer’s ability to act opportunistically</td>
</tr>
<tr>
<td>Oil price increase</td>
<td>Changes in oil price</td>
</tr>
</tbody>
</table>

Table 3.1 Risk Event (Manuj & Mentzer, 2008)

Norrman & Jansson (2004) did an explorative case study at Ericsson; the rationale of their study was to find out how Ericsson has implemented a new organization, new processes and tools for SCRM after a serious sub-supplier accident. They have summarized some risk sources from the last few years of supply chain, they are: hurricanes, diseases, fires, demand,
supply and supply chain capacity risks.

3.4.2 Risks of Logistics Outsourcing

Many risks of logistics outsourcing have been identified, for example, Tsai et al., (2008) analyzed the risks of logistics outsourcing in retail chains, and Wang & Regan (2003) highlighted the risks and reduction measures in logistics outsourcing. The authors review four articles in risks of logistics for outsourcers. The study of Tsai et al., (2006) is to develop a qualitative risk model to empirically identify the important outsourcing risks of logistics functions. Risk events have been developed with the combination of transaction cost theory and resourced based view; and analytical hierarchy process was used for risk calibration; data collection was made through a three-stage survey. They summarized the risks of logistics outsourcing, which is divided into three main parts:

Asset risks: this part highlights the value of information assets, management assets and inactive logistics facility or technology. Information risk can be seen as inaccessible information sharing, poor information quality, and information being illegally possessed or used by vested interests and biases. Management assets can be seen as loss of control over logistics activity in transportation outsourcing. The resistance from employee also should be added in this part. Inactive logistics facility or technology means low or no utilization of existing logistics facility or technology throughout outsourcing.

Competence risk: In distribution business, logistics is an important phenomenon. This part includes poor competence leverage, support strategic development, customer services, and protection.

Relationship risk: Relationship risk is less important than asset risks and competence risks. This part includes vendor opportunism, contractual violation, poor communication and lack of shared goals.

The study of Wang & Regan (2003) is about the risks pertaining to logistics outsourcing, and risk reduction measures, especially in China. They mentioned that the 3PL industry has become relatively stable in the US and in Europe; there are some important risks have been summarized which is divided into following four main areas and shows in figure 3.3; the measures of risk reduction can be summarized as performance indices for logistics outsourcing, information sharing encouragement mechanisms, suitable performance tactic,
and customer relationship management in their article.

<table>
<thead>
<tr>
<th>Category</th>
<th>Aspects</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>Hidden Cost</td>
<td>Many firms underestimate the costs related to selecting a third party logistics provider, and negotiating and drafting a logistics outsourcing contract. Incomplete information and moral risks resulting from asymmetric information will cause decision-making risk. The extent to which a firm may effectively counterparty some loss of control over the third party logistics provider is greatly determined by the information received. A lack of effective communication could cause incomplete information and lead to problems of quality and to delays, as well as to misunderstanding and even mistrust.</td>
</tr>
<tr>
<td>“Chaos”</td>
<td>Latent Information Asymmetry</td>
<td>A third party logistics provider does not guarantee a firm to maintain long term comprehensive competitive competencies and to have new ways of providing customized logistics services. A firm may find itself in an increasingly vulnerable position and cannot be responsive to changing market environment and customer requirements. It is difficult for a firm to manage logistics outsourcing. In some cases, there will be a need for a more professional and highly trained purchasing and contract management group.</td>
</tr>
<tr>
<td></td>
<td>Loss of Control over the Third Party Logistics provider</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dependence on the Third Party Logistics Provider</td>
<td></td>
</tr>
<tr>
<td>Market</td>
<td>Loss of Logistics Innovative Capacity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Possibility of Inefficient Management</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>Problems of Evaluating and Monitoring Third party Logistics Provider performance</td>
<td>Firms frequently overlook the task of appraising third party logistics provider outcomes. The goals of each party, management styles and degrees of bureaucracy within firms are different.</td>
</tr>
<tr>
<td></td>
<td>Conflicts of Culture</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3.2 Categories of Risks in Logistics Outsourcing (Wang & Regan, 2003)**

Similarly, the study of Lau & Zhang (2006) is to explore the key motivations and obstacles of outsourcing for organizations in China compared with Western developed countries. They have used case study approach in-depth interviews with six companies in China and data collection to draw the conclusions. Economic factor, strategic considerations and environmental factors are the main motivations of logistics outsourcing in China, and obstacles include loss of control; lack of capable service providers; poor transportation and IT infrastructure; local protection regulations; lack of overall post-outsourcing review.

