

**STRATEGIC ANALYSIS OF A GLOBAL TESTING FIRM IN THE MINE SITE
LABORATORY SERVICE INDUSTRY**

by

Sa'a K. Traxler

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF BUSINESS ADMINISTRATION

In the Executive Master of Business Administration Program
of the
Faculty
of
Business Administration

© Sa'a K. Traxler, 2014

SIMON FRASER UNIVERSITY

Spring 2014

All rights reserved. However, in accordance with the *Copyright Act of Canada*, this work may be reproduced, without authorization, under the conditions for *Fair Dealing*. Therefore, limited reproduction of this work for the purposes of private study, research, criticism, review and news reporting is likely to be in accordance with the law, particularly if cited appropriately.

Approval

Name: Sa'a K. Traxler

Degree: Master of Business Administration

Title of Project: Strategic Analysis of a Global Testing Firm in the Mine Site Laboratory Service Industry

Supervisory Committee:

Dr. Andrew von Nordenflycht
Associate Professor
Faculty of Business Administration

Dr. Jan Simon
Academic Chair, Executive Masters of Business Administration
Academic Chair, Master of Science in Finance
Senior Lecturer, Finance

Date Approved: _____

Abstract

This paper presents a strategic analysis of a mine lab services company, ALS Mine Site. As a relatively new business unit of a multinational testing firm, ALS Mine Site wants to expand its services in developing nations. The analysis provides an overview of the organization highlighting the scope of services that play a prominent role in supporting the market growth for ALS Mine Site. This paper analyses the business environment to determine ALS Mine Site's competitive position in the industry. The analysis then explores strategic alternatives to determine a recommendation that will help improve the company's position. The recommendation of this project is that ALS Mine Site should diversify its service offerings in three distinct stages of the mining life cycle: feasibility, construction and operations segments. Leveraging the company's internal networks, promoting organic growth and standardizing systems will help unify the company's testing divisions in a unique way to offer customers an attractive service-offering package in the mine site lab services industry.

Keywords: mine site lab services; mining; mineral testing.

I dedicate this work to Rob whose unconditional love and support helped make my vision become reality. To my daughter, Aliya – you remind me every time we are together that the present is truly a gift.

Acknowledgements

I would like to thank the ALS Minerals senior managers in North Vancouver for supporting me during the entire EMBA program. I would also like to thank John Pizimolas for inspiring me to write this paper.

I offer my sincerest gratitude to Dr. Andrew von Nordenflycht for your help throughout this challenging process. Without your expert guidance, I could not have achieved my goal.

Table of Contents

Approval.....	ii
Abstract	iii
Dedication	iv
Acknowledgements	v
Table of Contents	vi
List of Figures	viii
List of Tables.....	ix
Glossary.....	x
1: Introduction.....	1
2: Organization’s Current Position	3
2.1 Company Overview – ALS Limited	3
2.1.1 Overall Organization Structure	3
2.2 Overview of ALS Minerals Division	4
2.2.1 ALS Geochemistry.....	4
2.2.2 ALS Metallurgy.....	5
2.2.3 ALS Inspection.....	5
2.2.4 ALS Mine Site (ALSMS).....	6
2.2.5 Summary of Services	6
2.3 ALSMS Growth Strategy	6
2.3.1 Where? – Service Type and Customer Segment Focus.....	8
2.3.2 What? – Value Proposition	9
2.3.3 How? – Core Activities	10
2.4 Current Performance – Growth Challenges	11
2.5 Current Issues / Priorities	11
3: External Analysis	14
3.1 Industry Overview.....	14
3.1.1 Industry Definition	14
3.1.2 Industry Size.....	14
3.1.3 Industry Value Chain	15
3.2 Competitors	17
3.2.1 Industry Structure.....	17
3.2.2 Types of Competitors	19
3.3 Customers.....	20
3.3.1 Market Trends and Growth Rates	20
3.3.2 Customer Segments.....	23
3.3.3 Relative Size and Growth of Segments	24
3.3.4 Customer Preferences.....	26

3.3.5	Summary of Customer Opportunities & Threats	31
3.4	Suppliers.....	32
3.4.1	Site Infrastructure.....	32
3.4.2	EPCM Firms.....	32
3.4.3	Hardware.....	32
3.4.4	Software	33
3.4.5	Staff.....	33
3.5	Five Forces Synthesis.....	34
3.5.1	Rivalry.....	34
3.5.2	Entry Threat	36
3.5.3	Substitute Threat	36
3.5.4	Buyer Bargaining Power	36
3.5.5	Supplier Bargaining Power	37
3.5.6	Summary of Industry Opportunities and Threats	37
3.6	Sources of Advantage.....	38
3.6.1	Cost Advantages.....	38
3.6.2	Customer Utility Advantages	42
3.7	Relative Competitive Analysis.....	44
3.7.1	Relative Competitors.....	44
3.7.2	Relative Position of Competitors in Relation to ALSMS	45
3.8	Summary and Conclusions.....	49
4:	Strategic Alternatives.....	51
4.1	Identified Alternatives.....	51
4.1.1	Strategic Priorities.....	51
4.1.2	Alternative 1 – Diversify Testing Services Scope.....	53
4.1.3	Alternative 2 – Invest in Mobile Lab Services.....	54
4.1.4	Alternative 3 – Diversify Testing Services Scope and Offer EPCM Services.....	55
4.1.5	Alternative 4 – Limit Services to Customers in the Feasibility Stage.....	56
4.1.6	Criteria for Rating the Alternatives against Identified Strategic Priorities	57
4.1.7	Alternatives Assessment against Key Strategic Priorities.....	58
4.1.8	Alternatives Scoring.....	59
4.2	Alternatives Summary.....	61
5:	Feasibility Analysis and Recommendation	62
5.1	Feasibility Analysis: Diversify Testing Services Scope and Offer EPCM Services	63
5.1.1	Management Preferences and Experience.....	63
5.1.2	Organization Readiness.....	64
5.1.3	Available Resources.....	66
5.2	Summary of Feasibility Analysis for Alternative 3.....	67
5.3	Recommendation: Improve Market Position by Diversifying Service Offerings	68
5.3.1	Shared Resources and Group Incentive for Profitability.....	69
5.3.2	Standardization and Adoption of Best Practices	69
5.3.3	Further Investment in GEMS	69
5.3.4	Human Resource Development.....	70
5.3.5	Time Line	70
	Reference List	72

List of Figures

Figure 2.1 ALS Limited Organization Structure	4
Figure 2.2 ALS Mine Site's Business Strategy Consist of Four Essential Components.....	7
Figure 2.3 ALS Minerals Division Annual Revenue Distribution	11
Figure 3.1 Mine Site Lab Services Value Chain	16
Figure 3.2 Global Metals Price Index.....	21

List of Tables

Table 3.1	Distribution of Mine Laboratories and Mine Properties across Regions	18
Table 3.2	Testing Service Providers in the Mining Services Industry	19
Table 3.3	World Development Indicators for Economic Growth	22
Table 3.4	Average Gross Profit Margin for Top Mining Companies.....	23
Table 3.5	Market Size for Mine Site Laboratories by Project Stage	25
Table 3.6	Market Size for Operating Mining Plants by Region for Gold, Copper and Iron Ore	26
Table 3.7	Customer Preferences by Segment (3 = most importance and weight).....	30
Table 3.8	Industry Five Forces Factor for Apparent Weight.....	34
Table 3.9	Sources of Cost Advantage Weight as Percent of Total.....	40
Table 3.10	Sources of Customer Utility Advantage Weight as Percent of Total	43
Table 3.11	Relative Competitive Position – Cost Advantage	46
Table 3.12	Relative Competitive Position – Customer Utility Advantage.....	46
Table 3.13	ALS Mine Site S.W.O.T. Summary	50
Table 4.1	Identified Alternatives Table.....	52
Table 4.2	Evaluation Criteria and Relative Weights	57
Table 4.3	Evaluation of Alternatives against the Strategic Priorities	58
Table 5.1	Management Preferences and Experience Analysis	63
Table 5.2	Organization Readiness	64
Table 5.3	Available Resources	66
Table 5.4	Feasibility Analysis Summary.....	68

Glossary

ALS	An acronym for Australian Laboratory Services company incorporated in 1974 and acquired by Campbell Brothers Limited in 1981. In 2012, Campbell Brothers Limited changed its name to ALS Limited. ALS is as an umbrella term referring to the four main testing services divisions (ALS Minerals, ALS Life Sciences, ALS Energy and ALS Industrial) and their sub-divisions.
ALS Group	Another term used to describe all the testing services divisions for the company.
ALSMS	ALS Mine Site
GEMS	An acronym for Global Enterprise Management System, the company uses this system to manage and distribute information including analytical test results.
GFC	Great Financial Crisis that occurred between 2007 and 2009
LIMS	Laboratory Information Management System
MARC Technologies	An engineering firm and a subsidiary of the company that is part of the ALS Mine Site sub-division
MSGM	ALS Mine Site General Manager
SGS	A global testing firm and ALS Mine Site's main competitor

1: Introduction

ALS Limited is primarily a global testing and inspection firm that services four main markets: mining, life sciences, energy and industrial sectors. ALS Limited has strong market presence in the mining industry through its business division ALS Minerals. ALS Mineral's competitive environment has changed due to a slow economic recovery in the mining industry. To generate additional revenue, ALS Minerals has expanded its service scope to include all sectors of the resource mine cycle (exploration, development, production, trade inspection, and rehabilitation). ALS Minerals division comprises ALS Geochemistry, ALS Metallurgy, ALS Inspection and ALS Mine Site (ALSMS). The following strategic analysis will focus on ALSMS's efforts to design, build and operate mine site laboratories for mining companies at various stages of their mining projects.

ALSMS is a relatively new player in the mine site laboratory service industry. In the recent two years, ALSMS has implemented a marketing strategy with only one general manager dedicated to lead the growth of the business in key geographical regions. Establishing and growing a successful business plan in a niche market poses many challenges, such as, entry barriers, government regulations, staff recruitment, and customer base. As a new sub-unit to the ALS Minerals division, ALSMS also has limited internal resources at its disposal to provide mine site laboratory services.

Notwithstanding the challenges recently mentioned, ALSMS has identified the following goals for revenue growth over the next 3 to 5 years:

1. Develop a new customer base in the mine site laboratory services sector
2. Establish the ALS signature brand through quality of service and delivery
3. Increase workload for geochemistry¹ analysis
4. Solicit collaboration at senior management level to ensure there is minimal impact on the ALS Minerals business cost base

¹ Geochemistry refers to applying the principles of chemistry (digest or fuse samples with chemicals) to analyze the chemical compositions found in the liquids, gases, and mineral deposits of rocks and other geological material. By understanding the chemical compositions, one can understand the geology of the rock formation and hence determine the elements for which customers are prospecting.

This paper will examine and discuss the issues that are relevant for ALSMS to achieve competitive advantage in an oligopolistic market. More specifically, this paper will address the following issues:

- How can ALSMS go about winning more customer contracts?
- What set of services, including other testing services provided by other ALS businesses, should ALSMS promote?
- With only one full time employee, what is the best way for ALSMS to recruit, train and retain appropriate staffing for the provision of services?
- What internal capabilities should ALSMS leverage to maximize profits?
- Can ALSMS realistically provide mine site lab services with minimal input costs?

To address these questions this paper begins with a synopsis of the company structure and an examination of ALSMS's current strategic position in Chapter 2. Chapter 3 discusses the external environment that ALSMS competes in, including the mine site laboratory services industry, notable competitors and the various customer segments available to ALSMS. The external analysis will consider the value chain for the industry and present analysis of five forces affecting it. The external analysis will also consider the sources of advantages in the industry; the relative importance of the threats and opportunities in the external market place; and the internal strengths and weaknesses of ALSMS.

Chapter 4 is an analysis of the proposed strategic alternatives that ALSMS can implement to help meet its strategic objectives. The analysis will correlate the strategic alternatives to the firm's internal strengths, weaknesses, opportunities and threats identified in Chapter 3. In Chapter 4, the analysis evaluates each alternative's potential for a successful resolution to ALSMS's current issues identified in Chapter 2.

Chapter 5 will assess the feasibility of the recommended alternative to confirm that ALSMS has the capabilities to pursue it. The chapter will conclude with an implementation analysis of the recommended alternative to help ALSMS penetrate new markets, employ a low cost base strategy, establish brand recognition and customer utility and generate workload for mine site laboratory services. For any internal capabilities that ALSMS may lack, the analysis will identify areas of concern and what amendments to make to bridge these gaps.

2: Organization's Current Position

This chapter begins with an overview of ALSMS within the ALS Limited organization. The chapter will describe how ALSMS fits into the broader structure of the organization and how it relates to and interacts with other businesses within it. Next, the discussion goes into ALSMS's current growth plans, identifying key goals for the sub-unit, its customer segments, value proposition and core activities. The chapter concludes with the challenges that lay ahead for ALSMS that could significantly influence its endeavour to generate new business.

2.1 Company Overview – ALS Limited

ALSMS is a part of the ALS Group of testing services. ALS Group, which offers a range of testing services to various industries, is one of two main business divisions that make up ALS Limited (the company). This section will give an overview of the ALS Limited organization structure with some detail of the services that ALSMS will promote to all segments of the mining industry.

2.1.1 Overall Organization Structure

ALS Limited is an Australian publicly traded holding company with two main divisions: ALS Group and Rewards Distribution. ALS Limited operates across Australia, Asia, the Pacific, North and South America, Africa and Europe. This paper will only examine the ALS Group, with no further mention of the Rewards Distribution division. ALS Group's business is the provision of sophisticated, state-of-the-art services to four main markets: Minerals (Geochemistry, Metallurgy, Mine Site and Inspection); Life Sciences (Environmental and Food & Pharmaceutical); Energy (Coal and Oil & Gas); and Industrial (Asset Care and Tribology).

Figure 2.1 ALS Limited Organization Structure



Source: Author

2.2 Overview of ALS Minerals Division

ALS Minerals division comprises 5000 employees in key mining countries and trade ports in 6 continents with over seventy-five laboratory and offices. ALS Minerals division delivers services to the mining and mine exploration sectors through its four business sub-units as described in the subsequent four sections. Approximately 40 of the 5000 employees work solely under the ALS Minerals umbrella as part of the division administration group or part of MARC Technologies, which is a wholly owned engineering service firm acquired by the company in 2010.

2.2.1 ALS Geochemistry

Amongst the four sub-units, this business has the strongest brand reputation, generates the most revenue and employs the most people at approximately 4100 worldwide. There are over 60 laboratories located in 32 countries. ALS Geochemistry provides service primarily to mine exploration companies, geologists and miners to help them identify ore bodies for mining

opportunities. Customers submit samples, such as, rock, soil, sediment and other geological material that they have collected from the field for testing to determine its contents for gold, copper, silver and other metals of economic value. ALS Geochemistry provides a variety of testing services and techniques, which include sample preparation², geochemistry processes and advanced instrumentation³ to generate analytical data for each submitted sample. Its key competitive advantage is the ability to provide large amounts of accurate data with quick and reliable service.

2.2.2 ALS Metallurgy

ALS Metallurgy is the next biggest sub-unit with approximately 430 employees and 6 laboratories located in Australia, Canada and Chile. It provides metallurgical⁴ and mineral testing consultancy services to gold and mineral ore mining companies, mineral processing engineers and metallurgists. There are two main branches of services, diagnostic support of operating mines and process development of new mine projects. Diagnostic support often consists of mineralogical⁵ analysis and interpretation of plant streams to improve process efficiency through bench scale metallurgical test work. ALS Metallurgy also offers piloting services to generate advanced process engineering data for new mine project design, scale-up purposes and production of marketing samples.

2.2.3 ALS Inspection

The ALS Inspection business is the newest sub-division of the four units. When the company acquired Stewart Group in mid-2011, it was able to gain entry to the commodity inspection sector and thus created ALS Inspection, which is similar in size to ALS Metallurgy. There are approximately 430 employees and 6 total laboratories located in Italy, Mongolia, South Africa and United Kingdom. ALS Inspection provides inspection and analytical services to the coal, metals and mineral trading markets. It inspects, weighs, samples, analyses and reports on the

² Sample preparation is the drying, crushing, grinding and sieving of field samples (geological material).

³ Advanced instrumentation is highly technical equipment that is able to detect and quantify the presence of elements at atomic and molecular levels in a solid or liquid sample after it has gone through the sample preparation and geochemistry processes.

⁴ Metallurgical testing refers to the processing of ores to extract the metal they contain for consumption by manufacturing companies and other consumer industries.

⁵ Mineralogical analysis is a branch of physical geology that studies the chemical composition and crystal structure of mineral ores and product samples. Mineralogical analysis helps to determine any potential processing issues that might be encountered, thereby efficiently defining the optimum test work program for samples.

quality and quantity of commodities to produce findings used for final commercial settlement purposes.

