Prospective control of strategic capital investments in the mining industry – A controller point of view

Research proposal - 2013-09-25

BO KARLSSON

Department of Business Administration, Technology and Social Sciences
Accounting and Control
Luleå University of Technology
Luleå, Sweden, SE-97341
Telephone: +46 (0)920 492981
Fax: +46 (0)920 491399
E-mail: bo.karlsson@ltu.se
Abstract

Strategic capital investments (SCI) have a significant impact on the long term performance of companies. Yet, they are challenging, complex and involve a high degree of uncertainty. Previous studies also show that the suitability of different appraisal tools for SCIs is debatable. In the mining industry, SCI in new mining sites typically are highly capital intensive and have considerable long-term repercussions for local communities and regions. During the exploration phase it is essential to assess whether to allocate financial resources for additional exploitation of a mineral finding. The exploration phase allows companies to search for new opportunities that might lead to a competitive advantage. However, from a cost management point of view this is a decisive phase because large share of the production cost is determined here. Because the traditional functions of management accounting rely on established measurable outputs, they are less effective in this phase. Management control is demanding because money and resources cannot be traced to outcomes. This is a phase where control needs to be prospects-oriented. Knowledge is lacking when it comes to the specifics of how prospective control can be exercised and the possibilities for successful strategic control in the exploration phase. The overall purpose of this dissertation is to generate empirical knowledge of prospective control and to contribute with a more developed and dynamic theory of this concept in the context of strategic capital investments in the mining industry. The theoretical contributions of the planned papers are to generate theory about the nature and characteristics of prospective control in the context of SCIs and to create new insights about the controller perspective in this regard. The practical contributions of the proposed papers will be to identify factors and circumstances that are important to consider for practicing controllers in exploration environments.

Keywords: Prospective control, strategic capital investments, controller perspective, mining industry, management accountant
Prospective control of strategic capital investments in the mining industry – A controller point of view

1 Introduction

In recent years, the increase in innovation, new product development and entrepreneurship has resulted in a surge of interest for the capability to exercise management control in dynamic, changing and uncertain environments. While there is a need to strike a balance between exploration of new possibilities and exploitation of old certainties (March, 1991), several strands of literature converge in stressing the need to successfully orient management control towards future prospects under conditions of great uncertainty and complexity.

During exploration there is a lack of reliable information, invested capital and its returns are uncertain yet a long-term commitment is many times at stake. Exploration is decisive also because a large amount of the production costs will be determined here (Monden and Hamada, 1991), control is particularly complicated and overall satisfaction with controls is lower (Macintosh, 1994 p. 118). Often, strategic capital investments (SCIs) are being considered, that have implications for long-term survival and performance (Carr and Tomkins, 1998; Adler, 2000). One context in which such ‘prospective control’ (Macintosh, 1994 p. 117) will be particularly crucial is the mining industry. SCIs in mining can be divided into the different phases of exploration, development, mining and exit when the findings are depleted. Such SCIs are highly capital intensive and have considerable long-term repercussions for local communities and regions (Ejdemo and Söderholm, 2011). Companies depend on exploration for access to new mineral deposits, competitive advantage and market entry (Miles et al, 1978).

While previous research is rich with descriptions of the necessity to match the management control system (MCS) with the conditions that surround the company (e.g., Perrow, 1967; Miles et al, 1978; March, 1991; Simons, 1995), and the importance of keeping a balance between control mechanisms suitable in such situations (Miles et al, 1978; March, 1991; Simons, 1995) our knowledge of the dynamics in which processes of prospective management control unfold and the mechanisms involved in the pursuit of ‘matching’ and ‘balance’ is restricted.
Textbooks and fragmentary evidence suggest that prospective control consists of evaluation, planning and estimating future events rather than measuring and monitoring and that budgeting should be used for planning and coordination across departments (Dunk, 2011; Macintosh, 1994 p. 117). Control should be more of a dialog between controller and employees across all departments and that determining production target levels should involve the employees since they are experts or highly trained specialists in their field (Dunk, 2011; Macintosh, 1994 p. 117). This type of control calls for controllers that are learning oriented problem solvers capable of a trial and error approach and able to take future uncertain events into consideration (Coad, 1999). Previous research tend to approach prospective control from static point of view in order to determine the most suitable configurations of different control systems that fit best to various situations with different characteristics (Perrow, 1967; Miles et al, 1978; March, 1991; Simons, 1995). More recent research points out the important building blocks of prospective control yet, it still lacks a clearly defined way to practically use prospective control in a real world setting (Chenhall, Kallunki, Silvola, 2011; Jansen, Moeller and Schlaefke, 2011; Davila et al, 2009; Dunk, 2011;)

