

**ENTERING CHINA: A STRATEGY FOR  
*ELECTROMAGNETIC GEOSERVICE AS*  
IN THE OFFSHORE OIL EXPLORATION INDUSTRY**

by

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## **ABSTRACT**

ElectroMagnetic GeoServices AS (EMGS) is a pioneer in using the SeaBed Logging (SBL) technique for offshore exploration and field management. SBL technique is a patented electromagnetic exploration method that can significantly increase reliability of discoveries of oil fields and identify the most attractive drilling sites in deep water areas.

Through leading-edge SBL technology and high quality services, EMGS has established itself as a market leader in emerging electromagnetic survey industry. In order to broaden its customer base and increase profitability, EMGS intends to expand into rising Chinese offshore industry. For this purpose, a strategic analysis of electromagnetic survey industry and EMGS is conducted. By identifying critical success factors and incorporating those factors into company's core competencies in technology and services, the report further recommends the combined differentiation and cost leadership strategy, followed by a detailed implementation plan, for EMGS to enter Chinese offshore exploration market and enhance its long-term business opportunities in China.

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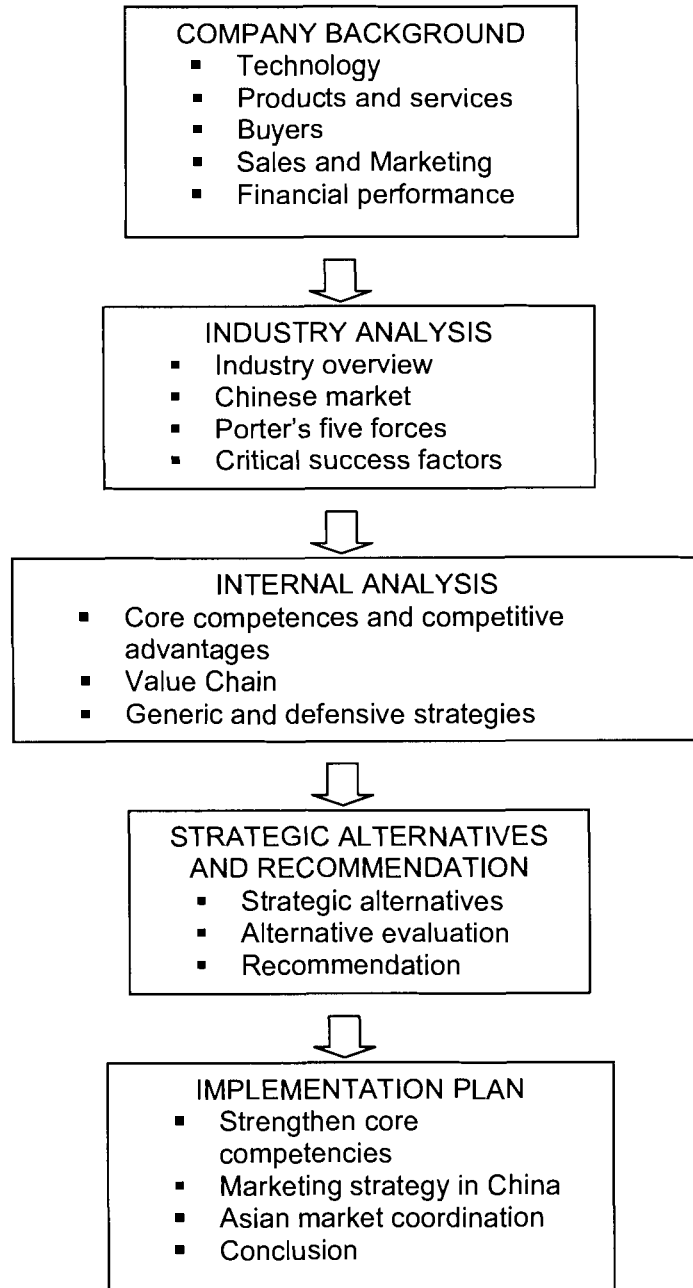


# 1 INTRODUCTION

ElectroMagnetic GeoServices AS (EMGS) is a pioneer in SeaBed Logging (SBL) technique for offshore exploration and field management. SBL is a patented electromagnetic exploration method that uses controlled source electro magnetic imaging (CSEMI) technology to increase the reliability of discoveries of oil fields and most attractive drilling sites, especially in deep water areas.

This report provides a strategic analysis (Anthony 2003) of the electromagnetic survey industry and EMGS, and a recommendation, followed by a detailed implementation plan, for the optimal market entry strategy for EMGS to enter Chinese market which the company is interested in pursuing for a number of reasons explained in Chapter 3 and on the basis that such a strategy would help EMGS enter Chinese offshore exploration market successfully and obtain its long-term market growth and profitability. The figure 1-1 below outlines the main structure of this systematic analysis.

*Figure 1-1 Report structure*



In the analysis, Porter's two major theoretical business models are applied to map the competitive position of EMGS. First, the five forces theory (Porter, 1980) is used to examine the business environment in which EMGS is operating in and determine the level of competition the electromagnetic survey companies are facing. At a company level, the value chain framework

(Porter, 1985) is applied to estimate the main cost and value drivers within the company's primary and support activities so thus to determine EMGS's competitive position in the market it serves. Then an internal analysis is performed to determine the company's core competences and competitive advantages in its market places. Combined the analyses serve to make recommendations and draw up an implementation plan.

## **2 COMPANY BACKGROUND**

### **2.1 The company**

ElectroMagnetic GeoServices AS (EMGS), a spin-off of the Norwegian oil giant, Statoil, was founded in February 2002, to reduce exploration risk by providing the SBL technique to identify high resistive layers in the subsurface to oil companies. The efficacy of the SBL technique has been verified by running surveys over well known oil and gas reserves. To date, EMGS has conducted more than 60 surveys. The SBL method has been thoroughly commercialized and many oil companies have bought services from EMGS. In 2003, EMGS with the SBL technique was awarded the World Oil Award for the Best Exploration Solutions Prize. In addition, EMGS, as the first fully integrated service provider of this technology, has attracted increasing interest from investors all over the world, and was consequently acquired recently by Warburg Pincus, a global private equity firm.

Since its establishment, EMGS has invested heavily in operational assets, and its business started to take off in spring 2003 when its customized SBL survey vessel, M/V Geo Angler, was ready for operation. For the last two years, EMGS has focused its operations primarily in Norwegian Sea, North Sea, Barents Sea and offshore West Africa. Following the rapidly declining reserves and emerging competition in these areas, EMGS has expanded its operations into the Far East, including Malaysia, India and the South-China Sea. EMGS expects this strategic move will allow it to broaden its customer base and take advantage of the rapid growth market for oil exploration and production in developing Asia, especially in China and India.

### **2.2 Technology**

Little more than four years ago a trial off West Africa made the oil industry take notice of a new technology, SeaBed Logging (SBL). SBL is a patented technique that has, according to key oil industry R&D groups, the potential to change the exploration game as surely as the introduction of the three dimensional (3D) seismic technology in the early 1990s (Ole 2004).

The SBL idea was originated by EMGS's founders – Svein Ellingsrud, Terje Eidesmo and Ståle Johansen during the autumn of 1997 at the Statoil's research centre in Trondheim,

Norway. SBL is an application of a remote-sensing marine technique, controlled source electromagnetic imaging (CSEMI) technology, for offshore exploration and field development activity. Electromagnetic signals are highly sensitive to the resistivity of the surrounding media, and are attenuated most when resistivity is low and the frequency of the signal is high. As showed in Table 2-1, a hydrocarbon filled reservoir has much higher resistivity than water-filled reservoirs and surrounding lithologies such as shales.

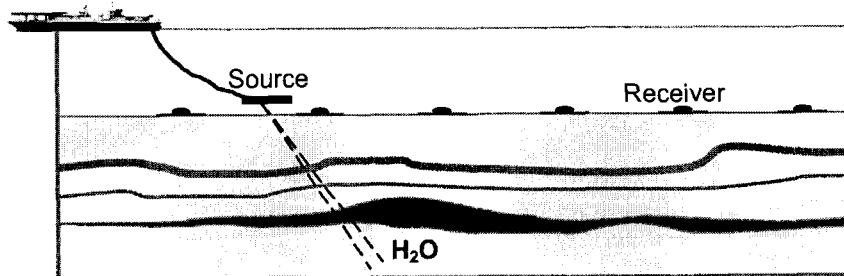
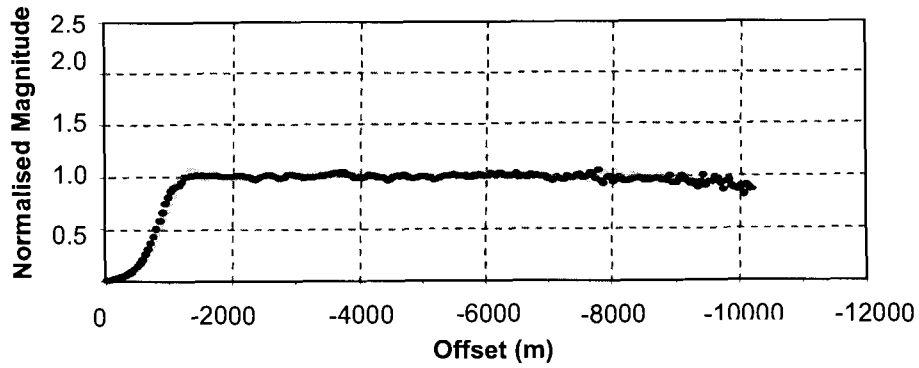
**Table 2-1 Resistivity profile**

<b>Subsurface layer</b>	Hydrocarbon-filled reservoir	Water-filled reservoir	Shales
<b>Resistivity ( <math>\Omega</math> m)</b>	10.0 – 200.0	1.0	0.5 – 3.0

Based on CSEMI theory, SBL can use low frequency electromagnetic signals to identify highly resistive layers in the subsurface prior to drilling. Figure 2-1 illustrates the SBL survey data from a water-filled reservoir and Figure 2-2 shows the SBL survey data from a hydrocarbon-filled reservoir.

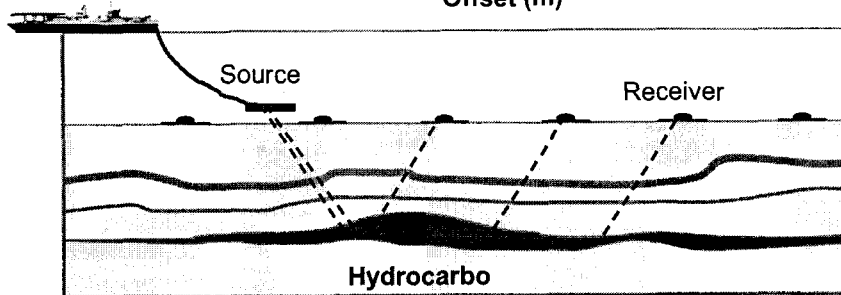
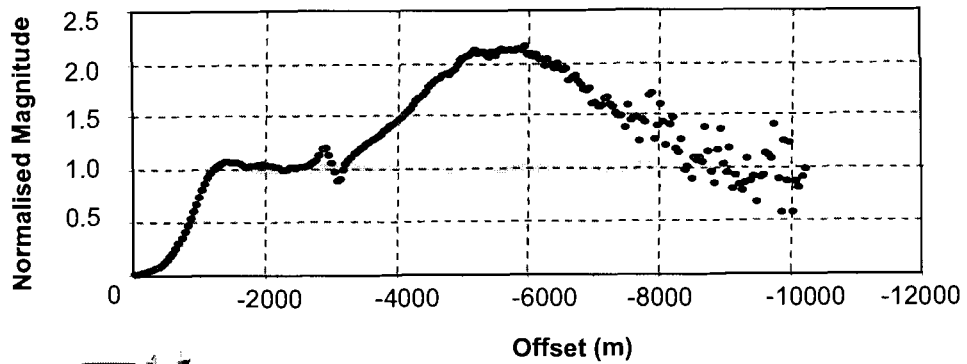
The seismic technology complements electromagnetic technology. It uses acoustic waves to obtain information about subsurface lithology to generate images of underground structures. The 3D seismic imaging is a breakthrough in seismic technology, which improved resolution of seismic mapping and, for the first time, made it possible to model Earth properties with nonlinear characteristics. The 3D seismic imaging thus allows oil producers to see into the earth's crust to define structures and visually identify possible reservoirs. The SBL takes up where seismic imaging leaves off, providing an explicit indication, rather than a hypothetical one, of an oil or gas accumulation deep below the seabed. As a result, the combination of a seismic and an electromagnetic survey has the potential to become a very powerful exploration tool, particularly in deep water or a harsh environment where the cost of dry wells can easily run in excess of US\$50 million per well (Ole 2004).