2.2.4 ALS Mine Site (ALSMS)

ALSMS is the smallest sub-unit with only one general manager and a shared administration employee within the ALS Minerals division. This business provides onsite process and mine support laboratory services ranging from sample preparation installations through to full service analytical laboratories. It currently supports five onsite labs providing sample preparation services. There are two branches of service delivery models, provision of engineering and construction services and provision of maintenance and operation management for onsite laboratory facilities. The analytical laboratories can provide mining and metallurgical process plant support including testing services for the full range of minerals commodities. ALSMS has the capability to provide quick, accessible analytical information to suit specific site requirements and flexible service delivery models to meet a variety of onsite laboratory needs. ALSMS has the capabilities to offer the full range of ALS Minerals division testing services (Geochemistry, Metallurgy and Inspection). In addition, ALSMS can offer environmental and industrial testing services thru ALS Group's Life Sciences and Industrial business divisions respectively, to help optimize mining and mineral processing production.

From hereon I will use the terms 'mine site' and 'onsite' laboratory interchangeably to describe a laboratory that exists on the actual mining site.

2.2.5 Summary of Services

ALS Mineral's diverse yet cohesive portfolio covers the resource cycle from exploration through mining, processing and finally shipment and sale. ALS Geochemistry provides service for the exploration sector to find mining opportunities; ALS Metallurgy helps mining companies develop and design mine process plants; ALSMS offers onsite laboratory services to keep the mine profitable and in compliance with local regulations; and ALS Inspection provides commercial settlement analysis to enable the delivery of commodities to market.

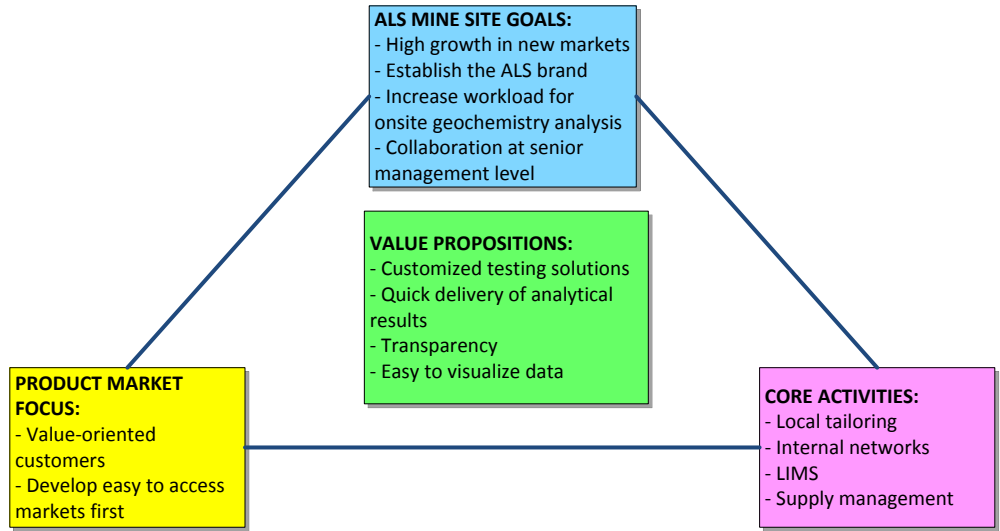
2.3 ALSMS Growth Strategy

ALSMS's strategy can be described best using Porter's discussion of the "origins of strategic positions" (Porter, 1996). Porter proposes that there are three bases for positioning: 1) variety-based position, which focuses on the variety of services rather than customer segments, 2)

needs-based position, which focuses on customer segments instead of services, and 3) access-based positioning, which focuses on the accessibility to customers, such as, geography or scale. ALSMS's position is a combination of needs-based and access-based positioning to serve the varying needs of the same customer throughout the mine project's life cycle in key mining areas.

ALSMS coordinates the services of the ALS Group offerings mentioned in Section 2.2.4. Regardless of commodity, location or breadth of service requirements, ALSMS can package comprehensive laboratory testing solutions to cover the entire resource life cycle from exploration, feasibility, production, design, development through to trade, and finally rehabilitation. ALSMS will build a new lab, install, commission and operate it according to customer's needs. ALSMS will not pursue opportunities that ask only for design and engineering services without lab operation oversight. In these cases, ALSMS will direct the customer to use the services provided by MARC Technologies group. To provide the above-mentioned services, ALSMS will draw on the ALS Group offerings from other divisions to help provide a unique and customized experience for key customers. This section will discuss in detail ALSMS's current strategy and how it plans to gain market share in the mine site laboratory services segment. Figure 2.2 captures ALSMS's current strategic position.

Figure 2.2 ALS Mine Site's Business Strategy Consist of Four Essential Components⁶



⁶ Figure 2.2 is a depiction of four distinct facet of strategy as described by Crossan, Mary M., et al. (2013); whereby, strategy is defined in terms of four related components. By clearly identifying the goals, product market focus, value proposition and core activities ALS Mine Site can establish a basis for monitoring its strategic direction.

2.3.1 Where? – Service Type and Customer Segment Focus

ALSMS offers onsite laboratory services to customers who wish to optimize their mine operations. There are two dimensions to consider for service type and customer segment focus: 1) service type needs, for either a new development project or existing mine site project and 2) remote locations in regions with high mineralization.

2.3.1.1 Service Type Requirements (Needs-Based Positioning)

Customers in the mine site services industry have varying needs based on the different stages of their mine site projects. ALSMS provides onsite lab services to three types of customers based on mine site project needs:

- **New Development Projects:** Customers in this market segment require some time to build capital investments and to design and construct a mine project before starting up the mine lab operations. There are three main stages in a new development project: 1) feasibility, 2) construction and 3) operation. It often takes two to three years for a new development project to begin mining production.
- **Refurbishment or Expansion of Existing Mine:** Similar to new development projects, customers in this market require some design and construction services to enhance their current operations before reinstating lab operations.
- **Existing Mine Site Projects:** Customers in this segment are either operating their own labs or using another competitor to do so. Projects become available because the contract with the incumbent firm has expired, customers are unhappy with the incumbent firm's service and severed their agreement or customers are seeking further technical help to improve their operational efficiency.

2.3.1.2 Geography and Commodity Focus (Access-Based Positioning)

The market for outsourced mine lab operations is greater in regions with highly mineralized terrain and few commercial labs nearby. Commercial labs in the context of this paper refer to labs that provide geochemical analysis for the entire mining industry. Typically, these commercial labs are located in developed regions with high mining activities. For example, in British Columbia there are four major commercial labs located in Metro Vancouver and Kamloops that provide testing services to Western Canada. Customers transport samples easily by ground or air within 24 hours to the respective testing labs. Cost for using a commercial lab

near the mine site has an economical benefit over building and managing a mine site lab. Near site commercial labs is a term used to differentiate between onsite mine labs and commercial labs in close proximity to the mine site.

The primary commodities for a mine operation in any geographical region are gold, copper and iron ore mines. ALSMS has chosen to target customers located in Africa, South America and Australasia (Australia and Asia-Pacific) where the market for outsourcing lab operations are in greater demand due to scarce resources for near site commercial labs. ALSMS will focus on the following geographic customer segments:

- Africa – Gold, Copper and Iron Ore projects
- South America – Gold and Copper projects
- Australasia – Gold projects

2.3.2 What? – Value Proposition

ALSMS provides its customers with these benefits:

- Customized testing solutions – ALSMS can provide a variety of testing services regardless of commodity type to help maintain a safe and efficient plant production. The objective of these assays⁷ and analyses help to define ore reserves, plant feed, plant performance and loss of tailings. Metallurgical testing will help optimize mine productions and grade inspection on the final product, which will provide confidence for the customer during commercial settlement processes. When customers receive accurate data from their mine plant, they inevitably shorten the commercial transaction time for determining the quality of the commodity and thus its value and the payment due. In addition, ALSMS can offer auxiliary services as mentioned in Section 2.2.4 to reduce searching costs for the customer.
- Quick delivery of analytical results – Customers in the mining industry need fast service delivery because time is money. ALSMS can leverage the systems that are already in place within the corporation to implement the required testing procedures, to monitor the quality of the lab processes and to benchmark performance.
- Transparency – the integrity of the analytical data is important for customers to help them make financial and operational decisions. With support from ALS

⁷ Assays are tests that determine the presence and content of metals in ores.

Geochemistry's Laboratory Information Management System (LIMS), ALSMS can provide tracking and traceability information on each analysis and performance based metrics on the lab operations. From here on the term, GEMS will refer to ALS Geochemistry's Global LIMS.

- Easy to visualize data – ALSMS can create comprehensive and customized reporting to suit the customer's needs. With the aid of ALS Geochemistry's Core Viewer™ and Webtrieve™ technology, ALS Mine can offer a unique integration of analytical information that can interface directly with third party 3D mine planning and geological modelling software. This technology is not only unique to the mine site lab services industry but also to the broader commercial mining lab industry. This value added service gives ALSMS a clear competitive advantage.

2.3.3 How? – Core Activities

ALSMS will use their extensive internal networks within the ALS Group businesses to help provide customized testing solutions to every customer with a new or existing mine site project. As previously mentioned, ALSMS can offer engineering services as well as lab operation management by collaborating and coordinating their service offerings with MARC Technologies. For other testing capabilities, ALSMS will pool resources from within the ALS Group community to provide consulting, technical, labour and professional support. Where possible, ALSMS will recruit operational support locally.

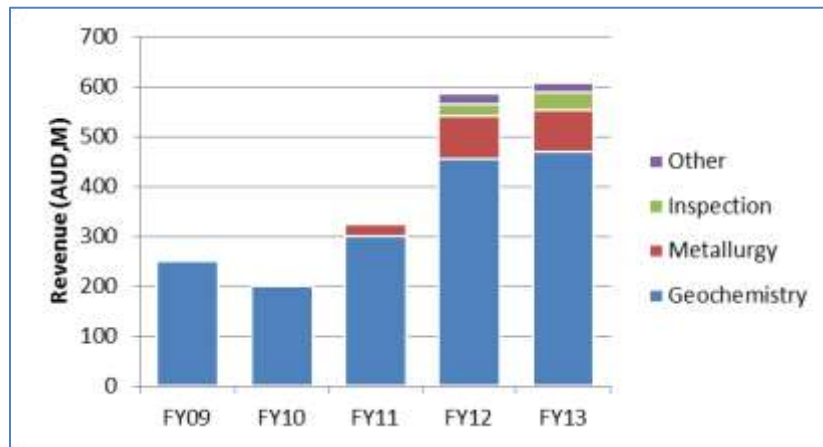
To provide fast delivery and transparent service, ALSMS will engage executive managers within the ALS Group network to support mine site activities and draw upon their knowledge and experiences. With collaboration at the highest level, ALSMS will be able to coordinate marketing opportunities, share resources, access information, and implement or integrate LIMS systems for managing all the test work onsite. ALSMS will leverage the ALS Geochemistry and ALS Metallurgy supply distribution channels to outfit new labs, provide chemicals and consumable supplies and ensure efficient and timely deliveries. These core activities will help keep customers informed and prevent unnecessary stoppages in production.

ALSMS will promote the CoreViewer™ and Webtrieve™ technologies at every opportunity by leveraging the existing customer relationships from other business units to help endorse ALSMS's credibility and commitment for providing a unique service offering. Once customers become more informed, they will be able to see the advantages of visualizing their data in a more comprehensive package.

2.4 Current Performance – Growth Challenges

ALSMS is a new entrant in the mine site services sector and a new business entity under the ALS Minerals division. Although, ALS Minerals had strong revenue growth in 2012, ALSMS contributed very little to that revenue growth. As Figure 2.3 illustrates, ALSMS is non-existent as a revenue contributor because the workload that it has managed to attract so far has been sample preparation work to help feed one of the near site labs for the analytical work. In some cases, other competing firms are completing the analysis, which generates more revenue than providing just the sample preparation service. At this point, ALSMS has not yet been able to establish a full-fledged on-site laboratory opportunity. In the fiscal⁸ year 2012 and 2013, its contribution is included as ‘other’ to denote that revenue earned was a combination of partial mine site service projects generated to supplement the analytical work accomplished by either ALS Geochemistry, ALS Metallurgy or other competing firms. As such, ALSMS’s focus remains to be establishing new on-site mine lab opportunities as effectively as possible.

Figure 2.3 ALS Minerals Division Annual Revenue Distribution



Source: Author

2.5 Current Issues / Priorities

ALSMS is in a position to help lead ALS Minerals into new segments of the mining industry; however, in the short term, ALSMS cannot readily provide the capabilities to outfit an entire mine lab operation for competitive advantage. This section describes some of the key issues that ALSMS faces and needs to address or resolve.

The analysis will focus on the following key strategic priorities:

⁸ The fiscal year for the company is April to March.

- **Winning Customer Contracts** – In order to improve the chances of winning more contracts, it would be helpful to understand what the customer needs are and which ones ALSMS is best positioned to serve. By assessing the customer needs, ALSMS can also determine what set of services to package in a unique offering for competitive advantage.
- **Leveraging Resources** – ALSMS does not have enough resources at its disposal to carry out a mine lab contract. ALSMS needs to utilize the resources and experiences available within its internal networks to establish the infrastructure and carry out the provision of services. ALSMS also needs to understand and coordinate activities within the other ALS business units to ensure the availability, expertise and technical capabilities exist.
- **Developing Appropriate Staffing** – Each mine site opportunity not only requires staff with the appropriate skill sets but also quick deployment of new staff to start up the mine lab operations. The ongoing cycle of hiring and training can be very challenging to outfit mine lab contracts in different locations. ALSMS will need to figure out how best to hire, train and retain the right staff. ALSMS will also need to find an efficient way to deploy a team of employees for each mine lab contract won.
- **Managing the Costs** – As ALSMS pools resources from other sister divisions to help generate new revenue, it needs to be cognizant of the opportunity costs that may affect ALS Minerals. Mine Site lab opportunities that are located in remote areas may require higher input costs to set up lab operations. Increased nationalization may diminish margins.

Chapter 1 and 2 gave us a snapshot of the corporate structure, provided an internal analysis of the organization and defined ALSMS's current strategic position. The review showed that ALSMS relies significantly on its sister divisions to help generate marketing opportunities and provide services to the onsite lab industry. ALSMS is keen on promoting the company's proprietary LIMS software capabilities to attract new customers for competitive advantage. ALSMS also faces some key challenges to generate revenue. One of the key strategic issues is how to coordinate services effectively within the ALS internal networks in order to win more customer contracts.

In order to help resolve these critical issues, the analysis will examine the external forces, customer needs and sources of advantages in the industry that will be important for identifying the strategic alternatives.

3: External Analysis

This chapter provides an external analysis of the industry; the relevant players (competitors, customers and suppliers) that will help identify the threats and opportunities presented to ALSMS. The analysis will use the resulting information about the main players and Porter's Five Forces⁹ framework to explain the structure and competitiveness of the industry.

Following a summary of the threats and opportunities, the analysis will highlight key sources of advantage that firms in this industry might have to strengthen their position. The analysis will examine the relative importance of each source of advantage to gauge the relative competitiveness of notable firms in the industry. Finally, the analysis concludes with the strengths, weaknesses, opportunities and threats (SWOT) summary to help ALSMS pursue strategic alternatives for competitive advantage.

3.1 Industry Overview

3.1.1 Industry Definition

Mine site lab service providers are companies that oversee the management and operations of a mining lab. Mine site lab service providers test samples from the mine site for metal and mineral content. Customers use the test results to optimize their mining and mineral processing production.

This paper analyses the mine site lab services industry in the global market. For the purpose of this paper, the global market consists of North America, South America, Europe, Africa and Australasia (Australia and Asia-Pacific).

3.1.2 Industry Size

The size of the industry takes into consideration all mining opportunities regardless of commodity at various stages of the mining life cycle – feasibility study, construction and

⁹ The five forces analysis helps reveal the industry structure. By understanding the industry structure, businesses can begin to determine how best to position themselves within the industry for competitive advantage. In this regard, the strategic direction is either building defences against the competitive forces or finding a position in an industry where the forces are weaker (Porter, M.E., 2008).

operation. To estimate the size of the industry, we need to make a couple of assumptions based on information collected from the MSGM. First assumption is that the success rate for all mining projects at the feasibility study stage is 80 per cent. Second assumption is that out of all the successful mining projects that pass the feasibility stage, only 25 per cent are available as potential mine site opportunities. The other 75 per cent are customers that choose to operate their own mine site labs or use a near site commercial lab. Given these assumptions and according to data collected by Intierra¹⁰ Resource Intelligence, the potential market size of the industry is 6,150 total projects. If only 25 per cent of customers wish to outsource their lab operation, this reduces the industry size to 1538 projects. The average project contract is USD 1.0 M for five years. By calculation, the annual size of the global market is approximately USD 307.5 M.

