Abstract

There is limited research on the topic of outsourcing in the mining industry. The purpose of the study is to fill this gap and gain a general understanding of the state of outsourcing in the mining industry. The study seeks to answer basic questions such as how prevalent is outsourcing, what activities are being outsourced and why they are outsourcing. Upon surveying the upper management (e.g. CEOs and COOs) of 106 primarily Canadian mining companies with global operations, it became evident that outsourcing is widespread among both juniors and large mining companies. Some 89.7% of mining companies outsource or have outsourced in the past. Mining companies outsource mining more than mineral processing because mineral processing is a revenue generator and require large investments, which outsourcing suppliers generally do not have. Other popular activities for outsourcing include construction during mining operations. The biggest reason for outsourcing is access to specialized competencies, including skilled labour, followed by flexibility such adapting to seasonality, changes in geology and commodity prices. According to the criteria created by Quinn and Hilmer (1994), mining and mineral processing are not core competencies for mining companies and should be evaluated carefully for outsourcing although some 92.1% of mining companies perceive these activities as being core competencies. The seven traits of core competency put forward by Quinn and Hilmer were that they are: based on skills and intellectual property in the company; create flexibility; one of the top three capabilities of the company; fills a gap in the industry; performed better than providers; shareholders/customers care about them; and embedded in company processes. None of the traits reached the 92.1% agreement (to match the mining companies’ perception) necessary to be a core competency and therefore, mining and mineral processing are not core competencies for mining companies.
Preface

I was responsible for the questionnaire design, which in part utilized the survey used by Steenkamp and van der Lingen in their 2014 paper. I was also responsible for the survey completion and data analysis with inputs and supervision from Professor Scott Dunbar at the University of British Columbia. The data collection and analysis was completed using SurveyMonkey.com. The research methodology was prepared and executed using some of the methods from W. Lawrence Neuman’s *Social Research Methods*, which is listed in the references. The study received approval from the University of British Columbia Behavioral Research Ethics board (certificate number: H16-00765). The results of the study will eventually be published in an academic journal to be determined.
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Chapter 1: Introduction

There is a general confusion as to what is meant by outsourcing in management literature and there is no unified definition. Gilley and Rasheed (2000) define outsourcing as the “fundamental decision to reject the internalization of an activity” (p. 764). This study defines outsourcing as the procurement of goods and services and/or the performance of value-addition activities from outside providers.

Outsourcing originated in the 1950s and was widespread by the 1980s, gaining momentum in the 1990s. Initially, companies outsourced to cut costs (1980s), but eventually companies were outsourcing to gain access to skills, competencies and knowledge in areas where the company lacks expertise. This was called “strategic outsourcing” and it prevailed through the 1990s (Hatonen & Eriksson, 2009, p. 144).

Outsourcing is widely studied. There is a large body of work on the subject ranging from the decision to outsource – why firms choose to ‘buy’ rather than ‘make’ – to the outsourcing process, what to outsource and what is needed for outsourcing to succeed (Hatonen and Eriksson, 2009, p. 146). However, there is limited research on outsourcing in the mining industry and there are only conjectures as to what is happening in the industry in terms of outsourcing. The objective of the study is to fill this gap.

The study seeks to gain a general understanding of outsourcing in the mining industry. The study was motivated by the desire to answer the following questions: who is outsourcing, how prevalent is outsourcing, what activities are being outsourced, why are they outsourcing (are they shedding assets to improve ROA? Are they trying to gain access to specialized skills and knowledge?), what are the risks of outsourcing, what are the critical success factors in outsourcing, and is mining and mineral processing core competencies for mining companies so
that they can be evaluated for outsourcing. The study also hopes to determine whether there is
evidence of extreme outsourcing in the mining industry.

Traditionally, outsourcing has not been prevalent in the mining industry because the
mining industry has long been protected from intense competition that forces companies to be
innovative. However, this has changed in the recent years, and mining companies now outsource
mine construction via engineering, procurement and construction management contracts as well
as outsourcing underground construction, maintenance and the design of mine waste
management facilities. There are signs that some of today’s mining companies are devolving into
loosely integrated networks of service and equipment suppliers (Scott Dunbar, pers.comm.
2016).

An international company based out of Australia called Orica provides one example of
the prevalence of outsourcing in the mining industry. Initially, Orica only supplied explosives to
mining companies. The explosives were detonated to create fragmented rock that would be
processed to produce metal or metal concentrate. Recently, Orica began offering to provide a pile
of blasted rocks with a specified fragment size distribution using its own equipment and
improved technology. This means that mining companies no longer need to own blasting
equipment or hire experienced personnel to carry out blasting operations. As a result, mining
companies can shed assets, save operating costs and have access to improved technologies.

To examine if the hypothesized trends are taking place, the study surveyed a hundred and
six Canada-based mining companies with global operations. The study also reproduced the
questions on outsourcing in the mining industry by Steenkamp and van der Lingen (2014) to
examine if mining and mineral processing are core competencies. The respondents were
primarily upper management such as CEOs or COOs, and 83% of the companies surveyed had
producing mines while the rest were juniors. A majority of the companies were large-scale producers with more than fifty employees, and most mined gold.

What the study found is that outsourcing is widespread among mining companies. Some 82.6% overall and 89.8% of producing mines outsource or have outsourced at some point or another. Mining companies outsource the mining process (such as drilling, blasting, loading, hauling and tunneling) more so than mineral processing (such as crushing, grinding, flotation, concentration and leaching), and the main reason for outsourcing is access to specialized competencies including skilled labour.

Flexibility (such as adapting to seasonality, changes in geology and commodity prices and short-term needs and life of mine such as a mine with a life of 5 to 7 years) is another reason that companies outsource while relationship with suppliers, community and unions do not significantly affect the decision to outsource. For companies with producing mines, mining and mineral processing are not core competencies although 92.1% perceive it as being so. In the following chapters, the paper will delve deeper into the design and results of the study such as the critical success factors and risks as well as discussing the relevant literature and the methodologies applied in conducting the study.
Chapter 2: Literature Review

2.1 Outsourcing

2.1.1 Definition

Gilley and Rasheed (2000) define outsourcing as the “fundamental decision to reject the internalization of an activity” (p. 764). They also point out that there is a general confusion about what is meant by outsourcing in management literature and that there is no unified definition for all. Furthermore, Gilley and Rasheed (2000) propose that outsourcing occurs in two ways: through substitution and abstention. Substitution occurs when outsourcing replaces internal activities and abstention occurs when activities that have never been performed in-house are outsourced. However, both forms of outsourcing reject internalization. Based on this analysis, the following definition of outsourcing was used in this study: outsourcing is the procurement of goods and services and/or the performance of value-adding activities that a company could have performed or produced in-house from outside providers.

2.1.2 Background

Outsourcing originated in the 1950s and was widespread by the 1980s, gaining momentum in the 1990s. Today, Chrysler and Ford produce less than one-half of all their vehicles in-house, and only 10% of the value of Boeing’s largest commercial aircraft, the Boeing 767, is produced in-house according to Gilley and Rasheed (2000). Outsourcing is also widely studied. The large body of work on the subject can be seen from Table 2-1 by Jiang and Qureshi (as cited in Steenkamp and van der Lingen, 2014, p. 846). Much of the studies focus on the decision to outsource – why firms choose to ‘buy’ rather than ‘make’ – as well as the outsourcing process. Researchers are also interested in what to outsource and what is needed for outsourcing to succeed (Hatonen and Eriksson, 2009, p. 146).
2.1.3 Evolution and Trends

In the beginning, outsourcing was mainly associated with the manufacturing sector such as by changing location to gain labour cost advantage, but it quickly spread to service-based and knowledge-based industries such as information technology, legal services and medical diagnostics according to Parkhe (as cited in Steenkamp and van der Lingen, 2014, p. 845). Hatonen and Eriksson (2009) divide the evolution of outsourcing to three phases: the era of the Big Bang, the era of the Bandwagon, and the era of Barrierless Organizations. The era of the Big Bang refers to the intensity with which the practice gained popularity while era of the Bandwagon refers to the increasing numbers of companies that jumped on the bandwagon. Era of the Barrierless Organization refers to the unlimited access that companies had to vendors and resources to facilitate outsourcing.