Lonsdale (1999) has made a research to address shortcomings of outsourcing by presenting an effective risk management model, and a case study has been made to fulfill the purpose of the
article. Lonsdale (1991) listed some risks of outsourcing, they are: dependence of suppliers, imperfect mobility, outsourcing into a limited supply market, poor internal alignment, and contractual incompetence in the face of different degrees of asset specificity.
4. Findings

4.1 Definition of Non-metallic Minerals and the Classification

Xi’an CGS (2012-04-27) defined that non-metallic minerals are the minerals which could provide capacities to the industry with extracting several non-metallic elements and they are also a kind of handicraft properties which use minerals or mineral collections directly. In the most extensive sense, non-metallic minerals are all the minerals accept metal and energy. Because there are many different varieties in non-metallic minerals, it is important to put these minerals into classification.

The non-metallic minerals divided into seven kinds by Xi’an CGS (2012-04-09) that are based on the functions, they are: (i) mainly used as the building materials: limestone, gypsum, quartz, moorstone, dolomite; (ii) mainly used as the refractory matter: kyanite, andalusite, sillimanite, magnesite, bauxite, zirconite; (iii) mainly used as the material of ceramic: kaolin, feldspar, diopside, serpentine, talcum; (iv) mainly used as the material of chemical industry: fluorspar, alumstone, phosphorite, potassium mineral, sulphur deposit; (v) mainly used as the material of machinery and electric industry: asbestos, plumbago, mica, adamas; (vi) mainly used as the powder filler and industrial additives: talcum, zeolite, Bentonite, kieselguhr; (vii) gem: gemstone, bowlder, color stone. Generally signifies mineral or rock which has bright color, bright luster, and rugged wear resistant, exquisite texture or has some special structure and color, like diamond, sapphire, ruby and emerald.

4.2 The Situation of the Non-metallic Mineral Industry in China

As everyone knows, at present, population, resources and environment have become the important issues, which are consisted in people's survival and development conditions. As an important part of natural resources, non-metallic mineral resources are the indispensable material basis in people's production, life and social development. The richness and the conditions of utilization about mineral resources are main factors and signs of economic strength and development potential in a country. As a great country in the world, Chinese population is about 1.34 billion according to the census in 2010 by CHINA POPIN (2012-05-09).

As Liquan (1993) said, China is one of the countries that has full range of non-metallic
minerals and is rich in natural resources in the world. Minerals that have been discovered in the world are also found in China, a few minerals occupy special places and the others have unique resources. More than 80 kinds of non-metallic minerals have proven their reserves, more than 40 kinds of non-metallic minerals have developed and utilized and more than 20 kinds have formed production capacities. As time goes by, the non-metallic mineral industry is expanded and it achieves remarkable achievements. This kind industry established a certain size and layout of the industrial system and it provided a considerable amount of resources and products.

31DATA net (2012-04-10) shows that the national selection industry in non-metallic minerals had a stable growth, the industrial sales values in such industry rose a little in the fourth quarter, it had a cumulative increase about 40%. As the country had several measures to obsolete outdated capacities, it was expected that the national selection industrial not only had more growth space but also there were more economic growth in the whole industry in 2011. The cumulative industrial sales values reached to 67.483 billion yuan from January to March in 2011, the values reached about 4.66%, more than the corresponding period in 2010. According to the data in March, the increase of selection industry in non-metallic minerals rose about 1.47%, more than the corresponding period in the last year.

From ASKCI (2012-04-10), secretary general Wang Wenli who is working for China Non-metallic Industry Association shows that in 2011, most of the non-metallic minerals have been exploitation which have been ascertain in China, and the ability of exploitation and machining has been formed. Among those non-metallic minerals, the output of talcum, fluorspar, plumbago, bentonite, gypsum, kaolin and some other non-metallic minerals are higher in the world. The off-take potential of non-metallic minerals are growing rapidly, especially some high attention minerals like fluorspar and plumbago. In 2011, the off-take potential of flake graphite is reach to about 1000 thousands tons, it will increasing in 2012. The heat of investment for plumbago has never reduced, the off-take potential of flake graphite will reach 1000 thousands tons, and the output is about 700 thousands tons. In 2011, the output of fluorspar is about 6550 thousands tons, increased 34.49% than before, but the price is decreased into 2000 yuan per ton at least. The total production of chrysotile per year is about 386 thousands tons, which is declined slightly than 2010; short fiber asbestos still
accounts for a high proportion in product structure, the sales volume of asbestos inside China per year has a decreasing than before. The output of wollastonite per year is 745 thousands tons, and the sales volume is 688 thousands tons, among the sales volume, 494 thousands tons are for export, which increased 6.50% than before. The production and business of talcum industry could been seen a modest improvement totally, the output per year is about 2100 thousands tons. The output of magnesium products and magnesium minerals are 33015 thousands tons, which have increased 3.60% than before. The output of kaolin is about 3200 thousands tons, which is almost flat than before.