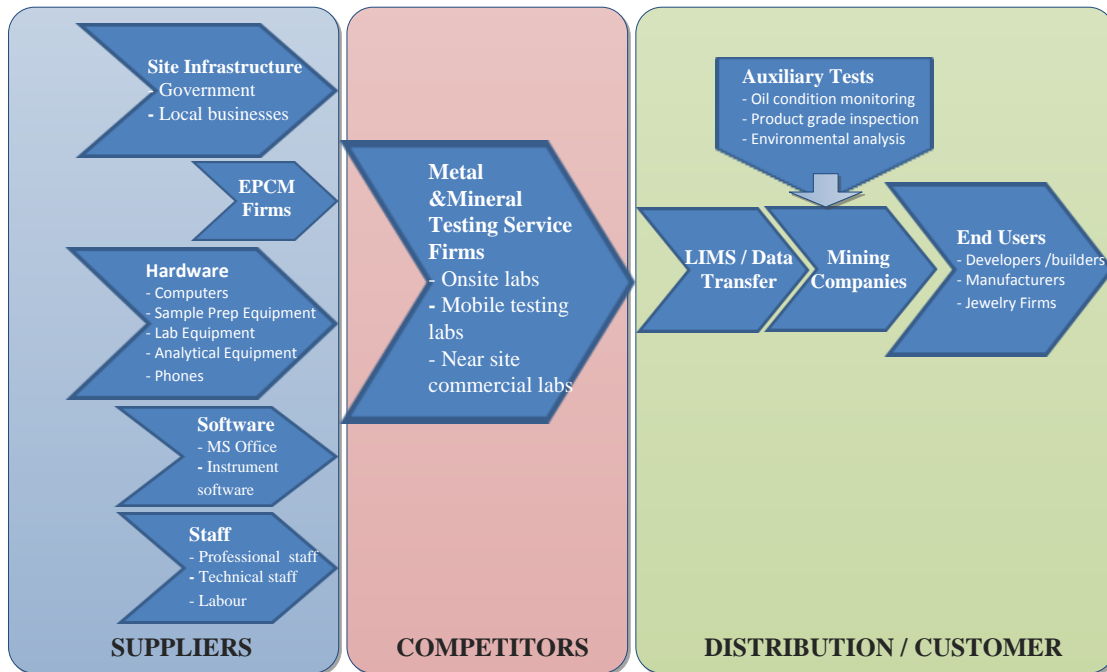
3.1.3 Industry Value Chain

The figure below illustrates a typical industry value chain for the provision of mine site lab services.

¹⁰ Intierra Resource Intelligence is a research and consulting firm that the company uses to collect market information on the resource sector; in particular reports and mineral information maps.

¹¹ Geostats Pty Ltd. is a reputable mining industry consultant firm that performs proficiency tests by conducting round robin surveys from various mineral testing laboratories. The company performs surveys twice yearly and involve over 100 laboratories worldwide. By applying statistical methods, the consulting firm helps to establish an industry standard on accurate measurements. Competing mine site and commercial laboratories use the results for benchmarking performance and as a selling feature.

Figure 3.1 Mine Site Lab Services Value Chain



Source: Author

The key components in the value chain are the staff and site infrastructure. Without people the service cannot be provided and other components of the supply chain become irrelevant. Site infrastructure is also important because companies need to work with governments and local businesses to ensure that there are ongoing efforts to support the mine operations and contribution to resource efficiency. Also of note, firms that have near site commercial labs or offer mobile testing services can also compete in the same market.

The degree of backward and forward integration along this value chain in the mine site lab services industry varies somewhat between firms. For instance, engineering, procurement, and construction management (EPCM) services are usually outsourced but larger organizations may choose to develop or acquire these capabilities. Such is the case for MARC Technologies, which is a subsidiary for the ALS Group. MARC Technologies in conjunction with ALSMS is able to offer both EPCM and lab management services.

After sales services is an example of forward integration. Once the onsite lab operations have commenced, there are other tests needed to support the mining operations. These auxiliary tests as seen in Figure 3.1 help keep the mine profitable, compliant with environmental regulations and move the products further along the value chain to the end user. In general, the larger the firm size the higher the degree of integration seen in the industry.

The following sections will explain in detail the different components of the industry value chain. Knowing the prominent suppliers, competitors and customers will help describe the competitive forces that may affect the relevant players.

3.2 Competitors

Competitors are firms that provide the main services, activities directly related to establishing the onsite mine lab, providing management oversight and capabilities for carrying out metal and mineral testing services. Mine site labs have similar services as mobile labs and commercial labs. Some firms may offer mobile lab services. Mobile sites typically conduct sample preparation services. Mobile sites for sample preparation are easier to establish than full-scale analytical labs because they do not require extensive infrastructure and storage of gases and chemicals to operate analytical equipment.

EPCM firms design and build the labs. Either the customer or incumbent firm will outsource EPCM services. In more developed regions, commercial labs in close proximity are also competing in the same markets.

3.2.1 Industry Structure

It is difficult to assess the number of mine site labs in the world notwithstanding the total number of mines that are currently producing. The majority of firms in the global market consist of mine site labs and commercial labs that are near the mine site. Onsite lab services firms will cluster around regions abundant with mineral deposits in remote, less developed countries. Commercial labs are more prevalent in developed regions with mineral rich properties and greater number of customers. For instance, according to the InfoMine's data research, there are 3455 customers listed in North America with mine properties when compared to only 90 customers in Africa. Therefore, we can assume that the demand for commercial labs will be greater in developed countries versus less developed countries. Customers that operate in less developed countries also desire easy access to testing facilities. However, the sunk cost to support very few customers is not profitable for most competing firms. As a result, the remote areas of developing countries will have fewer competitors.

To understand the niche nature of this industry, it is useful to look at the number of operating mine labs versus number of mining properties in specific regions. Table 3.1 illustrates the distribution of operating mining labs for the top three mining commodities against the number of mine properties worldwide. Asia, Africa and Australasia are at the top and include some of the

least developed countries in the world. In contrast, North America has the most number of mining properties with fewer mining labs in relative proportion. We can infer from this study that there are less commercial labs near the mine site in less developed regions, which results in more opportunities to provide lab services on the mine site.

Similarly, we can look at mineral testing labs that participated in an industry recognized round robin survey. Round robin surveys are inter-laboratory tests performed on a geological reference material (of known mineral content) to assess each laboratory's measurement systems relative to each other. Measurement systems analysis helps to identify variations in the analytical measurement and data between each laboratory. Measurement systems include test methods, equipment used and data reporting functions to ensure that the integrity of the data meets industry standards. Labs choose to participate in order to add credibility to their measurement systems and hence service offerings. Table 3.1 illustrates the distribution of owner operated mine site labs versus outsourced mine site labs worldwide that participated in Geostats Pty Ltd.'s¹¹ round robin analysis survey in 2010.

Table 3.1 Distribution of Mine Laboratories and Mine Properties across Regions

Region	Intierra Resources Research Data	InfoMine's Company & PropertyMine Database	Percent of Mine Properties with Operating Plants (A/B)	Geostats Round Robin Distribution of Labs		
	(A) Number of Gold, Copper, Iron Operating Mine Labs	(B) Number of Mine Properties		(C) Number of Owner Operated Labs	(D) Number of Outsourced Labs	(E) Total Number of Minelabs
Africa	247	987	25%	21	12	33
Asia	609	1238	49%	12	2	14
Australasia	279	1421	20%	18	6	24
Central America	13	n/a	n/a	1	0	1
Europe	201	1266	16%	3	1	4
Middle East	19	n/a	n/a	4	0	4
North America	314	6807	5%	15	0	15
South America	276	2394	12%	7	0	7

¹¹ Geostats Pty Ltd. is a reputable mining industry consultant firm that performs proficiency tests by conducting round robin surveys from various mineral testing laboratories. The company performs surveys twice yearly and involve over 100 laboratories worldwide. By applying statistical methods, the consulting firm helps to establish an industry standard on accurate measurements. Competing mine site and commercial laboratories use the results for benchmarking performance and as a selling feature.

3.2.2 Types of Competitors

Based on MSGM’s intelligence of the global market, SGS is the leading competitor and ALSMS’s main rival. According to Intierra Resource Intelligence market research there are about 87-100 onsite laboratories that are under SGS operational management as of October 2012. According to information found on the SGS website, the number of onsite geochemical labs is over 100. For the purpose of this analysis, we will assume that the number of onsite SGS labs is within the range of 87-100 labs.

In order to categorize competitors it is best to look at firms that have the potential and capabilities to offer onsite lab services. Therefore, the analysis will look at firms that also compete in the mining services industry. More specifically, the analysis will review firms that operate commercial labs and offer metal and mineral testing services. By analysing the number of commercial labs that each firm has located around the world and the range of services they provide, one can assume that they are potential competitors. Also of note, the greater the service scope the larger the firm. The table below presents a list of prominent potential competitors in the global market. For comparison, we will assume that the ALS Group directly relates to ALSMS services and capabilities. Section 3.7 will provide further information on each competitor.

Table 3.2 Testing Service Providers in the Mining Services Industry

Firm	Founded	Employees	Service	# of Labs & Offices	Geographic Regions (Worldwide)	# of Onsite Labs
SGS	1878	75,000	Inspection, Testing, Certification and Verification in multiple industries	1500	Est. 130 countries	87-100
Bureau Veritas	1828	59,000	Testing, Inspection and Certification in multiple industries	1280	140 countries	<10
Intertek	1885	35,000	Inspection, Auditing, Testing and Certification in multiple industries	1000	100 countries	<10
ALS Group (ALSMS)	1863	13,000	Testing, Inspection and Certification in multiple industries	350	55 countries	5
Actlabs	1987	1000	Testing in life sciences, minerals, environmental, forensics and material testing industries	26	13 countries	8

Source: Adapted from Annual Reports retrieved from Company Websites

Competing firms that offer mine site lab services are primarily large multi-national organizations with over 1000 staff servicing multiple industries. Competing firms are often conglomerates of a number of smaller private companies that provided testing services for a particular industry. For example, SGS originally began as an agricultural inspection services firm in the late 1800s before diversifying their service offerings to include testing, certification and verification. From the 1950s onwards, SGS began to expand and diversify its business worldwide. To date SGS continues to grow its business. In 2012, SGS reported 17 acquisitions of companies that competed in varying industries and sectors in the global market.

3.3 Customers

This section will identify the types of customers that growth (if any) will likely come from. This section will provide further discussion on the industry's demand. Understanding the changes in demand of the industry will help identify the threats and opportunities that ALSMS might face. The analysis will also define the customer segments and identify key customer preferences. Understanding the factors that will motivate customers to choose one firm over the other will help identify opportunities for further analysis.

3.3.1 Market Trends and Growth Rates

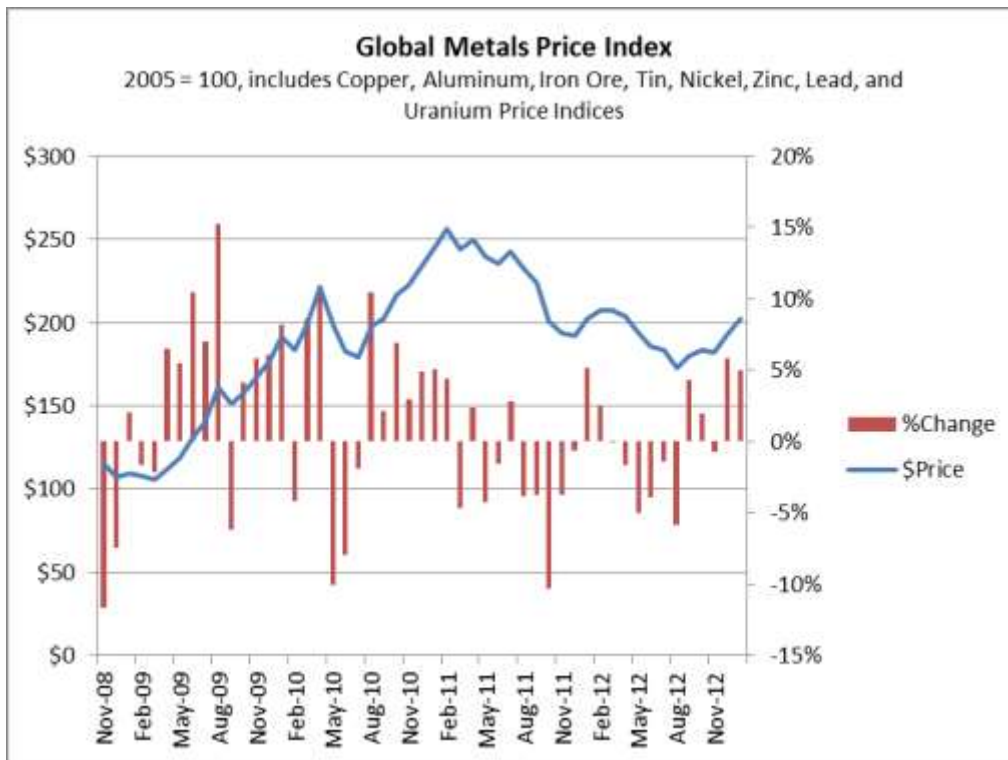
The mine site lab services industry generally trends with global mining activities. However, what drives demand in the broader mining industry? To help answer this question, the analysis will look at the historical performance of metals and world economic growth in the industry sector. In this section, we will also review the top mining companies' performance over a five-year period to observe their profitability throughout a cyclical industry.

3.3.1.1 Metals Performance and Outlook

According to Zacks Equity Research on the metals and mining industry, "the recent focus on the weakening outlook for global economic growth has emerged as a major headwind for the global metal industry. These near-term challenges aside, the group's long-term dynamics appear attractive." (Zacks Equity Research, June 2012). Growth in the emerging markets, particularly China and India, was a major driver of metals demand over the last few years. Europe's debt crisis from 2009 onwards still plays a factor in the world market but in the long-term the market will improve as developing countries receive fiscal and monetary stimuli (Zacks Equity Research, June 2012).

The Metals Price Index chart published by the International Monetary Fund gives a representation of the trends in the industry. The data shows that in 2011 the industry saw a steady decline in overall metal prices. The second half year of 2012 we begin to see some recovery in the industry which supports the research presented by Zacks Equity.

Figure 3.2 Global Metals Price Index



Source: modified from the International Monetary Fund

3.3.1.2 World Development Indicators

The gross domestic product is one of the primary indicators used to measure the health of a nation's economy. When a nation's economic activity increases, it is a positive sign that they are producing, trading and consuming more of the world's output. The demand for mining natural resources will increase as a result to help sustain this economic growth.

According to The World Bank, development in high income regions have decreased in the past twelve years while low and middle income regions have shown great improvements in their economies. Table 3.3 highlights the regions where economic growth has been the greatest in the low and middle income category. Also of note, the industry sectors in Asia and Africa have shown the most growth annually from year 2000-2012 when compared to year 1990-2000.

Table 3.3 World Development Indicators for Economic Growth

	Gross domestic product		Industry	
	average annual % growth		average annual % growth	
	1990-2000	2000-2012	1990-2000	2000-2012
World	2.8	2.6	2.3	2.6
Low income	2.8	5.5	3.2	6.6
Middle income	4.2	6.3	4.9	7.1
Lower middle income	3.5	6.2	3.4	5.9
Upper middle income	4.5	6.3	5.3	7.4
Low & middle income	4.2	6.3	4.9	7.1
East Asia & Pacific	8.5	9.3	10.7	10
Europe & Central Asia	0	4.7	-2.4	6
Latin America & Caribbean	3	3.5	3	2.6
Middle East & North Africa	3.7	4.5	2.9	5.1
South Asia	5.6	7.2	6	7.8
Sub-Saharan Africa	2.5	5	2	5.1
High income	2.5	1.7	1.7	1
Euro area	2	1.1	1	0.4

Source: The World Bank, World Development Indicators: Growth of Output 2013

3.3.1.3 Gross Profit Margins for Top Mining Companies

Mining is a high risk, high return industry. Major mining companies outlast juniors as a result of high market capitalization and diversification.

Junior mining companies are small to medium sized companies that are heavily leveraged. They have to raise significant venture capital in order to properly assess the extent and value of a mineral ore discovery. Junior mining companies want to advance their properties from prospects to viable operating mine plants. Government policy and industry best practices require that an audit of the mineral reserve is assessed for economic value. If the study provides positive results, the junior mining company will either raise capital or attempt to be bought out by a major mining company. In a depressed economy, Junior mining companies suffer more than the major mining companies because they are unable to solicit enough funding or be bought out by the conglomerates – as a result, their profits diminish significantly.

To get an idea of how profitable the mining industry can be a look at trends on the MarketWatch website for some of the selected top mining companies in the world is presented in Table 3.4. The table goes to show that despite the cyclicity of the industry mining companies

are able to sustain profitable margins. The average gross profit margin over the past five years is approximately 35%.

Table 3.4 Average Gross Profit Margin for Top Mining Companies

	Gross Profit Margin for Top Mining Companies					Exchange Code	Market Cap (USD)
	2008	2009	2010	2011	2012		
BHP Billiton LTD		33.98%	41.15%	51.75%	42.76%	NSE	126.05
VALE SA	51.97%	41.98%	58.93%	58.05%	43.90%	NSE	81.56
Rio Tint (PLC)	28.21%	19.70%	45.51%	53.71%	22.46%	NSE	63.72
Anglo American		6.60%	16.12%	14.40%	-5.08%	LSE	41.6
Xstrata	42.42%	42.38%	43.82%	43.20%	40.00%	LSE	33.75
FCX	31.26%	40.54%	48.26%	47.78%	33.89%	NYSE	33.47
Barrick Gold	35.19%	38.15%	51.36%	53.23%		NYSE	31.81
Goldcorp	25.63%	40.49%	-57.42%	13.33%	6.48%	TSX	28.54
Newmont	33.71%	47.60%	50.31%	47.10%	40.73%	NYSE	n/a
Average	35.48%	34.60%	33.12%	42.51%	28.14%		55.06

Source: Stock Exchanges Codes as Listed and modified from HSBC Bank plc 2013

3.3.1.4 Summary of Market Trends and Growth Rates in Emerging Markets

The demand for mine lab services is cyclical and follows closely with trends seen in the mining industry. As such, this section looked at the performance of metals and mining, world economic growth activity in key regions and profitability of top mining companies in the world market.