Initially, companies outsourced non-core competencies to cut costs (1980s). Eventually, however, companies were outsourcing to gain access to skills, competencies and knowledge in areas where the company lacks expertise. This was called “strategic outsourcing” and it prevailed
through the 1990s (Hatonen & Eriksson, 2009, p. 144). At the turn of the millennium, “transformational outsourcing” came into being, which is about building flexible and adaptive organizations consisting of loosely coupled network of suppliers according to Linder, 2004; Linder et al., 2002; and Mazzawi, 2002 (as cited in Hatonen and Eriksson, 2009, p.144). The key ideas discussed here are summarized in the following table from Hatonen and Eriksson (2009):

Table 2-2 Evolution of Outsourcing (p. 145)

<table>
<thead>
<tr>
<th>Time period</th>
<th>Prime motives</th>
<th>Buzzword</th>
<th>Core organizational competences</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Cut costs</td>
<td>Outsourcing</td>
<td>Management of key strategic business units (SBUs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Efficient organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Management of arms-length, transactions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strategic outsourcing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>International</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strategic alliances</td>
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<td></td>
<td></td>
<td></td>
<td>Focused organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Key strategic competences (core competences)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Strategic and competitive edge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strategically important organizational process</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Resource/competence-based view</td>
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</table>

An idea that is important to this study is what Mella and Pellicelli call “extreme outsourcing.” Extreme outsourcing refers to companies’ outsourcing – sometimes internationally – all or most of its business activity, thus forming a stable but flexible network leading to an essentially virtual organization. For example, in the pharmaceuticals and oil and gas industry, a significant portion of the “discovery” process is now outsourced according to KPMG (2012). The oil and gas industry outsources exploration, data acquisition, drilling, engineering, refining and distribution. As mentioned in the objective, this study seeks to examine the presence or emergence of extreme outsourcing in the mining industry by investigating the extent to which outsourcing has occurred in the mining industry.
2.2 Outsourcing in the Mining Industry

2.2.1 An Overview

In 1998, Embleton and Wright (as cited in Steenkamp and van der Lingen, 2014, p. 846) contended that mining is one of the industries with the lowest propensity for outsourcing. This was due, they explained, to the fact that mining has been a protected industry unlike manufacturing and retail where fierce competition forces companies to be innovative. However, the mining industry may be changing such that outsourcing is becoming more prevalent and, in the extreme, companies are devolving into loosely integrated network of equipment and service suppliers (Scott Dunbar pers. comm., 2016).

Sivakumar et al (2014) confirm that, “outsourcing has become a major corporate trend in the mining sector internationally.” Companies outsource mine construction via engineering, procurement and construction management contracts as well as outsourcing underground construction, maintenance and the design of mine waste management facilities. Companies even outsource the mining such as drilling and blasting. According to Mining Weekly, the outsourcing industry for mining is increasingly competitive as companies struggle to find quality contractors in some parts of the world (Montiea, 2015).

Unlike the literature on outsourcing, literature on outsourcing in the mining industry is extremely limited. There are five works in the area. Steenkamp and van der Lingen (2014) address whether mining is truly a core competency, which is important for the decision to outsource or not. The paper also addresses the decision framework for outsourcing – to outsource or not – and the critical success factors (CSFs) in the event of outsourcing. Unfortunately, the study was only completed within the context of one mid-tier commodity specialist company in
South Africa. Hence, there is room to expand the scope of the research to companies worldwide and Canada.

Sivakumar et al (2014) deal with the suitable outsourcing vendor selection process for the production in the green mining industries based on economic and environmental benefits and risk factors. They also discuss various mining business models for outsourcing. The short paper by Stacey et al (1999) deal with the industry problems that have led to an increase in the outsourcing of professional services in the mining industry as well as the pros and cons of outsourcing. In addition, the paper talks about the factors to consider when choosing an outsourcing partner. Kenny and Bezuidenhout (1999) provide an overview of the existing forms of subcontracting – similar to outsourcing – in the South African mining industry, focusing on subcontracting of labour in South Africa and its forms. Finally, the paper by Kirk (2010) talk about the operational and risk issues associated with contract mining – which is a low-level form of outsourcing

Ultimately, what the lack of literature on outsourcing in the mining industry indicates is that there is no general inquiry into the state of outsourcing in the mining industry. There is room to investigate who is outsourcing – the profile of the outsourcer in terms of commodities, size and location etc. – what they are outsourcing and to what degree, and the reasons for outsourcing. Finally, there are opportunities to examine what the problems, risks and barriers to outsourcing are in the mining industry and what the critical success factors are generally. This study aims to study just that; the study aims to fill the gap existing in the literature on outsourcing in the mining industry. However, the study has left some topics for future research. These include innovation with respect to outsourcing (i.e. who will innovate and what the innovation insertion points are) and the relationship between outsourcers and governments of
resource rich countries. Other topics include outsourcing strategy, supplier selection, contractual and relationship governance, risk perception and management strategies, outsourcing outcomes, available supplier capabilities, client and supplier behaviors, and lessons learned, all in the context of mining.

2.2.2 Mining and Mineral Processing as a Core Competency

Gilley and Rasheed (2000) identify two types of activities that a company can outsource: peripheral and core. Outsourcing peripheral activities entails outsourcing less strategically relevant activities whilst outsourcing core activities entails externalizing activities that are highly important to long-run success. Outsourcing core competencies is discouraged (Steenkamp and van der Lingen, 2014, p. 847). Several authors point out (as cited in Gilley and Rasheed, 2000, p. 770) that “core outsourcing” may lead to declining innovation and eventual competition from suppliers, resulting in reduced firm performance. This is confirmed by Stacey et al (1999) who assert that “a business should retain complete control over its core functions, but may find it attractive to outsource the others.” However, mining companies are outsourcing the very core of their business such as drilling, blasting, loading and hauling according to Quelin and Duhamel (as cited in Steenkamp and van der Lingen, 2014, p. 846).

Kenny and Bezuidenhout (1999) confirm this and state that mining companies are now using contractors for ‘core’ mining activities where in some instances whole shafts are outsourced in addition to peripheral activities such as shaft sinking, access development, catering and hostel maintenance. However, the reason mining is outsourced could be because mining is actually not a core competency. Steenkamp and van der Lingen (2014) conducted a study on one mid-tier commodity specialist in South Africa to determine whether mining is truly a core
competency. The research showed that mining is not a core competency for the company studied but business functions such as management, financing and resource acquisition could be.

2.2.3 Reasons for Outsourcing in the Mining Industry

There is an abundance of research on the factors for outsourcing. This short section will only address four of these as examples. Various studies list various reasons why outsourcing is an advantageous strategy. This study amalgamates the key findings in a survey questionnaire and directly investigates why outsourcing occurs in the mining industry, which has not been studied before. Quinn (1992) argues that outsourcing enables companies to focus on core competencies and increase in productivity. In addition, outsourcing reduces fixed costs and increases flexibility according to Dess et al (1995) who suggest that, “outsourcing allows for quick response to changes in the environment”. Lin et al (2016) argue that outsourcing allows companies to access specialized or missing competencies and knowledge as well as granting access to innovation and technology. Sivakumar et al (2014) agree and state that the benefits of outsourcing are reduced costs and access to technology. Finally, another significant reason for outsourcing is for a company to dispose of assets and avoid investment in fixed assets. This reduces capital expenditure and fixed costs.

2.2.4 The Negative Effects of Outsourcing

Although outsourcing is widely popular, it does not always result in positive outcomes. Sometimes, the effect can be neutral as Gilley and Rasheed find that outsourcing does not affect firm performance at all. Lin et al (2016) confirm that, “there are no guarantees that a firm will capture all or even a portion of the gains from an outsourcing engagement” (p. 5). Bettis Bradley, and Hamel (as cited in Gilley and Rasheed, 2000, p. 763) suggest that outsourcing may reduce organizational innovation, shift knowledge to supplier organizations and reduce control over a
firm’s activities. In this way, outsourcing may destroy long-run competitive advantage. In addition, there is the risk of loss of proprietary information, allowing outsourcing vendors to enter the market on their own account.

Levy (as cited in Rasheed and Gilley, 2000, p. 767) finds that longer lead times resulting from spatial dispersion due to outsourcing cause several problems such as larger inventories, communication and coordination difficulties, lower demand fulfillment, and unexpected transportation costs. Tariffs are another danger associated with outsourcing as well as the risks of delays and interruptions in ore production because the vendor does not share the risks of the mine. The outsourcing vendor may also not adhere to the same health and safety, environmental and social standards raising issues in terms of social license to operate or sustainable development. In terms of overseas outsourcing or offshoring, language and cultural barriers could affect both production and safety. Finally, outsourcing could create dependency on the outsourcing vendor (Niskanen, 2013, p. 39) and result in loss of control (Niskanen, 2013, p. 72).

