



Mongolia's Mining Services Cluster

The Microeconomics of Competitiveness

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A. Executive Summary

Home to the world's largest undeveloped deposits of gold, copper, coal, uranium and iron ore, Mongolia is on the verge of a mineral boom. With plans to fully begin exploiting its mineral wealth by 2013, the government hopes to triple Mongolia's GDP (\$5.3 Billion in 2008) over the course of the next decade and transform the economy.¹ Since transitioning to democracy and enacting economic reforms in 1992, Mongolia has attracted significant foreign investment but unemployment remains high and 35% of the population continues to live under the poverty line.²

In the first half of the report, we analyze Mongolia's national performance and recommend ways for it to increase prosperity and equality. Landlocked between China and Russia, Mongolia needs to address a series of unique challenges. It is one of the least densely populated countries in the world and is faced with a severe rural urban divide where 50% of the population is concentrated in the capital of Ulaanbaatar.³ The primary constraints inhibiting Mongolia's growth are a human capital base ill equipped to meet market needs and poor infrastructure. To move forward, Mongolia needs to find a way to turn its location into an advantage and establish initiatives that attract private sector investment into education and healthcare. Given Mongolia's strategic location between China and Russia, we recommend Mongolia invest in building transportation linkages and position itself as a stable, regional hub for accessing these two growing, large markets.

Ultimately, any attempts to increase Mongolia's prosperity will be built on a foundation of mining and in the second half of the report, we specifically discuss the emerging mining services cluster. High levels of sophisticated and diverse demand from mining companies who outsource a host of services are currently driving the cluster. There are currently 33 firms operating in the mining services space, earning \$154 Million in revenue.⁴ The demand is expected to grow dramatically as new mines, such as the lucrative gold and copper mine at Oyu Tolgoi with a deposit the size of Manhattan, come up for development.⁵

To fully take advantage of the anticipated mining growth, the cluster needs to increase the competitiveness of local players and overcome seasonality issues. The cluster lacks a cohesive, long-term strategy and we recommend establishing a mining services cluster initiative that creates a forum for collaboration, establishes standards and aggregates and disseminates data. To address seasonality specifically, we recommend giving tax incentives to foreign mining companies already in Mongolia if they utilize the services of the local mining services firms abroad. Given Mongolia's strategic location, the mining services cluster possesses potential to become the supplier of choice for the Asian region.

B. Mongolia – Country Analysis

1. Background

Landlocked between China and Russia, Mongolia is 1.6 km² in size and boasts a small population of 2.6 million people. The majority of the population is young, with 70% under the age of 35.⁶ Due to the uneven and harsh landscape, Mongolia is also extremely urbanized with over 50% of the population concentrated in the capital city of Ulaanbaatar.⁷

With Soviet support, Mongolia declared independence from China in 1921.⁸ Close ties to the Soviets led to Mongolia establishing a centrally planned regime in 1930 that lasted until 1980.⁹ In 1992, Mongolia peacefully transitioned from a planned and socialist economy to a democratic and open economy. After the transition, Mongolia instituted key reforms in several areas – including price liberalization, privatization and the establishment of market-based institutions – and moved to establish an open trade policy relatively quickly.¹⁰ Compared to other countries in similar situations, the transition has proved relatively peaceful and stable, which can be an asset for Mongolia going forward.

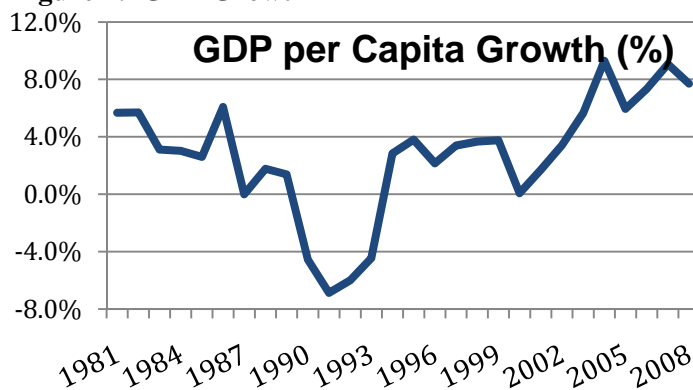
Mongolia currently depends on Russia for its energy needs and on China as a market for its exports.¹¹ In terms of endowments, the world's largest undeveloped mineral reserves lie under Mongolian soil.¹² If managed well, this rich and underutilized endowment promises sizeable economic gains for the country.

2. Overall Economic Performance

2.1. GDP Growth and Prosperity

Since exiting socialism in 1992, Mongolia has experienced a positive and sustained increase in growth. As shown in **Figure 1** below, growth in real GDP per capita rose from -4.4% in 1993 to 7.7% in 2008. During the period 1998-2008, real GDP per capita recorded an average growth rate of 5.2%.¹³ Such robust growth rate is attributed to two key developments: 1) The peaceful and well paced transition from a centrally planned system towards a market based economy; and 2) The sharp decline in population growth rates during the end of the 1980's and the beginning of the 1990's. Population growth ultimately stabilized at a lower level relative to the country's historical average.¹⁴

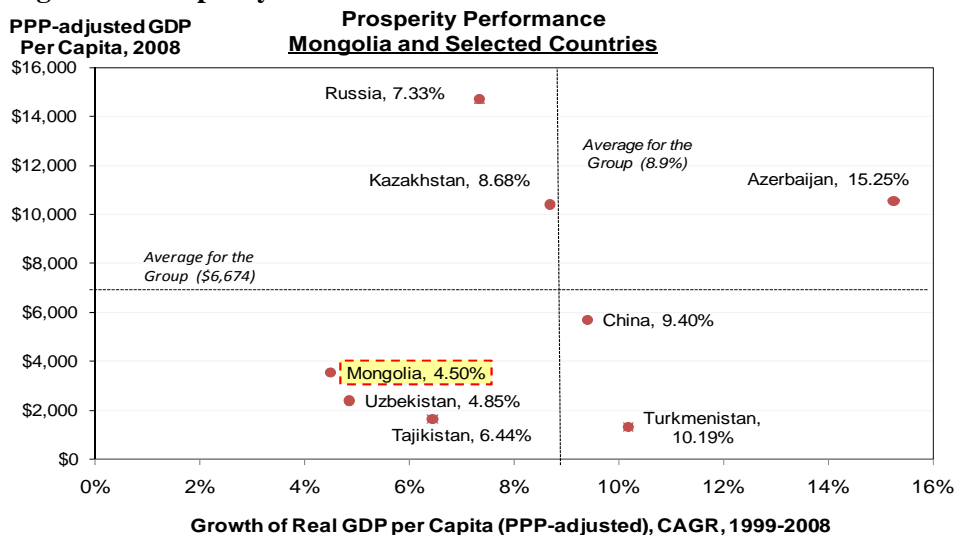
Figure 1: GDP Growth



Source: International Financial Statistics Yearbook, 2010.

At the same time, however, strong growth performance did not translate into notable improvement in prosperity levels. In 2008, Mongolia’s PPP-adjusted GDP per capita was \$3.3 Thousand in contrast to an average of \$19.2 Thousand for the East Asia region.¹⁵ During the period of 1999-2008, Mongolia’s GDP per capita grew at an average annual rate of 4.5%, lagging behind its regional peers as illustrated in **Figure 2** below.¹⁶ In addition, as of the end of 2008, 35% of the population continues to live below the national poverty line¹⁷.

Figure 2: Prosperity

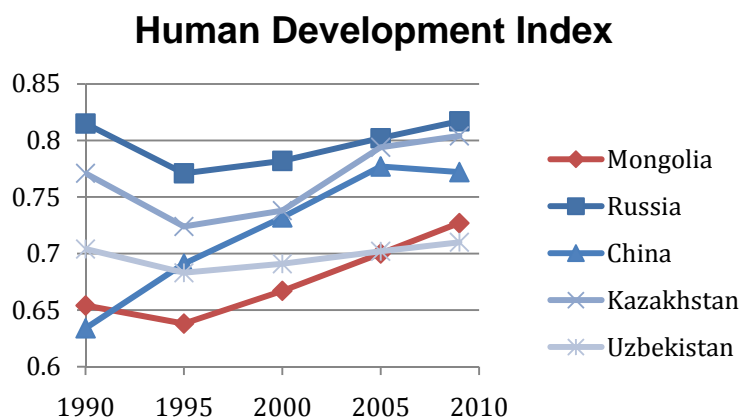


Source: EIU (2009). Mongolia Data from the World Development Indicators (2009).

The primary factor driving growth during the 2004–2008 time period has been labor productivity, with minimal contribution from higher workforce participation. Since the transition, 73% of real growth can be explained in terms of higher labor productivity (i.e. real output per worker) whereas only 27% reflects higher employment levels¹⁸. It is noteworthy that real output per worker in Mongolia reached \$6.6 Thousand in 2007 as compared to \$7.4 Thousand for China and an average of \$10.5 Thousand for Asia¹⁹.

The impact of growth on social and human development yields mixed results. On one hand, the country scores favorably in terms of primary and secondary school enrolment, literacy rates and life expectancy.²⁰ Furthermore, the Gini coefficient for Mongolia stands at 0.33, relatively low and favorable when compared to the overall levels of income inequality posted by its regional peers.²¹ However, at the same time, Mongolia remains classified as a low income country with 35% of the population living below the poverty line.²² Relative to its regional neighbors, Mongolia lags behind on human development. From 1990 to 2009, Mongolia's human development index increased very nominally from .654 to .727 (**Figure 3**).²³

Figure 3: HDI from 1990 to 2010



Source: World Fact Book; Human Development Index Country Rankings

A high level of urban-rural inequality poses the biggest challenge to Mongolia's human development. With over 50% of the population and almost all economic activity concentrated in Ulaanbaatar, healthcare, education and other social services don't permeate hard to reach areas. The country is divided into 21 provinces and growth did not spread regionally. The nomadic culture of the rural population also exacerbates these issues. Regional hubs are weak, with nomadic populations having little affinity or making long-term investments in any one specific place. Underdeveloped regional hubs lead to urban migration and underinvestment outside of the capital.