Figure 2-1 SeaBed Logging survey – water-filled reservoir



(C) 2004, ElectroMagnetic GeoService AS, adapted by permission.

Figure 2-2 SeaBed Logging survey – hydrocarbon-filled reservoir



(C) 2004, ElectroMagnetic GeoService AS, adapted by permission.

As the SBL technique offers a distinctive means of determining the fluid content of the prospective well prior to drilling. This gives those involved in the oil exploration industry a unique opportunity to reduce exploration risk, at a cost approximately 10% of that of drilling an exploratory well. The technology is a major leap forward in oil and gas exploration and is expected to have great implications on the drilling and oil service industry. Over the course of the SBL technology development, five patents have been awarded to Statoil, and the ownership of these patents has been transferred to EMGS.

SBL plays a significant role in exploration and prospect ranking, and is ideal for use offshore in West Africa, Brazil, Gulf of Mexico, India, South East Asia and the North Atlantic, where the geological structures are characterized by deep water, little salt and shallow formations. Several major oil companies have already taken exploration decisions based on SBL results and, in all instances to date, the results of SBL surveys have matched those of the actual drilling. In the longer term, EMGS anticipates SBL to become a powerful tool for reservoir delineation and reservoir monitoring.

Through EMGS's track record and successful surveys, SBL has become a proven technology for reservoirs ranging from 110 meters to 3100 meters below the sea floor. To push the depth limit towards 5000 meters, only minor adjustments to the equipment are necessary. On the other hand, as the airwave interference in shallower water has a great influence on the recorded signal, EMGS still has to solve some technologic challenges to extend SBL technology into shallower water applications.

Currently, EMGS has 15 professional engineers and consultants, who possess protracted experience and high level competence in operations, geology, geophysics and physics, engaged in SBL technology improvement and other research and development programs. In addition, EMGS has been actively cooperating with several research institutes, organizations, and local technology universities in the ongoing research. Through these efforts in research and technology development, EMGS expects that SBL will continue to stay ahead of its competitors in its field.

### **2.3 Products and services**

EMGS provides a complete solution for SeaBed Logging, including modeling, data acquisition, processing and interpretation, to the oil industry. EMGS offers a range of services including:

- feasibility studies and survey planning,
- data acquisition
- SBL data processing
- SBL interpretation

In feasibility studies and in the early phase of survey planning, clients describe their needs, and then EMGS experts assess the type of approach to be used and the degree of uncertainty. Plane layer forward modeling is used to test the suitability of prospects for SBL measurements. Effects of water depth, depth to target, reservoir thickness and subsurface resistivity changes can be effectively tested by forward modeling to evaluate the prospects. If detailed survey planning is required for the customer's decision making, 3D modeling and the customer's detailed geo-resistivity model are used for testing effects of both geometrical and resistivity changes in the subsurface, thus generating a detailed and precise survey layout.

In data acquisition, EMGS experts use SBL receivers, sources and expertise to screen the area indicated by the client, and collect electromagnetic data using multiplex coding and high density digital signal recording in order to obtain maps of high quality. Under the data acquisition activities, SBL receivers are placed on the seabed to record electrical and magnetic data, as well as Magneto telluric data, if necessary. The purpose-built EMGS source is towed close to the seabed, with a horizontal electric dipole antenna generating the electromagnetic energy. The quality of the SBL acquisition data is continuously monitored and assured throughout the survey.

In data processing, EMGS experts choose between different methods and tools to process electromagnetic data from digital form into process diagrams and imaging for the area scanned. A preliminary data processing is done immediately after the survey has been performed, and data is available within a few days. This offers the client the opportunity to make decision on further survey parameters while the vessel is still in the survey area.



In the SBL interpretation procedure, EMGS experts test the data and use alternative methods to confirm the findings of the previous analysis. This is done by comparing modeled 3D responses with actual SBL data collected at the prospect or field, and comparing the SBL data with 2D or 3D seismic data.

EMGS's services can be divided into two categories: contract surveys and multi-client data sets. Contract surveys are done exclusively for specific customers through contracts, EMGS hence enjoys lower risk and quicker asset turnover from this type of service. On the other hand, the multi-client data sets are generally acquired without commitment by any customer. From the revenue generation point of view, multi-client data generates extra revenue by utilizing the vacancy slot of the vessel, and EMGS's current multi-client data sales account for 10-20% of available vessels days (Ole 2004). However, multi-client data services also expose EMGS to the risk of capital loss due to obsolescence of multi-client data. Nevertheless, when entering a new market, the development of multi-client data sets is a good tool to use to attract potential customers as it proves the value of service and also shows EMGS's commitment to the SBL technology. To date, EMGS has conducted 60 SBL surveys including 50 contract surveys and 10 multi-client data sets.

## **2.4 Buyers**

For the past two years, EMGS has provided fully integrated SBL services primarily to big oil companies based in Norway, such as Statoil, Norsk Hydro and more recently Shell. The other oil companies that have bought services from EMGS include Petrobras, DNO, BP and ENI. Except for those buyers which operate off the Norwegian coast and West Africa, EMGS was recently rewarded a contract in Malaysia from Shell Malaysia.

As the technology is expected to have a major impact on offshore mid- to ultra deep-water exploration activities, EMGS has induced considerable interest from other oil companies. In order to follow this trend and meet the increasing demand, EMGS has established strategic alliance with a multi-client marketing firm, InSeis Terra. For example, InSeis Terra has attracted high oil company attention for their multi-client SBL data prior to the Norwegian 18<sup>th</sup> Offshore Licensing Round and for their prospective West Africa data.

## **2.5 Sales and marketing**

For the last two years, EMGS has focused its effort on direct and local marketing tactics to create an initial customer base and partner network. Partnership with key oil companies in particular regions, such as Statoil and Norsk Hydro in Norway, DNO in West Africa, Petrobras in South America, and Shell globally, has contributed significantly to the company's early success in the market place. In addition, EMGS customizes workshops/seminars for particular clients and actively participates in trade shows to create interest for its services and increase awareness of the company and its technology. Last but not least, by attending international conferences and campaigns, EMGS raises its profile as a leader in the electromagnetic oil exploration field.

Currently, EMGS's marketing objectives are to strengthen its relationship with existing customers, expand its customer base and generate more leads for its sales force. Establishing strategic alliances with international marketing firms and global agents not only opened up new opportunities for EMGS in the marketplace, but has also had great impact on its further business processes towards globalization. EMGS's current major markets are offshore Norway, Africa and South-East Asia. By accumulating experience and necessary financial and other resources over years, EMGS expects to expand its services into developing Asia, and eventually worldwide oil exploration market.

However, EMGS has only three full time employees working on the sales and marketing. In order to align with the company's strategic goal, it is critical to develop the worldwide sales and marketing resources required to meet its needs for global development. This not only refers to human resources, but also to the sales channels and marketing strategies.

## **2.6 Financial performance**

Since EMGS is a privately held company still in the early stages of its lifecycle, commonly used analysis tools could not be employed to accurately estimate the performance of the company. The traditional ratio analysis method could not accurately be employed due to rapid growth expected from a young company, the inability to accurately predict future cash flows and the unavailability of benchmarking data from the emerging electromagnetic survey industry.

Due to the lack of benchmark data from the electromagnetic survey industry, a benchmark data from the industry that experiences the same market and environmental forces is required. Examining the technology, market and product line, the seismic survey industry is the most obvious point of comparison. This is also because that the customers in the oil industry are used to use seismic survey as analogue of electromagnetic survey. However, it is important to keep in mind that seismic survey market is mature both in terms of technology and operation, and 30 times bigger than the new-born electromagnetic survey market.

The benchmark data used here is the average rate of small start-up companies involved in seismic surveying with less than 3 years of operation, a maximum of 500 employees and US\$25 million in annual sales, provided by Brandow Company (BizMiner 2004). EMGS's income statement and balance sheet are also provided for your references as Appendix 1 and Appendix 2, respectively.

### **2.6.1 Profitability**

As Table 2-2 illustrated, EMGS's operating income from oil exploration in 2003 was up US\$16 million or 537% from 2002, which represents approximately 64% of total revenue in the electromagnetic survey market. This indicates the company's strong growth over the year of 2003. Although EMGS has reported a positive gross profit of US\$7 million, the high depreciation on the operational assets such as the vessel, sources and receivers, and other operating expenses in terms of worker's insurance and pension have resulted in a net loss of US\$1 million.

The costs of goods sold have been cut down to 62% of net sales, which is slightly lower than its competitors, but higher than the seismic survey industry's average rate of 46.3%. The selling, general and administration expenses as a percentage of sales have also decreased to 43%, which is more than 15% less than that of its competitors. Given the technology similarity and geography proximity of the rivalries, this indicates that EMGS's operating expenses are in check.

**Table 2-2 Profitability comparison**

<i>Items</i>	<i>2002</i>	<i>2003</i>
<i>Operating income</i>	<i>18,816,726</i>	<i>2,955,573</i>
<i>Cost of goods sold</i>	<i>11,752,511</i>	<i>4,429,874</i>
<i>Gross profit</i>	<i>7,064,215</i>	<i>-1,474,301</i>
<i>Net income</i>	<i>-1,762,861</i>	<i>-3,776,443</i>

### **2.6.2 Liquidity**

Table 2-3 summarized EMGS's liquidity ratios compared to average rates in the seismic industry. The liquidity of EMGS has increased from 2002 and is above the seismic survey industry average. The current ratio which measures companies' capability in meeting short term debt has increased from 1.2 in 2002 to 2.3 in 2003. The industry comparison is 2.0. This indicates the company's debt paying ability is good and improving. The quick ratio that measures the short term cash position of the company has also increased to 2.0 in 2003 compared to 1.1 in 2002 and the industry average of 1.0.

In terms of the creditor's security, while the current liability and owner's equity ratio has declined to 46%, which is higher than the industry average of 31.9%, the total liability and owner's equity ratio of 95% is really high, compared to the industry average of 58.3%. This would certainly lead to the creditors' concern whether the total liability levels would exceed owner's equity.

The fixed assets and owner's equity ratio has decreased to 51%, the industry average is 59.2%. This suggests that EMGS has high working capital and low debt. However, the 354% of current liabilities and inventory ratio compared to the industry average of 233.7% indicates the company has over relied on inventory to finance operation.