2.2.5 Critical Success Factors

There are various propositions as to what the critical success factors (CSFs) are for an outsourcing engagement. The High Commission of India (as cited in Sivakumar et al, 2014, p. 65) argues that, “the key success factors in mining outsourcing are access to technically skilled expertise, effective industrial relationship strategies, economics development opportunity, and holding long term contracts. Stacey et al (1999) propose that shared values and the reputation, experience, financial stability of the outsourcing vendor as well as the human resource policies and procedures and systems in place are important in selecting an outsourcing partner. However, this study decided to adopt and test the critical success factors put forward by Steenkamp and van der Lingen (2014) in their study of a single mid-tier mining company in South Africa. The
CSFs listed by Steenkamp and van der Lingen (2014) include but are not limited to a fair and mutually beneficial contract, adequate incentive schemes including both gains and penalties, shared values and beliefs driving a spirit of partnership and strong communication channels driving continuous communication and knowledge sharing. These CSFs are divided into four groups: process control mechanism, output control mechanism, contract-based mechanism and social control mechanism. The results show that social and output control mechanisms are the most important CSFs.
Chapter 3: Methodology

3.1 Introduction

At the start of the research, the study obtained approval from the University of British Columbia Behavioral Research Ethics Board in Human Ethics. The approval certificate can be found in Appendix A. The study was conducted using a comprehensive and confidential survey with twenty-four questions. The method was chosen so that the state of outsourcing in the mining industry could be gauged objectively rather than through observation or secondary research, both of which are difficult to execute. The survey contained the following segments: who is participating and by virtue, who is outsourcing; do they outsource and if so, what is being outsourced; what equipment are provided by the outsourcing supplier (the study also reached out to a number of participants post-survey to determine who owned the assets provided during the outsourcing process); why are mining companies outsourcing; what are the risks and level of risks of outsourcing; and would companies consider more outsourcing and what the critical success factors are in the event of outsourcing.

The survey does not investigate outsourcing of pre-production activities (e.g. mine construction) or supporting functions such as catering and human resources. While it is well known that these pre-production and supporting activities are widely outsourced, it is not applicable to the scope of this research, which seeks to understand if outsourcing is occurring among core mining activities and whether that is contributing to the shedding of assets or reduction of fixed costs.

The survey questions were designed to capture an overview of the state of outsourcing in the mining industry. The study was conducted using SurveyMonkey.com. All data was stored on SurveyMonkey.com as well as some being stored on the researchers computer. To facilitate
analysis, the questions were not open-ended in most cases. For example, for activities outsourced, the survey provided options such as: mining (drilling and blasting), mineral processing (crushing, grinding and flotation) and waste management (waste dump operation).

The complete survey is available in Appendix B.

The final segment of the survey consisted of questions regarding whether mining and mineral processing are a core competency for the survey participants. This would help determine whether mining and mineral processing are desirable candidates for outsourcing. In essence, this segment of the survey reproduced the approach taken by Steenkamp and van der Lingen (2014) who ask whether mining is a core competency at a particular South African mining company. The study expanded that to include mineral processing asking whether mining and mineral processing are core competencies. The study first asks whether participants perceive mining and mineral processing as a core competency. Then, the study vets the answer by asking whether mining and mineral processing activities in the company are:

1. Based on skills and intellectual property in the company
2. Create flexibility
3. One of the top three capabilities of the company
4. Fills a gap in the industry
5. Performed better than providers
6. Shareholders/customers care about them
7. Embedded in company processes.

The list is the seven traits of a core competency (Steenkamp and van der Lingen 2014, p. 848) as per Quinn and Hilmer (1994). In the case of the one company that Steenkamp and van der Lingen (2014) studied, it was concluded that mining was not a core competency because
there was a mismatch between the perception and the actual traits. In other words, the company that Steenkamp and van der Lingen (2014) surveyed perceived mining as a core competency but they answered mostly in the negative to the seven traits of a core competency. One task of this study was to investigate this result.

In terms of execution, the study was initially piloted on one large mining company based out of Vancouver (the company had producing mines). Then, the study reached out to nearly 1450 primarily Canadian mining companies listed on the database SNL between June 2016 and August 2016.

Much of the analysis for the study was completed on SurveyMonkey.com, which automatically makes graphs and charts based on the questions. A few of the analyses were done manually on Excel but most results are available from the survey instrument on SurveyMonkey.com. For questions involving scale, the study used weighted averages. Whether to extrapolate the results of the research to a global base is left to the judgment of the reader considering that the mining companies are primarily Canadian with global mine sites. While the survey sample is not random, it is a complete and comprehensive list of Canadian mining companies downloaded from the database SNL. It is important to note that some of the companies surveyed happen to be juniors due to initial indiscretion but a majority of the mines are producing mines.

3.2 Survey Design

In the first section of the survey, the study created a profile of the respondents. Although the study is confidential and all data will be aggregated, the study asked for the respondents’ details for reference purposes and for future contact to obtain additional information. The details requested by the survey include name, name of employer, department and position and phone
number for future contact. The survey then asked for the commodities mined by the company as well as location of the mine and head office. Using the information on location of the mine and head office, a map of the geographic dispersion was created, found in the results section.

In the second part of the survey, the study asked whether the company outsources or have outsourced in the past. At the beginning of every section the term “outsourcing” is defined, which in this case is “the procurement of goods and services and/or the performance of value-adding activities from outside providers.” The survey also asked whether the respondents’ would consider more outsourcing in the future. The next question was what activities the respondents outsource, and respondents were asked to choose from an existing set of answers consisting of production activities (the study focused on operating activities and not pre-production activities, which we already know are outsourced). For example, the answer choices included: mining – drilling and blasting, mining – loading and hauling and mineral processing – crushing, grinding and flotation.

Next, the study asked about what equipment was provided by the outsourcing supplier. The purpose of this question was to determine whether mining companies are shedding assets via outsourcing. If outsourcing suppliers are providing the equipment, then mining companies do not need to own equipment and can thereby, shed assets increasing return on assets. The next question asked about the reasons for outsourcing. Respondents were asked to rate a list of reasons for outsourcing compiled from existing literature on outsourcing. Respondents were asked to rate each risk on a scale of one to five with one being not at all important and five being extremely important. When this data was analyzed, the weighted averages of the ratings were used to get one general rating.
A similar approach was taken when the survey asked about risks of outsourcing. A list of risks was created using existing literature and respondents were asked to rate each risk on a scale of one to five with one being not at all risky and five being extremely risky. Examples of the risks included ability to coordinate with supplier, maintenance of the production schedule and cost control. When evaluating the responses, the weighted average of the responses was calculated to get a general rating for each risk. Unfortunately, this question did no elicit the diverse range of ratings the study hoped for. In future research, another method should be developed to examine outsourcing risk. Either the respondents did not know or care about outsourcing risk or indeed, all risks are equally important.

In the next section, the study uses the approach of Steenkamp and van der Lingen (2014) to investigate the critical success factors (CSFs) of outsourcing in the mining industry. Respondents are asked to rate a list of twelve CSFs on a scale of one to ten with one being most important and ten being least important. Respondents are asked to rate the CSFs in terms of their effort required and potential value created. Examples of the CSFs include a fair and mutually beneficial contract, adequate incentive schemes (both gains and penalties) and extensive reporting from service provider to owner on standards and performance. The results were tabulated using the weighted averages of the ratings. As with the results on risk, the CSF ratings did not yield a wide range weighted averages, which begs the question if there was something wrong with the survey design or if indeed all the CSFs are of equal importance.

In the last section of the survey, the study reproduced the survey questionnaire on mining as a core competency by Steenkamp and van der Lingen (2014) (the survey questionnaire of Steenkamp and van der Lingen (2014) can be found in Appendix C). The survey asks whether mining and mineral processing are core competencies so as to capture the perception of survey
respondents. Then, the survey ask whether mining and mineral processing fit the seven traits of core competencies put forward by Quinn and Hilmer (1994) without disclosing to respondents that the questions are about traits of core competencies. Then the two parts – the perception and whether mining and mineral processing fit the seven traits of core competencies – are brought together in analysis. If the percentage of agreement to the seven traits matches the percentage of agreement to the perception of mining and mineral processing as core competencies, then mining and mineral processing are core competencies.