The overall purpose of this dissertation is to generate empirical knowledge of prospective control and to contribute with a more developed and dynamic theory of this concept in the context of strategic capital investments in the mining industry. The theoretical contributions of the planned papers are to generate theory about the nature and characteristics of prospective control in the context of SCIs and to create new insights about the controller perspective in this regard

The structure of the reminder of the paper is as follows. First, the concept of prospective control is defined in a broad sense and the characteristics of prospective control are discussed. The next section reviews the literatures on management control, strategy and innovation, and it is argued that a more dynamic view of prospective control is essential for achieving a better understanding of the concept and the underlying mechanisms in prospective control. In the following third section the context of strategic capital investments in the mining industry is outlined as an “ideal” case to explore the dynamics of prospective control. Thereafter the paper presents a discussion of research methods and a preliminary outline of my future dissertation. Finally, the paper ends with a concluding discussion.
2 The concept of prospective control

Previous research is unclear regarding prospective control. However, Macintosh, (1994 p. 117) describes prospects-oriented control as suitable when there is a shortage of reliable information. Prospects-oriented control is more a tool for evaluation, planning and estimation of the future than a tool for close measuring and monitoring. Therefore, controls should be less detailed, reports should occur less frequently while budgeting influence on planned investments should be used as a way of exchanging information (Henri, 2006; Macintosh, 1994 p. 117; Brownell and Dunk, 1991).

When invested means cannot easily be linked with, uncertain, future outcomes, budgets can be a way for controllers to coordinate departments, keep costs within limits and make speculative choices for future investments (Dunk, 2011; Macintosh, 1994 p. 117). Control reports typically involve coordination and planning and the controller serves as a mediator between employees across departments (Pierce and O’Dea 2003; Granlund and Lukka, 1998; Macintosh, 1994 p. 117). Quantitative appraisal tools are an example of the use of formal controls. This type of control tries to give knowledge of the best way of planning the work process, and rely upon measurability of future outcomes (Segelod, 2002). However, when outputs cannot be measured and the work process cannot be defined social control is better suited (Macintosh, 1994; Segelod, 2002).

Previous research is rich on what management control system (MCS) is most suitable during stable or unstable situations (e.g., Perrow, 1967; Miles et al, 1978; March, 1991; Simons, 1995, Macintosh, 1994; Segelod, 2002). Based on previous research this paper defines prospective control in a broad sense as control in the pursuit of new possibilities under dynamic circumstances (e.g. Miles et al, 1978; Macintosh, 1994; Segelod, 2002). Thus, examples of situations demanding prospective control include the early stages of investment projects or the development of new innovations. Dynamic circumstances like the ones above (e.g. outcomes are long-term, intangible, and unpredictable and costs are significant) are challenging to manage but decisive. This highlights the importance of a dynamic view of prospective control.
3 Prospective control over time

The foundations of prospective control can be traced back to the sixties and came from the insight that reaching a certain strategy needs different approaches. Organizations are complex but basically fit into four different classes: craft, non-routine, routine and engineering. This division into classes depends upon a technology variable that consists upon how analyzable problems are and how many exceptions the problem consists of (i.e. variations of the problem) shown in figure 1. (Perrow, 1967; Abernethy and Brownell, 1997)