**Table 2-3 Liquidity comparison**

Rate	EMGS		Average rate in seismic industry	
	2002	2003	Year 1	Year2
Current ratio	1.2	2.3	1.8	2.0
Quick ratio	1.1	2.0	1.1	1.0
Current liability / owner's equity (%)	147	46	45.8	31.9
Total liability / owner's equity (%)	558	95	84.2	58.3
Current liabilities / inventory (%)	12049	354	269.9	233.7
Fixed assets / owner's equity (%)	170	51	70.1	59.2

### **2.6.3 Leverage**

The company was less leveraged in 2003 as its loss was funded through additional owner's equity, not debt. Fixed assets and other long term assets remained relatively unchanged from 2002 to 2003. Owner's equity increase of US\$16 million in 2003 was due to the premium rate fund and non-registered equity.

Total current liabilities increased US\$0.4 million. Account payables have decreased both in terms of the real value and as a percentage of total liabilities. It was 28.5% in 2002 and 15.7% in 2003. This would indicate a decreased use of an available credit line.

The long term liabilities have declined US\$7.8 million from one year to another. This was partially due to the conversion of the subordinated debt into owner's equity. Hence the debt and equity ratio decreased from 32.7 in 2002 to 0.64 in 2003, and the ownership ratio increased from 0.03 in 2002 to 0.05 in 2003.

### **2.6.4 Efficiency**

As showed in Table 2-4, the company's operational efficiency is improving but is lower than the industry average. Total asset turnover increased from 0.2 in 2002 to 0.9 in 2003, but was much lower than the industry average of 2.5. The inventory turnover has decreased tremendously to 13.1 in 2003 from 75.3 in 2002 and compared to the industry average of 20.9. This shows the evidence of overstocking and perhaps poor inventory management. EMGS should monitor this

closely, especially the multi-client data's turnover which is the key issue of inventory management in both electromagnetic survey and seismic survey industries.

Net working capital increased US\$5.9 million in 2003, and net working capital turnover declined from 4.1 in 2002 to 2.9 in 2003. The accounts payable turnover increased from 0.7 in 2002 to 5.5 in 2003, and the industry average rate was 31.9. This suggests that the company was more efficient in using its assets and has stronger financial capability for expanding and improving its operation.

**Table 2-4 Efficiency comparison**

Rate	EMGS		Average rate in seismic industry	
	2002	2003	Year 1	Year2
Total asset turnover	0.2	0.9	2.5	2.5
Inventory turnover	75.3	13.1	20.5	20.9
Accounts payable turnover	0.7	5.5	45.8	31.9

### **2.6.5 Conclusion**

Although EMGS still experienced a profit loss in 2003, it had a rapid growth, given the five times revenue growth rate in 2003. The company was less leveraged in 2003 than in 2002, and EMGS's ability of paying debt was good and improving from 2002 to 2003, as its loss was funded through additional owner's equity, not debt. EMGS's operation efficiency also improved over the year of 2003, though still lower than the average rate of Seismic industry. Compared to the high growth and strengthening financial capability, the inventory turnover rate decreased significant in 2003. I would suggest EMGS to pay close attention to its inventory management to strengthen the inventory turnover and hence increase its operation efficiency in multi-client data sector.

## **3 INDUSTRY ANALYSIS**

### **3.1 Industry overview**

Over the past several decades, oil has been the world's foremost source of primary energy consumption, and it's expected to remain in that position over the next two decades according to industry experts (Energy Information Administration 2004). Currently, the oil industry can be characterized as operating with relatively modern process controls, routine work technologies, and mechanistic, formal organizational structures.

The oil industry is characterized by strong growth and uncertainty. The general evidence for industry growth includes rising profits, growing demand, increase in production capacity, and increased pressure from competitive operations. Recent statistic data reveal that world oil prices rose by almost US\$10 per barrel over the course of 2002, remained high throughout 2003, and rocketed in recent months to more than US\$50 a barrel. The remarkable rise in oil prices results in record profits for leading western oil companies. For example, in the third quarter- Royal Dutch/Shell recorded US\$5.4 billion profits and BP revealed nearly US\$4 billion (The Economist Newspaper Limited 2004).

Total oil demand improved over the last few years and is projected to increase worldwide through 2025, from 77 million barrels per day in 2001 to 121 million barrels per day in 2005. Oil consumption in developing Asian countries is expected to rise by 3.0% annually on average, with more than one-third of this increase coming from China alone. If this growth rate is maintained, oil demand for these nations will increase from about 14.5 million barrels per day in 2000 to nearly 29.8 million barrels per day by 2025 (Energy Information Administration 2004). This is due to the strong annual growth rate of 5.1% in the gross domestic product (GDP) over the next two decades, compared with 3.0% per year for the world as whole.

The projected increment in worldwide oil consumption would require an increment to oil exploration and production capacity. The world productive capacity is expected to be more than 44 million barrels per day over current levels. Although OPEC producers are expected to be the major suppliers of increased production requirements, non-OPEC supply is expected to remain

competitive, with major increments in supply coming from offshore resources, especially in the Caspian Basin, Latin America, and deep water West Africa.

Together with the characteristics typical of growth, the world oil industry also exhibits features of uncertainty. Currently, there are many forces which may lead to political and economic turbulence in the oil market. These forces include the post-war strife in Iraq, the international war on terrorism, uncertain economic recovery in developing Asia and Japan, the potential for continued social unrest in Venezuela, Brazil's impact on other Latin American economies, and economic recovery prospects for the former Soviet Union.

The growth and development of exploration and production in offshore fields will influence the level of exploration spending by the major oil companies and this will have great impact on the growth of the electromagnetic services. In the last decade, the offshore well drilling has grown at an average rate of 3,000 – 3,200 wells per year, of which 12% are in deep water (more than 500 meters of water). Deep water exploration is expected to increase and reach about 17% of all wells drilled in 2008, with US\$56 billion forecasted spending (Oil & Gas Journal 2004). Africa and North America have shown the effects of this trend and it's expected to expand to all regions all over the world except for Middle East. If this holds, it will be a major opportunity for the electromagnetic services to enter the mainstream market.

As the result of reductions in available shallow-water drilling opportunities over the last decade, the oil industry is under increased pressure from competitive operations. Deep water exploration and development activities are steadily increasing and are expected to be sustained over a long period. As oil prices and consumption rise, technology and resource availability can sustain large increments in oil production capability. The low price environment of 1998 and early 1999 did slow the pace of development in some prospective areas, especially the Caspian Basin region.

### **3.2 Chinese market**

China, the world's second largest consumer of petroleum products in 2003, has also the fastest economic growth rate in last two decades and was ranked one of the top three nations for attracting foreign investment in the international market since 1990. The Chinese oil exploration and production industry has, in addition to the characteristics of growth and uncertainty as the



other part of the world, its unique governing body and experienced major changes over the last decade.

China has opened its offshore industry to foreign investment since 1982 and has more than 30 production-sharing contracts with foreign partners by the end of 2003 (Michael 18). With China entering into the World Trade Organization, the State Energy Administration, founded in early 2003, is now responsible for the regulation and policy for the industry, and most of state owned oil and gas assets are reorganized into three large vertically integrated firms:

- China National Petroleum Corporation (CNPC), engage in crude oil production in the north and west
- China Petrochemical corporation (SINOPEC), responsible for refining in the south
- China National Offshore Oil Corporation (CNOOC), handle offshore exploration and production

The Chinese government has also amended regulations governing foreign investment in both onshore and offshore sectors in 2001. While the requirement of Chinese majority ownership in certain midstream and downstream enterprises has been removed, this still applies to the upstream foreign investors. Furthermore, foreign parties are no longer required to sell their share of production to their Chinese partner, and the preference for using Chinese personnel, goods and supplies has been diluted. Over the next two years, China will also allow foreign ownership in its retail and wholesale oil and gas markets. For the detailed policies and regulations in China offshore oil exploration please refer to Appendix 3.

In China, 90% of domestic oil production capacity is located onshore and is aging and rapidly shrinking over the last ten years. The Chinese authorities are now focused on stabilizing production in the eastern regions of the country at current levels, increasing production in new fields in the West, and developing the infrastructure required to deliver western oil and gas to consumers in the East. Offshore exploration and development is also a high priority. Recent offshore oil exploration interest has centered on the Bohai Sea area, east of Tianjin, believed to hold more than 1.5 billion barrels in reserves, and the Pearl River Mouth area. CNOOC has cooperated with Husky Oil, Chevron Texaco and ENI to develop several offshore oil field projects in these areas. Currently, as Sino-Vietnamese relationship improved, Beibu Gulf is open

for offshore oil and gas exploration. CNOOC just announced a tender for 10 new exploration blocks in May 2004.

### **3.3 Porter's five forces**

This section applies Porter's five forces model to examine the influence of the rivalry, buyer power, supplier power, barriers to entry and threat of substitutes on the electromagnetic survey industry, in order to determine the intensity of competition in electromagnetic survey industry in which EMGS operates.

#### **3.3.1 Rivalry**

The electromagnetic survey industry is at its market introduction life cycle stage, which is characterized by low overall sales, high costs and few competitors. Although the potential of the SBL technique for offshore drilling, oil service and field development activity has attracted a high degree of interest from the industry pioneers, the overall sales are low with negative profits and costs per customer are high. Awareness of the technology and brand recognition is poor when compared to the mature seismic industry. In 2003, revenues associated with the technology are a mere US\$30 million, most of which is linked with Statoil, ExxonMobil, Norsk Hydro and Shell. Revenues are expected to reach US\$600-900 million in three to four years, or about 25% of the current spending on offshore seismic (Ole 2004).

There are just three specialist companies currently offering this technique on the world stage, EMGS, Offshore Hydrocarbon Mapping (OHM) and AOA Geomarine Operations (AGO). OHM's technology base originated from the Southampton University in the UK. Over the past year, OHM has provided electromagnetic source technology to an Exxon Mobil managed operation and recently developed its own receivers. Furthermore, OHM has recently listed on the Alternative Investment Market at the London Stock Exchange, raising more than US\$18 million and broadening its customer base as a fully integrated service provider.

AGO was formed by AOA Geophysics Inc., an US-based geophysical service company, to acquire controlled source electro magnetic imaging data for offshore projects. AGO was recently acquired by Schlumberger, the world's leading oilfield services company. Today, Schlumberger employs more than 50,000 people of over 140 nationalities working in 100 countries and its operating revenue was US\$10.1 billion at the end of 2003 fiscal year.

Schlumberger also manages WesternGeco, jointly owned with Baker Hughes, WesternGeco is the world's largest seismic company, and provides advanced acquisition and data processing services. On one hand, Schlumberger's current entry into the electromagnetic survey market indicates the recognition of the electromagnetic technology in the oil industry. On the other hand, with Schlumberger's sophisticated experience in exploration service sector and a broad customer base, AGO is expected to enhance its competitive position significantly in the electromagnetic survey market.

Today, three services providers offer fully integrated acquisition support as well as highly critical data processing technology, and they all claim to be in a leading position with respect to data imaging technology. However, of the three only EMGS has its own dedicated vessel in commercial operation and has access to a substantial 60 survey data set. This gives EMGS the first mover advantage in terms of building market share and obtaining relatively high margin.