If there is a mismatch, then mining and mineral processing are not core competencies. In retrospect, not all seven of the core competencies were applicable to mining and therefore, a different set of traits should have been developed and used for future research. For example, #6 “Shareholders/customers care about them” is likely not completely relevant in the mining context since customers of the products of mining operations are far removed from the production process. However, shareholders might care.

3.3 Theoretical Framework

The research is quantitative with qualitative elements. The survey data was aggregated using statistical analysis and quantified; but there were some follow up phone interviews where detailed insights to specific questions were obtained. In a sense, there is triangulation of method. The research is also basic rather than applied because it is concerned with “advancing fundamental knowledge about the social world” (Neuman, 2003, p. 21) – i.e. the mining industry. In addition, the research uses reconstructed logic in a linear path. Reconstructed logic means that the research follows pre-existing, systematic steps such as piloting first, then data
collection and then data analysis. Following a linear path involves following a fixed sequence of events one step at a time.

The goals of the research are simultaneously exploratory, descriptive and explanatory. Firstly, the research is exploratory because it is concerned with becoming familiar with basic facts and creating a general mental picture of outsourcing in the mining industry. Secondly, the research is descriptive because it provides a detailed and accurate picture of outsourcing in the mining industry and locates new data that vets existing information. Finally, the research is explanatory because it tests an existing explanation or prediction; namely, the claim that mining is not a core competency by Steenkamp and van der Lingen (2014). Furthermore, the study is concerned with explaining why outsourcing occurs, which makes it explanatory in nature.

In terms of time dimension, the study employed a cross-sectional approach because it is concerned with the state of outsourcing at this point in time. A longitudinal approach would be more suited if the study was concerned with the evolution of outsourcing in the mining industry and growing trends. In terms of approach, the study is positivist because it seeks to be exact and objective using quantitative methods through surveys and statistics. In addition, the purpose of the research is scientific explanation – to discover and document the state of outsourcing in the mining industry – which makes it positivist.

As with most quantitative studies, the research first conceptualizes and then operationalizes. The study explores the definition of outsourcing and other related concepts and constructs at length in the literature review. All concepts and constructs are clearly defined in the survey. Then, through operationalization, the study “links [the] conceptual definitions to specific sets of measurement techniques or procedures” (Neuman, 2003, p. 174). For example, using
rules of correspondence, the reasons for outsourcing are measured in terms of importance on a scale of one to five with one being not at all important and five being extremely important.

In terms of measurement, the study employs both nominal and ordinal methods of measurement. More specifically, some measurements give direct amounts such as the percentage of respondents who outsource a certain activity while some measurements are ranked on a Likert scale such as the level of risk for specific outsourcing activities. The list of answers being measured is non-exhaustive. Only the most important and relevant options were included in the responses. In terms of sampling, the study used haphazard sampling initially, getting as many companies to participate as possible then switched to purposive sampling where only companies with producing mines were contacted. The study was self-administered over e-mail.
Chapter 4: Results

4.1 Descriptive Statistics – Respondent Information

Of the respondents, 83% owned producing mines and 17% were juniors engaged in exploration as seen from Figure 4-1. Originally, the survey contacted a population consisting of 84.9% juniors and 12.1% producing mines, which means that companies with producing mines are under-represented in the sample. Another 3% were no longer in operation or were unreachable so were dropped from the sample. A hundred and six of the companies responded to the survey. This makes the return rate 7.5%. However, it is important to note that halfway through the surveys, the study stopped contacting juniors because their activities were not relevant to the study. So the actual return rate is higher and comes primarily from the 12% of the companies with producing mines.

The sample should exclude juniors for future studies because juniors do not have much activity aside from exploration and drilling, which is always outsourced. The study is more interested in the outsourcing activities of companies who own assets and use them at producing mines. Therefore, the study has opted to exclude all data from junior mining companies from analysis. The results that follow are all from companies with producing mines.
In terms of size, nearly half the companies employed more than 100 people. As seen from Table 4-1, some 27.2% employed less than ten people while 16.3% employed 10-50 people. Some 3.3% employed 50-100 people and 14.1% employed 100-500 people. Ten percent of the companies employed 500-1000 people and 28.3% employed greater than 1000 people. The sample included many of the biggest Canada-based global mining companies.

Table 4-1 Company Size

<table>
<thead>
<tr>
<th>Number of employees in the company:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>27.2%</td>
</tr>
<tr>
<td>10-50</td>
<td>16.3%</td>
</tr>
<tr>
<td>50-100</td>
<td>3.3%</td>
</tr>
<tr>
<td>100-500</td>
<td>14.1%</td>
</tr>
<tr>
<td>500-1000</td>
<td>10.9%</td>
</tr>
<tr>
<td>More than 1000</td>
<td>28.3%</td>
</tr>
</tbody>
</table>

Figure 4-2 shows the commodities mined by companies with producing mines only, meaning that juniors are excluded. Gold is the most mined commodity with 68.1% of the
producers mining gold. Next is silver at 42.0% followed by copper at 36.2%. Lead/zinc, coal, iron and potash are mined but are not as popular. Other commodities mined by producers include but are not limited to: diamond, manganese, nickel, tungsten and uranium. The numbers do not add up to 100% because many of the companies mined more than one commodity.

![Figure 4-2 Commodities Mined by Companies with Producing Mines](image)

The mining companies are primarily based in Canada with mines worldwide. Figure 4-3 shows the dispersion of the mine sites and head offices of the companies with mines in production. As mentioned later in the chapter, almost every company surveyed outsources, so this means the descriptive statistics are a representative profile of the average company in the mining industry. Table 4-2 displays the geographic dispersion of mines and head offices by continent for companies with producing mines for all respondents.
The majority of the survey respondents were in upper management/executive. As seen from Figure 4-4, some 41% of the respondents were Chief Executive Officers (CEOs), 16% were Chief Operating Officers (COOs) and 13% and 10% were managers and vice presidents respectively. Four percent of the respondents were directors, and other respondents included Chief Financial Officers or senior mining engineers.
4.2 Outsourcing Information

As seen from Figure 4-5, 89.7% of the companies surveyed who have producing mines outsources or have outsourced all or any part of their mining and mineral processing activities. So far, there is no evidence of extreme outsourcing, which is defined as outsourcing majority of one’s business activities. The companies surveyed outsource parts of their business activities but not most or all of them.
As seen from Figure 4-6 below, the top activity outsourced by companies with producing mines is construction services during mine operation, which comprises 75.4% of the activities outsourced by all respondents. This is followed closely by mining (drilling and blasting) and mining (loading and hauling), which comprise 65.2% and 55.1% of the activities outsourced by respondents respectively. Other major outsourced activities include exploration services during mine operation (43.5%) as well as mining/tunneling (34.8%), mineral processing (crushing, grinding and flotation) at 14.5% and waste management (tailings dam operation) at 17.4%. Mineral processing (concentrate logistics/concentration) and mineral processing (leaching) are also outsourced but not as much as the aforementioned activities – i.e. mining – where most of the outsourcing occurs. The numbers do not add to 100% because companies outsourced
multiple activities. When asked whether they would consider more outsourcing, 77.3% responded that they would consider more outsourcing while 22.7% responded that they would not.

It is important to note here that the study did not investigate outsourcing of pre-production activities such as mine construction because it is well known that those activities are all outsourced. It would not yield new information and ergo, the study only focused on outsourcing of production activities. Supporting functions such as catering and human resources are also widely outsourced but it is not the focus of this study. Other activities outsourced as listed by respondents include (in no particular order): maintenance (including that of mining fleet and smelter); security, environmental and community engagement services; design and construction of tailings dam; reclamation; and grade control drilling.

![Figure 4-6 Activities Outsourced by Producing Mines](image)

In addition to the online survey, follow up calls were made to a number of companies to determine who paid for or owns the equipment provided by the outsourcing suppliers during the
outsourcing process. A majority responded that the outsourcing supplier fully provides and owns the assets needed during the outsourcing process. The equipment provided by the outsourcing supplier includes but is not limited to: blast hole drills, shovels, haul trucks, scrapers, dozers, mill equipment (crusher, grinding mills, hydrocyclone, etc), explosives and ancillary equipment.

The fact that outsourcing suppliers own the necessary equipment for outsourcing could be indicative of mining companies shedding plant and equipment assets or outsourcing to shed plant and equipment assets. Again, it is important to note that outsourcing primarily occurs in mining unit operations and that if plant and equipment are being shed, it is occurring with mining equipment and less so in mineral processing equipment. In fact, many of the companies that outsource mineral processing own, buy or rent the necessary equipment and hire contractors to operate the equipment. One company explained that this is because mineral processing equipment requires large investments, which many outsourcing suppliers cannot support.