The routine organizations are characterized with analyzable problems and few exceptions to these problems which often is the case in assembly line production. Craft organizations, like the routine, have few exceptions to problematic situations yet, they do have higher levels of unanalyzable problems demanding experts in that field. A non-routine organization has both unanalyzable problems and many exceptions to these problems. Engineering oriented organizations have many exceptions to problems yet these problems are analyzable like in the mining organizations. Organizations that reside in the non-routine and engineering fields deals with more dynamic and unpredictable work related situations. (Perrow, 1967; Abernethy and Brownell, 1997)

![Figure 1. Different technologies depending on number of exceptions and analyzability (Perrow, 1967).](image-url)
During the seventies the focus turned to the importance of keeping a balance between dynamic and stable situations. It was found that organizational strategies generally fall into four strategic categories namely *defenders, prospectors, analyzers* and *reactors* (Miles, Snow, Meyer and Coleman, 1978; Conant, Mokwa and Varadarajan, 1990; Andrews, Boyne and Walker, 2006). The reason for this is that different approaches to strategy are necessary depending on how an organization responds to entrepreneurial, engineering, and administrative situations (Miles et al, 1978; Conant et al, 1990; Andrews et al, 2006).

Defenders have a limited range of products and focus on efficiency and process improvement. The defender strategy will concentrate upon protecting current markets, maintaining stable growth and serving current customers (Miles et al, 1978; Conant et al, 1990; Andrews et al, 2006). Prospectors have a broad market/product domain and tend to lead change in the industry (Miles et al, 1978; Conant et al, 1990; Andrews et al, 2006). Organizations that follow the prospector strategy are highly innovative constantly trying out new markets and new opportunities with an orientation towards growth and risk taking (Miles et al, 1978; Conant et al, 1990; Andrews et al, 2006).

The analyzers strategy falls between the above two groups and uses efficiency and increased production in stable environments and innovates in more dynamic environments but not as innovative as the prospector (Miles et al, 1978; Conant et al, 1990). The analyzer can also use a “second-in” strategy and improve upon products offered by their competitors (Miles et al, 1978; Conant et al, 1990). The analyzer strategy is the most suitable strategy among larger organizations in order to keep a balance between protecting their core operations while at the same time creating new market opportunities (Miles et al, 1978; Conant et al, 1990). Analyzers try to have balance between exploration of new possibilities and exploitation of existing resources.

Reactors typically lacks a consistent strategic approach which means that they respond passively to environmental surroundings by reacting to these events but failing to anticipate or influence the events (Miles et al, 1978; Conant et al, 1990; Andrews et al, 2006). Most organizations that are categorized as reactors are underachievers which usually exhibit performance lower than that of defenders, prospectors or analyzers (Miles, et al, 1978; Conant et al, 1990; Andrews et al, 2006).
Balance between exploration of new possibilities and the exploitation of old certainties is a primary factor for organizational survival (March, 1991; Jansen et al, 2011; Widener, 2007; Wise and Spear, 2002; Voss and Voss, 2012). Exploration includes risk taking, experimentation, variation, flexibility, discovery or innovation. In the mining industry the prospecting of new mineral findings or expanding existing ones (e.g. deeper mining levels) is an example of exploratory actions necessary for long term survival (March, 1991).

Exploitation leans towards refinement, choice, efficiency, implementation, selection, production and execution. To a mining organization this is all about making as much profit as possible from the non-renewable findings of earlier phases of prospecting and to finance future endeavors (March, 1991; Voss et al, 2012). Organizations that solely relies upon exploration runs the risk of spending resources on projects or investments that in the end proves to be lost causes (e.g. new entrants in the mining industry) (March, 1991; Voss et al, 2012). However, organizations that solely rely upon exploitation run the risk of stagnation and may get overrun by their competitors or alternatively products may fail to reach its true potential or, as in the case of a mining industry, the mineral deposit will become depleted (March, 1991; Voss et al, 2012).