Since the GFC, the mining industry has been recovering slowly as indicated in the positive changes we see in the global metals price index (Table 3.2) and in the industry sector (Table 3.3). The analysis also showed that despite the turbulent nature of the mining industry, there is sustainable profit seen from the top mining companies around the world. Moreover, the GDP in emerging markets have increased at a more rapid rate than the rest of the world over the past ten years. Overall, the demand for mine lab services is slowly increasing in the world market. Demand in Asia and Africa is growing at a faster rate.

3.3.2 Customer Segments

There are two dimensions to consider when evaluating customer segments in the world market: 1) project stage and 2) emerging markets. The segments are further broken down below. The notion is that customers in different segments may value different things or value the same

things but one preference may have more importance than others may. Drilling down to segments that are more specific helps to identify any opportunities for differentiation or different competitive positions.

1. **Project Stage** – In section 2.3.1, we identified the three market segments that ALSMS was competing in based on customer’s service type needs at different stages of the project cycle. This analysis will use similar criteria to categorize customers for further evaluation.
 - **Feasibility Stage:** Customers in this market segment are in the process of evaluating the profitability of a new mining project. Therefore, customers require some time to build capital investments and to design and construct a mine project before starting up the mine lab operations. It often takes two to three years for a new development project to begin mining production.
 - **Construction Stage:** Customers in this segment require engineering and design services to either construct a new lab, refurbish an existing lab or expand current operations for an existing mine lab. Similar to new development projects at the feasibility stage, customers in this segment require some time to complete this stage of the project before implementing or reinstating lab operations.
 - **Operations Stage:** Customers in this segment are either operating their own labs or using another competitor to run their operations.
2. **Emerging Markets** - As mentioned in Section 3.2.1 the competition for onsite lab services are concentrated in developing countries that have regions of high mineralization. Therefore, customers in this segment will include Africa, Australasia and South American markets.

3.3.3 Relative Size and Growth of Segments

Growth in both project stage developments and emerging markets show positive outlooks but are very dependent on the global demand for resources. Customers in various stages of their mine projects experience delays and cutbacks as a reflection of changes seen in the world economic market. To help mitigate risks, large mining companies would enter into mergers. For instance, in 2012, Glencore International plc and Xstrata plc’s announced a merger with a multi-billion dollar transaction. Mining companies forged ahead with development and expansion plans but then towards mid-year investors started to lose faith. Increasing economic uncertainty led to

decrease in global demand making it difficult to do deals; however, 2013 is showing moderate recovery (The Economist Intelligence Unit Limited 2013).

The report also goes to describe geographical regions with the most economic activity in the next five years. Asia & Australia (including Japan), Latin America (Mexico and South America), Middle East and North Africa and Sub-Sahara Africa all show signs of continuous growth (The Economist Intelligence Unit Limited, 2013).

3.3.3.1 Project Stage

Having identified the overall market size in Section 3.1.2 from a total of 6150 mine site opportunities, we further analyze each segment by project stage as seen in Table 3.5 below. The research data indicates that market sizes for projects in the operation stage are still prevalent and make up over 75 per cent of the market. By applying the same 25% success rate for all mine site opportunities with an average contract rate of 1.0M per annum over five years, the relative size of the market is broken down accordingly: Feasibility (49M USD), Construction (24.7M USD), and Operation (233.8M USD).

Table 3.5 Market Size for Mine Site Laboratories by Project Stage

	Total (all projects)	Gold	Copper	Iron Ore	Balance (Other)
Feasibility Study - Total, assuming 100% success rate	1224	427	213	68	516
Feasibility Study - Total assuming 20% Fail Rate	980	342	170	54	414
Construction	494	179	70	46	199
Operation	4676	1193	513	331	2639
Total Mine Site Opportunity	6150	1714	753	431	3252

Source: Intierra Resources (October 2012)

Additional notes provided from the research:

1. Total column is all inclusive of all commodities being mined, globally (including quarries for example);
2. Data represents the primary commodity only as Gold, Copper and Iron Ore within the project (i.e. data excludes projects such as Copper-Gold, Copper-Cobalt etc.)
3. Feasibility Study- Total assuming twenty percent fail rate assumes that twenty percent of all Feasibility Studies fail and do not progress, hence a revised target is provided;
4. Balance (Other) includes commodities such as Coal, Aggregates plus the balance of the periodic table of the elements.

3.3.3.2 Emerging Markets

In the emerging markets segment, the research shows that the market size for Africa, Australasia and South America is significant. The opportunities for ALSMS are presented in Table 3.6 below. The African region has 247 sites; Australasia has 279 and South America has 276. By applying the same 25% success rate for operating mines with an average contract rate of 1.0M per annum over five years, we can calculate the overall market size for each region as follows: Africa (12.35M USD), Australasia (13.95M USD), and South America (13.8M USD).

Table 3.6 Market Size for Operating Mining Plants by Region for Gold, Copper and Iron Ore

Region	Number of Operating Plants			
	Total	Gold	Copper	Iron Ore
Africa	247	167	59	21
Asia	609	339	140	130
Australasia	279	167	43	69
Europe	201	96	79	26
Middle East	19	8	8	3
Central America	13	12	1	0
North America	314	213	85	16
South America	276	136	77	63
South East Asia	73	49	21	3
Pacific Islands	6	6	0	0
Total	2037	1193	513	331

Source: Intierra Resources

In summary, the operations stage segment is three times larger than the feasibility and construction stages combined. The smallest segment is the construction stage which is an indication that growth for new development or expansion of existing mine operations is somewhat static in the global market. When examining the market size in different regions, Asia wins by a large margin followed by North America at nearly half its size. The regions with the least number of operation plants are the Pacific Islands, Central America and Middle East. This research supports the notion that demand for mine site lab services in emerging nations will be greater in aggregate than North America and Europe combined.

3.3.4 Customer Preferences

Customers in the mine site lab services industry all consider the same qualities when choosing a testing firm, but place importance on different aspects of the services. For instance, customers in the operations segment will be less interested in lab engineering or construction services than those in the feasibility or construction segments. Customers in emerging markets

may be more or less discerning in following government regulations than customers in more developed countries where the rules in the mineral testing industry are regulated and generally adhered to as a value added service.

Nowadays, multi-national organizations in the metals and mining industry put significant efforts to mitigating issues associated with environmental and socio-economic influences. For instance, International Council of Mining and Metals (ICMM) is an organization created to help guide global mining firms in sustainable development abroad. According to ICMM the mining industry in the late 1990s faced “significant problems in reputation, sustaining profits, access to new assets and maintaining investor and employee confidence,” (ICMM website, 2013). Therefore, the customer preferences in Africa, Australasia and South America will be the same for competing firms – that is, ensuring sustainable development in foreign countries. This part of the analysis and onwards will only look at customer preferences at the project stage.

Below is a list of the preferences followed by an explanation for each category. Table 3.7 will summarize each preference and weight their importance.

- (CSR) **Corporate Social Responsibility** – how comprehensive and effective are the programs that are in place?
- (EXP) Metal and mineral **analysis expertise** offering a range of testing techniques to determine metal content in samples accurately
- (LAB) **Lab management and operations** expertise – what similar jobs (size and scope) has the testing firm worked on?
- (LIMS) **LIMS** functionality and ease of use
- (QUA) **Quality monitoring programs** – how rigorous and robust are they?
- (REL) Existing **relationship** between the customer and the service provider
- (SRV1) **Pre-sales service**
- (SRV2) **After-sales service**
- (TAT) Fast, reliable analytical results – often referred to as **turnaround time**

Corporate Social Responsibility (CSR):

As indicated earlier, firms that compete in the world market for metals and mining will need to integrate sustainability across their businesses. Customers look for organizations that

have well established CSR programs. These programs should include health and safety procedures for best lab practices, local community engagement, waste reduction initiatives, energy management, and climate change adaptation activities. The more comprehensive a competitor's CSR program is the more a customer's willingness-to-pay (WTP) increases. This preference is desirable at all levels of the project stage and especially in developing countries.

Metal and Mineral Analysis Expertise (EXP):

Depending on the mining operations in terms of mineral ore that is being mined, customers look for mine lab services that are able to provide the analysis to determine reserve and resource estimations; to help them with certification and raise capital and financing for their mine projects. Customers look for firms that can provide a variety of different testing techniques that cover the majority of the periodic table to reduce searching costs for other mine projects.

Lab Management and Operations Expertise (LAB):

Customers prefer firms that have proven ability to establish the work infrastructure and manage the mine site lab operations effectively. Firms that are able to provide outstanding value at reasonable costs will attract more WTP from customers.

More specifically, customers prefer qualified employees to manage and operate the mine site lab. Firms can acquire technical expertise and knowledge by developing talent organically, offering competitive salaries to hire externally or outsourcing the resources to a third party. Customers will also look for services that focus on waste reduction, best practices and engineering controls and design while the lab is in operation. Finally, competing firms that are able to offer more technical and professional human resources will attract more customers.

Laboratory Information Management System (LIMS):

LIMS is the competitor's internal systems and networks that collate all the test data and format it into a report. Essentially, this is a competing firm's primary service offering. The distribution of analytical data is highly important to the customer and is an integral part of an incumbent firm's value proposition. Mining companies use the data to make operational and financial decisions.

Customized reporting is a key factor that customers look for. The more compatible exported reports are with other software packages used to map and identify ore bodies, such as, 3D modelling, the more desirable it will be.

For customers in the operating stages, this service offering is particularly attractive if competitors are able to adapt and integrate better LIMS into their existing infrastructure seamlessly.

Quality Monitoring Programs (QUA):

Quality monitoring programs are quite important for customers. It is an indicator of how stringent the labs are with their processes. Samples often look very similar to each other without good labeling and quality control. This can cause sample mix-ups because the repetitiveness of the work required for analyzing samples can be prone to human error. There is risk to the firm if they do not implement appropriate governance over the provision of analytical data. Quality assurance and protection of confidential information is highly important to all customers.

Existing Relationships (REL):

The mining industry is a close knit community. Marketing and sales is typically done at the local level and strong relationships are developed through years of reliable and consistent service. Relationships are equally important across all segments. Due to the risky nature of the industry strong partnerships help provide stability.

Pre-Sale Services (SRV1):

This category identifies customers that look for additional services in the value chain to help reduce their searching costs. Pre-sale services, such as value engineering for designing and constructing a new lab, reduce searching costs for finding an EPCM provider. Other pre-sales services may include metallurgical engineering services to help design the mine project, consulting services for lab expansion based on industry experience and LIMS customization.

After-Sale Services (SRV2):

There are a variety of after sales services that may increase customer's WTP factors. After sales services include environmental testing for site reclamation activities, oil analysis to improve maintenance practices and product inspection to evaluate grade level and facilitate trade.

Turnaround Time (TAT):

Turnaround time refers to the time taken to provide analytical results upon receiving samples for processing. Customers prefer quick and accurate results. Mining companies lose money when drilling projects are held due to delays in receiving new information on their resource and reserve calculations. It's imperative that their results are delivered expediently.

Budgets get restructured because the business environment changes and funding for projects may often get cancelled abruptly if there is no significant progress seen. In other cases, results may help avoid political unrest in developing countries.

3.3.4.1 Customer Preferences by Segment

Table 3.7 Customer Preferences by Segment (3 = most importance and weight)

CUSTOMER	CSR	EXP	LAB	LIM	QUA	REL	SRV1	SRV2	TAT
<i>Project Stage</i>									
- FEASIBILITY STAGE	3	3	3	1	2	3	3	3	2
- CONSTRUCTION STAGE	3	1	1	1	1	3	2	2	1
- OPERATION STAGE	3	3	2	3	3	3	1	2	3
Total Category Score	9	7	6	5	6	9	6	7	6
% of Total	15%	11%	10%	8%	10%	15%	10%	11%	10%

Source: Author

Overall and across all segments, customers prefer CSR and strong client relationships. LIMS capabilities scored the lowest with a total rating of 5. LIMS are unique to laboratories. Customers view this as less important in the feasibility and construction stages because this attribute is not fully realized until it is implemented. Also of note, the construction stage has the lowest overall rating across all preference categories. The rest of this section discusses the differences in customer preferences.

Feasibility Stage Preferences:

In the feasibility stage, customers are evaluating the financial opportunities and risks associated with mine projects. Therefore, customers are interested in attributes that will help sustain their businesses and doesn't add any undue risk to the mine site operations. Customers in this segment prefer strong CSR programs; proven capabilities to provide the required testing services and lab management oversight. Customers also look for added value services before and after sales to incorporate it into their cost-benefit analysis.

As mentioned earlier, the mine site lab services is a niche market. Customers will favor firms that they have stronger relationships than others. Customers in this segment put less importance on LIMS, quality monitoring programs and turnaround time because the gains are more relevant after the mine project has been developed.

Construction Stage Preferences:

Once a project advances to the construction stage, customers in this segment are primarily interested in getting the mine site lab constructed within budget and on schedule.

Therefore, customers are most interested in choosing firms that they have strong relationships with because they've had successful joint ventures in the past. Customers will also choose firms with effective CSR programs to add value to their own sustainable development plans. Firms that have comparable programs to customers will be more favorable. Of slightly less importance with a rating of two each is the before and after sales services. Before-sales service would include LIMS customization and lab engineering consultation services. After-sales service would include all the different auxiliary testing services discussed earlier in Section 3.1.3.

Operation Stage Preferences:

Customers in this segment have a mine lab that is already in operation. The attributes that are most preferred include services that will improve or enhance their current operations. Firstly, competing firms need to show competency and ability to integrate effectively into the existing operations. Customers, therefore, will prefer the following attributes over all others: CSR, metal and mineral analysis expertise, LIMS functionality, robust quality monitoring program, strong relationships and a commitment to a good turnaround. Of less importance are laboratory oversight, after-sales and pre-sales services.

3.3.5 Summary of Customer Opportunities & Threats

The customer opportunities and threats are summarized below:

- **Opportunities:**
 - Global metal prices are on the rise which indicates demand for resources will also increase promoting further mine development in the world
 - Emerging markets show positive trends according to The World Bank and The Economist Intelligence Unit
 - Large mining companies are able to sustain profitable margins year over year; therefore, mine lab contracts can generate revenue during economic downturns
 - LIMS is an integral part of the distribution channel for customers yet customers in the feasibility and construction stages do not easily see its usefulness. There is opportunity to promote the benefits of a customized LIMS to customers in these two segments.

- **Threats:**
 - Mining industry is cyclical and risky
 - Customers with projects at the feasibility and construction stages do not provide immediate revenue

3.4 Suppliers

Section 3.1.3 provided an overview of the suppliers in this industry. The suppliers are segmented into five categories: Site infrastructure, EPCM firms, hardware, software and staff. The remainder of this section will discuss important supplier issues for each.

3.4.1 Site Infrastructure

Site infrastructure includes the land, transportation routes, communication, utility services, health services and the local businesses surrounding the mine site.

Governments provide and control the land by taxing businesses. Taxes reduce the profitability of the mining industry overall. Government tax directly impacts the mine lab services industry in a similar manner. Government tax can also affect local businesses. Local businesses help enhance human well-being for staff and indirectly improves workplace moral.

3.4.2 EPCM Firms

EPCM firms are sub-consultants hired to design and build the lab. More specifically, they are required to provide geotechnical, structural and electrical expertise to ensure the facility is safe and operable.

EPCM firms also work within the communities to ensure environmental concerns are addressed. If the local community and governments disagree with work practices, projects get delayed and costs increase as a result. Increased costs will reduce profits for customers and indirectly impact the mine lab services industry.

3.4.3 Hardware

Hardware includes equipment to conduct the testing methods and equipment to help manage the operations, such as, computers and phones. The equipment needed to provide testing

service could vary depending on the variety of testing required, such as, heavy-duty machinery for crushing and pulverizing samples, to laboratory equipment for sample digestion¹², to advanced instruments for quantifying the digested samples.

Hardware suppliers will offer some cost savings to testing firms making large volume purchases. Competitors typically pass these savings onto the customer by reducing the service price. However, suppliers are perceptive to scale economies and negotiating for a better price may not reap significant gains. Price, in this case, will affect the industry equally. There is virtually no advantage for competitors when suppliers choose to increase or decrease their prices.

3.4.4 Software

Software programs are typically Microsoft Office Suite and advanced instrument software supplied by the manufacturer. Microsoft offers discounted licensing fees for large corporations but the overhead costs offset the gains. Advanced instrument software is customized by the manufacturer and unique to each instrument model. Advanced instrument software enables the user to communicate with the instrument. Users require software training so that they can perform their tests on instruments. Each time a new instrument is manufactured commercially or a new version of software is designed, suppliers can capture more rents by updating their software. Instrument software suppliers can also charge licensing fees.