4.3 Reasons for Outsourcing

Figure 4-7 lists the reasons survey respondents (excluding juniors) chose to outsource rather than perform in-house. The respondents were asked to rate the reasons in terms of importance with one being not at all important and five being extremely important. The results show the weighted average of the responses. The top reason for survey respondents for outsourcing is access to specialized competencies, including skilled labour, which was rated at 3.78 out of 5 in terms of importance. This was followed closely by flexibility as a reason for outsourcing, which includes adapting to seasonality, changes in geology and commodity prices and short-term needs and life of mine (such as a mine with a life of 5 years or 7 years).

While the companies saw decrease in capital expenditure and avoiding investment in fixed assets as a significant reason for outsourcing (rated 3.37 out of 5), they did not rate
lowering fixed costs as highly. In fact, investigating the balance sheets of some of the companies
that outsource mining did not show significant decrease in the property, plants and equipment
section of their assets. The property, plant and equipment (PPE) section of their balance sheet
comprised more than 60% of their total assets, which is on the normal to high end of the
spectrum. The PPE of some companies was nearly 80%, which is notably high.

Another important reason for outsourcing was the desire to focus on core competencies.
However, what defines core competency will be explored further later in the chapter.
Interestingly, access to innovation was barely important to respondents as a reason for
outsourcing. This raises the question: who is innovating and whether outsourcing suppliers are
the point of innovation in the production cycle. Other reasons that did not feature prominently as
a reason for outsourcing but were mentioned in Steenkamp and van der Lingen (2014, p. 851) as
important reasons for outsourcing were relationship with unions, who most likely inhibit
outsourcing such as at Highland Valley Copper (Teck), and relationship with suppliers. Other
reasons that the respondents entered as reasons for outsourcing include use of local assets and
relationship with the community.

One thing that was noticeable from the study was that the top five reasons for outsourcing
were not rated much differently; note that the maximum rating was 5.0. There is little difference
between a rating of 3.45 (flexibility) and a rating of 3.78 (access to specialized competencies).
This means that the top reasons to outsource may not need to be ranked at all. They are all
equally important. However, what is clear is that outsourcing in the mining industry is still in the
‘strategic outsourcing’ phase and have not evolved into transformational outsourcing, which is
about building flexible and adaptive organizations consisting of loosely coupled network of

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suppliers. Mining companies are still very concerned with outsourcing to access skills and knowledge where the company lacks expertise in addition to cutting costs.

It is interesting that relationship with community and relationship with unions do not feature higher on the rankings. One would presume outsourcing to local providers would improve relationships with the community, creating jobs and stimulating the economy. Relationship with unions should inhibit outsourcing, as unions would oppose loosing their job to outsourcing suppliers. Another interesting aspect is that access to innovation did not feature higher on the rankings either. This begs the question: who is innovating? It is clearly not the outsourcing suppliers.

Figure 4-7 Reasons for Outsourcing for Companies with Producing Mines
4.4 Outsourcing Risk

Respondents were asked to rate various risks that could be incurred during outsourcing with one being not at all risky and five being extremely risky. Overall, the respondents did not perceive any of the risks as being particularly severe. The highest risk, which was rated at 2.96 out of 5, was quality control. Next was delays and disruptions at 2.89 out of 5 followed by adherence to health, safety and environmental standards at 2.73 out of 5. Other risks included cost control, maintenance of the production schedule, creation of dependency/loss of control, ability to coordinate with supplier and information confidentiality. Figure 4-8 shows further details on risks with regards to outsourcing. The fact that there was not a great disparity between the risk ratings could be indicative of problems in the question design or that respondents did not give careful consideration when they were filling out the survey. It is also possible that all risks are equally important, but in future studies, some method should be developed to collect better thought out responses.

![Figure 4-8 Outsourcing Risks](image)
When the all the companies were asked whether they would consider more outsourcing, 76.5% stated that they would consider more outsourcing as seen from Figure 4-9.

![Additional Outsourcing](image)

**Figure 4-9 Additional Outsourcing**

### 4.5 Critical Success Factors

The study surveyed what helps create a successful outsourcing arrangement by asking respondents to rate certain Critical Success Factors (CSFs) on a scale of one to ten with one being most important and ten the least. The respondents were requested to rank the CSFs in terms of efforts required to put them in place and potential value created by putting them in place. The results were then tabulated using their weighted averages. Table 4-3 and Table 4-4 display the results.
### Table 4-3 Critical Success Factors - Effort Required

<table>
<thead>
<tr>
<th>CSFs</th>
<th>Effort Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>A fair and mutually beneficial contract</td>
<td>4.74</td>
</tr>
<tr>
<td>The establishment and documentation of clear goals and objectives</td>
<td>4.81</td>
</tr>
<tr>
<td>Pro-active recovery plans when outcomes are at risk</td>
<td>4.90</td>
</tr>
<tr>
<td>Formalisation of roles and responsibilities</td>
<td>4.92</td>
</tr>
<tr>
<td>Ongoing senior management support</td>
<td>4.96</td>
</tr>
<tr>
<td>Shared values and beliefs, driving a spirit of partnership</td>
<td>5.09</td>
</tr>
<tr>
<td>Flexibility in the contract to allow for changes to scope and conditions</td>
<td>5.11</td>
</tr>
<tr>
<td>A strong group of contract management specialists</td>
<td>5.11</td>
</tr>
<tr>
<td>Adequate incentive schemes, both gains and penalties</td>
<td>5.16</td>
</tr>
<tr>
<td>Strong communication channels, driving continuous communication and knowledge sharing</td>
<td>5.16</td>
</tr>
<tr>
<td>Providing the contractor with (or assessing the contractor’s) Standard Operating Procedures</td>
<td>5.44</td>
</tr>
<tr>
<td>Extensive reporting from service provider to owner on standards and performance</td>
<td>5.48</td>
</tr>
</tbody>
</table>

### Table 4-4 Critical Success Factors - Potential Value Created

<table>
<thead>
<tr>
<th>CSFs</th>
<th>Potential Value Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>A fair and mutually beneficial contract</td>
<td>4.78</td>
</tr>
<tr>
<td>Strong communication channels, driving continuous communication and knowledge sharing</td>
<td>4.71</td>
</tr>
<tr>
<td>Flexibility in the contract to allow for changes to scope and conditions</td>
<td>4.76</td>
</tr>
<tr>
<td>Adequate incentive schemes, both gains and penalties</td>
<td>4.93</td>
</tr>
<tr>
<td>Pro-active recovery plans when outcomes are at risk</td>
<td>5.00</td>
</tr>
<tr>
<td>Shared values and beliefs, driving a spirit of partnership</td>
<td>5.01</td>
</tr>
<tr>
<td>Formalisation of roles and responsibilities</td>
<td>5.08</td>
</tr>
<tr>
<td>The establishment and documentation of clear goals and objectives</td>
<td>5.19</td>
</tr>
<tr>
<td>Extensive reporting from service provider to owner on standards and performance</td>
<td>5.30</td>
</tr>
<tr>
<td>A strong group of contract management specialists</td>
<td>5.37</td>
</tr>
<tr>
<td>Providing the contractor with (or assessing the contractor’s) Standard Operating Procedures</td>
<td>5.41</td>
</tr>
<tr>
<td>Ongoing senior management support</td>
<td>5.56</td>
</tr>
</tbody>
</table>
As seen from the weighted averages in Table 4-3 and Table 4-4, none of the CSFs were rated particularly high or low. All CSFs were ranked more or less equally important with slight discrepancies. The top three CSFs in terms of effort required were a fair and mutually beneficial contract, the establishment and documentation of clear goals and objectives and pro-active recovery plans when outcomes are at risk. The top three CSFs in terms of potential value created were a fair and mutually beneficial contract, strong communication channels, driving continuous communication and knowledge sharing and flexibility in the contract to allow for changes to scope and conditions. Figure 4-10 shows the CSFs with effort required and potential value created combined. The most important CSFs overall are a fair and mutually beneficial contract, pro-active recovery plans when outcomes are at risk, flexibility in the contract, strong communication channels and adequate incentive schemes. Shared values and beliefs are also important when the effort required and potential value created is combined.
4.6 Core Competency

Steenkamp and van der Lingen (2014) tested whether mining is a core competency on one mid-tier mining company in South Africa. First they asked if the company perceived mining as a core competency and then they tested their perception against the seven key traits of a core competency defined by Quinn and Hilmer (1994). The respondents were asked whether their mining operations have the seven traits of a core competency, which are: the activity is based on skills and intellectual property, creates flexibility, is one of the top three capabilities of the company, fills a gap in the industry, performed better by the company than providers, shareholders/customers care about them and it is embedded in company processes. The results showed a mismatch between the perception and the seven traits, meaning that mining was not a...
core competency for the particular company Steenkamp and van der Lingen (2014) investigated. Some 70% of the company’s respondents perceived mining to be a core competency yet less than 70% saw their activities meeting the seven traits of a core competency.