Managing a balance between exploration and exploitation allows organizations to be dynamic, adaptable and able to reach new markets or opportunities (March, 1991; Voss et al, 2012). At the same time the organization is robust and resilient which lets it protect its current markets and keep costs down (March, 1991; Voss et al, 2012). To a controller exploration is about introducing new information while exploitation is about how to use existing information (March, 1991; Voss et al, 2012). Exploitation uses existing information to calculate probable returns on investments. This is done with quantitative appraisal tools to find the most profitable investment decision (March, 1991; Voss et al, 2012). Exploration however, deals with the unknown trying out different alternatives which are long term and have uncertain returns (March, 1991; Voss et al, 2012).

Traditionally management control system involves the use of formal information-based routines (i.e. quantitative appraisal tools) which aims to guide managers to reach the stated goals of an organization (Simons, 1995 p. 5; Tuomela, 2005). These quantitative appraisal tools used to control organizations compares to the dials and gauges in an airplane cockpit as long as the set perimeters are in the safe predetermined zone no adjustment will be done to the
course of the airplane (Simons, 1995). Since organizational strategy, most often, aims at reaching financial success it might seem natural to use financial terms to measure performance (Tuomela, 2005). However, traditional management control systems that rely on historical information may hinder exploration, innovation and opportunities (Simons, 1995 p. 91; Tuomela, 2005; Jansen et al, 2011). Controlling organizations solely with quantitative tools based on set targets and goals risks control failures or even organizational crises (Simons, 1995; Tuomela, 2005). The traditional role of the controller in organizations works much in the same way. Diagnostic quantitative tools are used to monitor performance of single individuals, departments or the entire organization in order to fulfill preset goals and strategies (Friedman and Lyne, 1997; Coad, 1999; Kaplan and Norton, 1999). Controllers use these tools to secure revenues, market share and benchmark its performance against similar organizations (Baldvinsdottir, Nørreklitt, Burns and Scapens, 2009).

Control failures can be averted with adding levers of control of which diagnostic control system is but one of four aspects (Simons, 1995; Ferreira and Otley, 2009). The other three are beliefs, boundary and interactive control systems. Together these create a balance (Simons, 1995). Beliefs systems control mechanism works by way of symbols, artifacts, values and exemplary behavior that guide individuals to high performance and inspire to create new opportunities (Simons, 1995; Ferreira and Otley, 2009). Boundary systems are the formal rules and limits within organizations. These rules are often stated in negative terms or as minimum performance level. Interactive control systems are used by managers to personally connect with subordinates within the organization (Simons, 1995; Ferreira and Otley, 2009).

The focus of interactive control is to handle strategic uncertainties and to come up with new initiatives during these settings (Simons, 1995). These kinds of settings are often long-term, innovative and have uncertain outcomes (e.g. strategic capital investments) where budgets should be used for planning instead of controlling (Dunk, 2011; Simons, 1995). Control systems can be made more interactive by ensuring importance of a control system in a continuous dialog with subordinates, making sure that operating managers use and follow the control system on all levels of the organization (Widener, 2007; Simons, 1995). The role of the controller using interactive control should involve participation in face to face conversations with subordinates and continually challenging data, assumptions and action
plans (Widener, 2007; Simons, 1995). Maintaining a balance between the levers of control is considered suitable in order to achieve strategic objectives (Widener, 2007; Simons, 1995).

More recent research concerning prospective control indicates that balance between financial and non-financial control aspects is important factors in its conceptual use (Jansen et al, 2011; Nilsson, 2010; Widener, 2007; Wise and Spear, 2002). Other important factors of prospective control are coherence (e.g. cause and effect between different control systems), adaptation (e.g. continually updating control system to dynamic rapidly changing environments) and user know-how (e.g. understanding of control systems) (Nilsson, 2010; Jansen et al, 2011). User know-how stresses the importance of comprehensible control systems and training in their usage (Jansen et al, 2011). The results of the study by Jansen et al, (2011) showed that coherence and adaptation of prospective control is lacking in its conceptual use. However, the sampled companies in that study had only recently committed to the R&D activities which could mean that the need for adaptation had yet to occur (Jansen et al, 2011). Further, prospective control was only implemented in the R&D activities where control measures might not need coherence (Jansen et al, 2011).