**4.3 Empirical Findings: A Description**

**4.3.1 The Situation of the Case Company**

The main businesses of Shenzhen City Rocky Mountains Industry Development Company Limited focus on exploiting and sales of marbles, talc, barite and other non-metallic minerals. The major customers of this company are from Europe and the United States, the case company just does businesses in export and they are planning to have factories inside China now in order to start businesses inside China. The case company has a certain amount of mineral resources inside China now, and they have a few kinds of operation methods for those mineral resources. The case company has two mineral resources by holding stock, three by share stock, two by rent, and four by right to buy out and two by combination for sharing business. There is something needed to be explained that some of the above things are just mineral occurrences, not all of them are mines. The locations of main mines or mineral suppliers have been collected in three provinces, Yunnan Province: Xiangyun County, Malong County, Zhaotong City; Guizhou Province: Weining County, Guangling County, Tianzhu County; Guangxi Province: Rongan County. Figure 4.1 shows the main mines' and suppliers' locations of the case company (the yellow points show the locations of mines and suppliers, the red point show the location of the case company).
Figure 4.1 the locations of main mines or mineral suppliers

From the ranking of Chinese Top nets (2012-04-13), the case company also had a few achievements, such as it got the 12th place in whole China of the barite (native sulfate of barium) exporting.

According to the interviews the authors have made information collection, the case company has some competitive advantages, for example, good social imagination, professional direction of operation, preliminary professional management team, good technology support, good social relationships. The competitive disadvantages also could be seen as the occupancy volume of resources can not satisfy the volume of business, there is a great space for optimization and promotion of management system and management level, the case company does not have enough business talents.

The case company has its own organizational structure, a head company---Shenzhen Rocky Mountains Industry Development Company Limited, two sub-companies---Tianyan Barite Exploiting Liability Company Limited in Tianzhu country, Guizhou Province and Yaxiya Fire-resistant Materials Liability Company Limited in Zhanjiang, there are two branch companies---Zhaotong Branch Company in Yunnan Province of Shenzhen Rocky Mountains Industry Development Company Limited and Sanjiang Branch Company in Guangxi Province and they carry out their own duties. The case company does not have a clear division of functions, for instance, the sales manager, the purchasing manager and the
logistics manager. However, at current time, the management structure seems effectively. There are many reasons for the case company to form this management structure, variety of operation, the degree of involvement, the company's industrial chain, the local business environment and etc.

There are 15 people in the headquarters of Shenzhen Rocky Mountains Industry Development Company Limited; they are primarily responsible for the unified management and operation. There are 55 staffs in Tianyan Barite Exploiting Liability Company Limited; they are primarily responsible for the exploitation of mines, the mineral procurement and logistics. There are 48 staffs in Yaxiya Fire-resistant Materials Liability Company Limited, they are mainly responsible for minerals processing, exporting and quality controlling. 21 staffs are in Zhaotong Branch Company, they are responsible for the procurement and logistics of barite in Yunnan Province and Western Guizhou. 18 people are in the other places, such as Guizhou Province and Hunan Province; they are primarily responsible for the equity transactions, contract exploiting and the mineral procurement about the barite mines in Hunan Province and Guizhou Province (except Tianzhu). Through this way, the case company could get maximum profit.

The case company has three main products, they are barite, marble and talc. The pictures of these three products are showed below. These pictures are from Chinese Non-metallic Minerals Industry nets (2012-04-28).

Barite is a yellow, white or colorless crystalline mineral of barium sulfate, BaSO₄ that is used in painting and as the chief source of barium chemicals. It is also called heavy spar.

(Chinese Non-metallic Minerals Industry nets, 2012-04-28)
Marble is a massive, compact limestone, a variety of calcite, capable of being polished and it is used for architectural and ornamental purposes. The color varies from white to black, sometimes it is yellow, red and green and frequently it is beautifully veined or clouded. The name is also given to other rocks, like the use and appearance, as serpentine or verdant antique marble and less properly to polished porphyry.