This study applied the work by Steenkamp and van der Lingen (2014) among a hundred and six Canadian mining companies with global operations as well as expanding the study to include mineral processing, not just mining. The results are shown in Figure 4-11, but it is important to note that the junior mining companies were excluded from the analysis. The results will only focus on companies with producing mines. Unlike the findings of Steenkamp and van der Lingen (2014), a greater number of the respondents, 92.1%, view mining and mineral processing as a core competency. This was vetted against the seven traits of a core competency (Quinn and Hilmer,1994). The sixth trait was not wholly applicable to the mining industry as mentioned earlier but it is still included in the analysis. As seen from the red line drawn on Figure 4-11, none of the traits of core competencies reached – although somewhat close – 92.06% agreement. More specifically, only 63.5% view mining and mineral processing as based on skill sets and intellectual property while 83.9% see it as creating flexibility.

Some 79.7% view mining and mineral processing as one of the top three capabilities in the company and another 79.9% believe that their company is technically better positioned to conduct owner-operated mining and mineral processing activities than potential service providers. Some 63.9% view their mining and mineral processing as performed better than industry peers, and only 12.5% see their mining and mineral processing as embedded in systems and processes and not people and skills. Overall, the respondents’ perception of mining and mineral processing does not match the traits of core competencies.
The findings confirm those of Steenkamp and van der Lingen (2014): mining and mineral processing appear not to be core competencies for mining companies. It is possible that the results may change if mining and mineral processing were evaluated separately as we found during this study that many companies outsource mining but not as many outsource mineral processing. Therefore, it is possible that mineral processing is the core competency and mining is not. This is a topic for future studies.

What the results mean is that mining and mineral processing should be evaluated carefully as candidates for outsourcing. Quinn and Hilmer (1994) argue that companies should focus on “core competencies” and “strategically outsource” the rest. They list four successful outcomes in doing so: maximize returns on internal investments, protect market share by keeping out competitors, leverage outsourcing supplier competencies that are hard to access or duplicate and decrease risks, lower investment and create flexibility. For its core competencies, “a company must ensure that it maintains absolute preeminence”, state Quinn and Hilmer (1994).

Figure 4-11 Mining and Mineral Processing as Core Competencies for Companies with Producing Mines
In evaluating mining and mineral processing as a core competency using Quinn and Hilmer’s (1994) model, it is important to assess whether the traits are applicable to the mining industry. This could in fact be a new avenue of research, as mentioned in the Recommendations for Future Research section of the study. It is possible that new traits for core competencies need to be developed for the mining industry. However, given the current model, mining and mineral processing do not appear to be core competencies for the mining industry.

The first trait for core competencies – that the activity be based on skills and knowledge sets, not products, functions or physical assets – does appear to fit the mining industry. In an environment where the product – commodities – is homogeneous, there is no way to differentiate the product from competitors and gain a business advantage via the product. However, knowledge sets and skills such as better engineering or new mining technologies can provide a competitive edge and serve as a core business activity. However, physical assets do play an important role in mining such as mills, equipment and land, which means that in some ways, this trait does not fully capture the essence of the mining industry. Ultimately, both skills sets and intellectual property and physical assets are highly regarded in the mining industry.

The second trait of core competencies put forward by Quinn and Hilmer (1994) is that the competency be based on flexible long-term platforms, capable of adaptation and evolution. This quality seems applicable to the mining industry in that mining companies do need to be able to adapt to changing environments such as adapting to the various different jurisdictions in which their mines are located. A vast majority – 83.9% – of companies with producing mines perceive their mining and mineral processing activity as creating flexibility but it still does not meet the 92% threshold for being a core competency.
The third trait of core competencies – that the activity be one of the top three capabilities in the company – does apply to the mining industry. A company cannot excel in everything and must focus its energies on what it does best and what matters most. However, the result that only 79% of the companies surveyed believe that mining and mineral processing are part of their top three capabilities is an interesting finding because it is difficult to determine what else could be more important to a mining company than mining and mineral processing.

The fourth and fifth traits of core competencies – that the company be better positioned than competitors and that it performs better than its competitors – is an applicable core competency trait for mining. Mining companies need to be better than competitors in terms of efficiency and profitability to compete effectively. According to Quinn and Hilmer (1994), “companies consistently make more money than their competitors only if they can perform some activities — which are important to customers — more effectively than anyone else. True focus in strategy means the capacity to bring more power to bear on a selected sector than any competitor can.” This is highly relevant to mining.

The sixth trait of core competencies is that the function be important to customers in the long run. This quality is problematic to apply to the mining industry where the customer is difficult to identify. Likely the respondents meant whether the core competency is important to shareholders. If so, some 67.3% of the respondents believe that mining and mineral processing competency is important to shareholders.

The final trait of core competencies is that the activity be embedded in the organization’s systems rather than be based on people and skills. This does apply to the mining industry because depending on star players (i.e. employees) would mean that the activity will cease to be performed or performed less successfully if the star players leave. The company must be able to
perform its core activities irrespective of who is on the team. As such, this quality is very much applicable to the mining industry. Unfortunately, only 12.5% of companies with producing mines believe that their mining and mineral processing activities are based on systems and processes rather than people and skillsets. This could mean that either depending on people and skills is a trait of core competencies for the mining industry or that mining and mineral processing are indeed not a core competency. It is possible that mining companies see their people and skills as much more important than systems and processes. If they lose people and skills, they could see themselves in a disadvantage. It is possible that systems and processes may not be highly applicable to mining and therefore the Quinn and Hilmer factors need to be revised. This judgment is left for further research.

4.7 Limitations of the Research

There are a number of ways in which the study could be improved for future studies. One of the ways this could happen is if juniors were excluded from the survey sample. The study should have only focused on companies with mines in production. While it was interesting to determine that juniors outsource as much as large companies do such as their drilling and exploration, it does not help determine whether companies are shedding assets to improve ROA. Juniors outsource essentially everything but they do not have much to outsource and is therefore not relevant to the study. The study did ultimately separate the juniors from the producing mines in the data analysis but this extra step could have been saved if the study just focused on firms with producing mines.

Another way the study could have been improved is if the study focused on a global sample. The study only focused on primarily Canadian companies albeit with international
operations. It would have been interesting to see if samples from Australian or South African mining companies would have changed the study outcome. However, the sample was comprehensive in that it was a list of all Canadian companies listed on the database SNL. In addition, the sample size was only 106 companies with a return rate of 7.5%. One thing that may have improved this return rate is if the study did not ask for personal information (i.e. name, employer, position). It is possible but some people opted not to take the survey due to privacy concerns. Or if the questionnaire was more clear in requesting respondents to complete the questionnaire even if they did not include their personal information.

One of the questions in the survey was: if your company has outsourced, what assets/equipment were provided by the outsourcing supplier? (see Appendix B for the complete survey) The purpose of this question was to determine if companies are shedding assets to improve ROA using outsourcing. Unfortunately, the question is vague and does not indicate who owns the assets/equipment used during outsourcing. This critical question could have been better phrased such as “who owns the equipment/assets used during the outsourcing engagement?” with the answer offering a) outsourcing supplier and b) the outsourcing company. Because of the ambiguity of the question, the study had to contact a handful of respondents post-survey to determine who actually owns the assets/equipment. This extra step could have been saved if the question was better phrased, and we would have had a more complete answer set instead of just from handful of respondents.

Another concern with the study was that the questions on critical success factors and risks of outsourcing did not receive clear responses. The ratings for how important a given CSF or risk was did not differ very much from each other. All the risks and CSFs were rated similarly in terms of importance, which begs the question as to whether the questions were not phrased well.
It is also possible that the respondents did not know or care about the risks and CSFs of outsourcing. In future studies, some method should be developed to receive clearer responses to the questions of CSF and risk. Perhaps using multiple indicators to measure the same variable would have yielded more definitive answers – i.e. examining the same question from different angles or using different questions.