While most research related to the concept of prospective control promotes a balance between formal control and non-formal control causal linkage between social networking and organic culture can be argued (Chenhall et al, 2011). According to Chenhall et al, (2011), formal control can contribute to innovation in environments less dynamic if used for information gathering (Chenhall et al, 2011).

Social networking consists of longstanding relations and trust throughout organizations (Chenhall et al, 2011). Organic culture, similar to Simons, (1995) interactive control, promotes open and flexible communication and structure (Chenhall et al, 2011). Organic culture and formal control, by themselves, supports innovation directly (Chenhall et al, 2011). Social networking in its turn enhances organic culture and thereby also indirectly supports innovation (Chenhall et al, 2011). While this seems to refute the importance of balance a clear majority of the surveyed companies in that study operated in stable environments only 11 out of 100 operated in relatively unstable dynamic environments (Chenhall et al, 2011).
Research seems to indicate that during static stable environments qualitative aspects of prospective control becomes less important and the casual links (i.e. balance) between financial and non-financial control measures decreases (Schultz, Salomo, Brentami, Kleinschmidt, 2013; Wise and Spear, 2002). However, when in more innovative and dynamic situations the need for balance between the aspects of prospective control again increases (Schultz et al, 2013; Wise and Spear, 2002). SCIs start out in dynamic changing environments later phases of the SCI progress to a more stable and mature environment where more formal control is suitable (Chiesa, Frattini, Lamberti and Noci, 2009; Simons, 1995). This seems to indicate that the concept of prospective control changes as an SCI progresses over time. Accordingly it is suggested that during the early phase of SCIs organizations seem to rely more upon interactive control however, over time, as the SCI progress and uncertainties decrease more diagnostic formal controls are implemented (Chiesa et al, 2009; Simons, 1995). Figure 2 illustrates suitable control focus as an investment progresses over time (Macintosh, 1994 p. 105).

![Figure 2. Control focus over time (Macintosh, 1994 p. 105).](image)

The uncertainties of dynamic environments can make formal control less effective therefore companies should use non-formal control systems as a reinforcing complement (Schultz et al, 2013; Dunk; 2011). Yet, budgets often described as being ‘formal control’ can be used during more dynamic situations as a planning mechanism indicating that the way tools are used...
defines if they are formal or non-formal control systems (Dunk, 2011; Davila, Foster and Oyon, 2009).

While contemporary research stresses the importance of keeping a balance between formal and non-formal control they do it in a static way to certain fixed situations (Schultz et al, 2013; Dunk, 2011; Chenhall et al, 2011). Deciding on an SCI using formal control it is likely to be made in spite of a shortage of information suggesting instead that an approach with prospective control would be more suited (Alkaraan and Northcott, 2007; Henri, 2006). According to Davila et al, (2009) prospective control should not be considered a peripheral but a key element to organizations operating during dynamic circumstances. The study by Dunk, (2011) of control in manufacturing organizations also states the importance of a more prospective control approach during dynamic innovative circumstances. Yet, the concept of prospective control and the factors it entails during dynamic circumstances needs more research (Dunk, 2011; Davila et al, 2009).
4 The case of strategic capital investments in the mining industry

Strategic capital investments (SCIs) in the mining industry are capital intensive and large-scale which means that mining companies are forced to commit considerable resources in order to create and sustain a potential competitive advantage (Slagmulder and Bruggeman, 1995). However, resources are scarce and non-renewable which means that the future survival of a mining company depends on there being a contingency for SCIs (Adler, 2000; Nixon, 1995). In short, SCIs refers to dynamic situations that have no obvious example to follow, require a substantial commitment of resources, are long-term competitively oriented and outcomes are uncertain (Hopper, Northcott, and Scapens, 2007, p. 200). Further, the complexity of SCIs calls for diverse expertise and controllers should be able to make subjective decisions based on values and expectations (Hopper et al, 2007, p. 200).