3.4.5 Staff

Staff members include professional, technical and general labour people. Professional and technical staffs do the majority of the work that customers purchase. They help manage the lab operations, ensure the lab adheres to health, safety and environmental best practices and that the lab operates in an efficient and profitable manner. Professional staff supports the operations and do not necessarily work onsite all the time. Their roles include secretarial, information technology, accounting and finance and lab manager. Lab managers often wear multiple hats and work onsite. Lab managers can fulfil the roles of human resources, health, safety and environment officer, and technical expert.

Technical staffs perform the sample testing and report the results. Technical staff includes scientists, chemists and metallurgists. Technical staff must adhere to industry standard test procedures and laboratory best practices. Technical staffs in emerging countries are a scarce

¹² Sample digestion is the process of using acids and other chemical reagents to break down the sample from its solid state to a liquid form that can be easily measured by analytical equipment.

resource. Salaries for professional and technical staff are competitive due to the remoteness of the mine site. In this industry, technical staffs are commonly expatriates. Competing firms that can develop their talent organically will have a competitive advantage over firms that have to recruit externally.

General labour staff are employed part time by the company or on a contract basis depending on the life cycle of the mine project. General labour includes sample preparation workers (using heavy machinery), lab assistants and facilities maintenance worker. General labour consists of people in the local community.

3.5 Five Forces Synthesis

This section examines the competitive factors, attractiveness and key success factors for individual firms competing in this industry using Michael Porter’s five forces model. Table 3.8 below illustrates the apparent strength of each of the five forces on the industry and the key factors affecting its apparent weighting.

Table 3.8 Industry Five Forces Factor for Apparent Weight

Rivalry Degree	Entry Threat	Substitutes Threat	Buyer Power	Supplier Power
MODERATE	LOW	LOW	MODERATE TO HIGH	HIGH
(+/-) Demand growth	(-) Mobile lab services	(-) Non-traditional testing methods	(+/-) Buyers relative to sellers	(+) Low switching costs for Professional & Technical staff
(+/-) Differentiated services	(-) Commercial lab services	(-) Automation	(+) Ability to backward integrate	(+) Specialized skills to provide service
(-) High fixed costs			(+/-) Increasing switching costs	(-) Substitutes available for EPCM & hardware
(+/-) Increasing concentration			(+) Cost sensitive	(+) Hard to find substitutes for software suppliers
(+) High exit costs for competitor run labs				
(+/-) Shortage of skilled workers				
(+/-) Low switching costs for client run labs				

Source: Author

3.5.1 Rivalry

“The strength of Rivalry is primarily a function of the extent to which competition is based on price.” (vonNordenflycht, 2012). When the industry is concentrated with few competitors, has increasing demand for services and competitors offer differentiated services, then rivalry strength diminishes.

The strength of rivalry is moderate based on the key factors that affect competition in the mine site lab services industry below.

- Demand growth (moderate): Demand for resources is growing in developing countries as the world economy slowly improves. Growth in the mine site lab services, however, is slow because of the time it takes to develop a new mine project and those that already exist are already tied to yearly contracts.
- Differentiated services (low/moderate): Competing firms cannot easily differentiate testing services. They can combine services and offer customers a variety of different services.
- High fixed costs (low): There are high fixed costs and fluctuating demands in the resource cycle, which deters smaller firms from competing.
- Increasing concentration (low/moderate): There are few firms in this industry as listed in Table 3.2. The few competitors that are in the mine lab services industry are large global organizations that are expanding their services into emerging markets. Competition is more concentrated in emerging markets than developed markets.
- High exit costs (high): There are high costs to exit the industry which increases the intensity of the competition.
- Shortage of skilled workers (moderate/high): In emerging markets professional and technical staffs are a scarce resource. The impact is at a lesser degree in developed markets.
- Low switching costs (moderate/high): mine site lab services contracts have a set life cycle. Once the contract matures, customers can choose a different service provider if they are unhappy with their current provider. Customers that currently operate their own mine labs can switch anytime if the service offer is attractive enough. Competing firms that focus on projects at the feasibility stage will experience rivalry at a lesser extent because there is less certainty that the mine site project will reach production if only 25 per cent are successful.

3.5.2 Entry Threat

Even though there are few competitors that offer mine site lab services, competitors that have commercial lab and mobile lab businesses also compete in the same market. The commercial lab industry affects the mine site lab services industry to a greater degree in developed countries. The number of competitors in developed countries increases due to small and medium sized firms entering the market. In less developed countries, small and medium sized firms cannot compete because of the sunk costs to supply the infrastructure is too high.

Mobile lab businesses offer similar services to onsite lab services. However, the scope of services is limited to sample preparation services and simple testing procedures. Simple testing procedures include single element analysis with less advanced instrumentation. For instance, tests to determine gold and other precious metals require involved handling techniques and digestion processes.

In both scenarios, the threat of entry is low. Economies of scale, capital requirements and brand identity are high barriers for small and medium sized firms wishing to compete in this industry. Commercial labs do not survive in emerging markets because there are not enough buyers – remoteness of mine sites limits the number of customers. Buyers can also switch service providers upon contract expiry date, which affects the mobile lab industry to a lesser degree.

3.5.3 Substitute Threat

There are no real substitutes in the mine site lab services industry because the major services require management oversight. From the laboratory bench level, there is no real threat of discovering new testing methods because traditionally the existing ones are reliable and customers are averse to trying new techniques. Service providers that offer design and engineering consultations can implement more automation in lab processes but there is still a requirement for technical and professional skill to oversee the lab operations. There are commercially available sample preparation machines and analytical instruments that will decrease the demand for manual testing but this is not a real substitute for providing accredited results.

3.5.4 Buyer Bargaining Power

Buyers are mining companies that are public and privately held. There are many buyers in the mine site lab services industry. There are more buyers than there are sellers in the mine lab services industry. Major buyers are concentrated in developing countries.

To mitigate seller bargaining power most customers will backward integrate and operate their own labs. Buyers can also threaten to buy rivals services to increase their bargaining strength. Buyers and sellers enter a term contract that increases the cost of switching for the buyer. Buyers choose whether they want to pay the price based on value added and percentage of the buyer's total costs associated with the services. Given that many buyers choose to operate their own labs for reasons mentioned, the buyer bargaining power is moderate to high.

3.5.5 Supplier Bargaining Power

In this industry, the service provided is management oversight of the mine lab and reliable analytical results. The main suppliers are then professional and technical staff. Professional and technical staff that can offer management and technical skills will have more bargaining power. They are capable of switching firms but their cost to do so can increase if they have developed relationships with other staff members or have become a shareholder. Competing firms will offer attractive compensation packages and incentives for professional and technical staff to work abroad. General labour employees do not have strong bargaining power because their skills are easy to acquire from other people.

Hardware suppliers and EPCM firms have low bargaining power because there are many substitutes available for buyers to choose. Software suppliers, however, have strong bargaining power because users depend on them (i.e. Microsoft Office and instrument software) to manage and communicate information.

Having the right people with qualified skills is highly important in this industry. As a result, the supplier power has a high rating.

3.5.6 Summary of Industry Opportunities and Threats

The industry opportunities and threats are summarized below:

- **Opportunities:**
 - Increase customer's WTP by offering a variety of testing services
 - Offer mobile lab services to mitigate entry threat, reduce buyer impact of switching and build capital

- Invest in or develop lab automated or semi-automated processes to reduce the costs for hiring skilled workers
 - Build relationships/partnerships with global mining companies who generally do not outsource their mine lab operations
 - Leverage relationships with EPCM firms to attract more customers
- **Threats:**
 - Moderate level of industry rivalry
 - Market saturation by large global organizations
 - Low switching costs for buyers
 - Skilled workers have high bargaining power which will increase costs; they can also leave for competition with short notice

3.6 Sources of Advantage

Competitive advantage over a firm is successful when a firm is able to drive a wider wedge between input costs and customer's willingness to pay than its competitors (Ghemawat, 2010). This section will look at the key sources of advantage that can decrease costs and/or add value for customers. By understanding the sources of advantage (or nature of the key success factors) for competitive advantage in this industry, we can evaluate the relative competitiveness of relevant firms. See Section 3.7 for the relative competitive analysis.

3.6.1 Cost Advantages

In the onsite lab services industry, customers hire firms through formal proposals – request for quotation (RFQ). Competing firms charge customers on a per project basis. The project scope includes sample size, sample type, frequency of receiving samples, elements to be analysed and turnaround required. For mine labs that are in operation, the customer provides more information on the existing lab infrastructure. Pertinent information on the existing lab infrastructure includes staffing, management, operation and equipment details.

The sources of cost advantage for the competing firms include customer relationships, process standardization, LIMS, proximity to mine sites, partnerships or collaboration with EPCM firms and state-of-the art equipment.

3.6.1.1 Sources of Cost Advantage

- **Customer Relationships** – This is a cost advantage because it reduces time and money spent on market research to find new projects. Marketing is heavily dependent on customer relationships. There is a moderate level of rivalry so the cost advantage is mostly found prior to the RFQ process. Competing firms that have established good reputational capital find marketing to be less of a cost advantage. It is useful, however, for building customer loyalty and equity. For new entrants into the industry sector, marketing expenditures can be packaged together to promote testing services to more than one segment of the mining industry including mine site lab services. Human resources across these market segments can be shared to further save on costs.
- **Process Standardization** – There is a cost disadvantage if only highly skilled workers are hired. Alternatively, firms that segregate tasks down to a level where less skilled workers are required will have a cost advantage. Firms that already have in-house technical staff can use them to train new employees while they oversee the more technical aspects of the mine site operations. Any semi-automation or standardization of the process will help provide consistent analytical results to the customer. This is a cost advantage because there will be fewer errors and delivery times will be quicker as a result.
- **LIMS** – There are many benefits to having an effective LIMS. LIMS can eliminate manual handling for collating information and preparing reports to produce faster results. Less manual handling also means fewer errors and further reduces costs. LIMS can provide online tracking of samples upon receipt to help reduce searching time and meet national and international accreditation requirements. The article by Thurston also supports this notion,

“An automated information-management system can ensure documented and validated regulatory compliance with the many requirements imposed on the industry. A LIMS can provide the audit trail to assure those regulatory authorities that the company’s mining activities have no negative impact on the environment.” (Thurston, 2008, p.8)

Therefore, LIMS can provide a cost savings by addressing these requirements while serving as a tool to manage mining data.

- **Partnerships/Collaboration with EPCM Firms** – Developing strong relationships with engineering, design and construction services is a cost advantage because it reduces searching costs and marketing costs for establishing a customer base. Large global firms can further save on costs if they have bargaining power over the right engineering firm that can help them achieve scale economies. Moreover, firms that have integrated EPCM services will have a competitive advantage.
- **Proximity** – Firms that have offices in locations where there is a lot of mining activity have a cost advantage due to reduced searching and marketing costs. A project under construction can be managed more closely near site for timely completion and reduced travelling costs for site visits. If a competing firm has already established a commercial lab nearby or can offer a mobile lab service (entry threat from nearby industry) the proximity factor becomes a cost disadvantage.
- **State-of-the-art Equipment** – This is a cost advantage if the latest state-of-the-art equipment is used that can provide reliable data with low detection levels and fast analysis times for customers. Any equipment that can mechanize parts of the sample preparation, geochemical or analytical process will be a cost advantage by improving productivity.

3.6.1.2 Relative Importance of Each Cost Advantage

For each source of cost advantage there are differences in relative importance across the customer segments. The table below illustrates the relative cost advantage for each market segment. Competing firms will have the same advantages across segments.

Table 3.9 Sources of Cost Advantage Weight as Percent of Total

COST ADVANTAGE	MARKET SEGMENT WEIGHT			TOTAL WEIGHT
	Feasibility	Construction	Operation	
Customer Relationships	20%	10%	10%	40%
Process Standardization	5%	5%	15%	25%
LIMS	5%	5%	10%	20%
Partnerships/Collaboration with EPCM Firms	1%	3%	1%	5%
Proximity	2%	2%	1%	5%
State-of-the-Art Equipment	1%	1%	3%	5%
TOTAL (by category)	34%	26%	40%	100%

Source: Author

Total Weightings across All Segments:

Customer Relationships are the most important source of cost advantage when observing the weighting across all segments. In Section 3.5.4, we identified that buyers had moderate to high bargaining strength. There were low switching costs for buyers because they could choose another firm or decide to operate their own mine labs. Because projects have term-based contracts, it is upon the incumbent firm's best interest to develop strong customer relationships. Stronger relationships will invite longer-term contracts and more work in the future. Firms that do not continue to provide value to their customers may not be able to renew contracts. Additionally, losing a contract may also mean incurring extra costs to remove lab operations and personnel.

Process standardization is the main function of a competing firm's service. It involves direct management of the lab operations; therefore, it had the second highest weighting at 25 per cent. Process standardization is the ability of the firm to utilize resources and apply process improvement techniques. Maximizing resources will reduce overhead costs, which firms can pass on as savings to the customer. Improving techniques to the analytical method, whether by automation or better process flow management, can increase productivity.

The third highest weighting for cost advantage is LIMS. LIMS is closely associated to process standardization because of the many functions it is capable of doing. See the previous Sub-section 3.6.1.1 for more information on its uses. An effective LIMS can save costs on errors and improve efficiencies through better monitoring of the process.

The remaining three sources of advantage have the lowest weighting at 5 per cent each. There is not much distinction between the three factors. Most of the competing firms will have the same access to suppliers and locations nearby the mine site because of their size. The cost advantage will be marginal as a result.

Total Weightings across All Sources of Cost Advantage:

From the analysis on Table 3.9, we find the Operations Stage segment to have the most weight across all sources of cost advantage. The higher weight is because the main services (management oversight and analysis) that competing firms are providing can only be fully realized when a mine lab is in operation.

3.6.2 Customer Utility Advantages

This section identifies the assets and capabilities that a firm possesses which will provide a utility advantage for mining companies. In Section 3.3.4, we identified the customer preferences. By referring to customer preferences, we can determine the sources of utility advantages that customers will use to choose one firm over the other. This section will conclude with the relative weighting of importance for each source of customer utility advantage.

The sources of utility advantage are reputational capital, staff experience, range of testing services, responsiveness of service and LIMS.

3.6.2.1 Sources of Customer Utility Advantages

- **Reputational Capital** – There are a number of qualities that influences a firm’s reputation. They include but are not limited to, ability to provide accurate results to accredited methods and standards, number of successful mine labs operated, responsiveness to environmental and local government policies and overall prestige among competitors in the mine services industry including mine lab services. Reputational capital takes time to develop in the global community. Larger, diversified firms will have a better reputation than smaller firms because customers perceive large firms to be less risky. To many mining companies, the reputation of the mine lab service provider is a deciding factor.
- **Responsiveness of Service** – This is more applicable to each unique project, whether it’s providing the infrastructure for the mine lab, managing the lab operations or delivering analytical data. As project timelines and schedule are often crucial to its success, keeping alert and receptive of any changes to customer’s expectations provides a WTP for that firm’s services.
- **Staff Experience and Mobility** – Customers want lab managers to have industry knowledge and experience so that the mine lab can be established as soon as the mining project begins start-up operations. Hiring lab personnel with the right technical skills and who can adhere to industry testing standards and procedures will give the customer added confidence in the competing firm’s abilities. Furthermore, staff mobility is critical to establishing mine site lab services in remote areas. If firms can develop a core group of staff with varying skills that are not averse to working in remote areas then they will be better off.

- **LIMS** – This is a utility advantage for firms that can offer customized reporting and ease of use with the interface. The benefit for customers is online access to their samples and data in real time. There is improved delivery time to the customer because of better data handling tools through the LIMS software. There is added transparency to the operations when competing firms can offer customers bench level accessibility to raw data, user handling and sample tracking. Firms that can customize LIMS to integrate with other software packages will also gain competitive advantage.
- **Range of Testing Services (Product)** – In addition to reputation, staff experience, responsiveness and LIMS, customers look for firms that offer the testing services required for their mine operations – in particular, analysis for the elements of interest. Firms that have proven capabilities to provide a range of testing services will increase customer’s WTP. Firms that can offer different types of testing for environmental analysis, oil monitoring and grade inspection will increase customer’s WTP. Larger organizations (customers) that have multiple mine projects of differing commodity resources will have a high WTP factor for competing firms that possess the capabilities to perform different testing methods. For smaller sized customers, the range of testing services is still important but to a lesser degree.

3.6.2.2 Relative Importance of Customer Utility Advantages

Customer preference is similar across all segments since the main goal is to establish a feasible mine site, bring it to production and ensure the mine lab operates efficiently. Mining companies are attracted to large firms with high reputational capital and can provide quality data with fast turnaround time. Customers are willing to pay more if firms can guarantee quality and timeliness of their deliverables. For each source of customer utility advantage there are differences in relative importance.