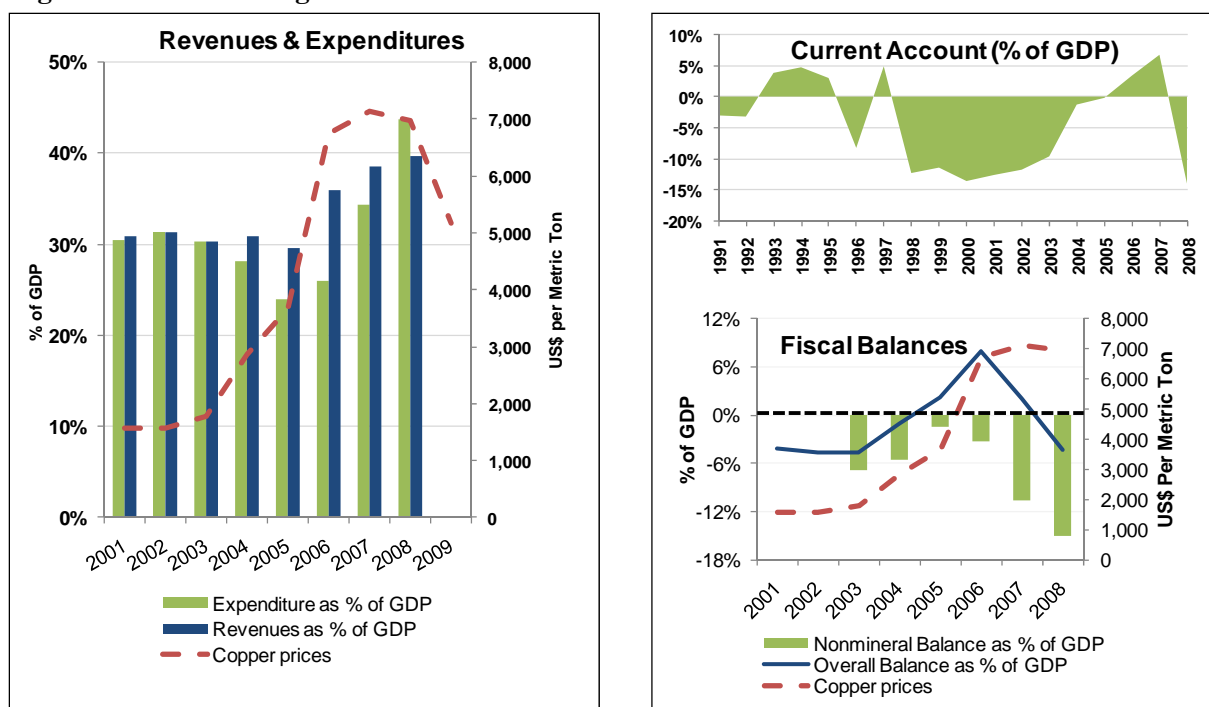
2.2 Macroeconomic Performance

A small and open economy, Mongolia's trade activity surpassed 120% of GDP in 2008.²⁴ Open trade has been accompanied by policies geared towards attracting FDI, especially in the mining sector. Accordingly, FDI picked up from 0% in the early 1990's to almost 15% of GDP in 2008.²⁵

However, Mongolia's underdeveloped macroeconomic framework cannot accommodate the challenges of a thriving mining sector. The country's economic openness coupled with its tightly managed exchange rate makes it highly vulnerable to swings in commodity prices. Thus, any rise in commodity prices translates into higher domestic prices. For example, the surge in international prices of energy and foodstuffs in 2008 passed through into high inflation rates in Mongolia that peaked at 34.2% in August 2008²⁶.

On the fiscal front, during the period of 2004-2008, the recent boom in international copper prices stimulated government revenues to grow at an annual average rate of 37.2%.²⁷ Unfortunately, the windfall revenues encouraged pro-cyclical measures such as cutting the VAT and social security contribution rates, stipulating a higher wage bill for civil servants and introducing universal transfer systems. These excessive benefits and spending programs fueled a large and unsustainable fiscal deficit with the non-mineral portion of the deficit being 10.6% of GDP in 2007, and further deteriorating to 15.1% of GDP in 2008²⁸. Likewise, excessive government spending expanded the trade deficit which then translated into a large current account deficit in the neighborhood of 14% of GDP in 2008 (see **Figure 4**).

Figure 4: Fiscal Management and Economic Imbalances



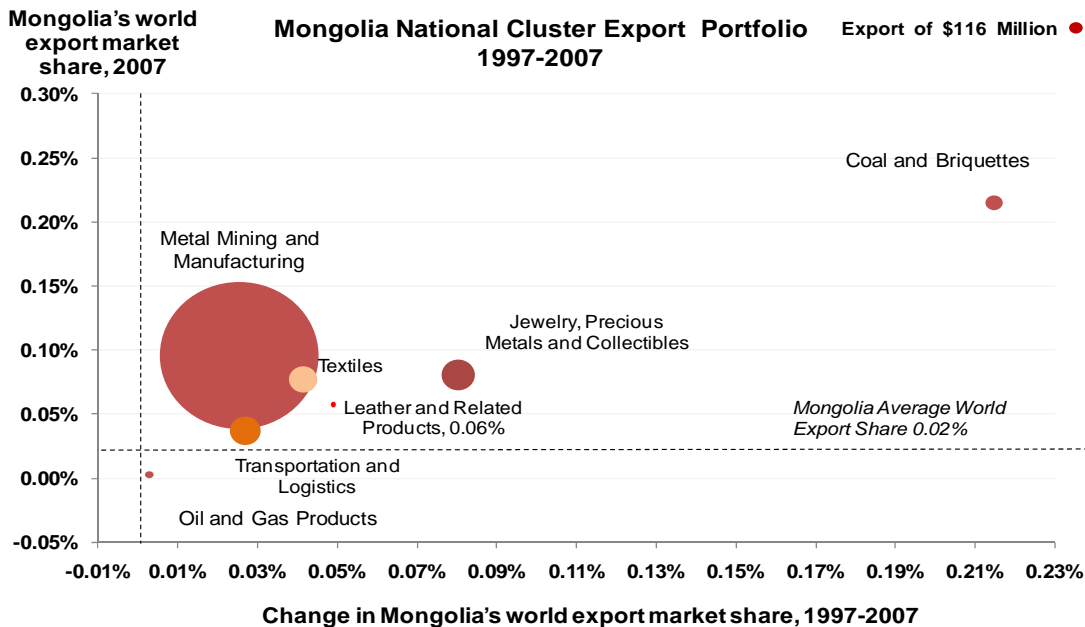
Source: International Financial Statistics (2010)

2.3 Exports and Economic Composition

The Mongolian economy traditionally ran on low value added activities in the agriculture and livestock sectors, with mining gaining sizeable importance only recently. The services sector contributes towards 50% of the country’s GDP whereas industry and agricultureⁱ contribute 29.5% and 21.2% respectively²⁹. Over the period 2004-2008, agriculture, mining, and transport & communication were Mongolia’s leading sectors in terms of contribution to GDP and real growth rates.³⁰ It’s worth noting that transportation and communication is high because in a country the size of Mongolia, transportation and fuel costs are expectedly expensive. However, real added-value growth from this sector is limited and will require an intense amount of investment.

Mongolia has limited export breadth in terms of products (unprocessed natural resources) and external markets. Specifically, as **Figure 5** illustrates, Mongolia is overly dependent on the “metal mining and manufacturing” cluster and shows limited growth in other export clusters. Natural resources, almost entirely mining goods, make up 81% of Mongolia’s total export proceeds compared to an average of 21% for East Asian countries. Mongolia’s main trading partners are China and Russia. More than two third of exports go out to China and 66.2% of its imports come in from China and Russia.³¹

Figure 5: Mongolia’s Exports



Source: Prof. Michael E. Porter, *International Cluster Competitiveness Project*, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director.

ⁱ Such sector includes livestock and cashmere.

3. The National Business Environment

Mongolia's business environment rank is 111 out of 127 countries, below the country's GDP per Capita ranking of 100.³²

3.1 Government Effectiveness

Mongolia suffers from weak government effectiveness and high levels of perceived corruption. Mongolia business environment rank 111 out of 127 countries³³ which is below the country's GDP per Capita ranking. According to World Bank indicators, Mongolia ranks in the 25th percentile for government effectiveness.³⁴ Low competence in combination with a high turn over rate makes the Mongolian civil service highly ineffective. This in turn impacts the government's ability to deliver on public services and create an environment that fosters a competitive private sector.

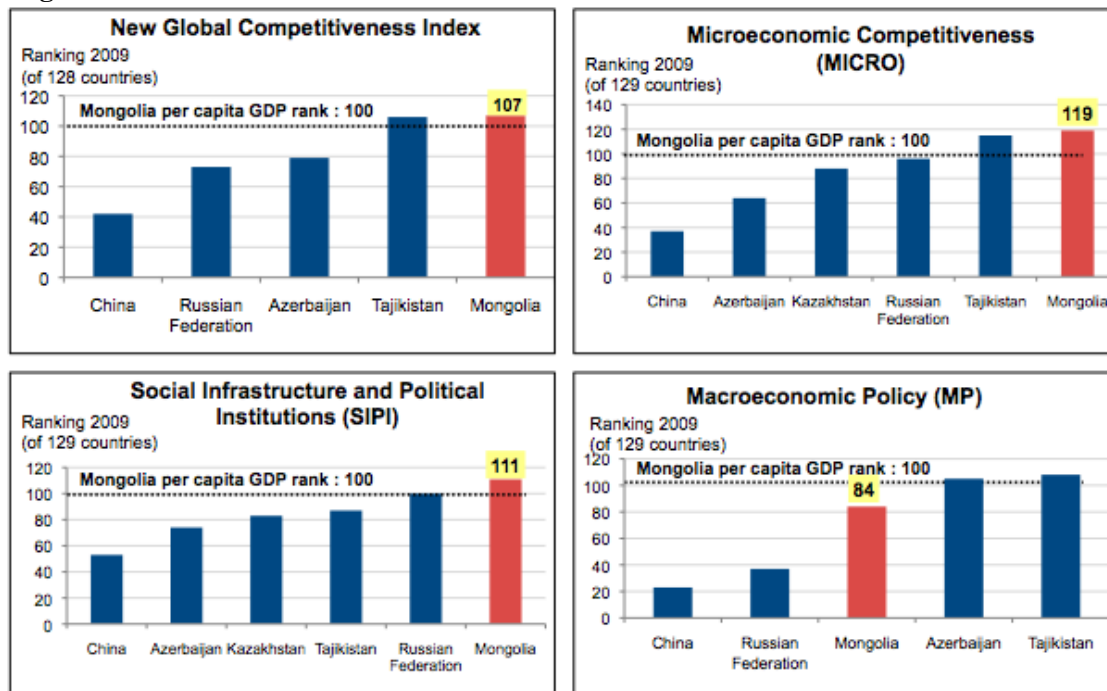
3.2 Corruption

With regard to corruption, Mongolia scores a low 2.6 on the corruption perception index and ranks 9 out of 62 countries where corruption is cited as a barrier to growth.³⁵ According to the World Bank Investment Climate Survey, unofficial payments and bribes for obtaining licenses account for as much as 40% of official fees. In comparison to other transition countries, however, people we interviewed feel overall corruption is relatively contained. Our interviews revealed three levels of corruption: 1) At the micro level; 2) At the policy/government level; and 3) At the private sector level. At the micro-level, there can be supplements for low-level social services (e.g. hospital co-pays). At the policy level, there are known cases of the government withholding or suspending licenses for political or economic gain. For example, under pressure from the Russian government, officials suspended the license for a Canadian controlled uranium mine. In the private sector however, where SMEs operate and the vast majority of business transactions take place, corruption is viewed as negligible and not a significant hindrance to conducting business.