Finally, for the mining and mineral processing as core competency questions, the study should have separated mining from mineral processing. It became clear during the study that most companies outsource mining but few outsource mineral processing. This could be an indicator of the fact that mining is not a core competency but mineral processing is (i.e. revenue generator). This is something that could have been determined through the study if the study separated mining from mineral processing when asking whether they are core competencies.

Another limitation with the core competency questions was the fact that the seven traits of a core competency put forward by Quinn and Hilmer (1994) and used by Steenkamp and van der Lingen (2014) may not all apply to the mining industry. For example, the sixth core competency trait is that shareholders and customers must care about the activity or put another way there is customer impact. But this is difficult to assess in the mining industry where it is unclear who the customers are. Furthermore, the fifth trait is that the activity must be performed better than industry peers. This is again, problematic to evaluate because it is difficult for companies to assess themselves as performing better or worse than industry peers.

Finally, it is important to note that the researcher did not have any experience in mining. The researcher comes from an Economics background, which could have affected all steps of the research from survey design to data analysis. If the researcher had a background in mining, it possible that greater insight would have been made during data analysis or the survey questions
could have been created differently. The study tried to limit the effects of this shortcoming by seeking inputs and recommendations from others at every step of the study. The lessons learned were that the survey questionnaire could have included more questions, which are discussed in the recommendations for future research section in the conclusion.
Chapter 5: Conclusions and Recommendation for Future Research

5.1 Conclusion

The purpose of this study was to report on the overall state of outsourcing in the mining industry, which has not been done before in academia or the public domain. The study was motivated by the desire to answer the following questions:

1. Who is outsourcing?
2. How prevalent is outsourcing?
3. What activities are being outsourced?
4. Why are they outsourcing (are they shedding assets to improve ROA? Are they trying to gain access to specialized skills and knowledge? etc)?
5. What are the risks of outsourcing?
6. What are the critical success factors in outsourcing?
7. And are mining and mineral processing core competencies for mining companies so that they can be evaluated for outsourcing?

The study also hoped to determine whether there is evidence of extreme outsourcing in the mining industry.

Conclusion 1: In terms of who is outsourcing, everybody in the mining industry is outsourcing from juniors who outsource exploration and diamond drilling to mega-corporations who outsource mining and mineral processing. More specifically, the profile of the survey respondents consists of mostly Canadian firms who have global operations. The respondents mine gold, silver, copper and various other commodities. Some 39% of the companies employ more than 500 people to thousands of people while 83% of the companies have mines in
production. A majority of the respondents were upper management such as CEOs, COOs and CFOs.

Conclusion 2: In terms of prevalence, nearly 90% or 89.7% of companies with producing mines outsource or have outsourced in the past. The number is 82.6% for overall respondents. However, there are no signs of extreme outsourcing among companies with producing mines so far.

Conclusion 3: Companies outsource mining more so than mineral processing with 53.6% of the companies outsourcing drilling and blasting while 46.4% outsource loading and hauling. Some 28.6% outsource tunneling while only 17.9% outsource crushing, grinding and flotation. Even less outsource concentration and leaching: 13.1% and 10.7% respectively. The numbers for outsourcing of mineral processing are lower especially for companies with producing mines because mineral processing requires high capital expenditure, which most outsourcing suppliers do not have the resources for.

Conclusion 4: The main reason for outsourcing among mining companies is to access specialized competencies such as skilled labour. Flexibility such as adapting to seasonality, changes in geology and commodity prices and short-term needs and life of mine (such as a mine with a life of 5 to 7 years) is another big reason for outsourcing. The desire to reduce fixed costs and capital expenditure or investment in fixed costs is also an important reason to outsource, but there is no evidence of increased ROA. Access to innovation somewhat affects the decision to outsource but not significantly.

Conclusion 5: Other prominent reasons for outsourcing include the desire to focus on core competencies. However, mining and mineral processing are not core competencies for mining companies according to the seven traits of core competencies defined by Quinn and
Hilmer (1994) (but whether the model fits the mining industry is up for debate and is a topic for future studies). This is especially true for companies with producing mines although some 92.06% believe that mining and mineral processing are core competencies. According to Hamel and Prahalad (as cited in Steenkamp and van der Lingen, 2014), the real core competencies for mining companies could be financing and management. This means that mining and mineral processing should be evaluated for outsourcing.

Conclusion 6: Mining companies are not significantly deterred by the various risks of outsourcing. All of the risks listed by the study were rated similarly in terms of importance. Their biggest concern was quality control, rated 2.96 out of 5 in terms of importance. Delays and disruptions to production also featured in the top risks as well as adherence to health, safety and environmental standards. Costs control was somewhat of a concern to mining companies who outsource, rated 2.7 out of 5. Other risks faced by outsourcing mining companies include creating dependency/loss of control and information confidentiality.

Conclusion 7: Overall, all the critical success factors for outsourcing in the mining industry were rated similarly in terms of effort required and potential value created with slight discrepancies. The most important critical success factor was a fair and mutually beneficial contract. In addition, pro-active recovery plans when outcomes are at risk feature prominently as a critical success factor as well as the establishment and documentation of clear goals and objectives. Ongoing senior management support and extensive reporting from service provider to owner on standards and performance were not rated as highly in terms of effort required and potential value created in an outsourcing arrangement.
5.2 Recommendations for Future Research

Perhaps the biggest issue with the study was that the limited scope of the research left many questions unanswered. These questions include but are not limited to: outsourcing strategy, outsourcing arrangements, supplier selection, contractual and relationship governance, management strategies, outsourcing outcomes, available supplier capabilities, client and supplier behaviors and lessons learned. The study also could have delved deeper into whether companies are reducing capital expenditure or shedding assets as a result of outsourcing.

Another interesting question that could have been investigated is what would happen to the relationship between mining companies and governments of resource rich countries as a result of outsourcing. Dobbs et al (2013) suggest closer relationships between governments and mining companies to mitigate the resource curse. It would be interesting to ask if outsourcing contributes to a closer relationship although it would be somewhat challenging to determine how the study can measure the willingness of governments to form closer partnerships. The study could have contacted officials of governments of developing countries through projects in governance and capacity building being undertaken by the Canadian International Resources and Development Institute, which is headquartered at UBC (www.cirdi.ca). The Shared Value Initiative (www.sharedvalue.org) is also an excellent source of information.

In addition to the above directions, the study could have also contacted suppliers to ask about innovation. Interesting questions to ask would have been who will innovate, would suppliers carry out innovation to gain competitive advantage, would suppliers feel the need to do that and under what circumstance and what would be the innovation insertion points. Finally, another interesting avenue for research would be to explore which of Quinn and Hilmer’s (1994) core competencies apply to the mining industry or in fact, to come up with new traits of core
competencies specific to the mining industry. It was discussed earlier that Quinn and Hilmer’s core competencies do not perfectly fit the mining industry so this would be an interesting new avenue of research.
Bibliography


Appendices

Appendix A  Complete Survey

1. Respondent Information

The University of British Columbia (UBC)'s Norman B Keevil Institute of Mining is conducting a study on the state of outsourcing in the mining industry. We are interested in who is outsourcing, what activities or services are being outsourced and why outsourcing is being done, among other topics. Please skip any question that does not apply. Throughout the survey, the term "outsourcing" is defined as the procurement of goods and services and/or the performance of value-adding activities from outside providers.

1. Full name:

2. Name of company/Employer:

3. Department/Position:

4. Commodities mined by the Company:

☐ Gold
☐ Silver
☐ Copper
☐ Iron
☐ Coal
☐ Diamond
☐ Lead/zinc
☐ Potash
☐ Other (please specify all)

5. Location of mine or office (city, country):
6. Number of employees in the company:

- [ ] Less than 10
- [ ] 10-50
- [ ] 50-100
- [ ] 100-500
- [ ] 500-1000
- [ ] More than 1000
2. Outsourcing Information

Please skip any question that does not apply. Throughout the survey, the term "outsourcing" is defined as the procurement of goods and services and/or the performance of value-adding activities from outside providers.