(Technical Chinese Non-metallic Minerals Industry Nets, 2012-04-28)

Talc is a fine-grained white, greenish or gray mineral, Mg₃Si₄O₁₀(OH)₂, it has a soft soapy feeling and it is used in talcum and face powder, as a paper coating and as filler for paint and plastics.

(Technical Chinese Non-metallic Minerals Industry Nets, 2012-04-28)

The case company has a lot of customers; the main sources of customers are in many foreign countries, for example, the United States, Germany and Malaysia. The case company also has a close and long-term relationship with its customers. Because the case company is operated in such special industry, it often has products with high prices, its customers could always accept in appropriate situations. In order to have a clear experience, the authors also drew two figures to show the locations of the case company's customers and competitors. Figure 4.2 shows the locations of the major customers in the case company (the yellow points are the locations of customers and the red point is the case company).

Figure 4.3 shows the location of the main competitors for the case company, the numbers in the figure and in the front of the companies' names in the previous paragraph are the same, number 12 in this figure is the case company (the yellow points show the locations of competitors and the red point shows the location of the case company).
4.3.2 The Current Logistics Method in the Case Company

Because this barite company is a big company of minerals and they have mines by themselves in China, logistics outsourcing is a significant method for delivery of their products from mines to their customers. As this company makes the production and sales by themselves, the interviewee said "the transportation of products is the part that should be done by outsourcing, the improvement of logistics is very important". According to the actual situation, the case company never determines to set up a dedicated logistics department, because it could simplify the company's management structure. The functions of logistics are very important functions in the case company, the realization of the company's logistics functions rely on the area. Only each regional company could understand the local environment of logistics, the logistics status and the logistics cost. According to the actual situation of the local logistics, the case company could realize its logistics functions on the optimal, rational and effective basis.

Because of the geographical problems in China, the logistics conditions are varied in different places. If the company sets up a separate logistics department, the case company imagines...
that, costs of human resources, effort costs and efficiency will not be reached such state.

At current time, the main logistics method in the case company is entrusted to the transportation power outside the company, such as leases other people's trucks and charters the whole train. Of course the logistics routes should be chosen by the case company. Delivery types are always based on the convention in contract from both company and customers; customers appointed the place with great majority and the delivery time also should be selected by customers. Under normal circumstances, people call it logistics outsourcing of transportation. The main reason for the case company to choose this choice is that this logistics method is based on the capacity of management and the reduction of logistics cost. In the above context the authors can define a term here called “traffic”, which is incomplete and owned by private.

As interviewee said, this kind of logistics method brings many advantages to the case company, for example, it could reduce the case company's input cost, decrease the management cost and the difficulty of management and simplify the structure of the case company. But it also has several disadvantages, for instance, the delay of time happens sometime and the direct cost of current transportation is higher.

Due to the distribution of mines is broad, the function of management and control for products of logistics should be responsible by the agency of the case company in the location of mines. Even though the case company does not have the specific assets to develop logistics, the case company still chooses to organize the logistics by itself. Based on the data from ASKCI (2012-10-04), the profit ratio of sales for non-metallic mineral industry in China is about 7.40%; for non-ferrous metallic mineral industry the ratio is about 14.71%; for ferrous metallic minerals industry, the ratio is about 12.8%. As the case company is operated in the specific industry, these kinds of non-metallic minerals do not have more profits than metallic minerals and they also have lower reserves, so it spends two or three years mostly to gather them.

Barite is belong to the non-metallic minerals, the main way of taking profit is sales quantity, so the ratio between products cost and logistics cost will become from 1:1 or 1:1.2 to 1:2, which is based on the different transportation distance. Logistics cost will be higher than the products cost at most time and it often happens in the normal business activities. The logistics
cost will affect the products cost, which is impossible to add it on the expense of the case company in finance. The customers of the case company understand this situation because it's normally in the non-metallic mineral industry. In the case company, the ratio of logistics cost: the whole costs is 0.5:1, it means that logistics cost in the proportion of the whole costs is about 50%, sometimes the cost ratio is more than 50%.

As a result of the distribution of mines is broad, there are no main transportation routes, but there are a few primary routes, for example, from Guizhou to Zhanjiang, from Yunnan to Zhanjiang. Because of different situations, the transportation routes should be chosen by the case company. The different logistics routes almost have the same logistics types, such as the price of vehicle transportation is based on the distance and the situation of loads, the price of train transportation is also based on the distance, railway property and different services fees in different regions.