3.3 Global Competitiveness Index

Relative to how we would expect Mongolia to be ranked based on GDP per capita, we find that Mongolia lags behind on all GCI indicators except for Macro-Economic policy (see **Figure 6** below). Particularly low are the Microeconomic Competitiveness and Social Infrastructure and Political Institutions ranks of 111 and 119.³⁶

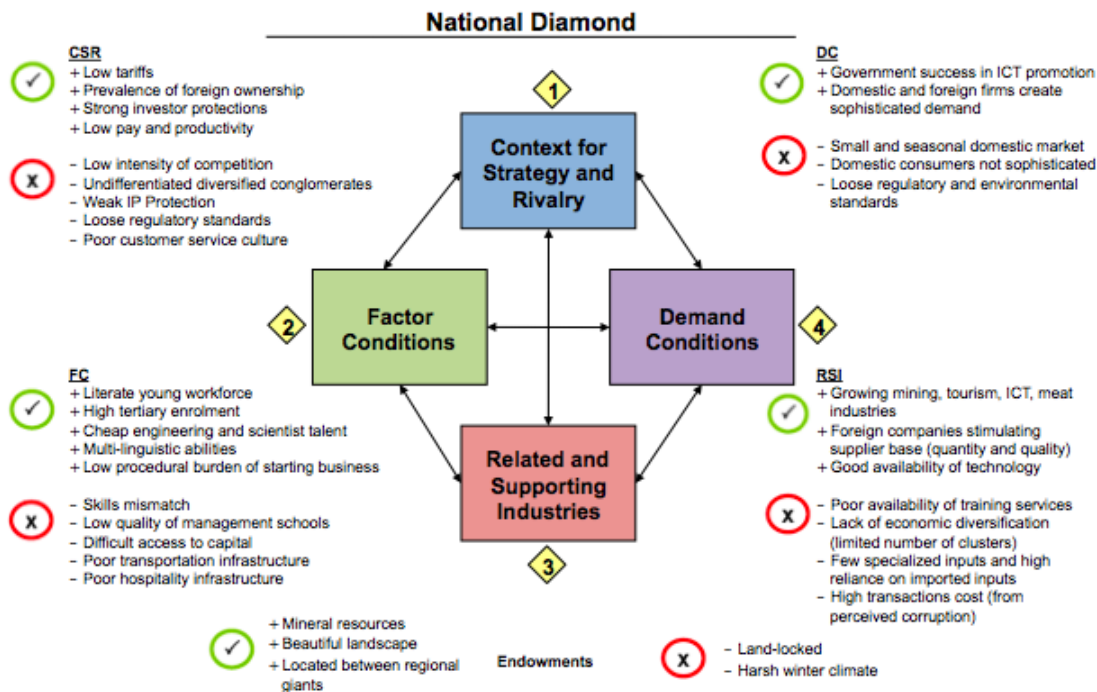
Figure 6: GCI Indicators



Source: Institute for Strategy and Competitiveness, Harvard University (2009)

3.4 Mongolia National Diamond

Figure 7: Mongolia National Diamond



Source: "Mongolia, Building a National Value Proposition for Competitiveness Scoping Report," Vallejo, Jorje R.; "Competitiveness: Creating a Mongolian Economic Strategy," Porter, Michael E.; Mongolia 2008 Turkish Embassy Annual Report

The following diamond analysis is in reference to **Figure 7** above.

Endowments: While Mongolia's blessings include minerals and a beautiful landscape, it suffers from harsh climate conditions. During the summer season (May to September), the average temperature ranges from -40C to +40C.³⁷

Context for Strategy and Rivalry: While we would expect factor conditions to be the core strength for a country with abundant natural resources, our analysis finds that the strongest element of the national diamond is Context for Strategy and Rivalry. Due to low tariffs (the weighted average for 2008 tariffs was 5.1%) and strong investor protections, Mongolia has created an inviting environment for foreign companies.³⁸ In mining alone, there are 23 foreign firms present. While there is a high prevalence of foreign firms, at the same time, the competitiveness of local players as compared to foreign players remains low. In addition, the majority of the FDI that comes into Mongolia is related to mining with very little coming in for other sectors of the economy. In 2009, Mining FDI represented 61.3% of total FDI inflow into Mongolia, followed by trade support services, representing 19.7% of FDI inflows.³⁹ Furthermore, weak IP protection in combination with loose regulatory standards also detracts from fostering an environment more conducive to competitiveness. The number of patent applications by residents only number 103, as compared to China and Kazakhstan, who both have 122,318 and 1,433 patent applications by residents respectively.⁴⁰

Factor Conditions: The two biggest factor-constraints inhibiting growth in Mongolia are human capital and infrastructure.

Human Capital

Mongolia inherited a strong basic foundation in education from its socialist legacy. School enrollments for the primary, secondary and tertiary levels are 98%, 87% and 42% respectively.⁴¹ The high enrollment rates are consistent across genders for both males and females.⁴² The government currently allocates 17% of GDP to education and there are 11 universities, 167 colleges and 37 technical and vocational colleges in Mongolia.⁴³

However, Mongolia suffers from a mismatch between the skills supplied by the labor force and the skills demanded by employers. There has been an increased demand for technical, behavioral and managerial skills, all of which are not being sufficiently taught in the education system that focuses more on traditional, core quantitative skills. Unemployment rates for individuals with primary, secondary and tertiary education are 3.8%, 9% and 4.3% respectively.⁴⁴ The effect on economic output is such that up to 50% of large firms are blaming a lack of human capital for not achieving full capacity.

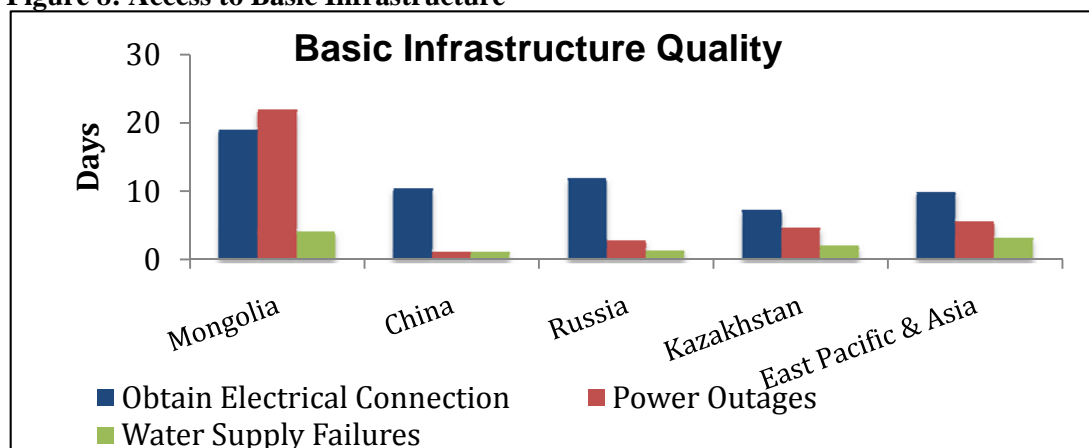
In addition to a structural shift in the skills demanded, influx of rural workers to urban areas further exacerbates the situation. Approximately 57% of the Mongolian workforce is self-employed in agriculture, a

low skill activity, and when these workers move to urban areas, they are not equipped with the necessary skill sets to find a suitable job in the city.⁴⁵ During the severe winter *dzuds*, an estimated 33% of livestock is lost annually, increasing the migration numbers.⁴⁶ It is estimated that approximately up to 20% of the workforce in the 25-29 age range remains idle.⁴⁷

Infrastructure

Another bottleneck constraining growth in Mongolia is infrastructure. Mongolia ranks last out of 134 countries for the quality of overall infrastructure in the 2010 Global Competitiveness Report. All of the basic utilities are government owned and still operate using soviet legacy equipment. As **Figure 8** shows, relative to its regional neighbors, it takes roughly twice as long to obtain an electrical connection and power outages and water supply failures are both high.

Figure 8: Access to Basic Infrastructure



Source: World Bank, “Mongolia Sources of Growth Country Economic Memorandum,” July 26, 2007

Inadequate transportation infrastructure also poses a critical constraint, especially considering Mongolia’s landlocked location. Currently, there are no paved roads from Ulaanbaatar to the Chinese border and only 13% of the state road network and less than 1% of the local road network is paved.^{48,49} This creates isolating conditions for the outer provinces and limits the connectivity of Ulaanbaatar. The railroad capacity is also stretched due to underinvestment. Even though the Mongolian corridor is the shorter distance between China and Russia but Kazakhstan earns higher transit revenue than Mongolia, largely due to better railroad transport. From 1995-2007, Kazakhstan invested approximately USD 749 M in its railroad system while Mongolia invested only USD 210 M during the same time period. In 2008, Mongolia only earned \$86 Million in transit revenue as compared to Kazakhstan’s \$394 Million.⁵⁰

Related Services and Industry: Mining companies are stimulating the development of a local supplier base by trying to source locally and at times even providing financing to vendors, but emerging clusters in Mongolia are

underdeveloped and far and few in between. As outlined in **Figure 9**, clusters with enabling elements already in place to develop further are Tourism, Meat, ICT and Cashmere.

Figure 9: Emerging Clusters in Mongolia

	Tourism	Meat	ICT	Cashmere
Size of Cluster	\$150 Million	\$520 Million	\$60 Million	\$210 Million
Elements in Place to Promote Cluster Development	Rich cultural legacy and beautiful landscapes	Strong legacy and only food export of Mongolia	Government support and strong demand in nearby Japanese and Korean markets	Legacy of skilled herders and largest producer of Cashmere after China
Factors Constraining Cluster Growth	Poor road infrastructure accentuated by low FDI	Dependent on Russian market and lack of capital to create more value-add	Lack of IP protection and limited access to capital	Lack of technical and marketing expertise lead to under capacity

Source: “Mongolia, Building a National Value Proposition for Competitiveness Scoping Report,” Vallejo, Jorje R.; “Competitiveness: Creating a Mongolian Economic Strategy,” Porter, Michael E.; Mongolia 2008 Turkish Embassy Annual Report

Demand Conditions: The weakest element of the national diamond is demand conditions. At the business level, foreign firms have exhibited strong and sophisticated demand for mining services. However, the size of the domestic market remains small and the local consumer is not very sophisticated, due to the recent transition to a market economy and the high poverty rate. Loose environmental and regulatory standards are also not conducive to increasing innovation that would lead to competitiveness.