SCIs in the context of the mining industry also have long-term repercussions to local communities and regions (Ejdemo et al, 2011). This context, as well, has other dynamic intangible factors and regulations to consider such as environmental, legal and political and logistics (Ejdemo et al, 2011; Cortese, Irvine and Kaidonis, 2009). These factors alone or combined may halt the entire SCI leaving only costs for the exploration and evaluation itself (Ejdemo et al, 2011; Cortese et al, 2009). SCIs such as an exploration phase for a mining company are, from a cost management point of view, a decisive phase because a large share of the production cost is determined here (e.g., Monden and Hamada, 1991).

The exploration phase of the mining industry is a dynamic environment where risks and high uncertainties make formal control less effective (Dunk, 2011; Chiesa et al, 2009; Henri; 2006; Wise and Spear, 2002). The uncertain dynamic prospective phase in the mining industry requires control stimulating innovation, creativity and flexibility without neglecting possible financial outcomes (Henri, 2006; Kaplan and Norton, 1999). Therefore the controllers needs to be more like mediators and innovators that interprets, advises and not solely provide information (Pierce and O’Dea 2003; Granlund and Lukka, 1998)

Yet, formal control that uses traditional quantitative appraisal tools still dominate in practice when companies consider SCIs (Hunjra, Batool and Niazi, 2012). Traditional quantitative appraisal tools that companies currently use are payback period, return on investment, discounted cash flow (Alkaraan and Northkott 2006). The most commonly used appraisal tool
in practice today is the discounted cash flow which is based on time value of money (Hunjra et al, 2012). However, before deciding on a specific SCI a company should also identify spending proposals make quantitative appraisals and dynamic qualitative assessments (Adler, 2000).

These steps are all equally important when committing to a SCI however the main focus, of most companies, lies on short-term quantitative appraisal tools (Adler, 2000). The reason being that it is perceived simpler to effectively use traditional quantitative appraisal tools and easily comprehensible for investors than to make use of dynamic qualitative assessments (Adler, 2000). Traditional quantitative appraisal tools neglects important long-term intangible factors which promotes more short-term investment options (Adler, 2000; Alkaraan and Northcott, 2006). This is because SCIs often demand either high hurdle rates as compensation for risk or a long payback period due to unknown values (Adler, 2000; Alkaraan and Northkott, 2006; Carr and Tomkins, 1998).

During dynamic environments formal control has obvious limitations prospective control seem to contain all the factors needed to bridge these limitations yet, the concept of prospect control and how to implement it is unclear. Prospective control during SCIs in the context of the mining industry also complicates the role of the controller. During these more dynamic SCIs the role of the controller should be a mediator and a problem solver open to new control systems and future uncertainties (Coad, 1999; Burns and Baldvinsdottir, 2007).

Management control research is characterized by an orientation towards prospective control as more effective when committing to the dynamics of SCIs (Schultz et al, 2013; Jansen et al, 2011; Mouck, 2000). Yet, in the northern part of Sweden there have been several recent SCIs in the exploration phase of the mining industry that seem to contrast with suggested research above (e.g. LKAB; Northland). For example, LKAB, a large Swedish mining company, decided 2008 to go ahead with a SCI, a new mining level, when the SCI was ready in 2013 it had cost 12,4 billion SEK (Karlsson, 2013). LKAB estimated 2008 with a quantitative appraisal tool the payback period to be 0,7 years and that the total worth of iron ore accessible for mining with this SCI to be 400 billion SEK and have a lifetime of 25 years (Karlsson, 2013). Seemingly this SCI with its dynamics and significant costs was lacking in prospective control making the context of the mining industry suitable to this study. In order to thoroughly investigate the dynamics of prospective control during SCIs in the exploration phase of a
mining company there is a need for case studies. The context of these case studies should therefore be new or recent SCIs in the mining industry during the exploration phase where prospective control, in actual use, can be documented through interviews and observation of controllers and other significant actors.
5 Methods and outline