The so called traffic, has been described above; here the authors will describe the using situation of traffic in the case company. Because of the huge quantity of traffic in China, the case company normally does not sign up the contracts with masters of traffic, but several filiales will sign up the contracts with part traffic. Because the case company just has export business now, the distribution route is from the mines to the port through traffic and trains, finally ship products to customers. The interviewee also said that the case company is planning to do domestic business in China now. The case company also needs trains transportation and shipping types in logistics, but the case company has their specific suppliers of trains’ transportation and shipping, the prices of trains and shipping are never changed a lot in operation. The case company wants the authors to help to improve the land transportation--vehicles for them since they will have domestic business soon.

The interviewee also has some personal ideas of their logistics management that are based on their present situation, he said that the logistics management method of the case company should be improved, the level of logistics management should be improved based on the participation of professional person or the guidance from logistics specialist.

4.4 Logistics Outsourcing in China

In line with Chinat sourcing (2012-04-27), till now, more than 30% of customers are
dissatisfied to the suppliers among firms, which have implemented the logistics outsourcing in China. Main reasons for this situation are: lag of information feedback, lack of emergency measures; the information technology system is lag behind from suppliers, following and monitoring for logistics activities cannot be processed effectively; lack of standardized operation process, service level is unequally for different projects or different segments of the same customers; lack of continuous improvement mechanism; simplex service functions; etc.

**Owner driver**

Based on Chinese Transportation Technology nets (2012-05-14), in the logistics field, owner drivers depend on all the vehicles engaged in logistics activities except for the vehicles used by logistics companies. Because the logistics industry is a system service industry, in it vehicle resources and storage resources are the most basic resources. With the development of the logistics industry, the form of ownership of logistics companies, which are used to operate the vehicles, is changing. According to incomplete statistics, more than 80 percent of vehicle resources are concentrated in self-employed businessmen. First, from fully-owned vehicles to co-owned vehicles with drivers, second, form own vehicles to owner drivers (vehicles of others) are co-existed in parallel and then the adoption of social vehicle resources completely; vehicles in logistics companies are basically experienced in this "trilogy".
5. Analysis & Discussion

5.1 The Common Risks of Logistics Management and Logistics Outsourcing from the Literature

In order to draw the common risks of logistics management and logistics outsourcing, literature review has been done to find out the risks which have been discussed before, and summarized them into the table. The table 5.1 and 5.2 shows the summarized risks of logistics management and logistics outsourcing from literature review.

Based on the descriptions of risk for logistics management in theoretical framework, a table has been made to summarize the risks of logistics management.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Contents</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>Capacity variations</td>
<td>×</td>
<td></td>
<td></td>
<td>×</td>
<td></td>
<td></td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Regulations</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Information delays</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization factors</td>
<td>×</td>
<td>×</td>
<td></td>
<td>×</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attached costs from lack of planning in transportation and cancellation, and from outdated materials</td>
<td></td>
<td></td>
<td>×</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Risks in contractual phase</td>
<td></td>
<td></td>
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<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forecast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business disruption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Transit time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Dependency and opportunism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inventory and tools ownership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External</td>
<td>Market prices</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actions of competitors</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manufacturing yield and costs</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier quality</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5.1 the risks of logistics management


The authors have reviewed a number of the literature, and summarized those risks above. The risks of logistics management mainly relate to global supply chain, purchasing organization and SMEs, which involve five main parts: management, finance, safety, supplier and environment. The most frequent risks include capacity variations, organization factors, market prices and supplier quality.

The aforesaid risks in logistics outsourcing have been summarized in table 5.2.
<table>
<thead>
<tr>
<th>Management</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of capable service providers</td>
<td>✗</td>
</tr>
<tr>
<td>Local protection regulations</td>
<td>✗</td>
</tr>
<tr>
<td>The possibility of inefficient management</td>
<td>✗</td>
</tr>
<tr>
<td>Problems of evaluating and monitoring 3PL provider performance</td>
<td>✗</td>
</tr>
<tr>
<td>Conflict of culture</td>
<td>✗</td>
</tr>
<tr>
<td>Employee resistant</td>
<td>✗</td>
</tr>
<tr>
<td>Poor competence</td>
<td>✗</td>
</tr>
<tr>
<td>Imperfect mobility</td>
<td></td>
</tr>
<tr>
<td>Poor internal alignment</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.2 the risks of logistics outsourcing


The risks of logistics outsourcing have been identified through retail chains, 3PL industry and organizations in China, which involve financial, "Chaos", market and management. The most frequent risks are latent information asymmetry, loss of control over the 3PL providers, poor facility/technology support, dependence on the 3PL provider, lack of capable service providers and problems of evaluating and monitoring 3PL provider performance.