4. Recommendations

4.1 Macro Recommendations

Mongolia needs a macroeconomic framework that can translate mineral wealth into sustainable growth and more importantly, into higher competitiveness and prosperity levels. This requires efficient and strategic use of windfall mineral revenues to diversify the economy and promote promising tradable clusters. To accomplish this, the current macroeconomic framework needs the following pillars outlined below. These recommendations are presented in order of importance:

1. Introduce **more flexibility in managing the exchange rate**. This can partially protect Mongolia from swings in global commodity prices along with associated high domestic inflation rates.
2. Establish a **stabilization fund** managed by the Ministry of Finance –similar to the Russian fund established in 2004 – that absorbs windfall mineral revenues. Accordingly, we recommend splitting the fund into a reserve fund and a wealth creation fund. The reserve fund should invest abroad, either assisting Mongolian

firms in expanding regionally or securing decent investment returns that can be used during domestic downturns. The wealth creation fund should invest in upgrading Mongolia's infrastructure base as well as promoting new tradable sectors. Such processes would absorb excessive liquidity, reduce inflationary pressure and insulate the economy from volatility of mineral export earnings.

3. Adopt prudent fiscal policy based on credible rules that **target sustainable deficit and expenditure ceilings**. We recommend automatically directing excess fiscal resources into the stabilization fund. As such, Mongolia's valuable mineral resources will be used more efficiently while preventing pro-cyclical measures that only result in political gains at the expense of devastating economic impacts.

4.2 Micro Recommendations

The two biggest micro-constraints facing Mongolia are infrastructure and human capital, followed by a lack of economic diversification. The recommendations for each section are presented in order of importance. We also discussed the prioritization of the recommendations during the course of our interviews as well.

Infrastructure: According to the World Bank, Mongolia needs \$8 Billion to update its infrastructure capacity. Urban concentration around Ulaanbaatar and increased mining production have stretched the limits of Mongolia's infrastructure capacity. Only 67% of the population has electricity and the railway capacity can't keep pace with import-export cargo flows.⁵¹

1. Government resources and loans provided by the World Bank and the Asian Development Bank are not sufficient to meet infrastructure demand. The government needs to **leverage the recently passed Public-Private Partnership law offering concessions to the private sector** to invest in infrastructure projects. It is estimated that \$5.2 Billion is needed to build energy facilities and transportation networks before mining can properly begin in the southern regions.⁵²
2. In making decisions about infrastructure projects, we recommend prioritizing investments **linking Ulaanbaatar and industrial sites to China in order to improve port access**. The majority of these sites will be in mining areas and the move will help to alleviate poor connectivity between regions.

Skills Mismatch: Private sector firms in Ulaanbaatar operate below capacity due to insufficient talent. This requires an underlying reform of the education system.

1. Approximately 93% of all workers who are gainfully employed expressed that they feel they don't have sufficient IT, leadership and creative thinking skills to maximize their work.⁵³ **We recommend extending funding to firms for upgrading their training programs for new hires.**
2. We recommend creating a **joint initiative between the Ministry of Education and the private sector to assess skill needs and reform education curricula**. Secondary and tertiary education needs to be more flexible and in particular, provide more vocational training options. Currently, only 10% of total enrollment

in higher education is vocational.⁵⁴ In addition, there also needs to be more ‘second-chance’ programs. About 38% of 18-35 year olds left school without completing basic education and while it’s difficult to rectify the situation completely, increased basic and vocational training will help make this group more productive.

Economic Diversification: We recommend creating a **national competitiveness council** to set a consistent national economic strategy for Mongolia, drive cluster specific initiatives and address cross-cutting issues such as skills mismatches and infrastructure upgrading. To ensure the sustainability of the initiative and enhance performance, a mix of foreign and domestic firms should be included. However, any initiative to upgrade competitiveness of the economy and enhance prosperity will need to use the mining cluster as a starting point.

5. National Value Proposition

The following characteristics contribute to Mongolia’s uniqueness: 1) It is strategically located between China and Russia; 2) It has gender equality in both education and the labor force; and 3) It has an open economy and stable democracy marked by peaceful transitions of power since independence. These characteristics lend themselves to a value proposition with the following elements:





1. A stable, regional hub for accessing the growing Chinese and Russian markets.
2. A transit trade corridor for regional trade and investment.
3. A stable environment for regional headquarters, reinforced by a cohesive society.

C. Mining Services – Cluster Analysis

1. Introduction

Mining companies in Mongolia fall into two categories: 1) Foreign companies (majors, juniors and traders); and 2) Mongolian companies. **Figure 10** below shows the four types of mining companies currently active in Mongolia. The multinationals are typically in the country in order to observe and potentially acquire smaller targets. They do some exploration but most projects so far are joint venture form. Due to their high corporate governance standards, they uphold high social and environmental standards, usually significantly higher than the local requirements. These mining companies outsource activities to mining service companies.

Figure 10: Types of Mining Companies in Mongolia: Downstream

<p style="text-align: center;">Foreign Majors</p>  <p>Large multinational mining companies own mines and market resources # Firms: 3</p>	<p style="text-align: center;">Foreign Juniors</p>  <p>Canadian/Australian ventures raise equity to explore and get acquired # Firms: 15</p>
<p style="text-align: center;">Mongolian Mining Companies</p>  <p>Mongolian entrepreneurs and medium sized exploration and mining companies # Firms: 27+</p>	<p style="text-align: center;">Foreign Traders</p>  <p>Traditionally Japanese or European commodity trading houses # Firms: 5</p>



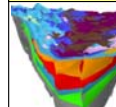



Source: Team Analysis

2. Mongolia Mining Services Industry

2.1 Cluster Definition

The Mining Services Cluster is composed of the downstream mining companies that outsource activities to the mining services companies, the core cluster. Both mining and mining services firms are based in Ulaanbaatar, and usually have a fly-in-fly-out model for supporting mining sites. We will be focusing on the core cluster, made up of 33 firms. **Figure 11** below shows the six types of mining services companies.

Figure 11: Types of Mining Services Companies in Mongolia

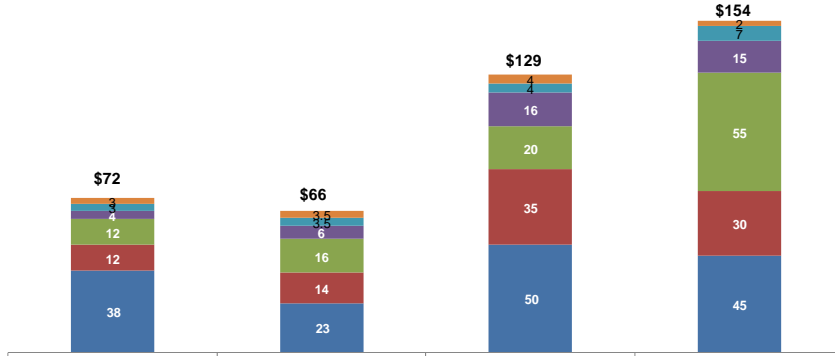
<p style="text-align: center;">Drilling</p>  <p>Own and operate drill rigs for mining companies doing exploration drilling # Firms: 10 Est. Rev: \$45M</p>	<p style="text-align: center;">Surveying</p>  <p>Perform hi-tech ground & airborne surveys for pre-drilling exploration # Firms: 8 Est. Rev: \$30M</p>	<p style="text-align: center;">Consulting</p>  <p>Develop mine models and resource estimate reports for developers # Firms: 4 Est. Rev: \$7M</p>
<p style="text-align: center;">Contract Mining</p>  <p>Operate mines on a per ton basis for mining Cos # Firms: 2 Est. Rev: \$55M</p>	<p style="text-align: center;">Camping/Logistics</p>  <p>Own, set up, and run camps at exploration sites # Firms: 7 Est. Rev: \$15M</p>	<p style="text-align: center;">Lab Analysis</p>  <p>Perform lab tests for exploration and mine quality control # Firms: 2 Est. Rev: \$2M</p>

Source: Revenue figures from (a) “Market Data 2009” (MICC), (b) Cluster Interviews

2.2. Core Cluster Performance

Figure 12 illustrates the core cluster’s quantitative performance over the last four years (data for earlier periods was not available).

Figure 12: Core Cluster Revenues



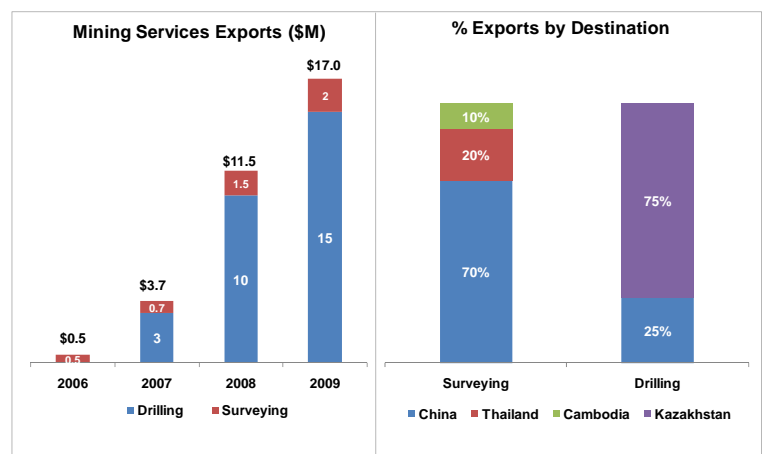
Source: Revenue figures from “Market Data 2009” (MICC); Cluster Interviews

The core cluster doubled in revenue from 2006 to 2009, from \$72 Million to \$154 Million, corresponding to a CAGR of 29%. The majority of this revenue came from drilling and surveying, which together account for approximately 49% of the core clusters revenues. Recently, however, contract mining has surged, driving

most of the cluster growth for 2009.

Qualitatively, the core cluster shows the typical signs of growth. First, surveying and drilling have started to export mining services, mostly to proximate countries such as China and Kazakhstan with warmer climates, demonstrating their competitiveness outside of Mongolia (see **Figure 13** below). With a high fixed cost base, drilling companies benefit most from scale economies, which partly explains why they have been accelerating exports. Over the last 4 years, drilling exports as a percentage of drilling revenues grew from 1% to 33%. Second, the presence of foreign mining services companies is encouraging healthy competition in the core cluster, and driving up the quality of Mongolian mining services companies. Lastly, the level of entrepreneurship, while low historically, is increasing, leading to successful spinoffs such as AIDD. Spinoffs are evidence of a cluster increasing in sophistication.