Table 3.10 Sources of Customer Utility Advantage Weight as Percent of Total

CUSTOMER UTILITY ADVANTAGE	WEIGHT
Reputational Capital	50%
Responsiveness of Service	20%
Staff Experience	12%
LIMS	12%
Range of Testing Services	6%
TOTAL	100%

Source: Author

3.7 Relative Competitive Analysis

Having identified the relevant firms in the onsite lab services industry in Section 3.2.2, this section will discuss the relative competitiveness of each firm based on the sources of advantages previously discussed. The relevant competitors are those that offer onsite lab services or have the capabilities to offer onsite lab services based on firm size and presence in the global market. We will also assume that ALSMS services and capabilities are synonymous with ALS Group's service offerings.

The majority of the selected firms are mega corporations with testing businesses in multiple industries and market capitalizations of over 1 billion dollars. Firms try to gain a competitive advantage by reducing costs and maximizing customer value.

3.7.1 Relative Competitors

3.7.1.1 SGS

As discussed in Section 3.2.2, SGS is the market leader in mine site laboratory services. SGS provides testing services to multiple industries. In 2012, the SGS oil, gas and chemicals business brought in the most revenue at nearly 18.7 per cent. SGS mining sector division placed fourth at 15.6 per cent of revenue. Regionally, the majority of SGS revenue is concentrated in Europe/Middle East/Africa (EMEA) at 47.1%.

The SGS network comprises over 1500 offices and laboratories around the world. Of the 1500 offices and laboratories, 140 are commercial geochemical laboratories, sample preparation and mine site laboratories. The number of mine site laboratories ranges from 87-100 (Intierra Resource Intelligence 2012). The major portions of these are located within the African continent.

3.7.1.2 Bureau Veritas

Bureau Veritas provides testing services to multiple industries worldwide. Bureau Veritas earns most of its revenue from its Industry business division at 23 per cent as published in its 2012 annual report. Its commodity business division, which includes mining, was the second largest revenue contributor at 18 per cent. Regionally, most of Bureau Veritas' revenue comes from EMEA markets at 49 per cent of total revenue.

Since 2007, this firm has acquired key analytical testing laboratories to provide global coverage in the resource sector. The most recent acquisitions include Acme Labs and Inspectorate, which have been competing in the global minerals markets for over 25 years. Bureau Veritas has 1280 laboratories and offices around the world. Out of the 1280 laboratories and offices that Bureau Veritas operates, 75 are commercial laboratories in the mining industry. Bureau Veritas offers mine site lab services as well as mobile laboratories but there is no information found as to how many they operate.

3.7.1.3 Intertek

Intertek provides testing services to multiple industries around the world. Intertek receives most of its revenue from inspection services (32 per cent) and commodity industries, which includes mining (28 percent). Intertek draws its revenue relatively evenly from key regions: America (33 per cent), Asia Pacific (35 per cent) and EMEA (32 per cent). Intertek operates more than 1000 laboratories around the world. Intertek offers mine site lab services but there is no information found as to how many they operate. However, Intertek touts a number of successful laboratory-outsourcing projects in other industries – notably the oil, gas and chemical industry. In some instances, these outsourcing projects lead to acquisitions.

3.7.1.4 Actlabs

Actlabs is a privately held company with approximately 1000 employees operating in 26 locations around the world. Actlabs competes by diversifying their service offerings on a contract basis with a focus on research and development. By staying ahead of the competition on the technological front Actlabs is able to serve niche markets. Actlabs has been successful at providing eight onsite lab services – five of which are full laboratory services. According to a valuation done by Biotechgate, Actlabs revenue at the fiscal year end of 2011 was 90 M CAD


3.7.2 Relative Position of Competitors in Relation to ALSMS

3.7.2.1 Scoring Methodology

Scoring is subjective, based on assumptions, ALSMS market research and information gleaned from the competitors' websites. Ratings are ranked high (5) to low (1) based on each firm's relative position to each other for each source of advantage. The following tables summarize the outcomes of the analysis.

Table 3.11 Relative Competitive Position – Cost Advantage

Firm Name	ALSMS	SGS	Bureau Veritas	Intertek	Actlabs
Firm Size	Mega	Mega	Mega	Mega	Large
# of Mine Labs	5	87-100	<10	<10	8
SOURCES OF COST ADVANTAGE					
- Customer Relationships, 40%	● 4	● 5	◆ 2	◆ 1	▲ 3
- Process Standardization, 25%	● 4	▲ 3	● 5	◆ 2	◆ 1
- LIMS, 20%	● 5	● 4	▲ 3	◆ 2	◆ 1
- Partnerships/Collaboration with EPCM Firms, 5%	▲ 3	● 4	● 5	◆ 2	◆ 1
- Proximity, 5%	◆ 2	● 5	● 4	▲ 3	◆ 1
- State-of-the-Art Equipment, 5%	n/a	n/a	n/a	n/a	n/a
TOTAL SCORE WEIGHT (out of 100%)	77%	80%	62%	31%	35%



Ranking Legend High Med Low


Weight: Percentage as defined on Table 3.9

Score: (% weight) x (category score)

Source: Author

Table 3.12 Relative Competitive Position – Customer Utility Advantage

Firm Name	ALSMS	SGS	Bureau Veritas	Intertek	Actlabs
Firm Size	Mega	Mega	Mega	Mega	Large
# of Mine Labs	5	87-100	<10	<10	8
SOURCES OF CUSTOMER UTILITY ADVANTAGE					
- Reputational Capital, 50%	● 4	● 5	▲ 3	◆ 1	◆ 2
- Responsiveness of Service, 20%	◆ 2	● 5	● 4	▲ 3	◆ 1
- Staff Experience and Mobility, 12%	▲ 3	● 5	◆ 2	◆ 1	● 4
- LIMS, 12%	● 5	● 4	▲ 3	◆ 2	◆ 1
- Range of Testing Services 6%	NO Adv	NO Adv	NO Adv	NO Adv	DIS Adv
TOTAL SCORE WEIGHT (out of 100%)	67%	92%	58%	29%	36%



Ranking Legend High Med Low

Weight: Percentage as defined on Table 3.10

Score: (% weight) x (category score)

Source: Author

3.7.2.2 Cost Advantages – Customer Relationships

Firms that score high in this category have a number of mine site labs currently in operation, a strong presence in the global market (number of locations) and years of service provided to the mining industry. SGS is the clear leader because it has the most mine labs in

operation and it is the largest firm across all the testing industries. ALSMS scored slightly higher than Actlabs because of its large client base in the mining industry (over 1000 customers served) and locations worldwide. Even though Actlabs has been more successful at providing onsite lab services, the firm is not as big or as mature as the ALS Group.

3.7.2.3 Cost Advantages – Process Standardization

The scoring in this category directly relates to the size of the firm and the number of years it has been providing testing services since its establishment. Older firms will have established their positions in key markets over time. Therefore, older firms will have proven regulatory systems and formalization to keep operations running efficiently. Operational efficiency is a result of process standardization. The oldest firm is Bureau Veritas, which scored the highest in this category. Meanwhile, Actlabs scored the lowest. Actlabs also touts research and development capabilities that require systems that are more agile and less formulized.

3.7.2.4 Cost Advantages – LIMS

The scoring in this category rates firms based on how accessible its LIMS is to customers, how well the LIMS has served the mining industry over time and if there are any distinguishing features that provides a competitive advantage. ALSMS scored the highest because of its LIMS capabilities to integrate with other mining data software. Actlabs scored the lowest because it is the newest firm relative to the other competitors.

3.7.2.5 Cost Advantages – Partnerships/Collaborations with EPCM Firms

In this category, firms receive a high rating if they have established integrated EPCM services. ALSMS rates in the middle because its subsidiary MARC Technologies is new when compared to SGS and Bureau Veritas. Intertek provides more consulting services than construction or engineering. Actlabs does not provide any type of EPCM service according to their published service offerings.

3.7.2.6 Cost Advantages – Proximity

This category ranks firms based on number of locations (offices and laboratories) around the worldwide. SGS ranks the highest with 1500 locations. Actlabs is the lowest with 26 locations.

3.7.2.7 Cost Advantages – State-of-the-Art Equipment

It is difficult to determine the ranking orders of how well a competitor utilizes state-of-the-art equipment as a cost advantage. Each firm proclaims to use robotics and advanced instrumentation for parts of the analytical process. Therefore, there is no clear advantage or disadvantage between firms. The total score weight excludes this category.

3.7.2.8 Customer Utility Advantages – Reputational Capital

The scoring in this category is a combination of the number of accredited services a firm can offer, the number of successful mine labs deployed over time, the overall perception of providing quality services in the mining industry and whether or not a firm actively promotes their CSR programs. SGS scored the highest because of its market position in the mine site lab services industry, size and capabilities to provide a variety of accredited testing services. ALSMS ranks the second highest primarily because of its reputation as part of the bigger ALS Minerals division in the mining the industry. Through ALS Minerals, ALSMS can offer a number of internationally accredited testing services.

3.7.2.9 Customer Utility Advantages – Responsiveness of Services

It is difficult to gauge the responsiveness of services for competitors because not all firms have established onsite laboratories. This category ranks each firm based on the number of offices and laboratories they have around the world. The more locations listed the more a responsive a competing firm can be to customer inquiries. It is important to note that ALSMS has only one person dedicated to grow its division, which is also a contributing factor to the low score of 2.

3.7.2.10 Customer Utility Advantages – Staff Experience and Mobility

This category ranks each firm based on the number of mine labs that are in operation and how prominent the firms are in EMEA markets. The more mine labs a firm operates the higher the ranking will be. As well, firms that are able to generate more revenue by focusing on EMEA markets will receive a higher score. The assumption is that firms will have established infrastructure in these markets to improve their mobility to hire and staff the right people for each contract. ALSMS rates in the middle. When comparing ALSMS to SGS and Actlabs, it is obvious that ALSMS comes up short in this category. Both and SGS and Actlabs have successfully outfitted a number of onsite lab services in emerging markets.

However, ALSMS scores slightly better than Bureau Veritas. Despite Bureau Veritas' success in EMEA markets overall, this firm has only recently begun to expand in the mining industry. When compared to ALSMS, Bureau Veritas does not possess the same depth of staff experience and mobility for the mine lab services industry.

3.7.2.11 Customer Utility Advantages – LIMS

This source of advantage is both a cost and customer utility advantage when considering the fixed and variable costs of a mine project. Any associated cost advantage in this category is also a cost savings for the customer; therefore, increasing customer value and utility. ALS scored the highest again because of its LIMS capabilities to integrate with other mining data software that is unique to the industry.

3.7.2.12 Customer Utility Advantages – Range of Testing Services

The scores in this category reflect the breadth of services each firm offers relative to each other. All the mega firms, including ALSMS, offer a variety of testing services that fulfil the testing requirements throughout all stages of the resource life cycle. Therefore, there is no clear advantage between the mega firms. The total score weight excludes this category. Of note, Actlabs has a disadvantage because its scope of services does not cover as many industries as the mega firms.

3.8 Summary and Conclusions

By ranking all the firms for overall cost and utility advantage, it comes as no surprise to see SGS rank at the top for competitive position. Multiplying the overall cost and customer utility advantages together allows us to examine how significant the differences are between firms. Here is the final ranking in order from the top:

1. SGS – first, 73.3 %
2. ALSMS – second, 51.7%
3. Bureau Veritas – third, 36.0%
4. Actlabs – fourth, 12.6%
5. Intertek – fifth, 9.1%

Since ALSMS, as part of the ALS Group, has been in the mining industry for a number of years, it scored high ratings for customer relationships and reputational capital. Collaborating with MARC Technologies as an EPCM provider and developing an advanced LIMS also helped boost ALSMS' rating.

This chapter closes with a summary of the internal (sources of advantages) and external forces (industry analysis) that ALSMS must address to help gain competitive advantage. Using the information derived from Chapter 2 and 3, we will now consider some strategic alternatives to leverage strengths and opportunities and/or mitigate weaknesses and threats in the next Chapter. Please refer to Table 3.13.

Table 3.13 ALS Mine Site S.W.O.T. Summary

STRENGTHS	WEAKNESSES
Relationships with clients in the mining industry	MARC Technologies is a relatively new firm in comparison to the main competitors
Customized LIMS system	Low brand recognition in the mine site lab services industry - few mine site labs operated
Internal exploration lab capabilities and expertise in the mining industry	Only one dedicated person to manage and grow the business in the world market
Mega company with technical and professional human resources	Low mobility to deploy onsite lab operation services
OPPORTUNITIES	THREATS
Emerging markets show positive trends over next five years	Mining industry is cyclical and risky
Large mining companies can sustain longterm profitability	Moderate level of industry rivalry
Enhance LIMS capabilities for data reporting and distribution for competitive advantage	Customers with projects at the feasibility and construction stage do not provide immediate revenue
Additional services to offer that provide an increase in customer WTP and increase revenues	Market saturation by large/mega firms
Offer mobile lab services to mitigate entry threat, reduce buyer impact of switching and build capital	Skilled workers have high bargaining power which will increase costs and leave for the competition
Invest in or develop lab automated or semi-automated processes to reduce costs for general labour	Low switching costs for buyers
Leverage relationships with EPCM firms for potential new customers	

Source: Author

4: Strategic Alternatives

This section discusses the strategic alternatives generated after examining the industry forces and sources of advantage of the firm. Based on the discussions in the preceding chapters, the analysis will relate some of the key SWOT issues presented in Table 3.13 to ALSMS's strategic priorities. Next, the analysis will evaluate each strategic alternative against the four strategic priorities to determine a recommended alternative. Chapter 5 will assess the feasibility of the alternative and suggest recommendations for action.

4.1 Identified Alternatives

4.1.1 Strategic Priorities

To determine what alternatives to consider, we must first review the company goals and key challenges that ALSMS currently faces. In Chapter 1, we identified that ALSMS wants to 1) develop a new customer base in the mine site laboratory services sector, 2) establish the ALS signature brand through quality of service and delivery 3) increase workload for geochemistry analysis, and 4) solicit collaboration at senior management level to ensure there is minimal impact to ALS Minerals business cost base.

In Chapter 2, we identified four key challenges that ALSMS needs to overcome in order to be successful. These are the strategic priorities for ALSMS, which also aligns with the overall company goals as discussed in Chapter 1. The four strategic priorities for ALSMS are:

1. **Winning customer contracts** to develop a new customer base
2. **Leveraging resources** for the provision of services
3. **Developing appropriate staffing** levels to fulfil contracts expeditiously
4. **Managing the costs** to minimize impact to the ALS Minerals business cost base

As part of the ALS Minerals division, the main goal for ALSMS is to win more customer contracts. By doing so, ALSMS can help the business expand into new sectors of the mine services industry. The remaining three strategic priorities are still important but to a lesser degree.

The alternatives presented offer multiple services including geochemistry analytical services. See Table 4.1 for a summary of the four identified strategic alternatives. The following subsections will explain how each alternative helps to address the four strategic priorities while at the same time considering the effects of the SWOT analysis.

Table 4.1 Identified Alternatives Table

Alternatives	What?	Where?	How?
A1 - Diversify testing services scope	Onsite geochemistry lab management with auxiliary testing services	Operations and Construction (Commissioning) Project Stage in emerging markets	<ul style="list-style-type: none"> • Provide Geochemistry and ALS auxiliary testing services, • Tap into existing client base from other divisions, • Create online marketing database to collate information and resources, • Integrate existing LIMS (GEMS) within ALS testing divisions, • Provide incentive package for internal staff development and training, • Define scope of responsibilities for regional managers to promote revenue growth, • Utilize the company's strong supplier relationships to keep input costs low
A2 - Invest in Mobile Lab Services	Similar to Alternative 1, but using mobile lab services	Feasibility and Construction (early development) Project Stage in emerging markets	<ul style="list-style-type: none"> • Similar to Alternative 1 except ALSMS would only provide Geochemistry, Metallurgical and Environmental testing services, • ALSMS would invest in utilizing containerized labs instead of building a permanent facility, • Develop mobile labs for advanced testing requirements
A3 - Diversify testing services scope and offer EPCM services	Same as Alternative 1, with addition of engineering, design and construction services	All three project stage segments in emerging markets	<ul style="list-style-type: none"> • Same as Alternative 1, with addition of EPCM services by MARC Technologies
A4 - Limit services to customers in the feasibility stage	Onsite sample preparation services with near site geochemistry and metallurgical testing services	Feasibility Project Stage in emerging markets	<ul style="list-style-type: none"> • Similar to Alternative 1 except that ALSMS would only provide mobile sample preparation services with geochemistry and metallurgical testing capabilities at near site ALS labs. All other activities remain the same.

4.1.2 Alternative 1 – Diversify Testing Services Scope

The first alternative is to focus on the operations and construction segments. An opportunity arises in the operations segment when contracts are up for renewal and mining companies send out a new RFQ. In the construction segment, the process is the same. This alternative provides immediate revenue if ALSMS can win projects away from competitors or can attract customers to outsource their mine lab operations while operating or commissioning the mine project.