In general, these two kinds of risks in logistics include four main parts, they are: management, financial, market (environment) and supplier. But in logistics outsourcing, the risks from supplier have been reflected more obviously.

5.2 The Characteristics of the Present Logistics Method and Logistics management in The Case Company

Based on the definitions of 3PL from Lieb (1992) and Aghazadeh (2003), the authors choose the general characteristics of 3PL from Arroyo et al., (2006), and to do the comparison with situations of the case company (i.e. Shenzhen Rocky Mountain) to draw the characteristics for the non-metallic mineral companies. There are no specific characteristics of the non-metallic mineral industry have been summarized, and Arroyo et al., (2006) used chemical industry and fabrication of mineral products as examples when did their study, the authors determine to use this choice.
The characteristics of the company using 3PL can be summarized based on the theoretical part in the table 5.3 below, and the characteristics which have been fulfilled by the case company have been marked in the table with an "×" in empty grid:

<table>
<thead>
<tr>
<th>Characteristics of the company using 3PL</th>
<th>The case company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial stability</td>
<td></td>
</tr>
<tr>
<td>Capacity to fulfill the demand</td>
<td>×</td>
</tr>
<tr>
<td>Demonstrated ability to attend to customer's requests</td>
<td>×</td>
</tr>
<tr>
<td>Price charged for the service</td>
<td>×</td>
</tr>
<tr>
<td>Joint problem solving ability, creativity</td>
<td></td>
</tr>
<tr>
<td>General reputation</td>
<td>×</td>
</tr>
<tr>
<td>International scope</td>
<td>×</td>
</tr>
<tr>
<td>3PL service provider has a continuous improvement policy</td>
<td></td>
</tr>
<tr>
<td>Wish to develop a reciprocal gain-gain relationship</td>
<td>×</td>
</tr>
<tr>
<td>3PL service provider has a quality certification and offers service guarantees</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.3 the Characteristics of 3PL

(Note: sources from Arroyo et al., 2006)

According to table 5.3, the characteristics of logistics management and logistics method from the case company can be summarized as: capacity to fulfill the demand, demonstrated ability to attend to customer's requests, price charged for the service, general reputation, international scope, and wish to develop a reciprocal gain-gain relationship. Because the case company uses 1PL and 3PL at the same time, the characteristics which have been fulfilled by the case company do not include the characteristics in 3PL service provider. These characteristics show that the logistics management method of the case company bring a few advantages and more competitive in China.

5.3 The Risks Analysis of the Present Logistics Method and Logistics Management in the Case Company

The comparison between common risks and the present situation of the case company will draw the risks of logistics management and logistics method in the case company which also
has been shown in the table. Due to the actual logistics activities have been outsourced by the case company, in this thesis, authors will analysis risks of logistics method in the case company by analysis the risks of logistics outsourcing. The risks of the present logistics method and logistics management in the case company have been shown in table 5.4 and 5.5. The risks can be divided into two main areas: logistics management and logistics method (logistics outsourcing).

The logistics management risks can be summarized based on the theoretical part in the table 5.4 below, and the risks which have been fulfilled by the case company have been marked in the table with an "×" in empty grid:

<table>
<thead>
<tr>
<th>Scope</th>
<th>Contents</th>
<th>The case company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>Attached costs from lack of planning in</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>transportation and cancellation, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>from outdated materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Risks in contractual phase</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Transit time</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Inventory and tools ownership</td>
<td>×</td>
</tr>
<tr>
<td>External</td>
<td>Market prices</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Actions of competitors</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Manufacturing yield and costs</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Supplier quality</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Supplier and customer relationships</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Demand</td>
<td>×</td>
</tr>
</tbody>
</table>

Table 5.4 the Risks of Logistics Management


In risks of logistics management, the case company never has any contract with their transportation providers and there is no specific logistics department in the case company, so the risks in contractual phase and supplier quality are existed. The case company always
produce after receiving customer order, there is a time period between production and transportation, attached costs from lack of planning in transportation and cancellation, and from outdated materials is occurring; at the same time, transit time is longer. The case company rent inventory yields near the train station, if the demand could not match the production, accumulation of products will happen. The non-metallic mineral industry in China is a lower profit industry, and the logistics costs is higher, if the market prices changed, the business will be affected by the actions of competitors.