Figure 13: Core Cluster Export Volumes and Destinations



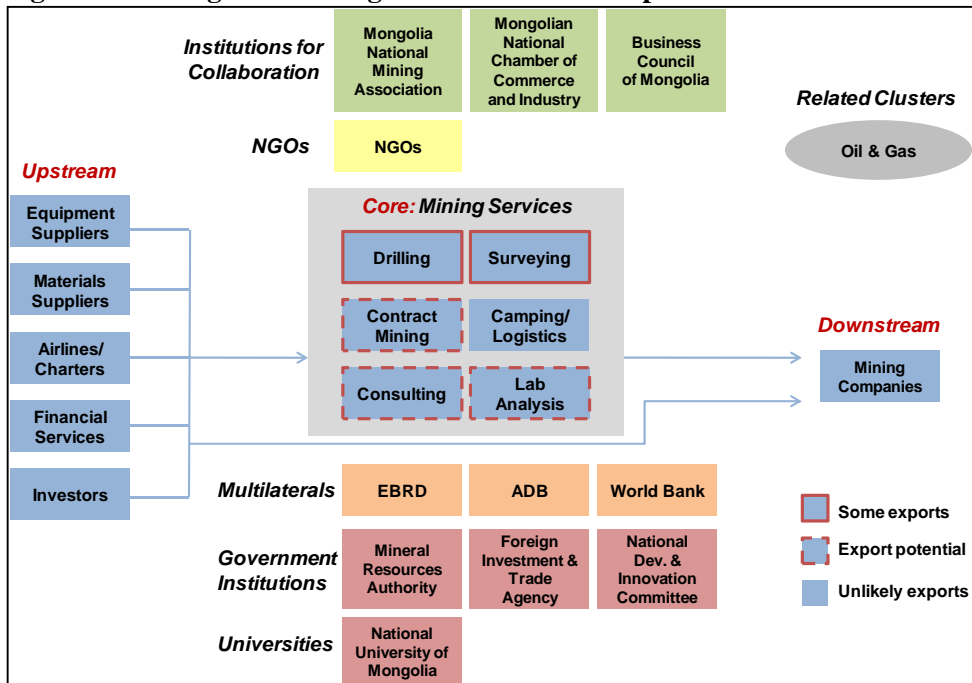
Source: Team Analysis; export figures are estimates provided by MICC

2.3 Cluster Location and Map

While mining service companies operate throughout Mongolia, the vast majority are based in Ulaanbaatar. Therefore, both mining and mining services companies warrant inclusion in the same cluster.

Figure 14 lays out the cluster map, with mining services companies at its core:

Figure 14: Mongolian Mining Services Cluster Map



Source: Team Analysis

Through our research and interviews with cluster participants, we sought to identify the extent to which different parts of the core cluster are internationally competitive. While drilling and surveying were the top contenders, as demonstrated by their exports in the last few years, contract mining, consulting, and lab analysis also have export potential. Of the 10 drilling companies, the world class companies are AIDD and Major Drilling. Of the eight drilling companies, the world class companies are: Geosan and Khed.

2.4 Role of Supporting Institutions

The Mongolian Mining Services Cluster is supported by four types of institutions: 1) Government institutions/universities; 2) Multilaterals; 3) Institutions for collaboration (IFCs); and 4) Non-governmental organizations (NGOs). The key activities of each of the main institutions are shown in Figure 15 below.

Figure 15: Key Supporting Institutions

Key Institutions: Mining Services Cluster			
Government Institutions/Universities	Multilaterals	Institutions for Collaboration (IFCs)	Non-Governmental Organizations (NGOs)
<p>Mineral Resources Authority</p> <ul style="list-style-type: none"> Created 1997 Conduct surveys, research Register and issue mining licenses 	<p>EBRD</p> <ul style="list-style-type: none"> Most active multilateral Dedicated Mining Team 3/2010: Funded Leighton LLC to develop contract services sector 	<p>Mongolian National Mining Association</p> <ul style="list-style-type: none"> Created 1994 Main institution representing mining industry Members include domestic and foreign companies Co-organizer of "Discover Mongolia" Forum 	<p>World Growth</p> <ul style="list-style-type: none"> Entered 2008 Focused on job creation and poverty alleviation Whitepapers on mining Aimag Partnership Project for SMEs
<p>Foreign Investment & Trade Agency</p> <ul style="list-style-type: none"> Promotion and facilitation of FDI Upgrade quality of FDI and business environment, esp. for SMEs 	<p>ADB</p> <ul style="list-style-type: none"> Second most active multilateral Invested over \$675M in 35 projects since 1991 	<p>Mongolian National Chamber of Commerce & Industry</p> <ul style="list-style-type: none"> Created 1960 Main institution representing the business community 	<p>Asia Foundation</p> <ul style="list-style-type: none"> Focused on mining and resource use, corruption, education Mongolia Corruption Survey Books for Asia program
<p>National Development & Innovation Committee</p> <ul style="list-style-type: none"> Created 2009 Coordinate development and implementation of nat'l development strategy Developed recently passed PPP Law 	<p>World Bank</p> <ul style="list-style-type: none"> Engaging key stakeholders to address competitiveness issues Invited Prof. Porter to Mongolia; funded scoping mission etc. 	<p>Business Council of Mongolia</p> <ul style="list-style-type: none"> Created 2007 Mission is to increase trade and investment Main institution representing all investors on business climate issues Members include domestic and foreign investors 	<p>Open Society Forum</p>
<p>National University of Mongolia</p> <ul style="list-style-type: none"> Oldest University Graduated 1/3 of Mongolians with degrees 12 schools, 12,000 students, including 2,000 graduate students 			

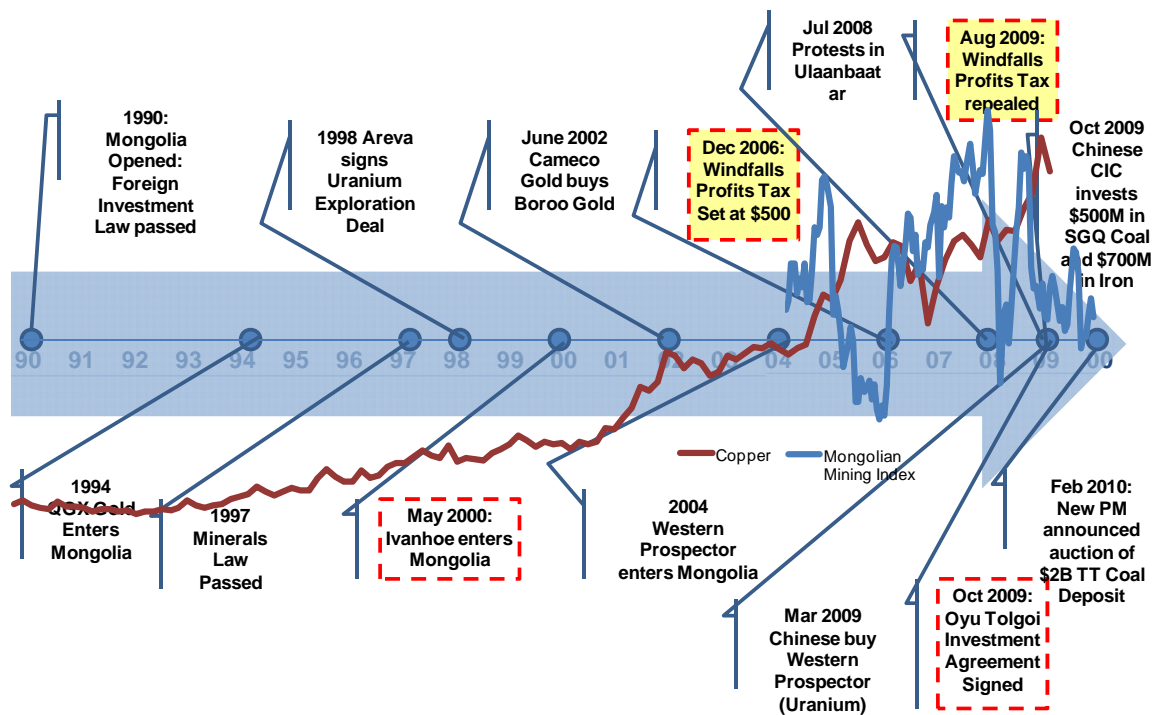
Source: Institution Web sites

While a variety of supporting institutions already exist, there are several problems. First, there is little collaboration among supporting institutions and a lack of clarity regarding the role of mining in Mongolia's national development strategy. Second, most institutions were formed to cater to the downstream activities, not the core cluster. There have been encouraging developments to rectify this historical coincidence, however. The Mongolian government created the National Development & Innovation Committee (NDIC) in 2009 to coordinate the development and implementation of a national development strategy. Impressively, the NDIC has already begun to show results. It developed the Public-Private-Partnership (PPP) Law to encourage private-sector-participation in key economic sectors. The EBRD also recognized the potential of the core cluster, investing in a contract mining company (Leighton) in 2009. The World Bank has been engaging key government stakeholders to address broader competitiveness issues as well, including a proposal to create a National Competitiveness Council, with work councils for each cluster. While all these are steps in the right direction, much still needs to be done to support the needs of the core cluster.

2.5 Cluster Development

Two factors have been central to the development of the Mongolian Mining Services Cluster: 1) mineral prices; and 2) government legislation. **Figure 16** below plots the market capitalization of companies in the Mongolian Mining Services Cluster against these variables:

Figure 16: Mongolian Mining Cluster Development Timeline



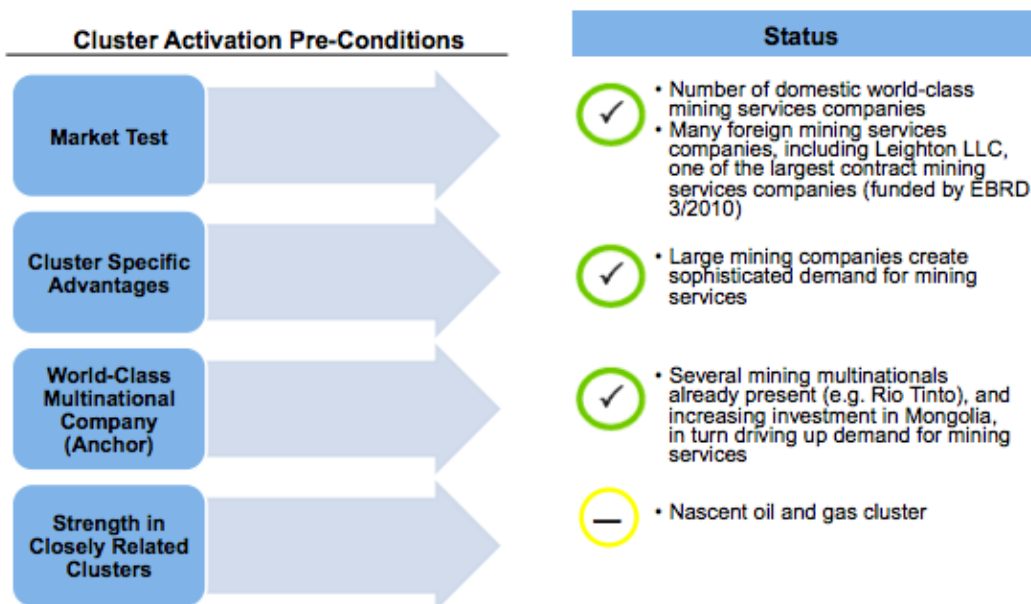
Source: Team analysis of data from Bloomberg, MICC, and MongolianViews.com accessed March 2010

Given the long-term horizon of mining investments, stability of government legislation is the most important factor affecting investor confidence. Mongolia has not done well in this regard, imposing (in December 2006) and then repealing (in August 2009) the highly controversial Windfall Profits Tax. The back and forth undermined investor confidence to the point that mining investments in Mongolia came to a standstill in the intervening period. In signing the investment agreement of Oyu Tolgoi in October of 2009, the largest mining investment in Mongolia's history, the investors made cancellation of the Windfall Profits Tax a key condition.