ALSMS would diversify its service offering through close coordination with other ALS testing divisions. ALSMS would offer the following testing services:

- ALS Geochemistry: Onsite geochemistry analysis for mine grade control and to monitor the profitability of the mine operation
- ALS Metallurgy: Metallurgical work to optimize the mine operation as needed
- ALS Environmental: Environmental analysis for acid mine drainage, air and water quality monitoring, occupational hygiene and stack testing to comply with local regulations and support the mine operation.
- ALS Tribology: Oil, fuel, coolant and metalworking fluid testing of heavy equipment to help reduce costly repairs, limit unplanned downtime, increase equipment utilization and help evaluate overall product performance.
- ALS Inspection: Pre-shipment inspection services to help bring commodities to market

While providing these auxiliary services ALSMS can grow its customer base through internal networks. The MSGM would also create a shared online database for collating customer information, project stage, market trends, and revenue potential. A shared database across testing divisions helps the company keep apprised of emerging opportunities. Moreover, the MSGM would collaborate with regional managers to define scope of responsibilities in their specific markets and promote revenue growth.

Fully integrating GEMS into the other ALS testing divisions will help streamline data distribution, lab process monitoring and provide customer value. For procured projects in the operations stage, ALSMS would have to invest some time and money to integrate GEMS to the customer's existing LIMS. Fortunately, the GEMS system is relatively easy to integrate for new customers since the LIMS is web-based and requires only a server and access to the internet.

However, integrating GEMS within the organization would be challenging since other divisions have their own LIMS and are more averse to switching.

ALSMS would promote the proprietary CoreViewer™ and Webtrieve™ software available only through GEMS to draw customers away from their own LIMS. If ALSMS can successfully persuade customers to use GEMS, then switching costs for customers would increase. However, in some instances, the customer may choose not to use GEMS and ALSMS would lose this opportunity for competitive advantage.

Since the company has 5000 employees working in the ALS Minerals division, ALSMS can attract talent within the organization to save on hiring costs for skilled workers. Ideally, these employees would come from the ALS Geochemistry sub-division because there are more workers that have the relevant industry skills and knowledge. The opportunity cost for the company would be potential loss of revenue and tacit knowledge from the other divisions that would be supplying the skilled workers. There would be an increase in variable costs to incentivize the right people and develop training programs.

Lastly, ALSMS would also utilize the organization's bargaining power to reduce supplier costs, which would allow for lower prices and increased customer utility.

With this alternative, all four strategic priorities may be improved. Integrating GEMS within the ALS network, however, may prove to be expensive and be slow to develop. As well, focusing too much on the construction segment will delay revenue.

4.1.3 Alternative 2 – Invest in Mobile Lab Services

The second alternative is investing in mobile lab services and offering fewer testing services than Alternative 1. This alternative would still collaborate with other ALS testing divisions but only offer Geochemistry, Metallurgical and Environmental testing services. Focusing on the feasibility and construction stage segments would improve ALSMS' chances to implement GEMS for competitive advantage and provide customer value.

Containerized mobile units are commercially available but the company would design their own. ALS Geochemistry has been successfully building and deploying complete mobile sample preparation laboratories to service the mine exploration segment. ALSMS would use these resources via MARC Technologies to manufacture the mobile units. These in-house mobile units take approximately 6 to 8 weeks to manufacture. Once configured, the container modules

would qualify as a standard 20-foot or 40-foot shipping container, which for shipping purposes is cost effective. The joint effort would help generate more revenue in the mine lab services sector.

ALSMS would not only provide mobile units for sample preparation but also complete onsite analytical capabilities for easy deployment. Customizing containerized units to support more advanced instrumentation and technology can be challenging. Further development in improving the existing equipment and instrumentation requirements based on industry standards is paramount. ALSMS would invest in providing state-of-the art equipment to gain competitive advantage and add customer value. For example, Agilent Technologies, who is a provider of test and measurement products, has developed an advanced atomic spectrometer for gold and precious metals analysis that is unique to the mining industry. The Agilent 4100 Microwave Plasma-Atomic Emission Spectrometer (MP-AES) can run unattended multi-element analyses without flammable or expensive gas supply, dramatically reducing operating costs and improving laboratory safety. The company would use its strong supplier relationships with Agilent Technologies to support ALSMS expansion in emerging markets.

Alternative 2 is attractive because there would be savings in analysis and operational costs for ALSMS and the customer. However, with respect to the four strategic priorities, there would be sunk costs to invest in customized mobile units and new technology. The company would have to absorb the upfront costs or pass these costs to the customer. Cost management may not improve significantly if the cost to invest in state-of-the art equipment diminishes the gains in operating costs.

Moreover, customers in the operation segment are less willing to switch over to a mobile unit when they have already established a permanent mine site lab. The market size for the feasibility and construction stages are much smaller than the operation stage. This alternative, though attractive, may not yield a quick return on investments in the short term.

4.1.4 Alternative 3 – Diversify Testing Services Scope and Offer EPCM Services

This alternative has all the same attributes as Alternative 1, except that ALSMS would include engineering, design and construction services for the mine lab. Alternative 3 focuses on three customer segments to maximize rent earning potential.

The company has designed many commercial labs around the world and recently acquired MARC Technologies to integrate the contracting and construction services. ALSMS would utilize MARC Technologies to design and build energy efficient and environmentally

conscious onsite laboratories. ALSMS can offer expertise in lab flow design, customized lab equipment and supplier knowledge by drawing on the expertise of other sub-divisions under the ALS Minerals umbrella. Moreover, with MARC Technologies' capacity and capabilities the company could develop semi-automated processes to increase staff utilization rate.

This alternative helps to mitigate the effects of all the mega firms' affiliations with prominent contractors or EPCM capabilities through strategic acquisitions. In comparison to the main competitors listed in Section 3.7.1, MARC Technologies is a relatively new firm. The company could invest in developing innovative semi-automated processes that would differentiate them from other EPCM service providers.

Alternative 3 is attractive because it would enhance customer utility and in turn increase the chances of winning more customer contracts by offering services to all three-customer segments.

4.1.5 Alternative 4 – Limit Services to Customers in the Feasibility Stage

The fourth alternative focuses on customers in the feasibility stage. Alternative 4 is similar to Alternative 1, except ALSMS would only offer onsite mobile sample preparation lab services and outsource the geochemistry and metallurgical work to its nearest sister divisions (ALS Geochemistry and ALS Metallurgy). All other activities, such as, utilizing the existing client base information from other divisions, creating an online database, implementing GEMS, promoting and hiring within the company, working with regional managers within the two sub-divisions to increase revenue for ALS Minerals and leveraging supplier relationships to reduce input costs remain the same.

In Section 3.1.2, we assumed that only 80 per cent of all mining projects at the feasibility stage led to a successful mine production. By calculation, 20 per cent are missed opportunities for competing labs in this industry. Alternative 4 allows ALSMS to capture rents from a segment that is unexploited.

By focusing only on sample preparation services at the onset, ALSMS can take more time attracting and developing staff within the ALS Minerals community to operate new mine site labs in the future. The benefit to Alternative 4 is that ALSMS would be able to satisfy all four strategic priorities while mitigating some of the opportunity costs. Instead of hiring a number of technical staff, ALSMS can use local labour resources that are available to them and promote

employees within the company to leadership positions and fewer technical positions. ALS employees would help instil the company brand and work culture.

The only downside to Alternative 4, is the time period to build revenue for ALSMS would be slower albeit still profitable for the ALS Minerals division.

4.1.6 Criteria for Rating the Alternatives against Identified Strategic Priorities

The following table summarizes the strategic priorities to achieve the firm’s goals and the relative weighting associated with each of them. The relative weighting is based on the existing ALSMS business plan priorities and the issues mentioned in Section 2.5. Moreover, the criterion for winning customer contract is weighted the highest because without the ability to generate revenue the subsequent criteria will not be relevant. These key priorities will help ALSMS determine the best alternative to pursue.

Table 4.2 Evaluation Criteria and Relative Weights

Evaluation Criteria - ALSMS Strategic Priorities	Weighting
1. Potential to win more customer contracts	50%
2. Degree of Leveraging Internal Resources	30%
3. Degree of staff development required	15%
4. Cost to Implement	5%
Total Weight	100%

Potential to Win More Customer Contracts:

Weighed highest at 50 per cent as ALSMS is interested in strengthening its market share in emerging markets by winning more customer contracts; therefore, alternatives that allow for this such as providing additional revenue streams or increasing customer utility will score higher.

Degree of Leveraging Internal Resources:

Weighed at 30 per cent this criterion is important for utilizing internal resources within the ALS Minerals division to help mitigate industry threats or capitalize on the opportunities. Alternatives that allow for exchange or sharing of resources that are more inter-divisional will reduce searching costs for technical skills, promote employee job satisfaction, and will score higher as a result. For instance, using MARC technologies to offer EPCM services is one way to mitigate a threat while utilizing internal resources.

Degree of Staff Development Required:

Weighed at 15 per cent this criterion is important for ALSMS to have trained staff readily available to deploy the overall infrastructure of operating the mine site lab and keeping it profitable throughout the duration of the contract. ALSMS is willing to invest the time to develop staff internally if there is long-term benefit for the company to retain experienced staff with technical and operational knowledge. Alternatives that provide more opportunities for staff to gain new skills or achieve higher positions will score higher.

Cost to Implement:

The company achieves strong financial performance through disciplined cost control. Alternatives that help to reduce operational costs or increase profitability will score higher. Weighed lowest at 5 per cent, ALSMS is willing to incur upfront implementation costs if there is an increase in profitability and workload for geochemistry analysis onsite.

4.1.7 Alternatives Assessment against Key Strategic Priorities

The following table evaluates the alternatives with respect to the strategic priorities listed in the previous section. Each alternative receives a rating value between one and four – four being the highest rating given to the alternative that best addressed the evaluation criteria relative to other alternatives. The relative score for each alternative with respect to each priority is the alternative’s value multiplied by the weight factor. Table 4.3 summarizes the results.

Table 4.3 Evaluation of Alternatives against the Strategic Priorities

Evaluation Criteria	ALT 1 Diversify Testing		ALT 2 Invest in Mobile Labs		ALT 3 Diversify & Add EPCM		ALT 4 Limit to Feasibility Stage	
	Rating	Score	Rating	Score	Rating	Score	Rating	Score
1. Potential to win more customer contracts, 50%	3	1.5	2	1.0	4	2.0	1	0.5
2. Degree of leveraging internal resources, 30%	3	0.9	2	0.6	4	1.2	1	0.3
3. Degree of staff development required, 15%	3	0.5	2	0.3	4	0.6	1	0.2
4. Cost to implement, 5%	2	0.1	4	0.2	3	0.2	1	0.1
Final Score	3.0		2.1		4.0		1.0	

Ranking Legend High Med/High Med/Low Low
Weight: Percentage as defined on Table 4.2
Score: (% weight) x (category score)

Source: Author

4.1.8 Alternatives Scoring

4.1.8.1 Potential to win more customer contracts

All four alternatives offer a variety of services that will increase customer utility, such as, an easy to integrate LIMS system and access to different testing services via the ALS Group network. Where they differ is in the segment focus of each alternative. For instance, Alternative 3 scored the highest rating because ALSMS would be able to provide services to all three segments thereby increasing the marketing pool. Collaborating with MARC Technologies allows ALSMS to backward integrate their service offerings and provide more value to the customer.

In Section 3.3.3.1, we looked at the market size for mine site laboratories. The operations segment was the largest at 4676 mine site labs, 494 at construction and 980 at the feasibility stage. As a result, Alternative 1 received the second highest rating for its focus on the commissioning stage and operations segment.

Alternatives 2 and 4 scored the lowest ratings because its focus is on the feasibility and early development stage of the mine project. There is less chance to win over more customers when compared to the bigger market size of the operations segment. Alternative 2 scored slightly better than Alternative 4 because of the investments ALSMS would make to upgrade the mobile units and implement GEMS for competitive advantage. There would be cost savings over time passed onto the customer, which would increase customer's WTP.

4.1.8.2 Degree of Leveraging Internal Resources

Alternative 3 scored highest in this category. The degree of integrating all the ALS Group's services into one attractive offering to the customer helps increase customer utility and gain competitive advantage for ALSMS. Alternative 1 scored the second highest because it would be able to leverage all the same ALS testing services capabilities as Alternative 3 but not the EPCM services.

Alternative 2 scored the third highest because it would not be able to leverage all the ALS testing services capabilities because its primary focuses would be on the feasibility and early development stage segments. Only the Geochemistry, Metallurgical and Environmental testing services would be useful at this stage. Only when the mine site lab is in operation can ALSMS take advantage of the company's Tribology and Inspection services.

Similarly, with Alternative 4 ALSMS can only utilize ALS Geochemistry and Metallurgical services; therefore, it received the lowest rating out of the four alternatives.

4.1.8.3 Degree of Staff Development Required

Alternative 3 received the highest rating because it offers the most opportunities for employees to get job advancement in a relatively new division of the company. Employees would have the opportunity to gain leadership, management and technical skills when working on a mine site lab. Moreover, MARC Technologies workload would increase which would allow for further organic growth in the company. Alternative 1 was slightly less impactful and rated the second highest because there was no EPCM service component to attract employees' interests.

Even though Alternative 2 has the same attributes as Alternative 1, with respect to offering employees more opportunities for job advancement, it falls short when you compare the segment focus between the two. There would be more opportunities in the operations segment than in the feasibility and early development segments when you take into consideration their market size.

Finally, Alternative 4 scored the lowest because the degree of staff development required to operate a sample preparation lab is minimal. ALSMS would only need a few technical or professional level staff to manage the lab. ALS Geochemistry or ALS Metallurgy would handle the remainder of the testing work at a near site commercial lab.

4.1.8.4 Cost to Implement

Alternative 2 received the highest rating in this category because of its potential to reduce operating costs. The upfront investment costs would allow ALSMS to gain competitive advantage by offering a superior mobile analytical lab with state-of-the-art equipment from the feasibility stage to mine production. Once the mine site lab is in operation, there would be added savings from using advanced technology and ALSMS profitability would increase as a result.

Alternative 3 received the second highest rating because the costs to expand resources for MARC Technologies and ALSMS to design, build and operate a mine site lab will help attract new revenue streams along the value chain. ALSMS would increase profitability through staff development as employees gained the required knowledge and skills. As market share increases so does the workload for geochemistry analysis.

Alternative 1 received the third highest rating because the implementation costs to pursue this alternative would go towards the development and recruitment of staff to manage and operate the mine lab. Under Alternative 1, ALSMS would still be able to increase profits and workload for geochemistry analysis but to a lesser degree than if ALSMS pursued Alternatives 2 or 3.

Alternative 4 does not satisfy this evaluation criterion completely since ALSMS would offer only sample preparation services. Therefore, the opportunity to increase geochemistry analysis onsite would not be addressed whatsoever. There would be some costs to develop staff and profitability would improve. However, in comparison to the other alternatives, the gains are not as significant. As a result, Alternative 4 yields the lowest rating in this category.

4.2 Alternatives Summary

This section presented four alternatives and evaluated all the alternatives against ALSMS' key strategic priorities. The key takeaway was discovering that Alternative 3 yielded the highest rating in all but one category. Alternative 3 provides services to all three customer segments to help win over more customers and establish the ALS brand. By providing EPCM services as a value-added package, ALSMS is guaranteed to carry out the provision of geochemistry analytical services onsite. Moreover, Alternative 3 allows ALSMS to maximize its resources by leveraging all the capabilities that exist within the ALS Group network.

To help achieve the company's goals over the next 1-3 years, ALSMS should pursue Alternative 3: Diversify Testing Services Scope and Offer EPCM Services. By default the recommendation would also include Alternative 1: Diversify Testing Services Scope.

The following Chapter discusses how feasible Alternative 3 is in relation to the company's capacity and internal capabilities.

5: Feasibility Analysis and Recommendation

Having evaluated the best strategic alternatives for ALSMS to pursue, this chapter will now focus on whether the organization has the required capacity and capabilities to implement the recommended option. This analysis will apply Crossan et al's comprehensive model, the Diamond-E¹³ framework, to help identify any internal gaps and recommend solutions for them (Crossan, 2013). The Diamond-E framework involves evaluating Alternative 3 against three categories of internal capabilities:

1. **Management Preferences & Expertise** – this category includes management preferences, decision criteria, experience of senior managers and the management team characteristics overall
2. **Organization** – this category includes organization structure, systems and culture to assess readiness for market expansion
3. **Resources** – this category includes operations, human and financial assessments where information is readily available

For each alternative, if the solutions to fill any of the identified gaps are too difficult to overcome then the alternative will no longer exist as a viable option and a new strategic alternative is proposed and evaluated.

The following sub-sections will provide a table that summarizes the feasibility analysis for each category listed above against the company's internal capabilities. Following each table is a brief discussion on the key takeaways. At the end of this Chapter, the analysis provides the final recommendations with prescriptive steps for executing alternative 3 based on the outcomes discussed in Chapter 4 and the feasibility analysis hereon.

¹³ The Diamond-E model is a high-level road map for strategic analysis. It identifies the key variables that need to be considered in the analysis and it structures the critical relationships among them (Crossan et al 8th edition, 2013)

5.1 Feasibility Analysis: Diversify Testing Services Scope and Offer EPCM Services

5.1.1 Management Preferences and Experience

The ALS Minerals Group General Manager and ALS Mine Site General Manager represent ALSMS’s management team. Senior managers in other divisions and sub-divisions play supporting roles for furthering ALSMS’s goals. In all cases, these executive managers are looking for ways to create new revenue. Alternative 3 will help satisfy each manager’s objectives.