The risks of logistics outsourcing from literature have been reviewed by the authors, table 5.5 shows the summarized risks' list from three literature, marks will be made for signing grid owned contents of three literatures and the case company with a "×" in empty grid.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Contents</th>
<th>The case company</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial</strong></td>
<td>Hidden cost</td>
<td>×</td>
</tr>
<tr>
<td>&quot;Chaos&quot;</td>
<td>Latent information asymmetry</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Poor communication</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Lack of shared goals</td>
<td>×</td>
</tr>
<tr>
<td><strong>Market</strong></td>
<td>Dependence on the 3PL provider</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Lack of capable service providers</td>
<td>×</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td>The possibility of inefficient management</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Problems of evaluating and monitoring 3PL provider performance</td>
<td>×</td>
</tr>
</tbody>
</table>

**Table 5.5 the Risks of Logistics Outsourcing**

(Nota: sources from Tsai, et al. 2008; Wang & Regan, 2003; Lau & Zhang, 2006; Lonsdale, 1999)

Because the case company does not have a specific logistics department inside, and the case company using owner drivers from individual masters which have mobility, there is less communication between 3PL providers and the case company. In other words, the case company present inefficient management on their providers, does not have enough information exchange, and never try to evaluate and monitoring 3PL. Based on the special 3PL environment in China, the case company is dependent on their 3PL providers, and also
worry about lack of capable 3PL providers.

To sum up, the case company uses a logistics combination of 1PL and 3PL. Even through this specific logistics management method is more suitable for the non-metallic mineral industry in China, but this method still has a lot of risks, especially in market (environment) and management parts. The risks outside the case company are more serious than the risks inside the case company, because in China 3PL is used less than western developed countries, and 3PL providers are more incompact which do not form perfectly as a system. These reasons cause the transitional logistics management method like the case company.
6. Conclusion

The purpose of this thesis is the risk investigation of logistics management and logistics methods in Chinese non-metallic mineral industry. The authors have compared risks from theoretic framework and the current situation of the case company, as this case company is representative, the conclusion can be used extensively in this industry. To fulfill the purpose, three main questions have been answered.

The common risks in logistics management and logistics outsourcing have been listed clearly on the analysis part. Because companies in the non-metallic mineral industry outsource logistics activities, the authors have used logistics outsourcing as the main logistics method in analysis part. The risks have been divided into two main parts: logistics management risk and logistics outsourcing risk. In logistics management risk part, capacity variations and organizational factors are the most frequently risk during seven literatures in internal risks; supplier quality is the most frequently risk in external risks. In logistics outsourcing risk part, loss of control over the 3PL providers is the most frequently risk during four literatures.

The common characteristics of the non-metallic mineral companies and the risks or problems of logistics management, logistics outsourcing in the non-metallic mineral companies have been summarized by comparison in analysis part. These characteristics in include capacity to fulfill the demand, demonstrated ability to attend to customer's requests, price charged for the service, general reputation, international scope and wish to develop a reciprocal gain-gain relationship. The logistics management risks include transit time, inventory and tools ownership, attached costs from lack of planning in transportation and cancellation, and from outdated materials in internal scope; market price, actions of competitors, manufacturing yield and costs, supplier quality, demand, supplier and customer relationships in external scope. The risks of logistics outsourcing include hidden cost in financial category; latent information asymmetry and poor communication in "chaos" category; dependence on the 3PL provider and lack of capable service providers in market category; the possibility of inefficient management, problems of evaluating and monitoring 3PL in management category.

The most important reason of risks and characteristics in the non-metallic mineral companies is the using of owner drivers. Owner drivers are a kind of popular logistics method in China
now. The masters of these traffic do not belong to any logistics companies or belong to the case company, which means they are managers of themselves. Due to the cultural quality of most traffic masters are not higher enough normally, the risks ratio of hiring is also higher, for example, the risks from the truck, the risks from the masters, etc. Because those traffic do not belong to any companies, masters have their right to get jobs from other customers that will result in inflexibility of time and difficult management of logistics.

**Contribution**

The authors find out the common characteristics and risks of logistics management and logistics methods for the Chinese non-metallic mineral companies based on the characteristics and risks which have been listed in theoretical part, and explain the reasons of those risks. We have build a risk evaluation for this industry, other companies in this industry also can use it to evaluate their logistics management and method.

**Implication for the managers**

The case company could find out its risks in logistics management and logistics method, the managers can reducing risks in these two areas. Maybe it's impossible to complete everything now; this report will be the foundation if the managers want to do risks measurement of their company in the future. As logistics is critical in this industry, we mentioned above, these risks only can be found out in such companies.