In addition to the independent service providers, Exxon Mobil has, for the last few years, invested heavily in its own CSEMI technology, called Remote Reservoir Resistivity Mapping (R3M). Since 2003, Exxon Mobil has leased and equipped its own dedicated vessel, the Polar Bjørn, and dispatched it around the world to evaluate the R3M's effectiveness in different geological conditions. If all goes well, Exxon Mobil expects that the R3M not only reduces its risk of drilling a dry well, but also gives it a competitive edge by allowing it to lock up permits and perhaps negotiate better contracts with countries where Exxon Mobile spots oil while others might miss. Exxon Mobil has begun drilling its first wells with R3M this summer.

Given that there are only a few companies available in the fast growing electromagnetic survey industry, and most of them are still in the process of verifying the reliability and evaluating the potential of the technology, the competition among rival firms in the electromagnetic survey industry is currently not intense. However, as the nature of the electromagnetic survey companies are characterized by high asset specificity, this will result in high exit barriers for the companies and companies must produce near capacity to attain the lowest unit costs. The high level production, together with the nearly zero switching costs and relatively weak brand identification, will inevitably lead to a fight for market share and result in increased rivalry in this industry sooner or later. As a consequence, the survivors of the electromagnetic survey industry will heavily depend on economies of scale, the growth of the industry and the extent that CSEMI is applicable for field monitoring.

### **3.3.2 Buyer power**

The introduction stage of industries is characterised by a few large and innovative buyers such as those found in the electromagnetic survey industry. Statoil, Norsk Hydro, Shell and Exxon Mobil are the early adopters of technology. Several other operators are just a step behind. BP for example recently awarded a CSEMI data processing contract to OHM. Petrobras and Apache are in the process of becoming active users, aiming at becoming the first commercial users of the technology in Africa.

An initial electromagnetic survey may typically cost US\$1.2 – 1.5 million including substantial crew and equipment mobilization costs. Once in position on a block, further fully processed surveys might typically cost US\$0.5 million or less per prospect (Ole 2004). The typical cost of an electromagnetic survey is only a few percent of the cost of an exploration well. This, given the high oil prices during the past years, has led to a significant willingness to pay for electromagnetic services, especially when ranking multiple prospects within a block. In that case, electromagnetic survey is not only used as a risk management tool, but also to ensure that the most prolific targets within a block are prioritized correctly to avoid missing development opportunity for a major field.

Although EMGS obtained most of its current contracts through one-to-one negotiation with Statoil, Norsk Hydro and Shell, the industry trend is towards the competitive bidding on the basis of the lowest price, and buyers' switching costs are almost close to zero. Consequently, electromagnetic survey service providers are under the pressure of operating on the basis of low margins and cost leadership does not provide a long-term competitive advantage to these service companies.

While a low margin industry does not generally favour backward integration, Exxon Mobil is developing its in-house CSEMI processing capabilities and Schlumberger recently acquired AGO. Given that the critical impact of the electromagnetic survey on the decision making process and the increasing competition between the giant oil companies, the backward integration is more likely to happen.

On one hand, at the introduction stage of the industry, the demand for electromagnetic services is dominated by a few powerful buyers. This has given these buyers relatively strong bargaining power over the service providers. The possible threat of backward integration from the powerful buyers, together with the low switching costs and the small percentage of the electromagnetic survey services to the buyers' total costs, enhances the buyers' bargaining position to some extent.

On the other hand, EMGS's services have momentous impact on oil exploration companies' decision-making as the electromagnetic survey data can help them effectively mitigate the risk of drilling dry exploration wells which are usually very expensive. The strategic importance of the services, together with the fact that EMGS is the only commercially available service provider in the market, leads to EMGS's significant bargaining power over its buyers. Furthermore, as the awareness and recognition of the SBL technology are increasing when the electromagnetic survey industry enters its early stage, the number of the oil exploration companies acquired the services will increase and more powerful buyers will acquire the services. This hence will strengthen electromagnetic survey service providers' bargaining position while reducing the influence from the current few suppliers.

### ***3.3.3 Supplier power***

EMGS's suppliers can be divided into three catalogues: fixed assets, specialized equipment and consultants. Fixed assets include vessels, data processing products and other equipment which is used by companies in other industries and are sold as standard products. Suppliers in fixed assets catalogue generally have no significant bargaining power over electromagnetic survey service providers.

In the specialized equipment catalogue, there are currently only two independent manufactures available in the market place. OHM produces sources and AGO offers receivers. The relative bargaining power of OHM and AGO seems to be high, compared to the suppliers in the fixed assets pool. However, there are only a handful of buyers in the demand side, and some of them are in the process of making their own sources and receivers due to the concern of protecting their proprietary technology. OHM and AGO's bargaining power is hence offset. To some extent, this might be one of the reasons that OHM and AGO have both forward integrated into the electromagnetic survey service, as mentioned above.

EMGS uses consultants to leverage its human resources in many areas: finance, R&D, operation and management. In early stage of the market, consulting suppliers may not have significant bargaining powers over EMGS as the competition and demand are both low, but this may change in the future when the electromagnetic technology is broadly spread and increasing demand drives up the competition.

In conclusion, the suppliers in the fixed assets catalogue do not possess significant bargaining power over electromagnetic service providers due to the commodity-like nature of the products. In the specialized equipment catalogue, although there are only two suppliers currently available, the credible backward integration threat from the service providers has significantly weakened their bargaining power. The consulting suppliers' bargaining power currently is not strong, but may be changed in the future when the demand for the consultants is higher than the supply as the result of fast growth of the electromagnetic survey industry.

#### ***3.3.4 Barriers to entry***

Data acquisition and processing are critical in the CSEMI survey, which require purpose-made operation vessels and ships' crews of 50 to 70 personnel. In addition, companies must meet the oil industry requirements and government regulations with regard to health, safety and protection of the environment. Conforming to these requirements obligates entrants to up-front capital requirements which are both large and industry specific. On one hand, the high asset specificity obligates electromagnetic service providers to engage in fierce competition in market share, and this will lead to the incumbents' intensive efforts on deterring new entry to the market. On the other hand, given the low margins in current electromagnetic survey industry and limited demand, potential entrant is unlikely to make such large investment in specialized assets.

Another major barrier to entry is acquiring expertise and experience. The learning curve has great impact in electromagnetic survey industry. The existing electromagnetic survey service providers have been in the process of acquiring technology since earlier 1980s, and the key players at each company are those gurus in the electromagnetic technology. In addition, patents are commonly used in the electromagnetic survey industry to protect the service providers' proprietary technologies.

In conclusion, the barriers to entry in the electromagnetic survey industry are high, given the high asset specificity, low margin, patents, and inability to technical know-how. However, given the quick changing environment the company is in, the most feared threat would be if a new competitor enters the market with a new breakthrough product that has a substantially lower price and / or delivers better quality. The new advanced technology will change the game of the whole industry and become a competitive advantage for new entrants while the existing players would struggle to keep up.

### **3.3.5 *Threat of substitutes***

It is difficult to point out any products or services that are substitutes for electromagnetic surveys, but it could be that seismic technology is a substitute in markets that are more price-sensitive and conservative. As EMGS focuses on electromagnetic, there is still virgin acreage that is surveyed by seismic only.

From the technology point of view, electromagnetic survey and seismic survey are complementary. Seismic surveys are used to generate structural images of subsurface targets, and have evolved into a mature technology, from 2 dimensions, 3 dimensions to today's 4D dimension survey. Electromagnetic is still in its young age, but it has a unique potential in distinguishing hydrocarbon from water in deep water area. Given that, the deep water and ultra deep water exploration activities should be improved with water depth by the electromagnetic survey. This will hence improve risk management and provide safer ranking of prospects within an oil company portfolio. This is especially true when oil companies are expected to drill deeper into their prospect portfolio than they currently do.

In addition to the unique technology advantage electromagnetic has, electromagnetic surveys also benefit from the advent of 3D visualization and steady advances in acquisition, processing and interpretation. Electromagnetic data now deliver not only more detail and complete data about the subsurface layer, but also stratigraphic information and direct hydrocarbon indicators. When electromagnetic data are integrated with well logs, core data, and other subsurface information, reservoir description and monitoring are significantly enhanced.

Even though there are no good substitutes today, there could be in the future. Maybe exploration of the seabed from satellites in orbit will be a possibility in the future, but this is far from being a threat to EMGS and the market.

### **3.3.6 Conclusion**

At the current stage of the electromagnetic survey industry, the competition among the rival firms is low, given the fast growth of the electromagnetic survey industry, only a few competitors in the market and EMGS is the only one currently in full commercial operation. However, competing for market share as a consequence of high asset specificity, together with the low margins, will inevitably induce competition in the future.

The strategic importance of the electromagnetic survey data to the oil exploration companies and a few available firms in the market gives service providers a relatively strong bargaining position over its buyers, although currently few dominant buyers and threat of backward integration may weaken this power to some extent. The situation is expected to change while the market grows into its early stage with bigger demand for the services.

The supplier power is also relatively weak due to a few buyers in the market and the credible threat of forward integration. The barrier to entry is high because of the high asset specificity, low profit, patent and inability of specialized expertise and technology. Finally, there is no close substitute to the electromagnetic survey.

In summary, the current degree of competition in the electromagnetic survey industry is relatively low, given the low rivalry, moderate buyer power, weak supplier power, high barriers to entry, and no close substitute. Firms with a strong competitive position will have better opportunity to succeed. However, the high asset specific nature of the electromagnetic survey company obliges firms in the industry to fight for market share, and the low margins further emphasize that cost leadership in this industry is necessary for survival.

### **3.4 Critical success factors**

According to the analysis above, the electromagnetic survey industry is characterized by strong growth, low margins, low competition, and the need for cost leadership in its current markets. Succeeding in providing electromagnetic services is influenced by a number of factors



including the service provider's reputation, the quality and reliability of electromagnetic data, development in technology aimed at cost reduction and the potential for innovation. Although the electromagnetic survey is still new to the Chinese market, it is reasonable to assume that the emerging Chinese electromagnetic survey market will follow the same learning curve as the other existing electromagnetic survey markets in the other parts of the world, given that the Chinese oil exploration market possesses the same characteristics as the other markets EMGS has entered.

In the electromagnetic survey industry, reputation and quality of the electromagnetic services are key value drivers, although current market conditions are forcing oil companies to choose electromagnetic companies based on the lowest price. The high reliability degree to which EMGS can help clients precisely locate oil fields makes the service valuable and strengthens the reputation of the company further.

What the new breakthrough of CSEMI can in reality achieve needs to be determined and proven to establish its reputation in turn boosting demand for EMGS's services. Over the last decade, most of the oil prospects are located in inhospitable areas as the result of exhausting easy-accessed oil. Exploration costs have increased tremendously, reaching more than two third of overall costs in some cases. Consequently, oil companies worldwide are seeking for new technologies to give them better control over their exploration costs. Given that, the accuracy and reliability of the electromagnetic survey data are critical to the recognition of the service and its future growth.

Cost leadership is a requirement for survival of electromagnetic survey companies due to the particular market conditions of low margin. As the electromagnetic segment targets the same customer group and delivers its services at similar manner as the seismic segment, the oil exploration companies have compared electromagnetic surveys with seismic surveys since electromagnetic surveys entered the marketplace. As the result of overcapacity in the seismic segment over the last decade, there has been a downward trend in margin in the exploration service industry, and there is no exception to in the case of the electromagnetic segment. Considering that the widespread of electromagnetic technology is not there yet and that economy of scale cannot be built over a short period of time, technology improvement aiming at reduction of costs is critical to ensure the electromagnetic service company's survival.