7. Does or has your company outsourced all or any part of your mining or mineral processing activities?

☐ Yes
☐ No

8. What activities does/did your company outsource? Please include all outsourced activities from the past.

☐ Exploration Services (during mine operation)
☐ Construction Services (during mine operation)
☐ Mining - drilling and blasting
☐ Mining - loading and hauling
☐ Mining - tunnelling
☐ Mineral processing - crushing, grinding and flotation
☐ Mineral processing - leaching
☐ Mineral processing - concentrate logistics/concentration
☐ Waste management - waste dump operation
☐ Waste management - tailings dam operation

Other (please specify all):

9. If your company has outsourced, what assets/equipment were provided by the outsourcing supplier?
10. What was the reason for outsourcing? Please select the level of importance for each one.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Not at all Important</th>
<th>Slightly Important</th>
<th>Moderately Important</th>
<th>Very Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to innovation/technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to specialised competencies including skilled labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility (such as adapting to seasonability, changes in geology, commodity prices, short-term needs and life-of-mine etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desire to focus on core competencies</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>To decrease capital expenditure/to avoid investment in fixed assets</td>
<td></td>
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<tr>
<td>To lower fixed costs</td>
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<tr>
<td>Relationship with unions</td>
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</tr>
<tr>
<td>Relationship with suppliers</td>
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<tr>
<td>Relationship with community</td>
<td></td>
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<tr>
<td>Other reasons for outsourcing (please specify):</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
11. Please select the level of risk for the following categories when outsourcing an activity

<table>
<thead>
<tr>
<th>Category</th>
<th>Not at all Risky</th>
<th>Slightly Risky</th>
<th>Moderately Risky</th>
<th>Very Risky</th>
<th>Extremely Risky</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to coordinate with the supplier</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Maintenance of the production schedule</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Cost control</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Quality control</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Delays and disruptions</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Information confidentiality</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Adherence to health, safety and environmental standards</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Create dependency, loss of control</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Other risks associated with outsourcing (please specify)

12. Would you consider more outsourcing?

- [ ] Yes
- [ ] No

If yes, under what circumstances?

...
3. Critical Success Factors

Please skip any question that does not apply. Throughout the survey, the term "outsourcing" is defined as the procurement of goods and services and/or the performance of value-adding activities from outside providers.
13. If outsourcing, certain Critical Success Factors are required. Please rank the following factors in terms of (i) Effort required to put them in place and (ii) Potential value created by putting them in place (1 being the highest and 10 being the lowest).

<table>
<thead>
<tr>
<th>Effort Required - Rank</th>
<th>Potential Value Created - Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A fair and mutually beneficial contract</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Adequate incentive schemes, both gains and penalties</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Flexibility in the contract to allow for changes to scope and conditions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Extensive reporting from service provider to owner on standards and performance</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Providing the contractor with (or assessing the contractor's) Standard Operating Procedures</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Formalisation of roles and responsibilities</strong></td>
<td></td>
</tr>
<tr>
<td><strong>The establishment and documentation of clear goals and objectives</strong></td>
<td></td>
</tr>
<tr>
<td><strong>A strong group of contract management specialists</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pro-active recovery plans when outcomes are at risk</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Shared values and beliefs, driving a spirit of partnership</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Strong communication channels, driving continuous communication and knowledge sharing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ongoing senior management support</strong></td>
<td></td>
</tr>
</tbody>
</table>
4. Mining as a Core Competency

Please skip any question that does not apply. Throughout the survey, the term "outsourcing" is defined as the procurement of goods and services and/or the performance of value-adding activities from outside providers.

15. Do you believe that mining and mineral processing are core competencies for your company as owner operated functions?
   - Yes
   - No

16. Are the mining and mineral processing activities in your company based on (i) Skills sets and intellectual property or (ii) Physical Assets?
   - Skill sets and intellectual property
   - Physical assets

17. Would you classify your company’s mining and mineral processing activities as (i) creating flexibility or (ii) inhibiting flexibility?
   - Create flexibility
   - Inhibit flexibility

18. Do you believe that the capability of your company to perform mining and mineral processing activities internally is one of the top 3 corporate capabilities in the company?
   - Yes
   - No

19. Is your company technically better positioned to conduct owner-operated mining and mineral processing activities than potential service providers?
   - Yes
   - No

20. Is your company more efficient and effective at mining and mineral processing than its industry peers?
   - Yes
   - No
21. Do your company’s owner-operated mining and mineral processing activities provide your company with a competitive advantage over its industry peers in the larger commodity markets?
   - Yes
   - No

22. Is your company’s technical competence currently predominantly based on (i) people and skills or (ii) systems and processes?
   - People and skills
   - Systems and processes

23. Comments:

24. May we contact you by phone to follow up with the survey?
   - No
   - If yes, please provide your direct phone number:
Appendix B  Steenkamp and van der Lingen’s Survey

Research Survey:

CONTRACTOR VERSUS OWNER MINING: DECISION MAKING FRAMEWORK FOR ABC RESOURCES

Respondent Information:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Unit</th>
<th>Department / Position</th>
<th>Experience with Owner Mining (H,M,L)</th>
<th>Experience with Contractor Mining (H,M,L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Nr</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Do you believe that Mining (defined as drilling, blasting and hauling of coal, waste and related rehabilitation activities)</em> as an owner operated function is a core competency for ABC?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td><em>Is operational excellence in ABC-Owner-Operated-Mining based on</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skill Sets</td>
</tr>
<tr>
<td>Nr</td>
<td>Question</td>
<td>Response</td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>3</td>
<td>Would you classify ABC-Owner-Operated-Mining as (i) creating flexibility or (ii) inhibiting flexibility?</td>
<td>Create flexibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhibit flexibility</td>
</tr>
<tr>
<td>4</td>
<td>Do you believe that the capability of ABC to operate a mining process internally is one of the top 3 corporate capabilities in the company?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Is ABC technically better positioned to conduct Owner-Operated-Mining than potential service providers (contractor miners)?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>Is ABC better at Mining than its industry peers (e.g. Anglo, BHP, and Kumba)?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Do ABC-Owner-Operated-Mining activities provide ABC with a competitive advantage over its industry peers in the larger commodity markets?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Is ABC’s technical mining competence currently predominantly based on (i) people and skills or (ii) systems and processes?</td>
<td>People and Skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Systems and Processes</td>
</tr>
<tr>
<td></td>
<td>Comments:</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Listed below are a number of potential factors to consider when evaluating insourced vs. outsourced mining. Mark (X) the model</td>
<td>In-sourced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It Depends</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outsourced</td>
</tr>
</tbody>
</table>
(Insourced, Outsourced, It Depends) that is most likely to have an advantage in terms of each factor.

<table>
<thead>
<tr>
<th>Composite unit cost of production (Rand / ton)</th>
<th>(Owner)</th>
<th>(Contractor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest fixed cost / variable cost ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing potential variability in Cash Flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enabling efficient allocation of capital investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adapting with variability in Mining Rate (based on Life-of-Mine, seasonalities, changes in geology etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adapting to rapid change in Mining Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry-wide shortage of Mining skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing industrial relations and union / community considerations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alignment of Mining operation focus to larger corporate goals, objectives and strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linking into the larger mining community</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

<table>
<thead>
<tr>
<th>Nr</th>
<th>Question</th>
<th>Response</th>
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</thead>
<tbody>
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</tbody>
</table>
In the event that contractor mining is chosen, certain Critical Success Factors are required to ensure the success of outsourcing the Mining process. Rank the following factors in terms of (i) Effort required to put them in place and (ii) Potential value created by putting them in place.

<table>
<thead>
<tr>
<th>Effort required Tier (1-3)</th>
<th>Potential value created Tier (1-3)</th>
<th>Effort required Rank (1-12)</th>
<th>Potential value created Rank (1-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A fair and mutually beneficial contract</strong></td>
<td></td>
<td></td>
<td></td>
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<td><strong>Flexibility in the contract to allow for changes to scope and conditions</strong></td>
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<td><strong>Extensive reporting from service provider to owner on standards and performance</strong></td>
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<tr>
<td><strong>Providing the contractor with (or assessing the contractor’s) Standard Operating Procedures</strong></td>
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<td><strong>Formalisation of roles and responsibilities</strong></td>
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<td><strong>The establishment and documentation of clear goals and objectives</strong></td>
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<tr>
<td><strong>A strong group of contract management specialists</strong></td>
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<tr>
<td><strong>Pro-active recovery plans when outcomes are at risk</strong></td>
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<tr>
<td><strong>Shared values and beliefs, driving a spirit of partnership</strong></td>
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<tr>
<td><strong>Strong communication channels, driving continuous communication and knowledge sharing</strong></td>
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<tr>
<td><strong>Ongoing senior management support</strong></td>
<td></td>
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</table>