**Further study**

With the development of logistics in the Chinese non-metallic mineral industry, there are many new kinds of logistics methods will be formed. In the future, based on the innovation of logistics management, more risks will occurred in this industry, and a new research of risks investigation in this industry can be done. This research can be seen as the foundation of risks management and measurement in the Chinese non-metallic mineral industry; and could also be seen as the foundation of risks investigation for this industry in other developing countries.
Reference


Croom, S. (2009), Introduction to Research Methodology in Operations Management, Researching Operations Management (Edition 1), Edited by Karlsson C., Routledge, USA.


Wang, C. and Regan, A.C. (2003), *Risks and Reduction Measures in Logistics Outsourcing*, University of California, USA.


Appendix

Appendix 1

Questions For the First Interview

The first interview time: 2012-04-10
Respond time: 2012-04-13
Interviewee: Zhu Yousheng

1. Could you please tell us which kind of specific work do you engaged in? What is your position in this company?

2. The general situation of the company:
   (1) the main direction of business;
   (2) the outstanding achievement and performance of the company;
   (3) the position of the company among the same enterprises;
   (4) the distribution of mines (including mines the company already has and the mines which are negotiated now), the mines of the case company are buying out by the case company, renting from the masters of mines or pooling with masters?
   (5) the major sources of customers.

3. The relationship between the company and customers:
   (1) close or arm length;
   (2) the reason for this choice;
   (3) generally, the relationships with your customers are long term relationships or temporary relationship?
   (4) which kind of cooperative relationship is more commonly in the company?

4. Delivery types of products:
   (1) which kind of delivery types does the company choose to delivery products (pick up by customers, home delivery service or other types);
   (2) the delivery types will be chosen by customers or the company;
(3) the reason for this choice;
(4) the delivery time will be chosen by customers or will be decided by the production situation of the company at that time?

5. Storage of products:
(1) the storage position of products;
(2) the storage places are belonging to the company or renting from someone else;
(3) the reason for this choice.

6. The current logistics method of the company:
(1) what kind of logistics method the company has now;
(2) the reason for this choice;
(3) the advantages and disadvantages does this logistics method bring to the company;
(4) does the company have a specific logistics apartment which could manage and control logistics?
(5) if the company does not have its own specific logistics method, what are reasons for the company which did not organize its own method?

7. The distribution routes of the company:
(1) the main distribution routes of the company;
(2) the specific routes will be decided by customers or the company?
(3) the delivery types, logistics prices and delivery time of different distribution routes.

8. The logistics costs:
(1) the logistics costs are generally added on the expenses of the company or added on the products costs;
   ① if the logistics costs are added on the expenses of the company, the costs burden is demanding for the company or could be supported easily?
   ② if the logistics costs are added on the products costs, how about the ratio between products costs and logistics costs? Is it possible that logistics costs will be higher than the
products costs? Is there any customer complain the higher prices of products? Is there any customer change to have cooperation with other companies because of the products prices?
   (2) the ratio between logistics costs and the whole costs of the company;
   (3) how the company will think about the costs, the costs are higher or lower? Does the company try to find out the solution if the costs is higher?

9. The current advantages and disadvantages of the company (competitive advantages and disadvantages).

10. How do you think about the current logistics management and supply chain management of the company?
Appendix 2

Questions for the second interview

The second interview time: 2012-04-20
Respond time: 2012-05-01
Interviewee: Zhu Yousheng

1. Could you tell us what specific position you take charge of in this case company? (for example, the sales manager, the logistics manager and the purchasing manager)

2. Could you introduce the management structure in this case company? For example, follow the CEO there are three presidents in branch companies, follow every president there are three charge managers, they are the sales manager, the purchasing manager and the logistics manager. Please use this form to introduce the management structure in the case company to us.

3. Why does not the case company set up a logistics department to simplify the mechanics of management under such management structure?

4. Could you introduce the number of employees and circumstances in the case company to us?

5. How many costs does the case company put into logistics? How about the expectations of the case company?

6. Could you provide a more detailed price list of logistics in the case company to us? For example, in general the fees about transportation from Guiyang to Zhanjiang.

7. Could you provide us a more detailed list of clients and their addresses and the list of competitors?
Appendix 3

Questions for the third interview
The second interview time: 2012-05-20
    Respond time: 2012-05-15
    Interviewee: Zhu Yousheng

1. Could you provide us the prices list of the transportation costs for the main distribution routes of your company (include the prices of traffic, railways and shipping)?

2. Could you provide us some information about the using of traffic in your company?

3. Could you provide us the main locations of your mines?