The search for hydrocarbon accumulations carries with it high risk factors of uncertainty, namely the actual exploration of oil reservoirs. Especially in deep-water reservoirs the reserves need to be large enough in order to cover the increased costs incurred from exploiting in such unfavourable environments. Offshore development has depended on advanced technologies to reduce cost and increase competence in exploration and production. To account for the demand of the oil industry in oil fields, service companies need progressive oil exploration techniques. This is where electromagnetic data is of enormous value and has increased the interest from the oil industry.

Except for the abovementioned factors, of key importance is also the electromagnetic survey companies' ability to show growth in revenues and earnings, capacity in the electromagnetic vessels and the development of prices for contract and multi-client data. In addition, electromagnetic survey services providers should also be aware of the special characteristics which make China a challenging place to succeed. These include frequently changing government regulations and policies, the relative underdevelopment of industry structure, the growth rate of the Chinese economy and markets, and the Chinese culture and value system (Jiaqin 102). In order for EMGS to succeed in Chinese market, all these factors must be considered in developing a viable marketing strategy for China.

## **4 INTERNAL ANALYSIS**

### **4.1 Core competencies and competitive advantages**

EMGS's core competencies and competitive advantage lie in three areas: namely quality of service, leading edge in marine electromagnetic technology and outstanding people.

Quality of service is the main driver of EMGS's growth in the market. EMGS has established a sophisticated quality control system to ensure that the company delivers the quality customers require. Together with its highly dedicated and experienced project teams, leading edge data acquisition and processing expertise, and proprietary SBL modeling systems, EMGS has made the quality of its services hard for its competitor to imitate, at least in a short period of time in a low margin industry. To date, EMGS has conducted 60 surveys, representing 64% of the total electromagnetic market share. Of the wells drilled on the basis of EMGS's surveys, there is 100% success rate, compared to a 5-10% global success rate in exploration and actual successful production after exploration in 1992. SBL services has reached out to West Africa, Barents Sea, Norwegian Sea, North Sea and South-China Sea in water depth ranging from 110 to 3100 meters, including 1600 Receiver deployments and 5500 kilometres source towing. In addition, EMGS has a strong focus on health, safety and environmental considerations, and has maintained a level of zero in the number of lost time injuries since its operation started.

EMGS conducted the first R&D marine electromagnetic survey in 2000 and first R&D commercial electromagnetic survey in 2001. Since then, there are 5 patents awarded to EMGS's SBL technology and the World Oil Award for the Best Exploration Solution. EMGS is perceived as a technology leader in the electromagnetic service field by the oil industry. In all these achievements, EMGS's experienced executive management and strong R&D team have played important roles. Compared to the technical know-how, the advanced technology may be easier to acquire through acquisition, just as Schlumberger's acquisition of AGO, but it takes time to turn it into core competence as it has to match with other functions in the company as well.

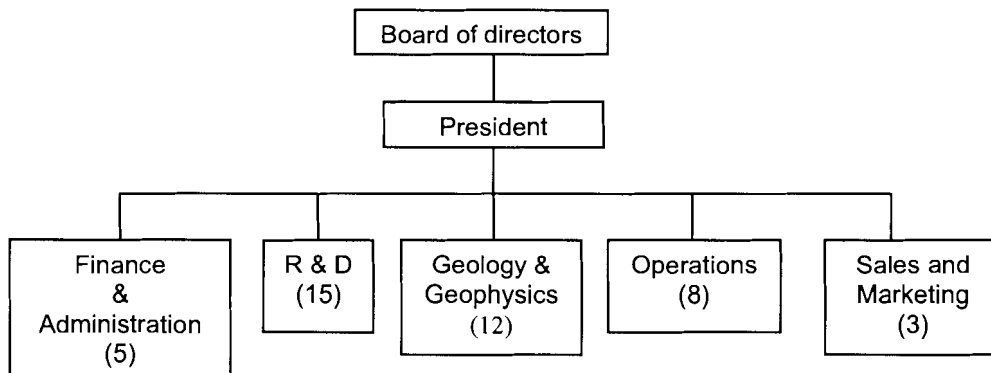
EMGS is a people oriented and technology driven company. Its flat and streamlined organizational structure has nurtured the human resources which it requires for its growth and

success in today's electromagnetic service market. In addition, the flexible and innovative organization culture has created an environment for it to attract and maintain the high qualification talents and help to keep them within the organization. EMGS employees actively attend international forums, technical conferences and publish papers in their field in order to keep their technology up-to-date and maintain their profiles as a technology leader in the respective field.

Although EMGS's outstanding people, strong positions in SBL technology and services have led it to the market leader position in current electromagnetic service market, it also possesses weaknesses which may affect its ability to develop the competitive advantage. EMGS's main weaknesses are its relative small organization, dependence on relatively few and powerful buyers and agency problem.

Size becomes important as it allows the company to tackle and solve large problems and internalize problem and signal success. EMGS's small organization, as illustrated in Figure 4-1 EMGS's organization chart, combined with the low margin in the industry, make it difficult for the company to obtain the competitive advantage in a short time. For example, currently having only one vessel in operation has limited the company's ability to exploit all market opportunities due to the high operation costs from the crew and equipment mobilization. In diversified international markets, there are limited resources available for developing international sales and marketing channels. In some cases, this has resulted in losing focus on clients. Furthermore, With EMGS's need to expand into the Asian market and Schlumberger's recent acquisition of AGO, EMGS is exposed to the challenge from big services companies with broader customer bases and more sophisticated international operation experience.

*Figure 4-1 EMGS's organization chart*



Notes: the number in each department indicates the number of people working in the department.

Most of EMGS's current revenue came from Statoil, Norsk Hydro and Shell. The lack of widespread recognition of SBL technology from the oil industry is the main barrier for EMGS to broaden its customer base. Although SBL technology has gained a reputation as one of breakthrough technologies in oil industry from its early adopters, many exploration companies are still concerned about the reliability and viability of the SBL services. This has resulted in EMGS's limited customer base in two ways: first, some exploration companies have suspended investment in SBL service pending further verification of the innovative technology; second, smaller explorers are waiting for the time to come when their perceived value of the services exceeds the costs of obtaining the service. Another barrier to customer base broadening is that oil companies consider that where the oil is located is strategic information, which provides competitive advantage to the owner of the information over the others. Majors with strong technology and financial capabilities, such as Exxon Mobil and Schlumberger, would rather obtain the innovative technology through in-house development or acquisition to protect their proprietorship, than acquire the services from EMGS.

Upon the establishment of the company, the ownership of EMGS was split 63% to Statoil Innovation AS, another 31% to the founders, and 6% to Norwegian Geotechnical Institute. However, as the result of acquisition, Warburg Pincus has acquired the majority shareholding position of EMGS from Statoil and the Norwegian Geotechnical Institute, and left only 10% to the employees. The change of ownership has also led to the reorganizing of the EMGS's Board. The previous owner in Petroleum GeoServices AS, Bjarte Bruheim, is the new director of the

board, while Svein Ellingsrud as one of the trio founders has also got a seat in the board. The other members of the board are three Americans and one Norwegian. It is expected that Warburg Pincus will sit as owners for only a few years before they either sell or take EMGS to the stock market. Although it's too early to say as the acquisition happened not long ago, this raises concerns about the possible conflict of interest between the company's management and its powerful shareholder. The fast growth of the company expected by current shareholder may destroy the long-term value of the company, leading edge technology and continuing innovation, which the management and previous shareholders have engaged in.

#### **4.2 Value chain**

Critical primary activities from a value chain perspective (Porter, 1985) include the activities that contribute directly to value creation and hence influence the value drivers. EMGS's primary activities include operations, outbound logistics, marketing and sales, and service. On the other hand, support activities include the activities that contribute indirectly to the value creation of the firm. Their influence on the value drivers is indirect, by ensuring that the primary activities receive the required support from the organization. The support activities for EMGS are similar to those of most other organizations. They consist of finance, administration, information systems, quality control, human resource management, research and development and procurement. The distinctive attributes of EMGS's value chain are focused on gaining the advantage of differentiation within the firm's value activities.

EMGS's value chain is characterized by primary strengths in operations and technology development, as would be expected for a firm competing as the technology leader in a growth industry. EMGS developed its data processes to tolerate a varied range of airwave influence which provides a significant competitive advantage in both quality and applicability. Lacking this tolerance of input signals, competitors' processes are vulnerable to disruptions in airwave as well as the quality problem stemming from unwanted effects of varying seafloor levels. Advanced process controls have been effective in reducing the costs associated with crew and equipment. These strengths in technology benefit customers by making the firm a more dependable supplier. EMGS's main focus, however, has been in the area of operation.

EMGS organized its operations recognizing the customer's need for wide range of low cost data. The company is the only electromagnetic service provider with a purposed equipped

vessel dedicated to electromagnetic survey. The multi-client data acquisition is coordinated with contract survey. This coordinated operation generates potential revenues resources and increases the return on capital by reduction of the unit costs. This expertise in operations benefits customers by providing more cost effective and timely data for their decision making.

In sales and marketing, EMGS's staff develop long-term customer relationships and support promotional activities at all levels. By maintaining frequent contact, EMGS keeps abreast of market conditions and can respond quickly and precisely to new situations. Marketing opportunities uncovered by their sales staff include EMGS multi-client data alliance and international agents that focus on overseas opportunities and the multi-client data sector. EMGS negotiates with its multi-client data partners to arrange exclusive price for its products, an advantage that is not universally enjoyed in the industry. Lower acquisition cost for customer provides extra value.

To provide high quality human resource support to meet business needs, EMGS uses multi-discipline project teams, continually improves the knowledge sharing for special products, and leverages highly competent consultants to meet various customer expectations. Also, EMGS offers customized training for employees, and is nurturing an organizational culture that enhances employees' commitment while minimizing costs. Another element of EMGS's human resource management is support for PHD students at research and education, as well as rewards and incentive programs for the young professionals and their research.

Although these individual elements are neither unique nor do they provide a sustainable advantage, they are part of a customer-driven marketing support package that would be difficult for competitors to duplicate quickly. Likewise, the data process innovations that EMGS pioneered result in high quality that cannot be captured easily by a competitor.

### **4.3 Generic and defensive strategies**

#### **4.3.1 *Generic strategies***

Working as a problem solver in the electromagnetic market, EMGS performs critical activities for the clients: drilling oil is very expensive and the assessment accuracy may separate success and failure. An appropriate strategy for this segment must concentrate on meeting the customers' expectations for high quality service with differentiated products.

Differentiation leadership is one of the few sustainable advantages that may be achieved in a fast growth and technology driven industry. Although low cost approach may increase market share, firms within a strategic group can easily match competitor prices and eventually erode the profits of the industry. EMGS pursues a differentiation strategy, selling SBL services based on the quality and reputation of the professionals in the company.

Recognizing the potential differentiation advantages of increasing quality in data processing, EMGS has developed a set of proprietary data processing techniques. It was the first in the industry to implement these data processing techniques. This data processing system helps the company to maximize the quality of survey data while minimizing misinterpretation by testing alternative geo-resistivity models. The system also helps the company to reduce costs by enabling the preliminary data interpretation on site within a few days right after the SBL survey data is acquired. In addition, EMGS developed Up-Down processing tools to separate energy travelling downwards from the energy travelling upwards. These algorithms will eliminate the contribution from airwaves, especially in shallow water areas. This proprietary technology is not available to other competitors. The company continues to develop and implement advanced process and analysis systems aggressively.