Table 5.1 Management Preferences and Experience Analysis

Management Subject	Required Capabilities	Observed	Major Gaps	Gap-Closing Analysis
ALS Minerals Group General Manager	Interested in growing market share in all segments of the mining industry and generating revenue	Generally match with required preferences. Wants to grow market share and increase return on investments (ROI).	None	None
	Enhance reputational capital			
ALS Mine Site General Manager (MSGM)	Interested in growing market share in mine lab services segment and generating	Limited match. There is little to no financial budget for marketing costs. The MSGM has a professional engineering background with industry market experience.	Limited sales team. There is only the general manager and one other employee to handle administration activities.	There needs to be coordination of activities to help support the initial growth of this division. Shared functional resources are essential.
	Enhance reputational capital			
	Determining right price and differentiation tactics for each type of testing service			
Senior Management team (other ALS Business units)	Interested in generating more workload and profitability for individual business units.	Generally match with required preferences, though loss of skilled professionals to support mine site operations and agreeing on an appropriate pricing model may be a sensitive issue	Tension with ALS Geochemistry management and their interest in maintaining skilled resources. Other ALS divisions are impacted to a lesser degree.	The tender process will need to be collaborative in its approach. Recommend implementing group incentive for profitability in addition to regional and divisional scope.
	Supportive of a collaborating to put together a competitive pricing model for additional services			

MARC Technologies Management	Technical and professional resources to support feasibility studies for customers	Match	None	None
------------------------------	---	-------	------	------

The MSGM has demonstrated drive to grow market share in the mine site lab services segment. However, expanding into new markets may prove to be difficult when there is only one person dedicated to grow the business. Even though the MSGM has extensive industry experience, marketing resources is very limited and developing a customer base requires support from other ALS Minerals sub-divisions. Tensions can arise between senior managers if the effort to support the ALSMS growth does not provide immediate return for them. The company could implement a group incentive for profitability in addition to senior manager’s regional and/or divisional scope of responsibilities.

For the provision of EPCM services by MARC Technologies, there are no management issues with this alternative.

5.1.2 Organization Readiness

ALSMS is a very small sub-division trying to expand and augment the ALS brand in the mine site lab services industry. In order for ALSMS to grow its revenue, it needs to expand its network and coordinate the ALS Group capabilities within its internal network to provide the services mentioned in Alternative 3. Table 5.2 summarizes the challenges that are ahead of ALSMS as it works to strengthen its organization through improved communication and relationships with other ALS divisions.

Table 5.2 Organization Readiness

Required Organization Capabilities	Observed	Capability Gaps	Gap-Closing Analysis
Close coordination across different business units within the company	Limited match. ALS Minerals further sub-divided into four units	Limited knowledge of marketing to anticipate increase in workload	Implement a shared network or web-based site that allows for real time marketing information, operational capacity and expected turnaround

Quick and appropriate response to customer requests	Limited Match	Limited knowledge of available resources	Develop standardized customer packages as a guideline to help customize service and pricing models
Collaborative culture - strong relationships across divisions to develop workload	Generally match, CEO holds annual meetings with senior managers to discuss strategic goals	None	None
Training systems for potential new staff or for existing staff to deliver services	Limited match	Development of training procedures and programs	Adopt training procedures and programs from ALS Geochemistry and other relevant business divisions
System in place for information sharing and monitoring development status of mine project	Limited match. Information is not centralized.	Relatively new service for the company	MSGM to familiarize himself with MARC Technologies scope of services; set up a system to share information easily
Development of metrics to assess quality of mine lab design and construction and provision of equipment service and maintenance	No match. There are no metrics in place as yet.	Staff to garner customer feedback	ALSMS is not prepared at this time to invest resources into this activity; ALSMS needs to develop market share first

ALSMS needs to hire and develop new employees from within the company's internal networks. Streamlining the marketing information across divisions and developing a customer profile to customize a pricing package will help expedite the tendering process. There would be less confusion and tension once all internal stakeholders have agreed on a pricing model. The main challenge with this alternative is being agile and flexible enough to fulfil customer's needs.

Alternative 3 is viable so long as there is communication between ALSMS and MARC Technologies during the critical construction stage to ensure investment into implementing a new mine site lab comes to fruition. Once market growth develops over time then ALSMS could look into assessing customer's feedback on site design and construction for continuous improvement. MARC Technologies could also supply lab equipment and/or provide laboratory maintenance service.

5.1.3 Available Resources

As the smallest sub-division within ALS Minerals, ALSMS has very few resources at its disposal. Alternative 3 allows for maximum support within the ALS Group network to help generate new revenue for the company. Table 5.3 highlights the issues that ALSMS must overcome to grow its revenue in the mine lab services industry.

Table 5.3 Available Resources

Resource Category	Required Resource	Observed	Major Gaps	Gap-Closing Analysis
Marketing	Significant marketing capability to increase recognition in mine lab service segment;	ALSMS has limited sales and marketing support	Marketing and sales personnel	Allow shared marketing resources between the ALS Minerals sub-division to generate more workload and revenue.
	MARC Technologies to have strong brand recognition and customer base in the mining industry	No match. MARC Technologies has a strong presence in the Australian market but is a small player in the international market	MARC Technology has low brand recognition compared to other EPCM service providers	None.
Operation	Strong distribution channels for analytical equipment and supplies	Generally match. Existing lab will already have major equipment in place.	Existing lab may be using old technology.	Invest in upgrading IT systems and equipment to company standards.
	Management oversight on location	Match with required resources.	None	None
	Management to coordinate scheduling for EPCM services and set pricing	Match, most of the coordination could be done by the MSGM	None	None.

Development	Knowledge and continuous improvement of best practices in the industry. Practical use of GEMS system.	Limited match with required resources.	New and existing mine lab personnel will require training to use new systems and adhere to new standards of operating	Adapt company GEMS system to existing mine site lab systems if customer does not want changes. Promote CoreViewer™ as a pull strategy to improve customer productivity and value.
Human Resources	Enough depth or capability to hire skilled professionals and labor to support mine site operations	Limited match with required resources	Personnel to hire skilled workers and train existing workers from a mine lab currently in operation	MSGM will have to take on recruiting activities with support from senior managers for the short term

For this alternative, ALSMS does not have the current capabilities to close the gap for low brand recognition of EPCM services in the mine site lab services industry. However, as ALSMS executes its marketing strategy, customers will start to realize the value added services MARC Technologies will bring as part of the whole mine lab services package.

The main hurdle for Alternative 3 is establishing ALSMS as a brand in the mine lab services industry, which will take some time. ALSMS needs to integrate GEMS into customer's existing systems to demonstrate its value. There is better chance for customers in the feasibility and construction stages to adopt GEMS system if marketing efforts can also focus on its advantages through CoreViewer™ applications.

5.2 Summary of Feasibility Analysis for Alternative 3

The feasibility analysis confirms that ALSMS has the capabilities to execute Alternative 3 successfully. Table 5.4 summarizes Alternative 3 with the gap-closing solutions of significant importance.

Table 5.4 Feasibility Analysis Summary

Alternative	Category	Capability	Gap Analysis - Impact on ALSMS
ALT-3, Diversify Testing Services Scope and Offer EPCM Services	Management	Very capable. The company has senior management support to expand services	Minimal impact. Functional support needed from corporate office and other divisions; group incentive encouraged to minimize tension with other business units
	Organization	Manageable capability.	Moderate impact. Gaps observed in human resources but could be bridged with support from other business units within the company
	Reources	Manageable capability.	Moderate impact. Some upgrading needed to integrate GEMS with client's LIMS; marketing resources would be shared across divisions

Utilizing internal networks across all the relevant business divisions will help support market growth for ALSMS and keep costs low. Coordinating services with a centralized information system will help streamline marketing information and increase response times to customers. By focusing on all three segments, ALSMS can generate revenue quickly while establishing the ALS brand through the value added services of GEMS and MARC Technologies. Providing services upstream on the industry value chain will help ALSMS gain competitive advantage.

5.3 Recommendation: Improve Market Position by Diversifying Service Offerings

The recommended alternative is to diversify testing services and offer EPCM services to provide customer value in emerging markets. Chapter 4 presented how this alternative could leverage the company's internal networks to keep costs in control, help to increase ALSMS's customer base and promote job advancement for staff in order to deliver onsite lab services with the ALS signature quality brand.

In this chapter, we conducted a feasibility analysis to ensure that the company had the internal capacity and capabilities to implement this alternative. The following sub-sections will highlight all the prominent gaps and solutions to bridge them.

5.3.1 Shared Resources and Group Incentive for Profitability

There are only two people working in the ALSMS division, therefore, it is essential to designate points of contact in each major region globally. Creating a collaborative marketing approach involving senior managers across divisions and regions will also help facilitate knowledge sharing and improve the quality and delivery of services. The ALS Minerals Group General Manager could incentivize group profitability to encourage cooperation for developing more mine lab opportunities.

5.3.2 Standardization and Adoption of Best Practices

MSGM should lead a standardized approach for marketing activities in the mine services industry. This includes establishing a shared database for marketing intelligence, customer information and new pipeline opportunities. Currently each region is managing their own marketing programs, which include mine site services through ALS Metallurgy, ALS Geochemistry, ALS Environmental and ALS Inspection business units. Creating pricing models for a variety of service offerings under varying customer preferences will help align resources more efficiently and provide customer value. When utilizing MARC Technologies resources, there needs to be clear communication on schedule of services and pricing for competitive advantage.

Adopting training procedures and programs from other business units will help expedite the training and keep the transferred knowledge and testing methods consistent.

5.3.3 Further Investment in GEMS

ALSMS should not overlook the current GEMS capabilities as a selling feature to customers. The company should continue to develop the CoreViewer™ software package so that customers begin to use it as their mainstay for resource modelling and mine planning. This will provide cost and utility advantages for ALSMS if customers switch over. The benefits will become apparent as the ALSMS brand expands and exiting costs for customers increase as a result.

5.3.4 Human Resource Development

Professional and technical expertise is limited especially in remote areas. ALSMS needs to coordinate an initiative to hire and develop internal talent for future lab operations as the division expands into new opportunities and new customer segments.

5.3.5 Time Line

5.3.5.1 First Period – 3 to 6 months

In the immediate short term, ALSMS should focus on existing operations that are going to tender within the year. Identify zones where efforts will need to be spent including enhancing customer relationships and review of capex requirements should there be an opportunity to offer upgraded equipment and systems. MSGM needs to engage the senior management team from other divisions to garner support for proposal generation as tender opportunities arise. A collaborative leadership style is required to facilitate knowledge sharing and dissemination of technical expertise of ALS Minerals within the Mine Site services network. As action priorities, ALSMS needs to develop and implement a shared site for marketing information within the ALS Group network including ALS Environmental. This will enable more support for market entry strategies and standardization of service packages, promotions and pricing models. Another action priority is to solicit technical and professional expertise within the organizations global resource pool. The company needs to seek out expressions of interest from qualified employees to begin training and development for future deployment into Mine Site lab services career.

5.3.5.2 Second Period – 1 to 2 years

ALSMS has identified areas and customers to focus for proposal generation. A review of capex proposals and resource requirements during the tendering process allows ALSMS to respond appropriately to customer needs. Coordination between ALSMS and local and global IT systems occurs to implement the infrastructure for network communication and data management. At this point, ALSMS must continue to build the ALS brand through reliable systems and continuous development of technical and professional staff. Additionally, the company must continue to reinforce and maintain strong distribution channels to provide reliable services. Promotion of CoreViewer™ technology and ALS auxiliary services is important for extending the brand into the mine site segment. To ensure viability for these key features ALSMS must continue to follow trends and opportunities in global mineral markets.

5.3.5.3 Third Period – 2 to 5 years

As ALSMS continues to establish growth and reliability in providing mine site lab services, the company must also continue to develop new capabilities internally for competitive advantage. Investment in new technology that will increase customer productivity or willingness-to-pay factors should be a priority in this period. Internal communication within divisions must also continue to grow to ensure knowledge and market intelligence is as current as possible. As workload for ALSMS increases, so should the workload for other divisions.

5.3.5.4 Fourth Period – 5 to 10 years

In this period, ALSMS has developed and established its brand in the market. The next steps are to focus on scale and scope of services across all segments. This will require expansion of ALS Metallurgy and ALS Inspection into new regions to support ALSMS opportunities as it continues to expand.

Reference List

- Activation Laboratories Ltd. (Actlabs) Valuation. Retrieved October 2013 from Biotechgate Global Database:
[http://www.canadianlifesciences.com/ca/db/detail.php?c=7375551k\\$SnNsWRfuWKLw](http://www.canadianlifesciences.com/ca/db/detail.php?c=7375551k$SnNsWRfuWKLw)
- ALS Limited Annual Report 2013, file ABN 92 009 657 489. Retrieved September 2013 from the ALS Global website: <http://www.alsglobal.com/en/Investor-and-Media/Investor-Information/Shareholder-Information/Investor-Documents>.
- Boardman, Anthony E. and Aidan R Vining, "Defining Your Business Using Product-Customer Matrices," *Long Range Planning*, 29(1): 38-48, 1996.
- Bureau Veritas Annual Report (2012). Retrieved November 2013 from:
<http://www.slideshare.net/ajaikartik/bureau-veritas-construction> [BV construction]
- Collis, David J., and Michael G. Rukstad. "Can You Say What Your Strategy Is?" *Harvard Business Review* 86.5 (2008): 82-90. *Business Source Complete, EBSCO*. Web. 15 Aug. 2011.
- Company & PropertyMine. *Company/PropertyMine Database Content*. Retrieved on October 2013 from the Company & PropertyMine website: <http://www.infomine.com/companies-properties/>
- Crossan, Mary M., Rouse, Michael J., Fry, Joseph N., & Killing, Peter (2013). *Strategic Analysis and Action (8/E ed.)*. Pearson Education Canada.
- The Economist Intelligence Unit Limited (2013). *Global Forecasting Service: Global Outlook Summary*. Retrieved February 2013 from The Economist Intelligence Unit:
<http://www.genesismc.co.uk/blog/wp-content/uploads/2013/02/EIU-Feb-2013-summary.pdf>
- Geostats Pty Ltd. *Round Robin Laboratory List*. Retrieved September 2013 from the Geostats Pty Ltd website: http://www.geostats.com.au/rr_lablist_sql.php2011.
- Ghemawat, P. (2010). *Strategy and the Business Landscape (3rd Edition ed.)*. (E. Svendsen, Ed.) UpperSaddleRiver, New Jersey, United States of America: Prentice Hall.
- International Council on Mining & Metals (ICMM). *Our History*. Retrieved on October 2013 from the ICMM website: <http://www.icmm.com/about-us/our-history>
- The International Monetary Fund (2012). *IMF Primary Commodity Prices*. Retrieved November 2013 from The International Monetary Fund:
<http://www.imf.org/external/np/res/commod/index.aspx>
- Intertek Annual Report (2012). Retrieved November 2013 from:
<http://www.intertek.com/investors/reports/>

- Intierra Resource Intelligence (2012). Retrieved October 2012.
- Pizmolos, John. "ALS Mine Site Strategy Paper – October 2012" *ALS Minerals Division – Mine Site*. October 2012.
- Porter, Michael E. (1996). "What is Strategy?" *Harvard Business Review* 74.6: 61-78. *Business Source Complete*, EBSCO. Web. 16 Aug 2011.
- Porter, Michael E. (2008). "The Five Competitive Forces That Shape Strategy" *Harvard Business Review*, 86 (1): 78-93.
- SelectScience. *Thermo Fisher Scientific Deploys SampleManager LIMS at Intertek (2007)*. Retrieved October 2013 from SelectScience website:
<http://www.selectscience.net/nouveaux-produits/thermo-fisher-scientific-deploys-samplemanager-lims-at-intertek/?artID=11427&language=2>
- SGS. *Leadership and Innovation Since 1878*. Retrieved September 2013 from the SGS website:
<http://www.sgs.com/~media/Global/Documents/Brochures/sgs-group-history-en.ashx>
- SGS. *On-site Geochem Laboratories, SGS Minerals Services – T3 SGS 227, file 06-2011*. Retrieved September 2013 from the SGS website:
<http://www.sgs.com/en/Mining/Inspection-and-Sampling-Services/Onsite-Laboratories.aspx>
- SGS. *SGS in Brief*. Retrieved September 2013 from the SGS website:
<http://www.sgs.com/en/Our-Company/About-SGS/SGS-in-Brief.aspx>
- Thurston, C. "LIMS Systems: Managing lab data." *Mining Magazine* 1 Jul. 2008. Web. 29 Nov. 2013.
- Von Nordenflycht, Andrew. "Strategic Analysis," vonNordenflycht-Strategic_Analysis_Framework-aug2012.
- The World Bank. *World Development Indicators: Growth of output*. Retrieved December 2013 from the World Bank website: <http://wdi.worldbank.org/table/4.1#>