2.6 Status of Cluster Activation Preconditions

Figure 17 shows the four preconditions identified by Professor Porter's research as important for success in cluster development. His research suggests meeting at least two of these preconditions is a basic requirement for success.

Figure 17: Cluster Activation Preconditions



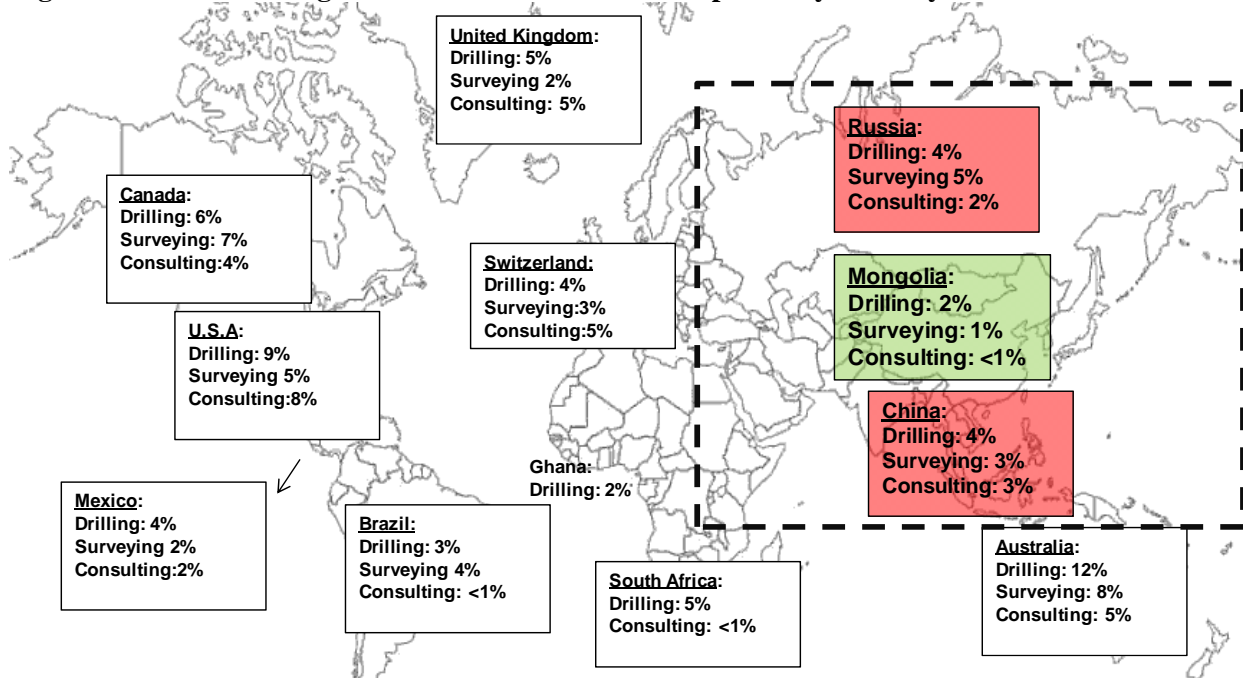
Source: Michael Porter, *Institute for Strategy and Competitiveness, Harvard Business School*

In the case of the core cluster, at least three of these preconditions have already been met. Therefore, we are confident that a successful mining services cluster is not only feasible, but also ready for the next stage in its growth.

3. Global Mining Services Industry

Globally, the mining services industry generated \$58 Billion in revenue for 2009⁵⁵ ⁵⁶. The most prominent companies are located in Australia, Canada and United States, all of which enjoy abundant mineral wealth. Canada is among the top five producers of sixteen different minerals ranging from potash to gold.⁵⁷ In comparison, Mongolian mining service companies are small but rapidly growing. Mongolia contains the biggest copper reserves in Asia, 3% of world’s fluorspar reserves and approximately 1% of the world’s gold reserves⁵⁸. As shown in **Figure 18** below, there is immense growth potential for Mongolian firms if they cooperate with the mining services companies operating in Russia and China.

Figure 18: Global Mining Services: Distribution of Companies by Country



Source: Thomson ONE Banker, March 2010

4. Competing Cluster Analyses

In order to better understand major industry success drivers, we analyzed mining services clusters in Australia and Canada, which are among the most developed. This proved insightful in helping us develop recommendations for the Mongolian mining services cluster.

4.1 Australia Mining Services Cluster

In 2009, mining service companies in Australia earned total revenues of approximately \$7.5 Billion⁵⁹. Similar to the mining industry, the mining services cluster in Australia is tied to the cyclicity of mineral prices⁶⁰. The diamond for the Australian Mining Services Cluster is especially strong in the areas of demand conditions, context for strategy and rivalry, and related and supporting industries.

Demand Conditions: Due to abundant mineral wealth, the demand for mining services in Australia is sophisticated and strong. There are 3,800 mining companies in Australia, which employ 93,000 people. Australia is among the top three exporters of gold together with the U.S. and South Africa, the second biggest exporter of lead and uranium, and the world's biggest exporter of coal⁶¹. Consequently, the biggest demand for the mining services companies in Australia comes from gold mining (36%), coal mining (23%), and iron ore mining (9%).

Context for Strategy and Rivalry: The Australian mining services cluster employs approximately 16,200 people and 115 establishments and 95 enterprises are in operation. The biggest companies are Leighton, Orica, Downer EDI Limited, Macmahon Holdings Limited, Transfield and WorleyParsons. A high level of competition within the market has led most of these firms to search for export opportunities. Investment funds in Australia are “bullish” on mining services firms and in a recent poll of six small-cap funds managers, 9 mining services firms were short-listed as best-buys among 18 competing stocks.⁶²

Related and Supporting Industries: Australian mining services firms are organized under the umbrella of “Mining and Energy Services Council of Australia (MESCA)”, an industry body that aims to enhance networking opportunities between mining companies and their suppliers. The organization has 330 members. It provides members with updated information on the latest industry developments globally and regular briefings regarding on-going mining projects. Several leading mining services companies, such as Leighton and Downer EDI, are members of the organization.

4.2 Canada Mining Services Cluster

The Canadian mining services diamond is very strong across all four elements.

Factor Conditions: The mining services cluster requires substantial investment and financing, especially for drilling and surveying operations. Toronto is the most important city in the world in terms of mining finance. In 2005, 41% of total global equity for mining was raised at the Toronto Stock Exchange. The mining services cluster together with the mining industry has also stimulated recent investments in the Canadian ports and railway.

Demand Conditions: One of the strongest parts of the Canadian mining services diamond is favorable demand conditions. Canada ranks first in the global production of potash and uranium, second in nickel and magnesium and third in aluminum. The mining industry of Canada employs 388,000 people and the industry accounts for about 15% of the country’s total exports. The demand for mining services is also sophisticated since mining companies in Canada invest more than \$500 Million each year for R&D activities.

Context for Strategy and Rivalry: There are about 240 companies operating in the mining services cluster of Canada. The major companies in Canada are Major Drilling, Landrill International and Bradley Bros. Due to the cyclicity of their business, several Canadian mining service companies chose international expansion and more than 40% of their revenues come from oversea activities.

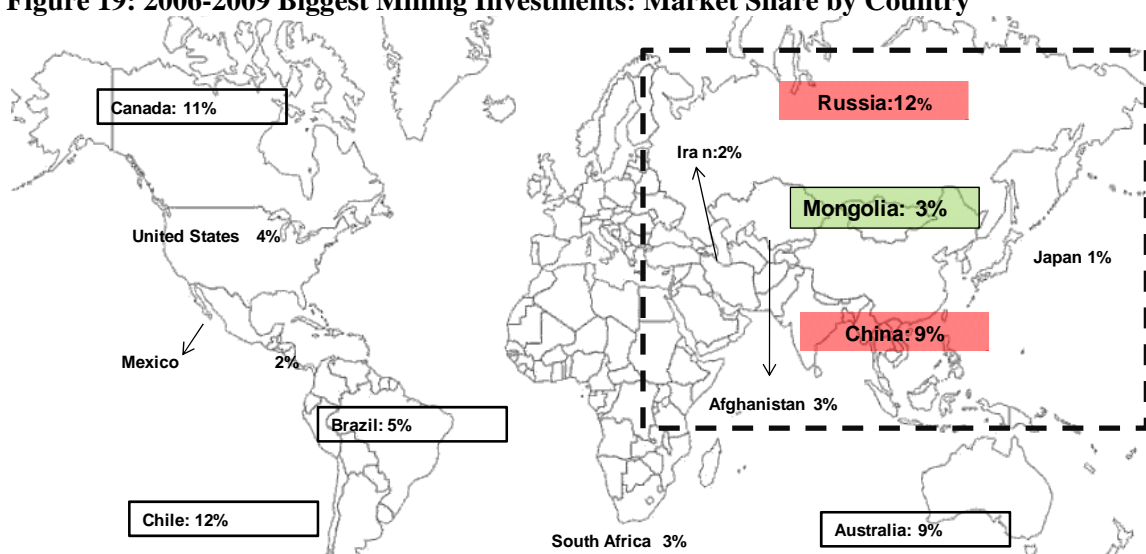
Related and Supporting Industries: CAMESE is a trade association aimed at supporting Canadian firms to export to the worldwide mining industry and to assist foreign buyers in finding mining supplier sources in Canada. It provides a forum for mining services companies to collaborate with each other and network with

mining companies locally and internationally. The organization has more than 250 members and derives 90% of its revenue from membership fees and the remaining 10% from a Canadian Government Agency, International Trade Canada. Besides providing information on global mining projects and networking opportunities, CAMESE has organized Canadian participation at more than 100 international mining events since 1995.

5. Regional Opportunities for Mongolian Mining Services Firms

Mining services firms in Australia and Canada overcome cyclicalities and significantly increase revenues by exporting their services globally. Mongolia is located in a region full of opportunities, allowing the mining services cluster to build on exports. Between 2006 and 2009, global mining investment averaged about \$160 Billion per year⁶³. As **Figure 19** shows, 36% of this investment took place in the neighborhood of Mongolia, including the countries of Russia, China, Afghanistan and Iran. The share of mining investments in the neighborhood of Mongolia has increased recently and created tremendous opportunities for Mongolian mining service companies to export their services.