EMGS recognized the differentiation advantage of multi-client data, and combined the contract survey and multi-client data acquisition to reduce the capital cost per customer. By continuing sharing costs between contract survey and multi-client data set, its market share is increased because it has lower costs per customer and more available products to offer.

To establish a sustainable differentiation advantage, EMGS has taken advantage of the industry's low level of rivalry and technical innovation. By implementing proprietary system in data processing and analysis, it increased its quality at survey results while reducing capital costs. Currently, this is an important part of the strategy to boost its demand and sales.

#### **4.3.2 *Defensive strategies***

EMGS's defensive activities are not particularly strong or unique. The firm relies on the leading edge technology for much of its protection from sustained competition. Currently, EMGS



focuses on two areas: protecting its patent rights and providing high quality service so that the entry barrier is rising and it is hard for competitors to imitate them.

Defensively, EMGS limits channel access by providing high quality service at reduced cost to exclusive customers. It supports exclusive customers with promotions and customized workshops. Although these moves could be matched by a competitor, they effectively raise entry barriers in an already low margin industry segment and encourage EMGS buyers to think twice before buying electromagnetic surveys from competitors.

In 1998, anticipating competition in marine electromagnetic technology, EMGS started its patent application on SBL technology to protect its proprietary technologies. Since then, it has been awarded five patents. Recently, EMGS took legal action against one of its competitors to protect its patent rights. While this may be costly and time consuming, there are few effective defensive strategies for protecting intellectual property. A court case at least, if not more than that, gives warning to those who wish to get an easy ride.

In conclusion, with its current strategies, EMGS has successfully established itself as a market leader in the emerging electromagnetic survey industry by capitalizing on its core competence in SBL technology and services. EMGS's core competences, including quality of service, leading edge in marine electromagnetic technology and outstanding people, are sustainable over a period of time with its strategic focus on R&D, human resource management and operation management. However, for a long-term growth, a strategic focus on building its brand reputation is important for EMGS to compete in this market, especially against the big services companies.

## 5 STRATEGIC ALTERNATIVES AND RECOMMENDATION

Based on the current industry dynamics and EMGS's core competencies shown by the analysis, growth and profitability should continue to be the main concerns in devising a strategy for entering the Chinese market. The strategy EMGS adopts must be based on how effective it provides EMGS with competitive advantages in terms of growth in market share and profitability.

### 5.1 Strategic alternatives

#### 5.1.1 *Alternative 1: status quo*

The first alternative is not to change the current strategy. At present EMGS focuses on a differentiation strategy without premium pricing through its leadership in technology and high quality services. The contract survey is the focal sector of the company. Although establishing partnerships with a few important oil companies over a diversity of markets is an effective business strategy for EMGS in this sector, EMGS appears to have no clear long-term market segmentation strategy. In the multi-client data sector, EMGS still cooperates with an international multi-client data marketing company, Inseis Terra, to further expand its business into multi-client data market. The local agents are used to bridge the gap which is not covered by either EMGS or its partners. The second vessel, expected to be put into operation, will increase operational capacity and reduce costs per customer by eliminating unnecessary mobilization of crews and vessels.

#### **Pros:**

- Easy to continue as it requires no changes within the company
- Needs no additional capital expenditure to maintain the current level of business
- Expanding into multi-client data segment may help to increase the awareness of the SBL technology and thus has a potential for broadening EMGS's customer base
- Partnership with important customers allows the company to concentrate on its core competencies in SBL technology and services

**Cons:**

- EMGS does not possess a competitive advantage in the markets when competition is based on the price, such as lowest price bidding. This will likely obstruct EMGS from entering those markets, especially when the awareness of SBL technology is low
- By trying to follow its partners in a variety of markets, regardless of their attractiveness, EMGS prevents itself from being able to strengthen its core competencies and establish a strong reputation in strategically important markets
- Loss of market opportunities in important markets and changes in partnership with key customers could affect EMGS's revenue significantly

**Likely Outcome:**

EMGS will be able to maintain its leadership in technology with continuing investment in R&D. Revenue and market share are likely to grow in markets where EMGS possesses competitive advantage due to the innovative SBL technology. EMGS should be able to identify one or few oil companies, which have or will have operations in the Chinese offshore oil market, as potential partners. With more effort put towards marketing to Chinese customers, EMGS will increase its marketing and sales presence in China. However, without a clear market segmentation strategy, EMGS is likely to experience difficulties in entering the Chinese market where most of contracts are awarded on the basis of lowest price bidding.

**5.1.2 *Alternative 2: the hybrid strategy***

The second alternative is to provide differentiation services at a price lower than that of competitors. This is an opportunity for EMGS to exploit a potentially transient first mover advantage as well as quickly establish a broad customer base in Chinese market where energy problems are significant and the level of competition is low. EMGS should focus its resources on core competencies in order to maintain its leading position in SBL technology and services and become more cost-efficient. More specifically, this involves three specific recommendations.

First, EMGS should focus exclusively on strengthening those areas where EMGS has a distinctive technology advantage that matches the needs of the Chinese market. This may be achieved by carefully examining the value chain activities, identifying and marketing different function services respectively. The key to success is to meet the requirements of tendering

documents at the lowest cost by standardizing the basic services and to maximize the profits by offering substantial complementary services through technological excellence. Since the level of competition is low, the SBL technology is cost effective for the customers, and in turn yields high margin for EMGS.

Second, EMGS should allocate resources to carry out a marketing focus strategy for the Chinese market to increase the awareness of SBL technology and build the brand recognition for EMGS's services. The first challenge EMGS is likely to face is to obtain reliable, accurate and up-to-date information on market conditions in China, given the dynamic and rapidly changing nature of the Chinese market. A complete market entry strategy should also include the development of an effective marketing program aiming at increasing the awareness of the SBL technology and services, as well as a strong sales and marketing network. Once the entry has been achieved, a clear follow-through strategy must be considered in order to sustain the competitive advantage the company has achieved.

Third, EMGS should coordinate the Chinese market and the other Asian markets with respect to market information sharing and resource utilization in order to minimize the total costs and maximize the long-term growth. This will also enhance the recognition of the SBL technology through increased effectiveness of the marketing activities.

**Pros:**

- Allow EMGS to focus on where it really excels and pursue long-term growth and profitability
- Help to profile EMGS as a market leader in technology and innovation
- Help to build up a broad customer base quickly and establish a strong reputation in Chinese market
- Easier to exploit opportunities in the Chinese market than to compete for a limited number of projects in shrinking markets. Moreover, conditions in China are favourable for EMGS to enter

**Cons:**

- In the short run the profit margin might be low and benefit of entering China market may take some time to realize

- EMGS's resources, such as capable personnel and financial capability may limit the expansion in China
- Potential political and economic risks in the Chinese market

**Likely Outcome:**

By focusing on strengthening core competencies and cost-efficiency, EMGS will be able to utilize its leading edge SBL technology to satisfy the Chinese customers' needs and expand into the Chinese market profitably. By carrying out a thorough market entry strategy, EMGS will become the market leader and establish a strong reputation in China market. Since low levels of competition characterize this market, the company's profitability is bound to improve. Since the Chinese offshore exploration industry is just emerging, EMGS is likely to obtain first-mover advantages in this market and have a great potential for long-term growth. Furthermore, the coordination of the Asian markets as a whole will reduce the total risks and costs of developing businesses in the new markets. This alternative hence would ensure a stable and sustainable growth for EMGS.

**5.1.3 Alternative 3: the focus differentiation strategy**

The last alternative is to provide high perceived value justifying a substantial price premium to a selected market segment. By delivering the perceived value clients need, EMGS can command higher prices from clients, while increasing the value generated in excess of the additional costs incurred. Leveraging on its R&D competence, the company should focus on customizing and diversifying its services in terms of technology, product features and differentiated customer services to target different market segments. To achieve this, an in-depth understanding of the Chinese customers' values and behaviours is essential, and a strong service design capacity is required in order to turn the customers' perceived value into the services EMGS offers. EMGS is also required to build its reputation as a committed value-added SBL service provider through active interaction with the local authorities, cooperation with research institutes and organization, participating in industry conferences/forums, and supporting the local communities' activities.

**Pros:**

- Help to strengthen EMGS's reputation as a market leader in SBL technology and innovation

- Easy to focus on selected market segments with customized marketing mix
- Allow EMGS to satisfy its customers' needs exclusively and maximize profits from its services
- Expand the breath of EMGS's product line

**Cons:**

- Hard to obtain a premium price in a low margin industry
- Difficult to identify the perceived value in different selective market segments
- The costs of customization are high and market penetration might be slow

**Likely Outcome:**

If successfully implemented, this alternative will generate much higher gross profits and return higher value to the SBL services. The EMGS's leadership in SBL technology and service will be further enhanced in the electromagnetic survey market and thus improve its competitive position in the marketplace. However, given the high costs in customization of services for each selected market, EMGS might have difficulty of sustaining its growth in China which is characterized by low margin and less desire for highly customized services.

**5.2 Alternative evaluation**

In this section, the critical success factors and EMGS's strategic goals will be used to evaluate the above three alternatives and develop recommendations. This chosen strategy must help EMGS develop a sustainable competitive advantage and maintain a healthy rate of long-term growth in existing marketplaces and expand into the Chinese offshore oil exploration industry successfully.

Table 5-1 outlines assessment of the strategic alternatives against critical success factors. Each factor is assigned a weighting scale ranging from 0 to 100% indicating the relative importance to the objective. Given that the quality and reliability of survey data is EMGS's most important growth driver, it's given a weighting scale of 35%; Reputation of company and brand recognition is the key to obtain a long-term growth, it's assigned 30%; cost leadership has critical influence on EMGS's capability of developing markets in which its leading SBL technology does not posses competitive advantage, it is hence given a weighting scale of 20%; in order to maintain the market leader position, it's essential to keep up with the speed of innovation, but this is not as

critical as the other three factors at this moment given the leading position SBL technology has at this moment, so its weighting scale is 10%.

Table 5-2 assesses the strategic alternatives against the company’s strategic goals. A similar weighting scale is used to indicate the relative importance of each goal to the success of the company. Each strategic alternative is ranked by a score ranging from 1 to 5, with 1 being the least favourable and 5 being the best fit to the criteria. As a small young technology-driven company, EMGS heavily relies on its competitive advantage to compete in the marketplace, so it’s given the highest weighting scale of 50%; given the high asset specificity and the relatively small demand at this stage of the electromagnetic survey market, market share is critical to EMGS’s long-term profitability, hence it’s assigned scale of 30%; for a young company, the ultimately goal is to make it profitable and increase the return on investments and the shareholder’s values, a scale of 20% is given to the factor of profitability.

The total weighted score for the alternatives are summarized at the bottom of each table. The alternative selection is based upon which alternative scores the highest. As shown on both tables, the hybrid strategy is scored the highest.