The dynamics, high risks and capital intensity of ventures in the mining industry creates a challenging setting to investors, controllers and management (PWC, 2012 p. 1). The resources of the mining industry is non-renewable making investments in the search of new mineral findings crucial (Adler, 2000; Nixon, (1995). Yet, prospective control in the mining industry is a research area where few studies have been conducted. The majority of studies that approach prospective control lean towards product development in manufacturing industries and not the extractive setting of the mining industry (e.g. Chiesa, et al, 2009; Poskela and Martinsuo, 2009). However, the extractive non-renewable resources of the mining industry make it unsuitable to directly compare findings from the manufacturing industry with this sector. The dissertation will have an exploratory design, since, as shown in the concluding discussion, the concept of prospective control from the perspective of the controller has significant room for further research. Also, prospective control involves important soft variables hardly assessable through explanatory studies.

Case studies are appropriate when the researcher seeks a deep understanding of a specific research area (the dynamics of management control) and to study certain phenomena (prospective control, perspective of the controllers) in a real-world context (exploration phase in the mining industry) (Meredith, 1998; Miles and Huberman, 1994; Yin, 2009). Case studies can combine both qualitative and quantitative data gathered from interviews, questionnaires, archival and observations making it a suitable approach in order to gain a deeper understanding of prospective control (Eisenhardt, 1989). Case studies as a research strategy are also more suitable when exploring the unknown in order to generate new theory (ibid).

I have therefore decided to use the case study research as an overall methodological approach for my future empirical investigation in regard to my articles. The case study is a method for building a rich understanding of complex phenomena (Eisenhardt and Graebner, 2007). Further, the case study has the capability required to answer “how” and “why” questions (Yin, 2009, p. 29). The approach will be a multiple case study approach, which allows both an in-depth examination of each case and the identification of unforeseen variables that distinguish each case from the other. It is appropriate to use multiple case studies when attempting to externally validate the findings from a single case study, through cross-case comparisons (Eisenhardt, 1989). Therefore, they typically yield more robust, generalizable and testable
interpretations of a phenomenon than single case study research (Eisenhardt and Graebner, 2007).

The context of this research project will include mining companies involved in strategic capital investments in Sweden. The investment projects will be selected based on the following criteria; they should be strategic in nature and in the exploration phase, current or recent and they should contain controller responsibilities and work. Case studies in different settings of the investment projects will enable cross-reference between differences and similarities (Eisenhardt, 1989). Also, case-studies in different phases of the investment will allow me to identify potential contrasts in management control approaches as an investment “matures” (Eisenhardt and Graebner, 2007). These differences could also include prospective control in domestic or multinational, state-owned or private companies. These differences of the companies are likely to create a variety of interesting approaches to management control (e.g. corporate culture, legislative routines or financial strength). Suitable companies include for example, LKAB (operating in the northern part of Sweden).

The controllers are, in their daily work with control over information, especially important to the development, innovation and investments to companies (Lindvall, 2009). Controllers involved in different strategic capital investment projects will therefore be interviewed in order to understand the controller perspective, work and responsibilities during the exploration phase of each investment. The term controller, which I use, might not be the overall title for all significant actors. Therefore, additional interview participants will be selected through snowball sampling in order to access additional potential significant actors involved in the prospective control of the investments. The interviews will be semi-structured which aims at letting the researcher discover and understand phenomena rather than deciding something that is predetermined (Starrin and Svensson, 1996, p. 55). Further, the semi-structured interview admits flexibility and the order of the questions can vary thus the interviewed can leave open answers important in interpreting the perspective of the controllers during different phases of investments (Denscombe, 2009, p. 234-235). All interviews will be recorded and transcribed. Secondary information will be collected through company reports and project documentation. This will allow background information about selected companies and the characteristics of the investments. Further, the secondary information will be triangulated with the data drawn from the interviews which helps avoid retrospective interpretation ensuring validity (Yin, 2009, p. 121).
This research design is presently under development. I would particularly welcome all suggestions and discussion of this area