Figure 19: 2006-2009 Biggest Mining Investments: Market Share by Country



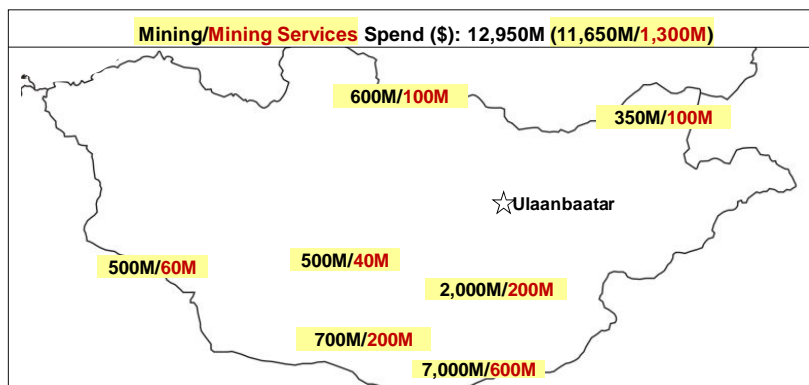
Source: Euromonitor & Emerging Markets Database

6. Demand for Mining Services in Mongolia

The strongest element of the Mongolian mining services cluster is favorable demand conditions. In quantitative terms, as **Figure 20** illustrates below, \$13 Billion worth of mining investments are planned for Mongolia. This in turn will create \$1.3 Billion worth of demand for Mongolian mining services companies. When we analyze the demand qualitatively, we find it is both sophisticated and diverse. First, the demand is sophisticated since multinational mining companies operating in Mongolia have high environmental and safety standards. In addition, some mineral resources such as copper require specialized expertise. Second, the

geology and the existence of 10+ minerals with different attributes have contributed to the development of a diverse set of mining services.

Figure 20: Mining and Mining Service Spend



Source: MICC Industry Estimates

Case Study: Australasian Independent Diamond Drillers (AIDD)

In 2004, drilling engineer James Polson and driller Robert Edwards, left Major Drilling Mongolia to launch AIDD. Since then, they have successfully captured the second largest market share behind Major Drilling in Mongolia, at times even surpassing them.

They currently have 17 clients for drilling in hard rock (copper/gold), soft-rock (coal), and Uranium. All of their clients are foreign firms, mostly Canadian and Australian junior mining companies, as well as all of the multinationals present in Mongolia. When copper/gold drilling went out of favor due to the windfalls profits tax, AIDD built up capability in Uranium drilling, enabling it to further build market share.

As of 2010, AIDD employs 150 people, only three of which are expatriates. Every previous expatriate contract included a provision mandating a skills transfer to Mongolian colleagues. They have set up operations in China (through acquisition of a small local driller) and Kazakhstan for multinational clients that they initially formed relationships with in Mongolia. In 2008 AIDD received an equity investment from the European Bank for Reconstruction and Development to accelerate their growth and acquire new drill rigs.

Case Study: Geosan LLC

Geosan was founded in 1994 by entrepreneurial Mongolian geophysicist Ikhbayar Gombosuren, who today remains the sole owner. They are the market leader in ground geophysics and are the only ones to offer airborne geophysics. They offer an impressive array of geophysical surveying services using the latest technology instruments, primarily manufactured in Canada.

As of 2010, Geosan employs over 70 employees, geologists, and geophysicists, of which only one pilot and one consultant are expatriates. They have completed over 50 assignments for multinationals and juniors in Mongolia and a few government agencies. Their strategy has been to heavily invest in training and cutting edge technology, staying one step ahead of their clients needs. While they have competitors in some of their specific services, particularly the lower value ones, no one in Mongolia comes close to matching their breadth of one-stop-shop services.

Geosan has done several one-off assignments in Asia, including Thailand, Laos, Cambodia, and China for their multinational clients active in Mongolia. These assignments are usually done in the Mongolian winter months when business drops off precipitously. A high margin business, Geosan has been able to grow organically with the help of local working capital loans. When it expanded into airborne geophysics, it received vendor financing for its first aircraft and subsequent debt financing from EBRD for its second aircraft.

7. Social and Environmental Impact of Mining

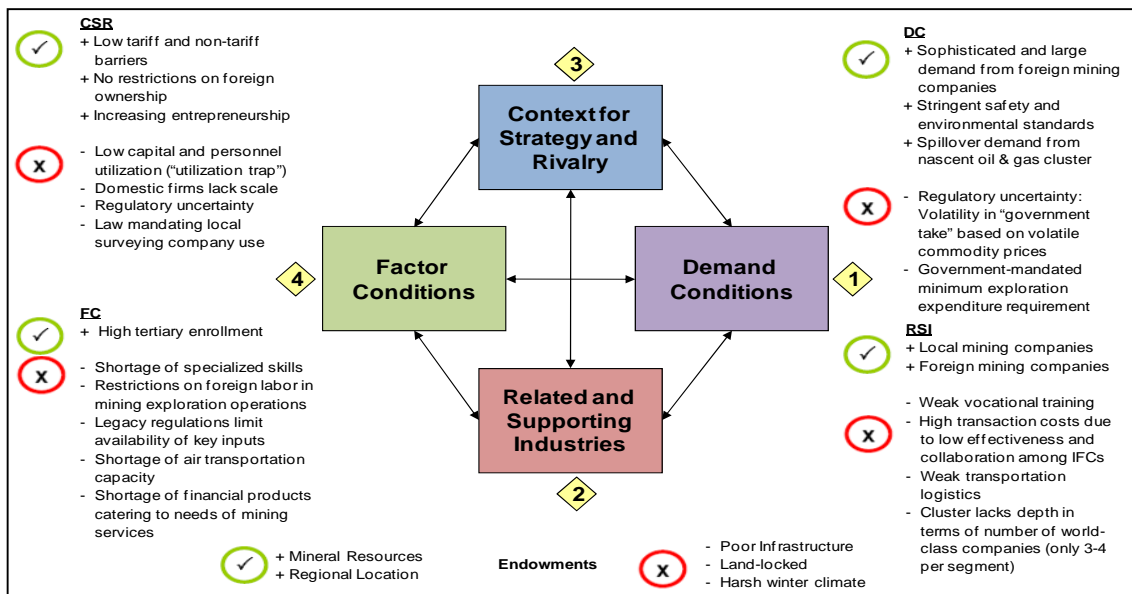
Prior to the 1990 reforms, large mining projects were planned and executed by Russian central planners who viewed them as an opportunity to industrialize a new region. Hence, the cities of Erdenet (for copper) and Darkhan (for steel) were built, along with several smaller ones for coal in other regions. While this ‘company town’ model is still used by mining companies for some large projects, it is associated with significant upfront capital expenditures and many social risks. The landmark copper-gold project in the South Gobi of Ivanhoe Mines will pursue a hybrid model of ‘integrated community’ and ‘fly-in-fly-out’ (FIFO). Hence, the company will invest in developing the local town with employment and necessary social services, and supplement employment with workers flown in from Ulaanbaatar (for instance 9 days on, 5 days off schedule.).⁶⁴ The Oyu Tolgoi project will employ an operations workforce of 1,112 workers, with expatriates making up 10% the first year, but only 2% by year 12. During the construction phase the contractors will have a larger force.⁶⁵

Mongolian mining towns will face the typical social challenges arising from gender imbalanced communities and ones dominated by one well-paying company. The main environmental risk arises from the increased dustiness of roads that impacts pastoral land. The internal mining companies in Mongolia are actively engaged in attempted to manage all social and environmental risks.

8. Mining Services Cluster Diamond

The weaknesses in some parts of the cluster diamond are mitigated by strengths in other parts. Below we discuss the main elements of the diamond followed by a closer look at the key issues.

Figure 21: Mining Services Cluster Diamond



Source: Team Analysis

The analysis below is based on **Figure 21** above.

Endowments: The cluster derives its strength from mineral wealth and Mongolia’s location between China and Russia. However, there are a few impediments: in addition to being land-locked, Mongolia has a harsh-winter climate, which has a detrimental impact on the competitiveness of Mongolian mining services companies.

Demand Conditions: Foreign mining companies engaging in downstream activities (and, more recently, the oil and gas companies) generate large, diverse, and sophisticated demand for mining services. However, legislative uncertainty and government intervention continue to dampen investor confidence. The strength of demand conditions drives the Mongolian Mining Services Cluster story.

Related and Supporting Industries: Spin-offs from foreign mining and mining services companies continue to move into the cluster. However, the core cluster lacks depth, with only 3 to 4 world class players, and that only in drilling and surveying.

Context for Firm Strategy and Rivalry: The absence of restrictions on foreign ownership encourages firm rivalry. However, low capital and personnel utilization as a result of the harsh Mongolian winter inhibits the emergence of strong local players.

Factor Conditions: While tertiary enrollment is high, the education system is not industry-aligned, and the resulting shortage of specialized skills limits growth of the core cluster. The weakness of factor conditions will need to be addressed to capitalize on the opportunity created by demand conditions.

9. Issues Impeding Cluster Growth

Based on the diamond analysis and industry interviews, we believe the following three issues are hindering the development of the mining services cluster: 1) Low capital and personnel utilization due to seasonality; 2) Shortage of specialized skills; and 3) Lack of government intervention and support. We present them here in order of significance.

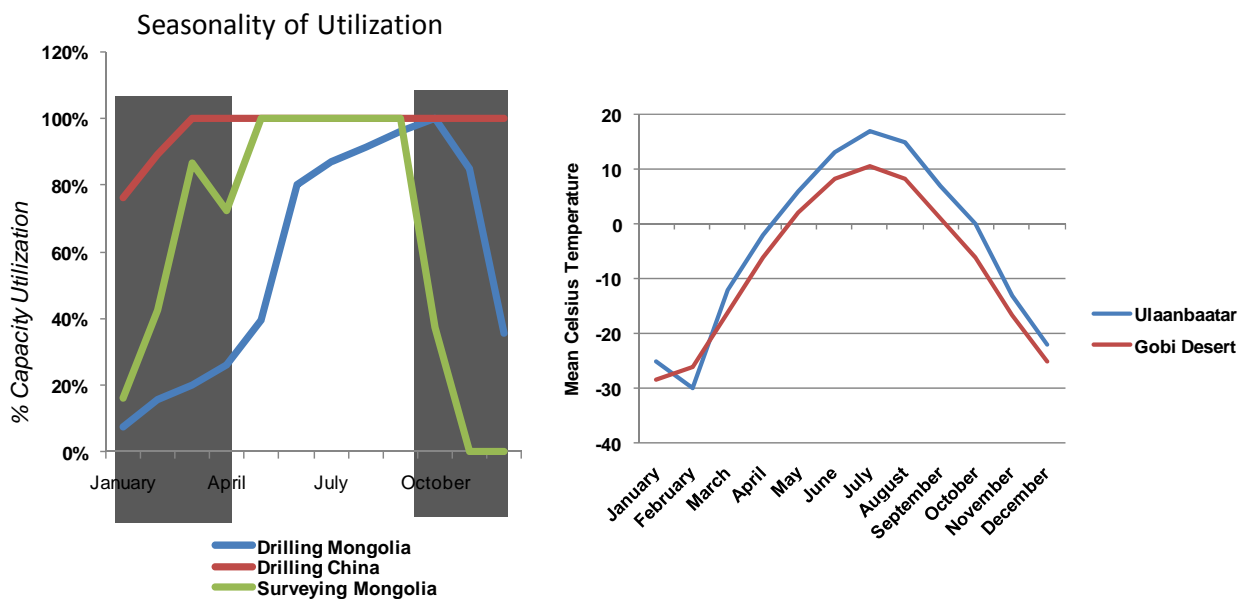
9.1 Local Capital and Personnel Utilization Due to Seasonality

The harsh Mongolian winter climate, when temperatures drop to extremes of -45C, halts mineral exploration related activities for up to five months a year.⁶⁶ The impact of climate on the ability to perform different services varies, but within exploration related services, disruptions in one usually cause disruptions in others.