**Table 5-1 Alternative evaluation matrix with critical success factors**

<i>Critical Success Factor</i>	<i>Weighting</i>	<i>Strategic Alternatives</i>		
		<i>Status Quo</i>	<i>Hybrid</i>	<i>Focus Differentiation</i>
Reputation	30	4	5	3
Quality and reliability of survey data	35	5	4	4
Development in technology aiming at cost reduction	20	4	5	3
Potential for innovation	10	3	4	5
<b>Total weighted score</b>	<b>100</b>	<b>405</b>	<b>430</b>	<b>340</b>

*Weighting: 0-100%*

*Rating: 1 - worst, 5 – best*

**Table 5-2 Alternative evaluation matrix with strategic goals**

<i>Strategic Goals</i>	<i>Weighting</i>	<i>Strategic Alternatives</i>		
		<i>Status Quo</i>	<i>Hybrid</i>	<i>Focus Differentiation</i>
Competitive advantage	50	4	5	3
Market share growth	30	4	5	3
Profitability	20	4	3	5
<b>Total weighted score</b>	<b>100</b>	<b>400</b>	<b>460</b>	<b>340</b>

*Weighting: 100 - highest*

*Rating: 1 - worst, 5 – best*

### 5.3 Recommendation

Based on the above analysis, the recommended strategy for EMGS is to enter China with a combined cost leadership and differentiation strategy. In order to achieve this, EMGS should focus on both differentiating products in terms of quality, technology and services, and obtaining the cost advantage through cost improvement from scale, scope and experience, as well as substantial complementary services sales. EMGS also needs to improve its capabilities in marketing and sales, and develop an effective marketing and sales network in China.

As mentioned above, this strategy consists of three specific recommendations which will help EMGS to obtain competitive advantage and long-term profitability in the Chinese market. This position will be achieved by quickly establishing the reputation as a market leader in the Chinese market, through SBL technology leadership and cost efficiency. EMGS needs to reorganize its value chain to maximize its values and minimize its costs to obtain both continuing innovation and the cost leadership advantage. Product improvement and development should focus on targeting key customer values in the most cost-efficient manner. More resources and efforts are needed to increase the efficiency of the operation and enhance the capacity of technology development innovatively.

Furthermore, EMGS’s market entry strategy for the Chinese market should focus on developing a competitive sales and marketing network. First, EMGS should identify a strategic partner in China, given the particular requirement for foreign companies participating in the Chinese upstream market. The partner should not only have the knowledge and capacity to market SBL technology and services effectively in the Chinese market, but also be capable of



helping EMGS to overcome the trading barriers stemming from cultures, traditions, social value norms, and political and economic systems in China.

EMGS should also establish a centralized Chinese sales office to send a positive signal to its Chinese customer that the company is committed to focus its resources on servicing them. This will also help EMGS to better understand its customer's values and behaviour, as well as allow the company to be more responsive to competitive pressures and dynamic situation at the regional levels.

In conclusion, this recommendation, capitalizing on EMGS's core competences and the business opportunities in Chinese offshore oil industry, should allow EMGS to expand into China successfully and obtain the long-term market growth and profitability.

## **6 IMPLEMENTATION PLAN**

As a strategic choice is only as good as its implementation and implementation also relies on the company's competence, I suggest the implementation plan be carried out in two phases: the initial phase, which focuses on the resources preparation, and the execution phase, which involves the market promotion activities. The implementation plan can be summarized by function, as shown in Table 6-1.

Table 6-1 Implementation plan summary

Objectives	Responsible parties	Phase I			Phase II		
		Tasks	Time Frame	Cost (US\$)	Tasks	Time Frame	Cost (US\$ per year)
<b>Strengthen core competencies</b>	R&D, Operation	Identify and customize appropriate technology for Chinese market	Month 3-8	30,000	Adjustment and Improvement in technology	Ongoing	20,000
	R&D, Administration	Register and protect patents and trademarks in China	Month 6-12	20,000	Register and protect patents and trademark	Ongoing	10,000
	HR	Increase departmental resources in sales and marketing	Month 3-6	30,000	Ongoing recruiting	1 year later	
	IT, Senior Management, All department managers	Implement management information systems	Month 8-19	330,000	Utilize, maintain and upgrade systems	Ongoing	30,000
	<b>Subtotal</b>		<b>Month 3-19</b>	<b>410,000</b>		<b>1 year +</b>	<b>60,000</b>
<b>Establish Chinese operation</b>	Senior Management, HR	Appoint personnel to head the China operation	Month 3-6	100,000	Establish office in Beijing and operation	1 year later	100,000 500,000
	HR	Recruit Chinese workforce of 3 (1 administrative, 1 sales and marketing and 1 support engineer)	Month 3-6	60,000	Ongoing research and relationship with the Chinese offshore exploration market	Ongoing	50,000

<i>Objectives</i>	<i>Responsible parties</i>	<b>Phase I</b>			<b>Phase II</b>		
		<i>Tasks</i>	<i>Time Frame</i>	<i>Cost (US\$)</i>	<i>Tasks</i>	<i>Time Frame</i>	<i>Cost (US\$ per year)</i>
	HR	Market Research in Chinese offshore exploration market	Month 4-10	30,000	Market promotion	Ongoing	100,000
	HR, R&D	Employee Training at EMGS	Month 4-8	20,000	Training in marketing and SBL services	Ongoing	20,000
	<b>Sub-total</b>		<b>Month 3-12</b>	<b>210,000</b>		<b>1 year +</b>	<b>770,000</b>
<b>Asian markets coordination</b>	Chinese staff, Marketing, Senior management	Knowledge sharing of the case for entering Chinese market	Month 3-12	30,000	Tailor strategy of entering China to other emerging Asian markets	ongoing	50,000
	Chinese staff, Marketing	Resource and information sharing	Month 3-12	20,000	Resource and information sharing	Ongoing	20,000
	<b>Subtotal</b>		<b>Month 6-18</b>	<b>50,000</b>		<b>1 year +</b>	<b>70,000</b>
<b>Total</b>			<b>Month 6-18</b>	<b>670,000</b>		<b>1 year +</b>	<b>900,000</b>

## **6.1 Strengthen core competencies**

### ***6.1.1 Identify and customize appropriate technology for Chinese market***

As EMGS expands its markets from the developed countries into a developing country, China, the appropriateness of technology and service is essential for the company's long-term success in the Chinese market. There are a few factors need to be consider while making decisions on applied technology and product/service design. They include the local customers' requirement, local partner's need, financial capacity, skill lever of workers, and the development direction of the industry. In Phase II, the continue adjustment and improvement in selected technologies should be carefully carried out in corresponds with the changes in the Chinese offshore oil exploration market.

### ***6.1.2 Register and protect patents and trademarks in China***

Patents on SBL technology must be registered both in China and other international territories that EMGS enters. New developments will require additional patents on technology and systems. Patents will remain EMGS's property. Trademarks, logos, copyrights and other visible markings will be registered under EMGS, either in Norway or in international markets. Partner agreements will specify how trademarks can be used in third party documentation.

### ***6.1.3 Increase departmental resources in sales and marketing***

As the current resources in the sales and marketing department are not able to support EMGS's organic growth, new resources should be devoted to this important activity so that the proposed organizational expansion can be fully supported. During Phase I, I recommended that as least one additional employee should be hired to reinforce the sales and marketing forces. In Phase II, the department should be further reinforced according to EMGS's global expansion pace.

### ***6.1.4 Implement management information systems***

Since 1990s, the management information system has significantly changed the way organizations operate in their marketplaces. Although EMGS has a strong information system in SBL technology and data processing, the company's information system capacities still lag behind business needs for supporting decision-making, customer services, and supply chain management on the global level. A medium-size management information system should be

implemented to improve the company's productivity and operational effectiveness, enhance decision-making, and thus support its global expansion. The recommended management information system includes customer relationship management, human resources management, inventory management, sales and marketing, and financial accounting functions. As EMGS's operation is further expanded in the future, the system should be enhanced to meet the company's business needs. Table 6-2 illustrates the detailed tasks, time frame and breakdown costs for the system implementation during Phase I and Phase II.

**Table 6-2 Implement management information systems**

<i>Phase I</i>		
<i>Task</i>	<i>Time Frame</i>	<i>Cost (US\$)</i>
Analyze business process and requirements	Months 2 -4	20,000
Design functional/technical specifications	Months 2-4	50,000
Develop and test systems	Month 2 -5	200,000
Enhance company web-sites	Months 2 -5	40,000
Implement systems	Months 2 -6	20,000
<b>Total</b>	<b>Months 8-19</b>	<b>330,000</b>
<i>Phase II</i>		
Utilize, maintain and upgrade systems	Ongoing	<b>30,000 per year</b>

## **6.2 Establish Chinese operation**

### **6.2.1 Appoint head of Chinese operation:**

The first step toward focused global expansion in China is to appoint someone within the EMGS organization to head the operation. The candidate should preferably have technical background and experience in international business. His/her annual salary and other expenses in China are estimated to be US\$180,000. He/She is expected to return to EMGS after 2 years when the operation in China will be handled by local staff.

### **6.2.2 Setting up the office and recruit personnel**

The second step is to register EMGS's subsidiary in China and start recruiting personnel. One sales and marketing representative, one support engineer and one secretary will be recruited to start the initial operation.

The local sales and marketing representative and support engineer will be trained at EMGS in related to company business processes, SBL technology and services.

### **6.2.3 Market research**

The local staff will conduct market research in the offshore exploration market regarding market size, offshore oil exploration technology, blocks that need offshore exploration services, local and foreign offshore oil exploration service providers, and Chinese oil exploration industry regulations. Key contacts with Chinese government ministries are going to be established during this period. These ministries include State Energy Administration, Ministry of Geology and Mineral Resource, National Economic Planning Commission and Ministry of Foreign Trade and Economic Cooperation. The objective is to get information on the current projects and potential projects included in the next 5-year plan. Research into major Chinese oil exploration companies in China is also needed, for example, CNOOC, to be able to select potential partners.

### **6.2.4 Market promotion**

#### *6.2.4.1 Product strategy*

EMGS's core competence lies in its leading SBL technology and services. The new strategy is targeting the Chinese mass market with new, approved services at a lower price. In addition to its focus on R&D, EMGS should also establish a brand strategy for the company and its services. The brand strategy should focus on satisfying the customers' need, cost efficiency and long-term benefit.

EMGS should try to change the customers' current perception of SBL technology as an unapproved innovation, or as an expensive alternative to seismic technology. The brand identity should focus on the new and high standards of offshore oil exploration. EMGS's brand position should emphasize the technological excellence of SBL technology, critical effect on customers' decision-making, and enhancement in risk management.

The brand identity and position should be reflected in the promotional campaign and communicated to customers through the mass media. At least one person needs to be devoted exclusively to the task. This person would, with the help of an advertising agency, design and work out the print and audio commercials for EMGS's services so that they can be used in print media and in industrial conferences and exhibitions.

In addition to the brand strategy, the product strategy should focus on standardization of basic services, such as data acquisition and processing, and customize value-added services, for example, data interpretation and visualization, through technology excellence. This will allow EMGS to provide differentiation services to the mass market at a lower price, thus capture the market share more quickly.

#### *6.2.4.2 Pricing strategy*

Target-return will be used in setting the price. The most important and pressing issue is to establish a reputation of high offshore oil exploration standards in the market place so that the firm's credibility will help promote the services. The main objective in pricing is to penetrate the market. As most offshore projects in China are awarded on the basis of the lowest price bidding, EMGS should apply a more aggressive price strategy for its basic services which meets the customers' needs. As the competition in value-added services is relative low and currently no competitors can provide such services, EMGS can have premium price on its value-added services to maximize the profit. A comprehensive market research and analysis on competitors' cost and offers should be conducted on the regular basis and under the exceptional market circumstances to ensure the intended price strategy is up-to-date and responsive.

#### *6.2.4.3 Promotional strategy*

The key issue of the promotional strategy is to communicate the EMGS's brand and customer benefit to the potential customers. The promotional efforts should be geared towards high-value customers. Direct sales promotion should be conducted to target companies like China National Offshore Oil Corporation, which was exclusively authorized by Chinese government to take in charge of offshore oil and gas exploration and has 4 holding companies and 8 subsidiaries across China. Customized workshop and seminars should also be offered.