The following is a preliminary outline of papers to be included in the dissertation:

1. Prospective control in the mining industry: comparative case studies
2. Operational control and strategic investment appraisal in the mining industry: the perspective of the controller (Conference paper)
3. Strategic investment appraisal in the mining industry: the case of exploiting a new finding of iron ore
4. Strategic investment appraisal in the mining industry: the case of expanding existing mines
5. Operational control and strategic investment appraisal in the mining industry: the perspective of the controller (Journal article)
6 Concluding discussion

The overall purpose of this dissertation is to generate empirical knowledge of prospective control and to contribute with a more developed and dynamic theory of this concept in the context of strategic capital investments in the mining industry.

The field of management control research has changed significantly over the last fifty years. Management literature is rich with new concepts and empirical evidence that questions the use and effectiveness of formal control systems with quantitative appraisal tools alone. Emerging concepts related to prospective control promotes the importance of keeping the right balance between formal and non-formal control systems during dynamic circumstances as a key element. Previous research tends to approach prospective control from more of a static point of view in order to determine the most suitable configurations of different control systems. During static stable environments qualitative aspects of prospective control and balance between financial and non-financial control measures becomes less important. However, when in more innovative and dynamic situations these aspects of prospective control again increase.

The first conclusion of this paper provides new insight of the concept of prospective control yet, there is significant room for further research. Based on previous research this paper defines prospective control in a broad sense as control in the pursuit of new possibilities under dynamic circumstances.

Important contributions can be made by studying the exploration phase in the mining industry and the perspective of the controller in this context. In the mining industry resources are scarce and non-renewable which means that the future survival of a mining company depends on there being a contingency for SCIs. The mining industry in the exploration phase involves outcomes that are long-term, intangible, and unpredictable and costs are significant. The uncertain dynamic phase in the mining industry requires prospective control stimulating innovation, creativity and flexibility without neglecting possible financial outcomes. Controllers in this context need to be mediators introducing new information instead of using existing information.
The second conclusion of this paper is that dynamic circumstances like the exploration phase of the mining industry provide the needed theoretical base to further extend the concept of prospective control in an innovative setting.

This is a research proposal for my dissertation on the topic of this paper. As already mentioned I welcome all comments and suggestion to further my planned dissertation.
References


# Time plan

<table>
<thead>
<tr>
<th>Task</th>
<th>Start Date</th>
<th>End Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>2021-01-01</td>
<td>2021-01-31</td>
<td>Develop project plan</td>
</tr>
<tr>
<td>Task 2</td>
<td>2021-02-01</td>
<td>2021-02-28</td>
<td>Conduct literature review</td>
</tr>
<tr>
<td>Task 3</td>
<td>2021-03-01</td>
<td>2021-03-31</td>
<td>Data collection</td>
</tr>
<tr>
<td>Task 4</td>
<td>2021-04-01</td>
<td>2021-04-30</td>
<td>Data analysis</td>
</tr>
<tr>
<td>Task 5</td>
<td>2021-05-01</td>
<td>2021-05-31</td>
<td>Writing a conference paper</td>
</tr>
<tr>
<td>Task 6</td>
<td>2021-06-01</td>
<td>2021-06-30</td>
<td>Drafting final paper</td>
</tr>
<tr>
<td>Task 7</td>
<td>2021-07-01</td>
<td>2021-07-31</td>
<td>Final editing and proofreading</td>
</tr>
<tr>
<td>Task 8</td>
<td>2021-08-01</td>
<td>2021-08-31</td>
<td>Submit for publication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>Task 1-4</td>
<td>Plan developed</td>
</tr>
<tr>
<td>2021</td>
<td>Task 5-8</td>
<td>Paper drafted and revised</td>
</tr>
<tr>
<td>2022</td>
<td>Task 5-8</td>
<td>Paper submitted</td>
</tr>
<tr>
<td>2023</td>
<td></td>
<td>Paper published</td>
</tr>
</tbody>
</table>

*Note: The timeline is an example and may vary based on the actual project requirements.*