Drilling	<ul style="list-style-type: none">• Most severely impacted due to subsoil freezing that makes drilling difficult. There are also problems with liquids freezing.• High capital intensity makes seasonality particularly difficult.
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Surveying	<ul style="list-style-type: none"> Varies by surveying technology - some technologies are ineffective when the ground is snow-covered and any technology involving bore-holes also encounters difficulties. Since personnel mobility is generally lower in the winter, many clients do not come during the winter months and business generally slows down.
Contract Mining	<ul style="list-style-type: none"> Uninterrupted for most mineral as large mining operations can run 24 hours a day and 365 days a year. Some issues result from moisture that hardens coal when frozen, but these can be addressed (with steam for example).
Camping & Logistics	<ul style="list-style-type: none"> Can be provided all year round. However, closely tied to the personnel and goods movement associated with the other services.
Consulting	<ul style="list-style-type: none"> Can be provided all year round. Some consulting services are tied to immediate fieldwork and are hence impacted, while others like mine planning can be done off season.
Labs	<ul style="list-style-type: none"> Can be provided all year round.

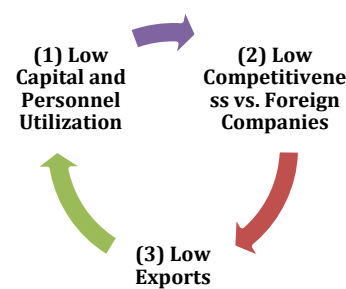
Figure 22: Seasonality of Utilization



Source: MICC Industry Data and Weather.com

The seasonality issues described in **Figure 22** above lead to poor asset and personnel utilization, particularly in asset intensive activities such as drilling and surveying, where 45% of capacity is not utilized for five months out of the year. Foreign firms entering Mongolia on a contract basis do not face this issue since they can offset the seasonality with projects in warmer climates. This dynamic makes it difficult for Mongolian firms to compete and export their services to

Figure 23: Utilization Trap



offset seasonality. The inability to export in turn makes it difficult for them to improve utilization, resulting in what we call *the utilization trap* (Figure 23).

9.2 Shortage of Specialized Skills

Due to the skills mismatch, mining services firms have difficulty finding local talent. The shortage is more severe for industry-specific skills and in particular, segment specific skills.

Figure 24 to the right specifies the types of skills required by the industry.

Based on our research, specialized skills have proven to be the key success factor across all mining services segments:

- Drilling: highly experienced rig operators
- Surveying: highly trained geophysicists
- Contract Mining: skilled operators, mine managers, environmental & safety experts
- Camping & Logistics: skilled trade workers (i.e. cooks), experienced management
- Consulting – highly trained geologists
- Labs – trained chemists and geologists

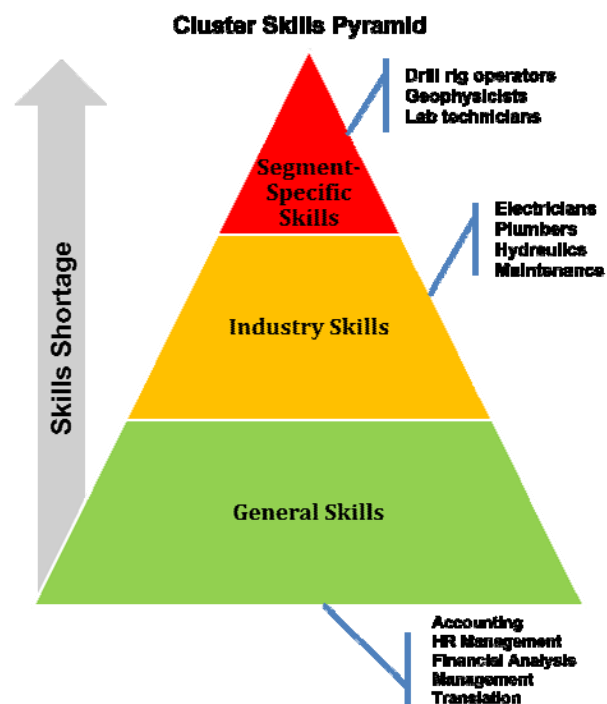
We find that the skills shortage has three root causes:

1. Government flip-flops on mining policy, creating regulatory uncertainty that undermines investor confidence in the mining sector. This in turn impacts the demand for mining services as firms are not prepared to make significant skill investments without the certainty of future revenues.
2. Firms do not have the cash flow to make long-term investments in human capital and the cost of capital is prohibitively high (20%+ commercial loan rates). As the market is still relatively nascent and fragmented, most firms are small (Revenues < \$1Million).
3. Due to the general scarcity of labor, firms are concerned that if they make an investment in their employees, competitors will poach them as they would be the only qualified talent in the market.

9.3 Government Intervention and Lack of Support

The Mongolian government has made little headway in contributing to the development of the mining services clusters. It has focused on short terms revenue gains from mining projects at the expense of developing a long-term vision for the mining services cluster. There is potential for long-term sustainable impact from the cluster that is correlated with mining but it requires special attention and different support mechanisms. In addition, as mentioned above, government inconsistency in mining policy undermines investor confidence –

Figure 24: Cluster Skills Pyramid



Source: Interview with Randy Myer, Wagner

while the overall policies are currently favorable, it is the uncertainty associated with them that makes investors uneasy. This constraint on demand is one of the most significant hindrances to development and impacts the quality of all investment opportunities.

Due to the government's lack of support and attention, there are many bureaucratic obstacles standing in the way of the mining services cluster. Due to legacy regulations, mineral labs need to meet special licensing requirements for certain industrial and specialty chemicals. These licenses are prohibitively expensive and sometimes impossible to obtain for a minerals lab. Similarly, the top surveying firm requires radioactive isotopes to calibrate its instrumentation for certain airborne surveys. The transportation and import of these isotopes, which are of negligible quantity and completely harmless, are heavily restricted as Mongolia designates itself to be nuclear free zone. Having to calibrate outside the country adds significant cost and immobility.

There is also a lack of coordination between the local, regional, and national government bodies with regard to property, mining and environmental legislation. While in theory the Mongolian Mining Law is to take precedence over local law, in practice, the approval process is much more complicated. Local communities often object to exploration being conducted on wild pastureland, despite licensing for such exploration being granted at the federal level.

10. Micro Recommendations

We have recommendations for each of the issues described above. The need to take these actions has been confirmed by key industry players during the course of our interviews. The recommendations are presented in order of significance.

10.1 Shortage of Specialized Skills

Regulatory uncertainty: The government should continue signing Investment Agreements with foreign and domestic mining companies in order to build investor confidence. It should also maintain compliance with these and previous agreements and avoid quick changes in its mining laws.

Firm size: The largest mining services player (Wagner Asia Caterpillar) should take the initiative to start an IFC dedicated to training for the whole cluster. The training should focus on industry and segment specific skills.

Free rider problem: The programs at the above IFC should be jointly sponsored by employees and employers in order to promote risk sharing between the two.

10.2 Low Capital and Personnel Utilization Due to Seasonality

The government should provide tax incentives to reward foreign companies active in Mongolia for using Mongolian firms for projects abroad. Most contracts awarded to Mongolian mining services firms abroad have been awarded by their multinational clients in the domestic market. Such contracts create the impetus for setting up operations abroad and establishing a foothold and we recommend providing minor incentives to encourage more of them. Companies should also focus on proximate markets with warmer climates in order to build a reputation in the region and keep mobilization costs low. In order for contracts from existing clients to translate into further business leads in countries abroad, we recommend firms focus on a few high potential countries in the immediate vicinity that are currently underserved. The IFC mentioned above that will take on training shall also be active in export promotion by attending and hosting regional mining services conferences.

10.3 Government intervention and lack of support

Short-term focus on mining investments: We recommend the government and main actors in the mining service industry establish a Cluster Initiative for Mining Services to develop a long-term strategy. The initiative should also provide a forum for collaboration and increase coordination among the key institutions. This can be an extension of the existing working group of the Business Council of Mongolia.

Legacy regulations and structures: The customs agency should create a special code to reclassify substances that the mining services industry deems important for importing and exporting but which do not pose any risks. The Mineral Resources Authority should also establish a Single Window to coordinate local and national policy-making and expedite approval of exploration and mining licenses. We also recommend amending the Minerals Law of 2006 to exempt mining services firms from the foreign labor restrictions. This law was enacted to prevent mines from employing low-wage Chinese workers instead of Mongolians, but for mining services firms, foreign talent is critical for the purposes of training local talent. In order to promote competition in the segment, the legislature should also repeal the requirement to use domestic firms for environmental surveying.

Low number of domestic firms: Access to credit is poor. Mining firms active in Mongolia (foreign and domestic) should grow their vendor base by supporting new businesses with capital expenditures. As part of a contract, they can provide a letter of credit or assist with a vendor lease in order to help new firms get established. We advise the government to encourage this with a minor tax incentive.

11. Cluster Value Proposition

The Mongolian Mining Services Cluster has some unique characteristics. First, Mongolia has strong cultural, linguistic and political ties to China and Russia. It also is one of few states that have diplomatic ties to less accessible states such as North Korea and Burma. Second, there is a demographic window of opportunity, which coupled with strong educational institutions, can provide a solid workforce. Third, Mongolia is politically stable with relatively advanced democratic and market reforms. Lastly due to the size complexity, and wide range of mineral deposits present, the demand for mining services is sophisticated and diverse.

These characteristics lend themselves to a value proposition with the following elements:

1. To be the supplier of choice for central Asia and politically inaccessible states in Asia.
2. To have world-class geophysicists, geologists, and mineral economists, combined with cutting edge technology and the highest safety, and environmental standards.
3. To be a one-stop-shop for a wide range of services relating to the diversity of mineral types.

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