Attending conferences and exhibitions related to offshore exploration technologies is another important alternative. They include the Asian offshore conference and exhibition, national offshore conference and exhibition, and power and energy exhibition. The key objective of participating in conferences and exhibition is to establish close relationship with relevant government agencies to increase their awareness of SBL technology and benefits.



EMGS should also advertise in government and industry sponsored newspapers and magazines, such as “China oil” and “China oil and gas newspaper”, throughout the year to increase the awareness of the EMGS and its leading SBL technology. In addition to print advertisement, direct mails including videotapes regarding SBL technology and customer benefits should be sent to potential customers identified by market research. Telephone calls are to follow the direct mail campaign.

#### *6.2.4.4 Channel strategy*

In the short-run, EMGS would not be allowed to enter the Chinese offshore exploration independently. EMGS needs to identify potential partners that have offshore oil exploration capability and a national coverage. EMGS should enter into sub-contracting agreement with such a partner. Companies such as holding companies or subsidiaries of China National Offshore Oil Corporation would be ideal candidates. The main criteria for the partner should be marketing, quality and technical capability.

There are many essential differences between China and Western countries in terms of culture, traditions, social value norms, and political and economic systems. Furthermore, there are also different expectations of joint ventures by foreign investors and their Chinese partners. For example, while the primary objective for EMGS’s entry to Chinese market is to open China’s market for its products, its Chinese partner is seeking advanced technology to improve its competitive position in the marketplace. Consequently, an in-depth understanding of these differences and building a trust relationship with its Chinese partner is the key for EMGS to succeed in China in the long run.

### **6.3 Asian market coordination**

#### *6.3.1 Knowledge sharing of the case for entering the Chinese market*

Given that the similarity of the markets and geographic proximity, the expansion plan in the other emerging Asian markets, such as India, can be implemented using the same model that has been presented above, in China’s case. Adjustments should be made based on specific conditions/regulations of the target markets, but the first-hand experience of entering the Chinese market can be transferred to direct the activities in other markets. All the activities should be coordinated and controlled at the corporate level in order to minimize the overall costs and maximize the benefits from economy of scale and scope.

### **6.3.2 Resource and information sharing**

Many Asian oil exploration and production companies operate beyond their home country, if not globally. Cross references from partners and customers have great effects on market promotion, especially in regional markets. The research into potential partners, marketing channels and agents, which can be used to reach out to other Asian emerging markets, is also needed. The Chinese staff should also represent EMGS in participating in trade shows, exhibitions and seminars in the Asian region.

## **6.4 Conclusion**

With the promise of China emerging as a lucrative market and the impressive increase in demand for oil in the near future, China provides EMGS with a great opportunity to meet its business need for broadening its customer base and improving profitability. The recommended hybrid strategy will allow EMGS to establish itself as a market leader through its technology excellence in Leading-edge SBL technology, capture the market share as quick as possible through cost efficiency, and obtain the first-mover advantage in Chinese offshore exploration industry. The strong reputation in the market will help promote the service, and the first mover advantage will allow EMGS to accomplish the economy of scale and sustain its long-term growth and profitability. Furthermore, the first-hand experience of entering China market can be transferred to direct the activities in other emerging Asian markets thus minimize the total market development costs and maximize the profit.

Despite the great opportunities, the Chinese market also possesses risks. These mainly include the possibility of failure to penetrate the market, inappropriateness of technology and services offered, and the possibility of underestimating the complexity of the Chinese business environment. To mitigate the risk of failing to penetrate the market, the hybrid strategy suggests EMGS should target the market with differentiated products at a lower price than that of its competitors, given that most of projects in the Chinese oil exploration industry are rewarded on the basis of lowest price bidding. To ensure that EMGS offers appropriate technologies and services to the Chinese market, It is recommended that EMGS put great effort into Phase I to identify the appropriateness of the technology and services based on the market research conducted by the local Chinese staff, and continuously monitor and upgrade the technology to ensure it remains appropriate. Given the dynamic and rapidly changing nature of the Chinese

market, it is difficult to fully understand the Chinese business environment in a short period of time. Establishing trust and long-term relationship with local partners is recommended to help EMGS to cross these barriers and mitigate the risk of underestimation of Chinese business environment.

It is suggested that the implementation of the recommended hybrid strategy is carried out in two phases, the initiation phase and the execution phase. The whole implementation is expected to finish within a time range of 18 to 30 months, depending on the coordination of different tasks. The projected costs for Phase I are estimated to be US\$670,000 and US\$900,000 for Phase II. This basic preliminary cost estimates are based on the available market information and some assumptions are made to suit this specific case which might in time prove to be less than fully accurate. For a comprehensive financial projection, a thorough and systematic financial analysis is needed.

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## APPENDIX 1 INCOME STATEMENT

<i>Fiscal Year Ended (USDUS\$)</i>	Y 2003		Y2002	
<b>Operating income and Operating expenses</b>				
<i>Operating Income</i>		18,816,726		2,955,573
Sales income	18,761,139		2,947,617	
Other income	55,587		7,957	
Cost of goods sold		11,752,511		4,429,874
Gross Profit		7,064,215		-1,474,301
<b>Operating Expenses</b>				
<i>Operating Expenses</i>		8,054,288		3,093,021
Research & Development	0		0	
Selling, General and Administrative Expenses	2,586,140		987,183	
Depreciation	2,563,776		873,269	
Other Operating Expenses	2,904,373		1,232,569	
Operating Income		-990,073		-4,567,322
<b>Financial income and Financial expenses</b>				
<i>Financial income</i>		195,748		149,247
Interest income	44,744		120,939	
Other financial income	151,003		28,308	
<i>Financial expenses</i>		1,706,820		882,405
Interest cost- inter-company	1,620,337		822,655	
Other interest expenses	65,281		49,695	
Other financial expenses	21,202		10,054	
Earnings Before Taxes		-2,501,145		-5,300,480
Income Taxes (deferred tax)		-738,285		-1,524,037
<b>Net Income</b>		<b>-1,762,861</b>		<b>-3,776,443</b>

## APPENDIX 2 BALANCE SHEET

<i>Fiscal Year Ended (US\$)</i>	<i>Y 2003</i>	<i>Y 2002</i>
<b>Assets</b>		
Cash	3,845,009	802,820
Accounts Receivable	4,476,700	2,957,500
Other Receivables	1,937,396	1,652,451
Inventory	1,438,675	39,229
Unpaid share capital	0	157
<i>Total Current Assets</i>	<i>11,697,780</i>	<i>5,452,157</i>
Plant, Furniture and equipment	5,643,846	5,499,336
Obligations and other financial assets	69,488	86,694
Patents/rights	1,964,343	2,200,064
Software, licenses	65,858	0
Deferred tax	2,262,321	1,524,037
<b>Total Assets</b>	<b>21,703,638</b>	<b>14,762,288</b>
<b>Equity &amp; Liabilities</b>		
Ordinary Equity	550,173	550,173
Non Registered Equity	1,053,556	0
Premium Rate Fund	15,043,797	0
<i>Total Equity</i>	<i>16,647,526</i>	<i>550,173</i>
Accounts Payable	3,415,610	4,207,264
Government Taxes	235,567	132,904
Other Short Term Debt	1,448,238	386,477
Total Current Liabilities	5,099,415	4,726,646
Subordinated Debt, Convertible	5,440,305	13,174,390
Other Long Term Debt	55,696	87,522
<i>Total Long Term Liabilities</i>	<i>5,496,001</i>	<i>13,261,912</i>
<i>Total Liabilities</i>	<i>10,595,416</i>	<i>17,988,558</i>
Retained Earnings	-5,539,304	-3,776,443
<b>Total Equity &amp; Liabilities</b>	<b>21,703,638</b>	<b>14,762,288</b>

## **APPENDIX 3 CHINESE OIL EXPLORATION POLICIES AND REGULATIONS**

<i>Exploitation of Offshore Oil Resources</i>
1. The Regulations of the People's Republic of China on the Exploitation of Offshore Petroleum Resources in Cooperation with Foreign Enterprises
2. Provisions of the Ministry of Petroleum Industry of the People's Republic of China for the Control of Data concerning the Exploitation of Offshore Petroleum Resources in Cooperation with Foreign Enterprises
<i>Safety and Environmental Protection</i>
1. Announcement of China Offshore Oil Operation Safety Office
2. The Provisions on the Survey of Offshore Oil and Gas Production Facilities of the Ministry of Energy of the People's Republic of China
3. The Safety Control Provisions on Offshore Petroleum Operations of the Ministry of Petroleum Industry of the People's Republic of China
4. The Procedure of the Offshore Petroleum Operation Approval of Geophysical Survey Vessel
5. The Procedure of the Offshore Petroleum Operation Approval of Pipe Laying Ship
6. The Procedure of the Operation Permission of Mobile Offshore Drilling Unit of the Ministry of Petroleum Industry
7. The Procedure of the Operation Permission of Production Installation of Offshore Oil (GAS) Field of the Ministry of Petroleum Industry
8. Well Control Requirements for Offshore Petroleum Operations
9. Safety Requirements in Hydrogen Sulphide Environment for Offshore Petroleum Operations
10. General Rules on the Safety Operation of Mobile Offshore Drilling Platforms and Oil



(GAS) Production Installations

11. The Safety Control Rules for Radioactive Substances and Explosive Materials on Offshore Petroleum Operations
12. Safety Control Rules on Stand-By Vessels in Offshore Petroleum Operations
13. Rules on Safety in Electric Operation of Mobile Offshore Drilling Platforms and Oil(GAS) Production Installations
14. The Qualifications for the Managers and Special Operating Personnel of Mobile Offshore Drilling Units and Production Facilities
15. Requirements for Offshore Petroleum Operators in the Design of Safety Emergency Plan
16. Safety Rules on the Lease of Helicopters for Offshore Petroleum Operations
17. Requirements for Accident Report and Statistics of Offshore Petroleum Operations
18. Procedures for the Operation Permission of Sub-sea Long Distance Oil (GAS) Transmission Pipeline
19. The Safety Control Rules for Tying up Utensils during Offshore Petroleum Operations
20. The Procedure of Offshore Oil Operation Approval of Derrick Barge
21. Safety Control Rules on Boilers and Pressure Vessels in Offshore Oil Production Facilities
22. The Procedure for the Operation Permission of the Extended Drill Stem Testing on an Offshore Oil Facility (WELL)
23. Requirements for Offshore Oil Operation Safety Training
24. The Control Rules on offshore Oil Well Abandonment Operations
25. The Procedure of the Operation Permission of Onshore Oil and GAS Terminal for

Offshore Oil

***Taxes Regulations***

1. Rules of the Ministry of Finance and the General Administration of Customs Concerning the Levy and Exemption of Customs Duties and Consolidated Industrial and Commercial Tax On Imports and Exports for the Chinese-Foreign Cooperative Exploitation of Offshore Petroleum
2. Notice of the State Council on the tentative regulations concerning the application of VAT, consumer tax and business tax to foreign invested ventures and foreign enterprises
3. Notice of the payment of the Royalty Concerning the Exploitation of Offshore Petroleum Resources
4. Replied letter of MGMR Concerning the Confirmation of the free of Royalty for the Exploitation of Offshore Petroleum Resources within the sea area of the People's Republic of China

*Data source: China National Offshore Oil Corporation*